BETTER CROPS W

The Pocket Book

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April-May, 1933 to February-March, 1935

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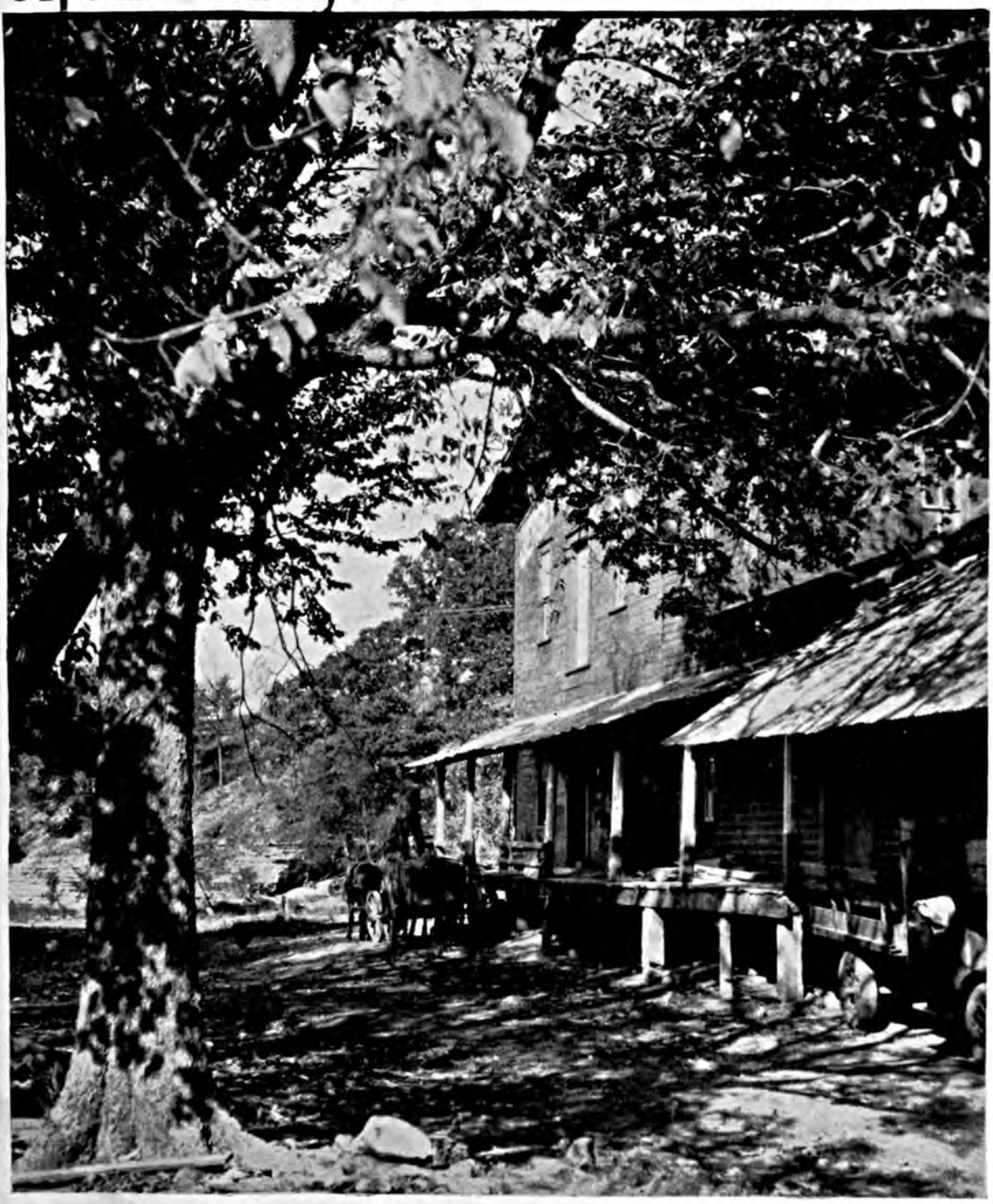

The Pocket Book of Agriculture

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

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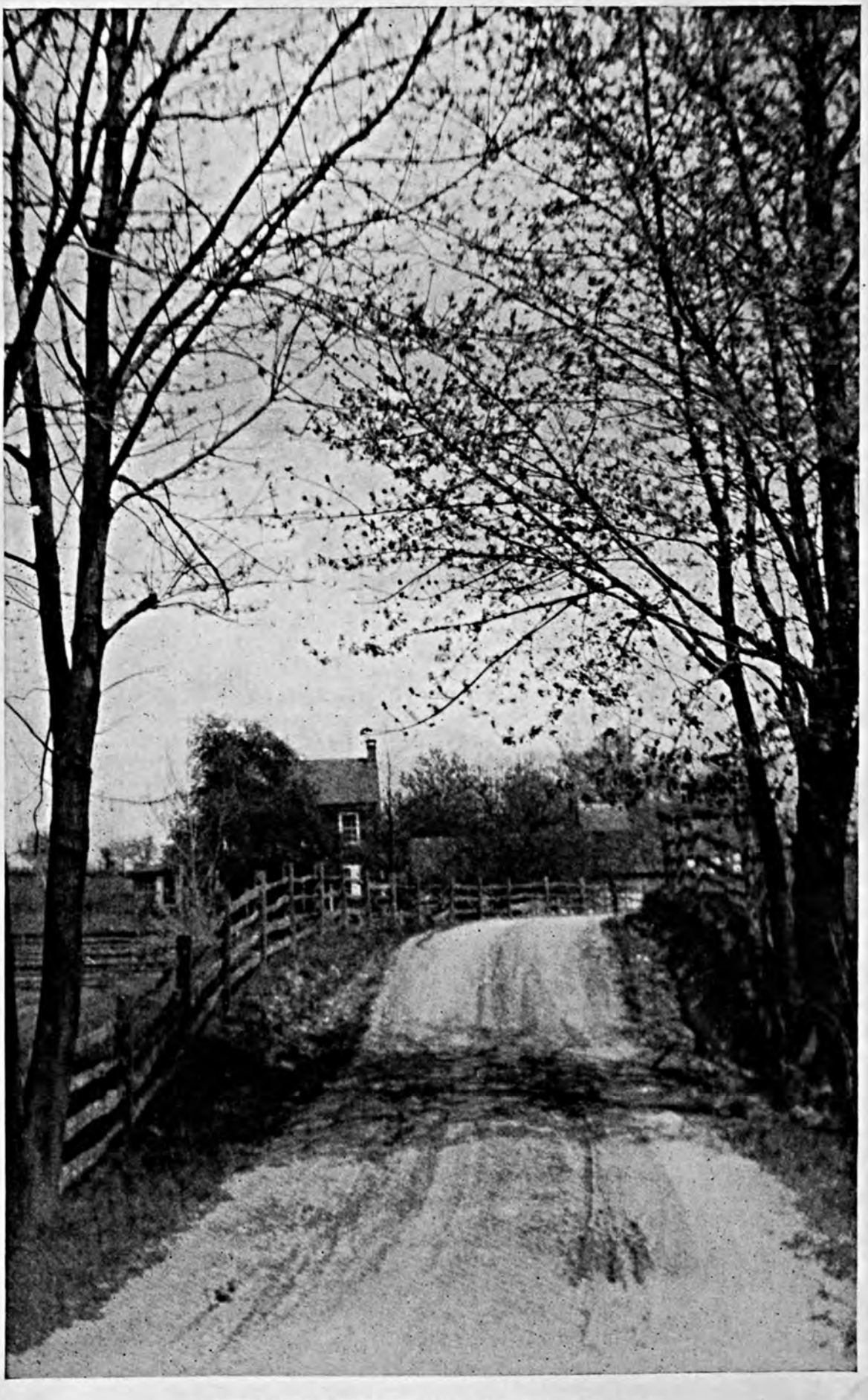

WHEN THE OPEN ROAD BEGINS TO CALL.

Better Crops with PLANT FOOD

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VOL. XIX NEW YORK, APRIL-MAY, 1933 No. 1

Spring, with Nature awakening, brings—

Faith Anew

By Jeff McDermid

LET us stand by the pasture gate when the meadows are lush and the fescue is heading and the white clover and the bumblebee are keeping company with dewdrops and sunbeams in the land of Milk and Honey. It is good to get away from the confusion of the bleating radio and the contradictions of the newspapers, and come close to the grass roots again to ponder like Whitman and Sandburg or watch the cloud shadows and the nodding blossoms of the lilacs and the locust trees.

Most of us soil-born and farm-reared folks can never come to accept completely the theory that superabundance is sinful and that diminished food must be the ultimate good. We try hard to square our mental perceptions with our soul's intuitions, trying to force ourselves and our friends to accept the fatal logic that he who has health and land and seed should relinquish his pleasant sovereignty so as to produce sparingly in order that others who have nothing may get more of nothing.

Mortgages and chattel papers shall for once be forgotten, for those cows in the fescue and the clover blossoms come up at eventide with brimming milk-wells, no matter who happens to be the judge or the jury, the creditor or the debtor. It's gadflies that disturb dairy cows in June time, not dusty documents in some old county court-house.

WE have bred them for generations to give us butterfat and custards, Devonshire clotted cream, foamy globules of whipping cream for our strawberries, yellow cheeses for noontime lunches, thick golden gravy for 'taters and onions, and gallons of liquid protein to make pork and juicy broilers. We have sold most of their male issue to the greedy veal markets of the city, and because they were quartered in green pastures and stabled in abundant countrysides, these calfless creatures adopted us. They gave us the substance of their pulsating bodies, made out of the stuff we raised with sweaty hopefulness; and so the dams welcomed the daughter calves we saved for them and added to the creamline of the herd with the ageless power of their chromosomes.

We have gone to auction sales and picked the best of the bullocks and the heifers, aiming for creamy hide and ear-lining, the pigments of plenty, as well as for the straight top-line, deep escutcheon, good broad muzzle, mild eyes, wide barrel, firm legs, and excellent heart girth. These and their progeny we have nurtured and catalogued, balanced in bone and flesh and milk flow on the largess of the best farms in the finest pastoral places that God ever gave to the husbandman.

Our professors have been paid hard-earned tax money to teach us all they know already about cows and then to find out what more there is to know. Most of these overall scientists have been skillful with test-tubes and manure forks and they have taught us to do better than Jacob and Esau or any other subsequent graziers, with the selfsame natural resources intended for human appetites.

And of all this we are proud and satisfied, because on this droning bee-clover, bell-tinkling, bird-singing spot we cannot accept the doctrine that what is good is wrong and that what is pregnant is barren.

We know, of course, that the cow is here and the hungry baby is there and that some obstacle separates the foster mother of mankind from those in want. But we have abiding faith in the spirit and resolve of our magnificent people and we are certain that patience a little longer will get a reward much quicker and kindlier than to follow malcontents and charlatans wielding the bloody club.

We consider that the goodness of the land in our State and the fruits nature has bestowed upon the land only set the scenic stage for the actors who determine the drama's worthiness.

Watching the cows browsing along the river brim or chewing their cuds and swishing at gnats beneath the oak trees where the sod is trampled into sand, we have a feeling that men who once owned this land and broke its pioneer sod somewhere are wondering to what stewardship they left it.

IT might be as well now to refer to them as crusaders, those farmers from afar who arrived in my State about a century ago, although they surely didn't look like Bohemund or Baldwin or wear any plumes, chain mail, or trappings of the joust. At least my granddad didn't in the tintype.

No doubt they were just as solicitous about "my ladye faire" as mud, rain, desolation, and wilderness permitted; even though her palfrey was an ox-cart and her bower happened to be a windy, clay-daubed cabin.

I suspect most of them were fed up on castles, dungeons, and red-nosed tyrants anyhow, and preferred to be squires in a raw hemisphere among four-legged wolves than to bow before

titles or pay tithes among two-legged ones.

They were sick of fading feudalism with its fosse and forke, infang theof and outfang theof, sackage and sockage, cuisage and jambage, and all the rights of free warren, pillage, rape, and kindred foot-kissing and cringing. So we look back upon this exodus of yeomen and behold them advancing upon this favored nook of America.

Among the first to come were the Germans, yes and some Austrians, pretty disgusted with old Metternich

and the failure of the Parliament of Frankfort. Finally they came to be known as the "forty-eighters" and one of them was Carl Schurz, another was Franz Siegel, men known as generals who led hosts of "Dutchmen" fresh from Heidelberg and the farms of my State into the hell-fire of the Civil War. Of course some of them founded breweries afterwards, but this is not in this epic.

And we had Vikings—men and women who drifted and washed their way over seas in the Restauratus, noble little Mayflower where they cooked lutfisk and told legends of Thor and Woden while sailing toward a land where their grandsons would become the best tobacco growers and teat-pullers known to diversified dairyland.

When I traced the honor roll of our Master Farmers this winter, it showed that three-quarters of them were upstanding lineal descendants of Germanic and Norse independents, and I argue that you can't get a stranglehold or an economic jiu-jutsu on men with that kind of fiber planted in their body cells.

Then we have Polish settlements where names are spelled with consonants and you get a premium if you can find a vowel. They also had a dark background and came over here to be citizens instead of serfs. In fact, we boast an international pageantry of farming and you can write a check in any language and have it translated.

The color of our fields and meadows after spring rains please the Irish and the handy hickory and buckthorn give them better fuel than the peat of their fathers, with decided advantages in the weight and grain for making shillalahs. And corn may be properly distilled.

WE visit our Welch neighbors, cow lovers and hard grubbers, whose recreation betimes is in Cambrian song that never can be issued over the radio because its syllables get stuck crosswise in the microphone. We depend upon them for our piety and they have never failed us. But they have guts as well as gospel and are not averse to using either a fist or a fast, whichever promises certain results.

Modesty forbids my including encomiums about my own canny race or their bloody relations, the English. Plenty of them came over when things got a bit thick and what they secured when they got here is here yet, even if some of it is being kept safe for them by proxy. It is terrific to think, however, what a sorry lot of kine and heatherbrowsers of the fold we would now have if my kinfolk had decided to stay in Aberdeen.

This makes up the All-American agricultural team that has thus far taken many touchdowns against the aggregation of despair which played against us since 1929. What has been lacking

is coaching or somebody to obey the coach when he did coach. But we are coming to that in 1933.

And don't you forget it, these mixed nationalities of my State went through some hard times together long before Hoover came along to be the goat for spleen. A few halting banks and limping security companies can't take the tuck out of men who worked in the lumber woods, cleared two-hundred-acre farms with raw knuckles, and made the greatest dairy commonwealth in the union in less than twenty-five years.

BUT as I talk with them and walk with them along the spring furrows in this potent season, I detect a new strain springing up in their make-up. It is not to their discredit either, and it runs like this perhaps:

That courage and stiff necks are inherited, but when forces keep popping at you from ambush and each day brings a new dread to turn on the radio or take down the receiver or go out to the mail box by the syringa bush, for a sort of unknown grapple with dilemma, then it begins to wear you down!

If Europe does this or doesn't do that; or if our governor can make enemies kiss each other through conferences; or folks swig enough at taverns to make barley pay—all those ifs and whereases interfere with the quiet and peaceful thoughts a fellow should have when plowing or laying by corn.

So they begin to wonder if farmers, however so pliant and sturdy, may not be like one man against the wind, with his courage. Would it not be wiser to go into a huddle or build a tank of some kind so as to pool that inherited courage and roll right into the teeth of the gale? This cooperative talk which farmers' institutes used to dally with, let's make it mean something besides a slogan to get memberships on the dotted line!

Oh, ho, that cooperative talk! How hard it was to make the ideals of the cooperative lecturers and the market leaders square right up with the fertile farm and the early bird at the plow handles. What sounded good for the mass never worked out for the man, anyhow not for the man with independence bred from tyranny.

They used to say that cooperation got recruits like the Devil got religion. Temporary spells of worse times filled the schoolhouses with Townleyites and eleventh-hour cooperators. The old mourning-bench creaked with its load of sin and sang with hymns of renunciation. Then the middleman and the profiteering milk dealer received such a tongue lashing that their ears burned, but nothing else.

Why even the government took a hand to lead the sinners to repentance. But it takes more than a preacher or a tall steeple or an usher to make a man get the power so he can snap up and crack his heels together in the name of cooperation, and keep on doing it when morning comes with the dawn.

Morning came with the dawn and each independent farmer hitched up his team and his galluses, spat on his competent palms, and careened full tilt along his own furrow, throwing the weeds over the fence on adjoining land, and digging ditches to let private ponds become public property. Let the ladies' auxiliary patch overalls and make quilt blocks to the cooperative music, but as for us, breed more cows and speed more plows! And the Devil was feeling stronger than Gabriel again, and so was the farmer.

AND so the farmer had himself to fight, as well as the weather, but he knew the weather better than he did himself. Hence the crop conquest was simpler than self-conquest. Nature evened up results on the weather basis. If it was dry the corn boomed, and if it was wet the pastures flourished. We usually got our thirty-six generous inches of real wet rainfall somehow during each calendar year. With

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Potash Tripled Cotton Yield

By W. M. Nash

Wheatley, St. Francis County, Arkansas.

DURING the past few years we have learned that we cannot profitably grow cotton on the gray silt loam soils which prevail here in St. Francis county, Arkansas, without the use of potash. Both wilt and rust are prevalent and by using 200 pounds of 20 per cent kainit per acre on my own cotton, I have been able to almost entirely control these troubles. On my own farm cotton receiving 200 pounds kainit has regularly produced right at three times as much as the same kind of land produced without the use of potash.

Last year I was unable to buy enough of this fertilizer for my entire crop, and several acres had to go without it. On this portion of my crop I averaged 620 pounds seed cotton per acre, while that which received 200 pounds kainit averaged 1,760 pounds, or 1,140 pounds increase. This was due solely to the 200 pounds of potash. The ground where the kainit was not used was equally as good, as well prepared, and was cultivated more than that which received the kainit.

Where the potash was not used, the rust started in July, causing the leaves to turn yellow and start dropping off between August 1 and 15. Because the growth was checked early, few of the bolls ever became grown and there was not nearly as many of them.

The cotton without the potash produced a much shorter staple, only a third as many pounds, and was mean to pick. The bolls never did open wide. They just cracked about half open.

When I sold my cotton, the buyer remarked when he came to some of the bales coming from the unfertilized field, that this must have been grown on poor hill land. I told him, no, it grew on the same kind of land as the other and the only difference was in

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Left: With 200 lbs. 20% Kainit. Right: Without potash.

Balanced Food *for* Potatoes

By F. L. Musbach

Professor of Soils, University of Wisconsin.

PLANTS require a balanced ration just as animals do. In the case of the dairy herd the ratio of protein to carbohydrates is fairly well established for the most profitable production of butter fat. This is quite universally so for all dairy breeds. In the plant kingdom, however, the thing becomes more complicated by reason of the fact that we are dealing with more variables. We have to deal particularly with climatic conditions, also soil differences, and the system of farming followed. Again crops have unlike root systems and different capacities for extracting plant food from the soil, but after all these differences are considered, we have in general certain characteristics as concerns their plant-food requirements.

The potato is essentially a storehouse for starch. After the water is squeezed out of the tuber, better than 80 per cent of the dry matter remaining is made up by what are known as carbohydrates, chiefly starchy materials. Potash is in some way intimately connected with the formation of starch and other carbohydrates. If potash is omitted in the mixture used or the supply available is low, typical potash hunger is manifested. Phosphate hastens maturity, and when used in moderate amounts, frequently reduces the yield by shortening the growing period; but potash in addition to phosphate balances the ration, resulting in satisfactory yields.

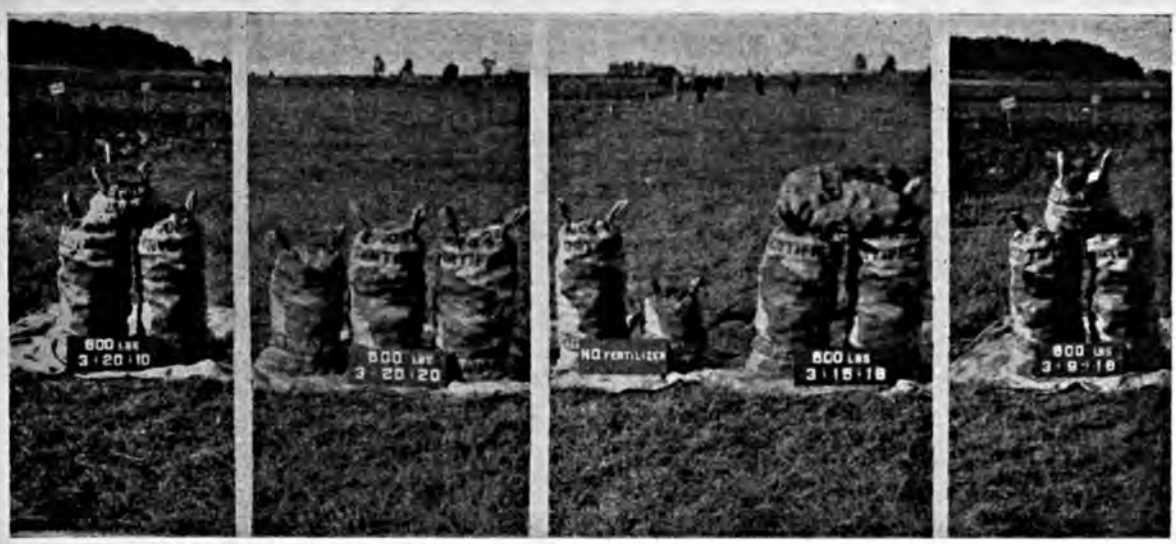
Just what is the best ratio of phosphate and potash for the potato crop? The answer to this can best be determined by extensive field trials. The soil type, system of cropping, and climate are factors which must necessarily be considered. In any case because of the end product, namely, starch, potash in liberal quantities is indispensable. Whether it is supplied through animal manures or commercial carriers is immaterial.

Study Profitable Balance

During the past year a study of the potash-phosphate relationship was undertaken in Barron county, one of the important potato sections in Wisconsin. The soil upon which this study was made is mapped as Colby silt loam, a soil well supplied with liberal amounts of phosphate and potash. Tests for availibility, however, indicate sparing amounts of each. The field had been in hay and pasture for a number of years and received no manure other than the commercials applied alongside the row at planting time. Triumphs were planted on May 31 in three-foot rows, spaced 13″-14″ apart in the row. The crop was harvested on September 19, and considering the abnormal temperatures during the growing season, excellent response to the fertilizers was secured.

The results of the year's work are indicated in the table opposite.

The data are interesting, studying



The 10 extra units of potash in the 3-20-20 served to increase the yield 58.26 bus. above the 3-20-10; and the 6 added units of phosphate in the 3-15-18, 35.79 bus. above the 3-9-18.

pairs of treatments, namely, 3-20-20 with the 3-20-10, and the 3-15-18 with 3-9-18. In the first pair potash is relatively low in the 3-20-10, and in the second phosphate is likewise low in the 3-9-18. The 3-20-20, as will be noted, outyielded the 3-20-10 to the extent of 58.26 bushels, and the 3-15-18 increased the yield over the 3-9-18 by 35.79 bushels. In both cases No. 1's and not total yields are considered. The 10 additional units of potash in the 3-20-20 served to increase the yield, and likewise the six units of phosphate in the 3-15-18 made an appreciable difference. It appears that under the condition of the trial the mixture for best results should contain about the same amount of phosphate as of potash.

It is true that fertilizer cost per acre is higher for the better balanced mixtures. In the case of the 3-20-20 the increased cost amounts to $2.92 per acre for which an extra 58 bushels were secured, and for the 3-15-18, $1.65 for the 35 bushels. Stated differently, increased fertilizer costs of the better balanced rations are 5c. per bushel in the one case, and 4.7c. in the other, surely a profitable investment.

In the table are also indicated the returns per acre above fertilizer costs based upon the cash retail price and assessing 50c. per bushel against No. 1 potatoes. No. 2's some years have a nominal value, but these were not considered in the returns. The highest acre returns, $46.44, were secured with the 3-20-20; and 3-15-18 came a close second, returning $45.58.

The question of economy in the use of fertilizers may be viewed from another angle. Experienced users are quite convinced that high-analysis or

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HIGHEST PROFITS RESULTED FROM CORRECTLY BALANCED FERTILIZERS

Treatment	U. S. No. 1's	No. 2's	% No. 2's	Increase No. 1's over Blank	Fertilizer cost per acre	Returns per A. above fert. cost*
Blanks	146.60	14.82	9.18	—	—	—
600 lbs. 3-20-10	216.11	17.32	7.41	69.51	14.52	$20.23
600 lbs. 3-20-20	274.37	14.04	4.86	127.77	17.44	46.44
600 lbs. 4-8-7	228.66	15.83	6.47	82.06	9.70	31.33
600 lbs. 3-15-18	266.24	19.12	6.70	119.64	14.24	45.58
600 lbs. 3-9-18	230.45	14.34	5.85	83.85	12.59	29.33

* Potatoes 50c. per bu., (U. S. No. 1's)

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

WHEN auld Jenny Geddes, of immortal memory, let fly her cutty stool at the head of Dean George Hannay, in St. Giles church, Edinburgh, Scotland, on Sunday, July 16, 1637, and cried "Deil colic the wame o' thee!" she expressed and impressed, emphatically, the protest of the staunch Presbyterians of that day against the reading of the English Collect or Liturgy. Hers was the vigorous objection of the dissenters to the new form of public worship sponsored by Charles I. Of that dour and doughty band were some of the Lyons of Perthshire, of which fine family Thomas Lyttleton Lyon, who has been Professor of Soil Technology at Cornell University for 27 years, is a greatly respected and esteemed descendant.

The name of Lyon is historic and highly regarded in the straths of Forfar and Perth. It is the family name of the Earl of Strathmore and Kinghorne, whose ancestral seat is Glamis Castle in Forfarshire, dating from the 11th century, and the scene of Shakespeare's "Macbeth", who was Thane of Glamis. John Lyon was the first member of the family to inhabit that ancient castle, which Sir Walter Scott in his "Demonology and Witchcraft" called a "hoary old pile," and on which the interest of all Great Britain was centered a few years ago, when from its portals came a charming daughter as the bride of the Duke of York, second son of King George V. And there, some years later was born, to the joy of all loyal Scots, their second daughter, Princess Margaret Rose.

The ancestors of Thomas Lyttleton Lyon, and other members of his persecuted sect, moved from Perthshire to the north of Ireland during the reign of Charles II, and joined the colony there, as Presbyterianism was not opposed. Later, when their religious liberty was assailed, they emigrated to Cumberland county, Pennsylvania, arriving there in 1748. Other members of the Lyon clan joined them in 1763.

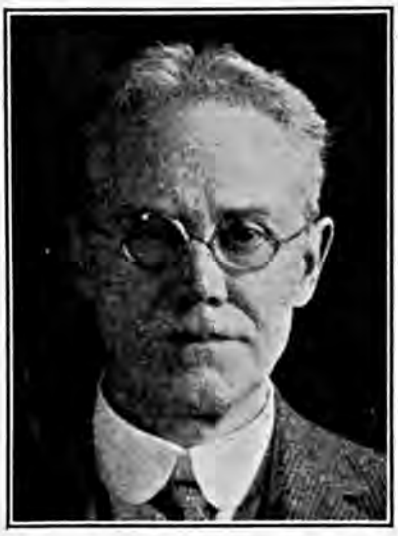
In American History

Dr. Lyon's great grandfather, William Lyon, on his mother's side, surveyed the town site of Carlisle, Pa., in 1750, served as a lieutenant in the French and Indian war, and was present at the capture of Fort Duquesne. His cousin, Benjamin Lyon, great grandfather on his father's side and a captain in the Revolutionary War, was a member of the expeditionary forces against Quebec in 1775 and fought in many of the later battles. Among other ancestors were Thomas Savage, who came to Jamestown, Virginia, in 1607, and Nathaniel Lyttleton, who settled in eastern Virginia, in 1635. Lyttleton is a fine old family name in Worcestershire, England.

Another famous representative of

the Lyon clan was Mary Lyon (1797-1840) the founder of Mount Holyoke Female Seminary, a permanent institution consecrated to the training of young women for usefulness and "designed to furnish every advantage which the state of education in this country will allow."

Thomas Lyttleton Lyon was born in Allegheny county, Pennsylvania, February 17, 1869, his father being James B. Lyon and his mother Anna M. Lyon. His boyhood days were spent on the farm and in attending the district schools; then he prepared for college at the Pittsburgh High School, where he became intensely interested in chemistry. In that early day, facilities and equipment for the study of chemistry were comparatively primitive and inadequate; therefore, young Lyon, like Dr. Stephen Moulton Babcock, improvised his own "tools and apparatus." For a laboratory, he fitted up a room over an outside laundry, and there worked to good advantage, as the High School did not offer laboratory instruction as a supplement to its class-room work in chemistry. Thus early in the life, on his father's farm and in the chemistry workshop he devised, the lad who was to become famed as a chemist, agronomist, soil technologist, and "lysimeter expert" learned how to labor and developed the self-resourceful and initiative attributes which were to stand him in good stead throughout life.



DR. T. L. LYON

Naturally, he decided to follow his bent and, therefore, he studied chemistry under Professor G. S. Caldwell, at Cornell University, from 1887 to 1891, until he received the degree of Bachelor of Science in Agriculture. In the autumn of 1891, he was appointed instructor in chemistry at the University of Nebraska and, to familiarize himself with sugar beet cultivation and the manufacture of beet sugar, he spent three months in the beet sugar factories of the State.

That practical experience and his instructional work did not, however, satisfy his insatiable thirst for higher education in chemical science, and so he went to Germany and studied for two semesters under Professor Tollens at the University of Goettingen, where Dr. S. M. Babcock, in 1879, had been an illustrious student. While in Germany, he added to his knowledge of beet sugar manufacture by visiting the factories.

Returning to the University of Nebraska, he worked at the Experiment Station as first assistant and chemist and supervisor of sugar beet experiments, from 1894 until 1895; then he was made Professor of Agriculture in that Institution.

In 1899, he was married to Bertha Laura Clark, daughter of the late John R. Clark, a prominent banker of Lincoln, Nebraska. They have two children, John Lyttleton Lyon and George Clark Lyon.

Obtaining leave of absence from the University of Nebraska, he again studied agricultural chemistry under the direction of Professor Caldwell at Cornell University and earned the degree of Doctor of Philosophy which was conferred upon him in 1904. His thesis, on improvement of the quality of wheat, was published by the Bureau of Plant Pathology of the U. S. Department of Agriculture as Bulletin No. 78. Returning to Nebraska, he continued his research and instructional work until 1906, when he was appointed Professor of Experimental Agronomy in Cornell University, and there took charge of the experiments

in soils and field crop production. At that time, plant breeding was not included in agronomy work, chemistry being the major consideration. In that science he had been well trained, and in addition to that knowledge, he brought to his new position years of experience in field experimentation, which fitted him the better for his duties.

Developed Agronomy

During his years of service in Nebraska, Dr. Lyon found that recurring cycles of dry seasons caused crop failures; therefore, he sought to develop and introduce methods of crop growing better suited to the environment than those of the more humid region of the Eastern States, which had been practiced by the settlers. His experiments with soil management were directed chiefly to the conservation of soil moisture and the introduction and production of crop plants adapted to dry farming. He tested, thoroughly, in various parts of the State, durum wheat, brome grass, Kafir-corn, and several millets introduced by the U. S. Department of Agriculture, together with many other varieties that proved less suitable. The Kherson variety of oat, introduced by the Nebraska Station, was one of the most promising varieties disseminated. His experiments included a study of the changes occurring in the life habits of corn, wheat, and other crops when exposed to new conditions of moisture and temperature. Careful attention was given to the testing of hardier strains of alfalfa than the common one, which had already been grown to a limited extent in Nebraska. In this important undertaking, during most of the time student help was the only assistance available. The results of his painstaking experiments were recorded in 22 bulletins published by the Nebraska Experiment Station.

Agronomy was a new study when Dr. Lyon began work in Nebraska and he had to develop courses and devise laboratory practices for its teaching. The popular laboratory manuel entitled, "Examining and Grading Grains," was published by Dr. Lyon in conjunction with Professor Edward Gerrard Montgomery at that time. His plan of instruction attracted wide attention and was described, along with that of four other agricultural colleges, in Bulletin No. 127 published by the Office of Experiment Stations, U. S. Department of Agronomy, in 1903.

Dr. Lyon had charge of the Dairy Test at the Trans-Mississippi Exposition in Omaha in 1898. One of his constructive accomplishments, while resident in Nebraska, was the development of a secondary school of agricultural instruction trains on the railroads of the State. He also acted for the Bureau of Plant Industry of the U. S. Department of Agriculture as one of the judges of agricultural products at the Louisiana Purchase Exposition at St. Louis, Mo., in 1904, and served as a member of the faculty of the Graduate School conducted by the Association of Agricultural Colleges and Experiment Stations at Urbana, Ill., in 1906, again at Ithaca, N. Y., in 1908, and at Lansing, Mich., in 1911.

Called to Cornell

In 1906 Dr. Lyon was called to Cornell University as Professor of Experimental Agronomy, to take charge of experimental work in soils and field crop production. There he quickly discovered that the agronomic problems to be solved in the New York State environment were materially different from those presented in Nebraska and required an entirely new outlook and program. The measurement of soil fertility losses and methods for their control required immediate consideration; therefore, experimentation to that end was actively conducted.

The use of the lysimeter was decided upon as the most likely means of accomplishing the desired results, and

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Lambs on alfalfa pasture at Michigan State College—September, 1932.

Fertilize Alfalfa Then Pasture It

By H. C. Rather

Head of the Department of Farm Crops, Michigan State College.

IN 1919 Michigan farmers grew 74,000 acres of alfalfa. In 1932 the Michigan alfalfa acreage had climbed to 750,000, having increased to more than 10 times the 1919 acreage. During that time, Michigan growers have demonstrated to their own satisfaction that alfalfa is not only the best of roughages for all classes of livestock, but that under many conditions it is without a peer as a pasture crop, if properly fortified by plant-food reserves in the soil, so that it can withstand competition from other plants and the impairment of continuous grazing.

For some years now, the Michigan State College has been conducting pasture experiments with dairy cows and sheep on its W. K. Kellogg Farm near Augusta, Michigan, in cooperation with the Division of Forage Crops and Diseases of the U. S. Department of Agriculture. A. B. Dorrance of the U. S. Department is locally in charge.

The first thing we learned was that alfalfa needed to have plenty of food in the soil. With that provided, alfalfa immediately showed up as a more valuable pasture crop than either sweet clover or excellent stands of permanent grass.

The soil on the particular field where the dairy cow experiments were carried on is a Fox sandy loam. In 1929, when the alfalfa was seeded, it was in a rather low state of fertility.

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Profitable Cotton

By G. Chalmers McDermid

Charleston, South Carolina

A YIELD of 9¾ bales of cotton, each weighing slightly over 500 pounds from 5 acres is a mighty good crop of cotton any year. It showed a profit with cotton at five cents per pound. Harry Inabinett of Woodford, Orangeburg county, South Carolina, who claims he is nothing, if not an average farmer, explains how he secured this yield last year.

"I did it by selecting my soil, and putting down plenty of the right kind of plant foods to make the crop. I have been using lots of potash for the last few years, because of the prevalence of cotton rust in my neighborhood, and everywhere I go in my State. From what I learned from our State Agricultural College and from others, I found out that cotton rust was due in a large measure to lack of available potash in the soil. Now, from my own experience, I can make the unqualified statement, that potash controls cotton rust.

Tried It on Own Farm

"Just to prove that I was right about this potash idea, I placed a two-acre test in the center of my five-acre field. One of these acres I top-dressed with 100 pounds of sulphate of ammonia, and the other with the same amount of ammonia and 200 pounds of high-grade kainit (20%). At all times during the season, I could notice a slight difference in favor of the potash acre, but this difference was very marked during early September and from then on. When the final weights of the two acres were totaled, my ammonia acre gave me 2,324 pounds of seed cotton, and my potash and ammonia acre gave me 2,726 pounds, a difference of 402 pounds of seed cotton for the expenditure of a sack of 20% kainit.

"As stated before, the difference in the two acres was quite marked. There were more bolls on the potash acre. These bolls were larger, opened better, and picked cleaner. The plants kept their leaves and remained green longer than on many acres which I saw about that time of the year. (This was true of both plots, because I had 900 pounds of 4-8-4 (NPK) per acre under the crop.)

Nearly Two Bales per Acre

"My 1932 crop was not as large as was my 1931 crop, but this I think was due to extremely dry weather at planting time. Lack of moisture gave me poor germination and stand. I had to supply the missing places as late as May 20th. These replants, however, came through the summer in fine style and gave me a good crop, although I lost one entire picking from frost. Any year that I can make nearly ten bales on five acres I am satisfied, and it will take more than just a depression to make me stop planting cotton.

"There are thousands of acres of cotton in my county and in my State that have suffered from cotton rust for a good many years, and I feel sure that the addition of 200 pounds of 20% kainit next summer in a top-dresser, or the putting down of a fertilizer analyzing about 4% ammonia, 8% phosphorus and 8% to 10% potash will put many of those fields back into balance, and make better crops of cotton on smaller acreages."

Pictorial

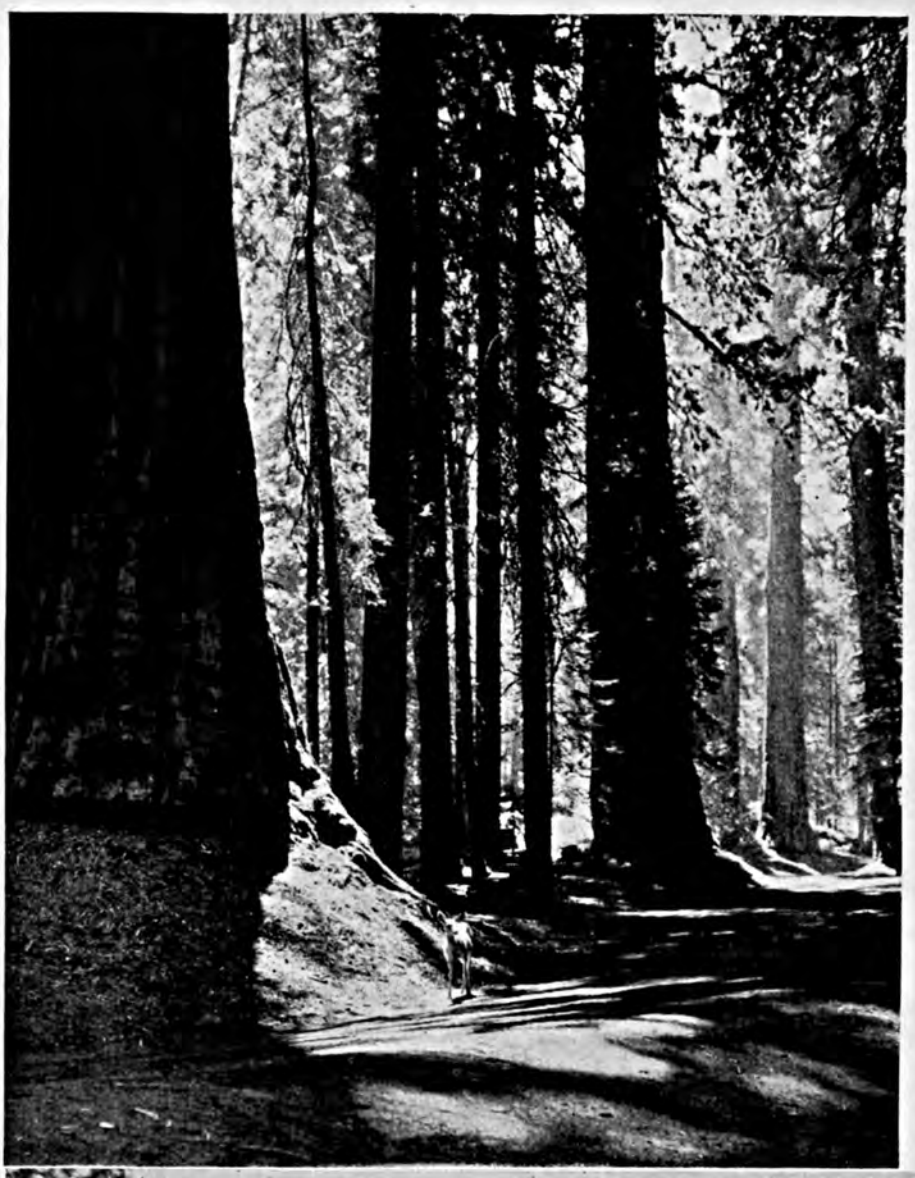
ON THE SUNNY SIDE OF THE STACK.

Above: Flooding a rice field on the farm of Virgil Hall, DeWitt, Arkansas.

Below: With many tractors laid by, there is a brisk demand for horses like these this spring.

Above: Perfect team-mates enjoy their leisure as well as their work together.

Below: Plowing cotton on the J. T. Fargason and Son plantation near Clover Hill, Mississippi.



Left: Giant Sequoia trees of California in Sequoia National Park.

Below: A cypress swamp near Scott, Arkansas.

The Editors Talk

Efficiency in Fertilizer Usage

The important fertilizer problem at present is how to get the most profitable results from the use of fertilizers on the farm. A vast amount of research and experimental work by State and Federal authorities is being conducted to this end. Among such projects is the problem of the best method of applying fertilizers for different crops.

In 1925, a Joint Committee on Fertilizer Application was formed of representatives from four national organizations, namely, American Society of Agricultural Engineers, American Society of Agronomy, National Association of Farm Equipment Manufacturers, and National Fertilizer Association. It was organized at the suggestion of Director Jacob G. Lipman of the New Jersey Agricultural Experiment Station, and is still carrying on its work. Its purpose was and still is to study the problems that are involved in applying fertilizers to different crops on different soils, to compare different methods, and to recommend those that give most efficient results.

Before this committee was organized, and beginning in 1919, the National Fertilizer Association financed a number of research studies at various experiment stations for the purpose of obtaining accurate information with respect to both fertilizer placement and machine design. Among the more outstanding results it has been found that to broadcast fertilizers is not always the most profitable method. Great improvement in fertilizer distributors and in the results obtained from fertilizers has been made.

Recently H. R. Smalley, Chief Agronomist of the National Fertilizer Association, has written a detailed account of the progress of the work, giving recommendations for the application of fertilizers to different crops. This account has been published in the agricultural press and should be read by all farmers interested in the efficient application of fertilizer.

It is very important to study a new combination fertilizer-planter before buying it. The desirable points about the machine are given in the report and are very practical. Certainly the Joint Committee on Fertilizer Application has accomplished excellent results. Yet there is much more to be done.

In addition to the report by Mr. Smalley, other agencies have published valuable material. Among them, is a report on the machine placement of fertilizers applied to snap beans in Florida by G. A. Cummings and A. L. Sharp of the Bureau of Agricultural Engineering, United States Department of Agriculture. This contains very practical information, including photographs of machinery involved and of the effects of different fertilizer placements.

Along the same line it is noted in the publication of the Department of Commerce, "World Trade Notes on Chemical and Allied Products," that an International Fertilizer Application Committee is proposed. In fact, an International Conference on the Application of Fertilizers was held in Rome in November, 1932, under the auspices of the International Federation of Agricultural Districts. They approved a movement to constitute an international organ for promoting the use of chemical fertilizers. A temporary committee

including French, German, and Italian delegates was formed to work out a proposed International Institute and make a report. Thus, it is possible that the work at present being conducted in the United States may yet have a larger and more important influence.

The Value of Research

In association with two State universities, Purdue University, Indiana, and the University of California, reports on the purpose and value of research recently have been published.

The Purdue Research Foundation held its Third Industrial Research Conference at Purdue University at the end of last year. As stated by G. Stanley Meikle, at this conference an attempt was made to indicate and to evaluate the research activities on the Purdue Campus during the last few decades. The State began to appropriate funds to Purdue in 1870. In 63 years it has appropriated slightly more than $29,000,000 for all purposes, principally educational. It is conservatively estimated that the material wealth of the State is being increased each year by almost twice this amount. "The primary purpose of the Purdue Research Foundation is to cooperate with industry in the solution of pure and applied scientific research problems which are adequately subsidized, to the end that the Foundation, the University Staff member, the Graduate Research Student, and industry itself shall be mutually and substantially benefited."

The report by the University of California is entitled "How California Agriculture Profits by Economic Research" and refers particularly to the facilities offered by the Giannini Foundation which has been organized as an integral part of the College of Agriculture, coordinating resident teaching, research, and extension activities relating to all phases of agricultural economics. In view of the changed economic order throughout the world and the necessity for agricultural adjustments within the State and Nation which have confronted California farmers in recent years with an entirely new category of problems, it is believed that fact-finding economic studies are of the utmost importance.

It is very encouraging that in these hard times the real value of research is being appreciated. And it is particularly encouraging that forces outside of the Universities themselves recognize this value and are taking practical and encouraging steps for the mutual benefit of their respective States.

Dressed Up

The American Potato Journal published by the Potato Association of America with the March issue appears in an improved form. The cover design has been altered, the type face changed, and the magazine now appears with an editorial on the first page. The articles contained in the March issue are of much practical interest. There is one by B. E. Brown of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, on the results obtained from the use of concentrated fertilizers on potatoes on three important soil types. Another article, by John S. Gardner of the University of Kentucky, presents a comparison of the tuber-unit and tuber-index methods of potato improvement. Trends in potato production and marketing are noted by W. Stuart of the Bureau of Plant Industry, U. S. Department of Agriculture. Crop market news and sectional notes covering the important potato-growing centers complete the issue.

The editors are to be congratulated on giving all interested in potato production such a practical and well-edited magazine.

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, and Crops. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Potato growers, especially those on the southern Coastal Plain, will be interested in North Carolina Agricultural Experiment Station Bulletin 283, "Results of Five Years' Fertilizer Experiments With Irish Potatoes in Eastern North Carolina," by C. B. Williams, H. B. Mann, and J. J. Skinner. Space does not permit a discussion here of the many pertinent phases of the subject covered by this work. General conclusions indicate that under the conditions of this experiment, best results were obtained with one ton of a fertilizer containing about 18 units of plant food in approximately a 1-1-1 ratio. The potash could be derived from the muriate form and a combination of organic and inorganic nitrogen carriers should be used to supply the nitrogen.

"The Comparative Effect of Muriate and Sulfate of Potash on the Composition and Quality of White Burley Tobacco" by P. E. Karraker (Kentucky Agricultural Experiment Station Bulletin 334) shows that for this type of tobacco small amounts of chlorine may be contained in the fertilizer without seriously damaging the crop. Tests conducted over a period of six years showed that chlorine in the fertilizer increased the chlorine content of the tobacco. However, this increase did not become serious until 50 or 100 pounds per acre of muriate of potash were used. Sulfate of potash in increasing amounts increased the sulphur content of the tobacco. However, the increases were comparatively small compared to the increase in chlorine content with muriate of potash and did not become serious until 400 to 800 pounds per acre of sulfate of potash had been applied. Burning tests and commercial grading of the muriate and sulfate-fertilized tobacco showed in general that sulfate of potash produced a higher quality leaf, but indicated that small amounts of muriate of potash could be used without particularly injurious effects. It would be concluded from this work that sulfate of potash probably should furnish the bulk of the potash in the fertilizer for burley tobacco, but that muriate of potash could be used to supply part of the potash, provided that not over 25 or at the most 50 pounds per acre of chlorine would be applied by the fertilizer. It scarcely need be mentioned that this tolerance of burley tobacco for chlorine does not apply to the other types of tobacco.

"State Laboratory Fertilizer Report, Seed Report, July-December, 1932, Feeds and Miscellaneous, January-December, 1932," State Bd. of Agr., Dover, Del., Quar. Bul. Vol. 22, No. 4.

"Annual Report of the State Chemist of Florida for the Year Ending December 31, 1932," Dept. of Agr., Tallahasse, Fla., J. J. Taylor.

"Official Inspections 145—Commercial Fertilizers, 1932," Agr. Exp. Sta., Orono, Me., Oct., 1932, James M. Bartlett.

"Commercial Fertilizers, Commercial Feeds and Agricultural Liming Materials," Univ. of Md., College Park, Md., Control Series, No. 146, Jan., 1933.

"The Story of Field A of the Massachusetts

Agricultural Experiment Station—A Review of Experiments With Nitrogen Fertilizers," Agr. Exp. Sta., Amherst, Mass., Bul. 290, Nov., 1932, Fred W. Morse.

"Inspection of Agricultural Lime Products," Agr. Exp. Sta., Amherst, Mass., Control Series, Bul. 66, Dec., 1932, H. D. Haskins.

"County Fertilizer Data: Mixed Goods and Materials," State Dept. of Agr., Jackson, Miss., Season, 1932, January to July 1.

"Third Annual Fertilizer Report of New Mexico Field & Fertilizer Control Office State College, New Mexico," N. M. Col. of Agr., State College, N. M., March 1, 1933, F. E. Oakes.

"The Effect of Certain Mineral Elements on the Color and Thickness of Onion Scales," Agr. Exp. Sta., Ithaca, N. Y., Bul. 552, Jan., 1933, J. E. Knott.

"Effects of Fertilizers and Rotation on Earliness and Total Yields of Tomatoes," Agr. Exp. Sta., Geneva, N. Y., Bul. 619, Feb., 1933, Charles B. Sayre.

"Report of Analyses of Commercial Fertilizers Sold in New York State, July 1, 1931 to June 30, 1932," Dept. of Agr. & Markets, Albany, N. Y., Agr. Bul. 269, Nov., 1932.

"Home-Mixing of Fertilizers," Clemson Agr. Col., Clemson College, S. C., Cir. 126, Jan., 1933, R. W. Hamilton.

"Inspection of Fertilizers," Agr. Exp. Sta., Kingston, R. I., Ann. Fert. Cir., Sept., 1932, W. L. Adams and A. S. Knowles, Jr.

"Fertilizer Experiments with Cotton," Agr. Exp. Sta., College, Sta., Tex., Bul. 469, Dec., 1932, E. B. Reynolds, G. T. McNess, R. A. Hall, P. R. Johnson, R. H. Stansel, Henry Dunlavy, P. B. Dunkle, and H. F. Morris.

"The Use of Fertilizers for Washington Soils," State Col. of Wash., Pullman, Wash., Ext. Bul. 176, Jan., 1933.

"Commercial Fertilizers—1933," Dept. of Agr. & Markets, Madison, Wis., Bul. 142, Feb., 1933, W. B. Griem.

Soils

The large losses in soil moisture and especially in nutrients from soil erosion and methods to reduce or control this erosion are given by M. F. Miller and H. H. Krusekopf in Missouri Agricultural Experiment Station Research Bulletin 177, "The Influence of Systems of Cropping and Methods of Culture on Surface Runoff and Soil Erosion." This bulletin brings up to date the well-known erosion experiments begun at this Experiment Station in 1917. Bluegrass sod has been found most effective in preventing erosion, followed by a corn, wheat, and clover rotation. Continuous wheat allowed somewhat more erosion, while continuous corn permitted the most erosion of all the cropping systems studied. The greatest losses, however, were on the plowed and fallowed plots.

An interesting comparison was made of the erosion from two plots in corn. One plot had been growing corn continuously, while the other had corn growing in a rotation with wheat and clover. Much less erosion occurred from the corn ground in the rotation than from the ground growing corn continuously. The authors say: "It is evident that the influence of good crop rotation in controlling erosion is not entirely due to the larger portion of the time when crops covered the ground but also to the influence of the rotation cn the soil itself." The effectiveness of soybeans in controlling erosion was also investigated. It was found that soybeans grown in rows and cultivated were apparently no more effective than continuous corn in controlling erosion. Soybeans grown in eight-inch drill rows were a much more effective control. This bulletin deals primarily with surface or sheet erosion. The losses and damage from this type of erosion are not so noticeable or spectacular as those from gullying, but they are nevertheless great. Surface erosion removes the top soil, the most fertile part of the farm, resulting in decreased yield or crop failure. The work represented by this bulletin is of great value to all farmers and warrants their attention.

"Soils of Georgia," Univ. of Ga., Athens, Ga., Ext. Cir. 237, Jan., 1933, M. W. Lowry.

"Electric Soil and Hotbed Heating," Agr. Exp. Sta., Moscow, Idaho, Cir. 68, Oct. 1932, Hobart Beresford.

"Studies on the Biological Decomposition of Peat," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 129, Dec., 1932, R. M. Snyder and Z. N. Wyant.

"Soils in Relation to Fruit Growing in New York—Part I. A Detailed Soil Survey of the Hilton Area, Monroe County," Agr. Exp. Sta., Ithaca, N. Y., Bul. 541, July, 1932, A. T. Sweet and Joseph Oskamp.

"A Survey of Ohio Orchard Soils Relative to Phosphorus Distribution and Acidity," Agr. Exp. Sta., Wooster, Ohio, Bul. 517, Jan., 1933,

J. H. Gourley and R. M. Smock.

"Soil Survey of Caroline County, Maryland," U. S. D. A., Washington, D. C., Series 1929, No. 7, H. B. Winant and S. R. Bacon.

"Soil Survey of Talbot County, Maryland," U. S. D. A., Washington, D. C., Series 1929, No. 8, S. O. Perkins and Merle Hershberger.

"Soil Survey of Hampden and Hampshire Counties, Massachusetts," U. S. D. A., Washington, D. C., Series 1928, No. 25, W. J. Latimer and L. R. Smith.

"Soil Survey of Branch County, Michigan," U. S. D. A., Washington, D. C., Series 1928, No. 23, J. W. Moon, Robert Wildermuth, J. O. Veatch, C. H. Wonser, B. E. Musgrave, and J. A. Porter.

"Soil Survey of The Fort Sumner Area, New Mexico," U. S. D. A., Washington, D. C., Series 1930, No. 1, A. T. Sweet and E. N. Poulson.

"Soil Survey of Ottawa County, Ohio," U. S. D. A., Washington, D. C., Series 1928, No. 26, A. H. Paschall, J. G. Steele, G. W. Conrey, and S. W. Phillips.

Crops

The spring season brings into circulation a large number of excellent publications on different crops and their profitable adaptability to the respective States. In the list below will be noted pamphlets on such specialized crops as pecans, the soybean, spinach, Ladino clover, chicory, peanuts, grazing crops for poultry, blueberries, mushrooms, blackberries, and others. Several of these indicate the increasing demand of producers for information on crops with which to tempt more consumer dollars.

"Annual Report Extension Service," Univ. of Ark., Little Rock, Ark., Ext. Cir. 302, Jan., 1933.

"Annual Report of the Director for the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., Newark, Del., Bul. 179, Dec., 1932, C. A. McCue.

"Alfalfa Production in Delaware," Univ. of Del., Newark, Del., Ext. Bul. 18, Mar., 1933, Henry C. Harris and C. E. Phillips.

"Annual Report For the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., Gainesville, Fla., Wilmon Newell.

"Grading, Packing and Stowing Florida Produce," Agr. Exp. Sta., Gainesville, Fla., Bul. 254, Oct., 1932, M. R. Ensign.

"Twelfth Annual Report 1931," Coastal Plain Exp. Sta., Tifton, Ga., Bul. 19, June, 1932, S. H. Starr.

"Propagation of Pecans," Exp. Sta., Experiment, Ga., Bul. 172, Nov., 1932, J. E. Bailey and J. G. Woodruff.

"Cotton for Georgia, 1932," Univ. of Ga., Athens, Ga., Ext. Cir. 211, Jan., 1933, E. C. Westbrook.

"Extension Work in Athens District, 1932," Univ. of Ga., Athens, Ga., Ext. Cir. 214, Jan., 1933, Lula Edwards.

"Landscape Gardening in Georgia," Univ. of Ga., Athens, Ga., Ext. Cir. 215, Jan., 1933, H. W. Harvey.

"County Agents Activities in Northwest Georgia," Univ. of Ga., Athens, Ga., Ext. Cir. 217, Jan., 1933, L. F. Skinner.

"Horticultural Efforts in Georgia, 1932," Univ. of Ga., Athens, Ga., Ext. Cir. 230, Jan., 1933, George H. Firor.

"A Year's Progress in Solving Farm Problems of Illinois, 1931-32," Agr. Exp. Sta., Urbana, Ill., H. W. Mumford.

"Genetics and Breeding in the Improvement of the Soybean," Agr. Exp. Sta., Urbana, Ill., Bul. 384, Nov., 1932, C. M. Woodworth.

"Spinach, Early and Late," Agr. Exp. Sta., Urbana, Ill., Cir. 404, Feb., 1933, J. W. Lloyd.

"Wild Garlic and Its Control in Indiana," Purdue Univ., Lafayette, Ind., Ext. Leaflet 167, Jan., 1933, C. E. Skiver.

"Report of Agricultural Research For the Year Ending June 30, 1932," Agr. Exp. Sta., Ames, Iowa, C. F. Curtiss.

"Building Iowa's Agriculture," Ia. State Col. of Agr., Ames, Ia., Annual Report 1931, Ext. Serv., R. K. Bliss.

"Program of Sugar Cane Production for South Louisiana 1932-1933," La. State Univ., Baton Rouge, La., Ext. Cir. 151, Jan., 1933.

"Maine Extension Service Annual Report for the Year Ending June 30, 1932," Univ. of Me., Orono, Me., Ext. Bul. 209, Jan., 1933, Arthur L. Deering.

"How to Grow Rhubarb," Mass. State Col., Amherst, Mass., Ext. Leaflet 46, Rev., Jan., 1933, Paul W. Dempsey.

"How to Grow Spinach," Mass. State Col., Amherst, Mass., Ext. Leaflet 99, Rev., Jan., 1933, Paul W. Dempsey.

"Pruning Young Fruit Trees," Mass. State Col., Amherst, Mass., Ext. Leaflet 109, Rev., Dec., 1932, J. K. Shaw.

"Ladino Clover," Mass. State Col., Amherst, Mass., Ext. Leaflet 144, Oct., 1932, Ralph W. Donaldson.

"Chicory—Its Culture and Uses," Mich. State Col., East Lansing, Mich., Ext. Bul. 127, Nov., 1932, H. C. Rather.

"Field Studies of Bud Sports in Michigan Tree Fruits," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 130, Dec., 1932, Brooks D. Drain.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XV, No. 3, Feb., 1933.

"A Well Planned Farm Business," Univ. of Minn., St. Paul, Minn., Spec. Bul. 155, Nov., 1932, S. B. Cleland.

"The Agricultural Extension Service, Missouri College of Agriculture; Annual Report for 1932," Univ. of Mo., Columbia, Mo., Cir. 302, Jan., 1933, R. R. Thomasson.

"Factors Causing Cull Apples in Missouri," Agr. Exp. Sta., Columbia, Mo., Bul. 319, November, 1932, G. C. Schowengerdt and D. C. West.

"Eight Years' Work by the Montana Grain Inspection Laboratory, July 1, 1923 to June 30, 1931," Agr. Exp. Sta., Bozeman, Mont., Bul. 270, Jan., 1933, Clyde McKee, W. O. Whitcomb, W. D. Hay, and D. M. Feese.

"Improving Pastures," Univ. of Me., Orono, Me., Cir. 111, Jan., 1933, R. F. Talbot.

"Facts About 36 Varieties of Peaches," Agr. Exp. Sta., New Brunswick, N. J., Cir. 262, Dec., 1932, M. A. Blake.

"Forty-fifth Annual Report 1932," Agr. Exp. Sta., Ithaca, N. Y., Cornelius Betten.

"Cherry Growing in New York," N. Y. State Col. of Agr., Ithaca, N. Y., Cornell Ext. Bul. 246, Nov., 1932, G. W. Peck.

"Soils in Relation to Fruit Growing in New York—Part II: Size, Production, and Rooting Habit of Apple Trees on Different Soil Types in the Hilton and Morton Areas, Monroe County," Agr. Exp. Sta., Ithaca, N. Y., Bul. 550, Rev., Dec., 1932, Joseph Oskamp and L. P. Batjer.

"The Value of Crop Rotation in The Coastal Plain Area," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Bul. 280, Jan., 1933, R. H. Rogers and H. B. Mann

"Approved Practices for Peanut Growers," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C. Bul. 281, Jan., 1933, B. F. Fulton, P H. Kime, S. G. Lehman, and H. B. Mann.

"Grazing Crops for Poultry," Agr Exp. Sta., State Col. Sta., Raleigh, N. C., Bul. 282, Feb., 1933, R. S. Dearstyne and P. H. Kime.

"A Study of the Ash Constituents of Apple Fruits During the Growing Season," Agr. Exp. Sta., Wooster, Ohio, Bul. 519, Feb., 1933, E. F. Hopkins and J. H. Gourley.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XVIII, No. 2, March-April, 1933.

"Wheat Varieties for the Columbia River Basin of Oregon," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 308, Dec., 1932, D. E. Stephens, R. B. Webb, and J. F. Martin.

"Annual Report of the Director For the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., Brookings, S. D., J. W. Wilson.

"Alfalfa Production Under Irrigation in Western Texas," Agr. Exp. Sta., Col. Sta., Tex., Bul. 472, Dec., 1932, John J. Bayles.

"Good Gardening—VII—Commercial Fertilizers," Univ. of Vt., Burlington, Vt., Emergency Leaflet No. 9, April, 1933.

"Vegetable Planting and Yield Data," Univ. of Vt., Burlington, Vt., Brieflet No. 313, Feb., 1931.

"Department of Agriculture Immigration of Virginia," Dept. of Agr., Richmond, Va., Buls. 302 and 303, March and April, 1933.

"Observations and Experiments with Blueberries in Western Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 276, Jan., 1933, D. J. Crowley.

"Garden Plan for a Family of Five," State Col. of Wash., Pullman, Wash., Ext. Cir. 19, March, 1933, C. L. Vincent.

"Report of the West Virginia Agricultural Experiment Station for the Biennium Ending June 30, 1932," Agr. Exp. Sta., Morgantown, W. Va., Bul. 254, Dec., 1932, F. D. Fromme.

"Forty-second Annual Report of the University of Wyoming, 1931-1932," Agr. Exp. Sta., Laramie, Wyo., J. A. Hill.

"Experiments in Wheat Production on the Dry Lands of Oregon, Washington, and Utah," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 329, Nov., 1932, David E. Stephens, H. M. Wanser, and Aaron F. Bracken.

"Rotation and Tillage Experiments at the Lawton (Okla.) Field Station, 1917-1930," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 330, Nov., 1932, W. M. Osborn,

"Red-clover Seed Production in the Intermountain States," U. S. Dept. of Agr., Washington, D. C., Leaflet No. 93, Dec., 1932, E. A. Hollowell.

"Mushroom Growing in the United States," U. S. Dept. of Agr., Washington, D. C., Cir. 251, Dec., 1932, Edmund B. Lambert.

"Roses for the Home," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 750, Rev., Dec., 1932, Furman Lloyd Mulford.

"Sweetpotato Growing," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 999, Rev., Dec., 1932, Fred E. Miller, J. H. Beattie, and H. H. Zimmerley.

"Blackberry Growing," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1399, Rev., Dec., 1932, George M. Darrow.

"List of Publications of the United States Department of Agriculture From January, 1926, to December, 1930, Inclusive," U. S. Dept. of Agr., Washington, D. C., Misc. Publ. 153, Mabel G. Hunt.

Economics

With a series of circulars, Iowa is keeping her agricultural readers informed on the present agricultural emergency. The first circular, No. 139, "The Situation Today," by A. G. Black, presented the main facts of the case. No. 140, "The Causes of the Emergency," by Geoffrey Shepherd, dealt with the causative factor. The third, No. 141, by Theodore W. Schultz and A. G. Black, discussed "The Voluntary Domestic Allotment Plan." Circular No. 142, the fourth in the series, was entitled "Iowa Farm Mortgage Situation," and its authors were William G. Murray and Ronald C. Bentley. Circular No. 143, "Control of the General Price Level," by Geoffrey Shepherd and Wallace

Wright, is the fifth in the series. Undoubtedly these well-presented studies are eagerly sought by agriculturists endeavoring to obtain a clear picture of the situation.

"An Economic Study of the Agriculture of the Connecticut Valley—5. Factors Affecting the Prices and Acreages of Cigar Tobacco in the United States," Agr. Exp. Sta., Storrs, Conn., Bul. 180, June, 1932, H. B. Boyd.

"Results of Farm Management Extension Work, 1932," Univ. of Ga., Athens, Ga., Ext. Cir. 231, Jan., 1933, Kenneth Treanor.

"A Review of the Accuracy and Timeliness of Outlook Statements," Agr. Exp. Sta., Moscow, Idaho, Cir. 62, Dec., 1932, C. O. Youngstrom.

"Agricultural Outlook for Illinois 1933," Agr. Exp. Sta., Urbana, Ill., Cir. 402, Feb. 4, 1933.

"Organization and Management of Maryland Farms—Piedmont Plateau Region," Agr. Exp. Sta., Col. Park, Md., Bul. 337, Sept., 1932, S. H. DeVault and Ray Hurley.

"Economic Efficiency of the Farm Layout in Maryland," Agr. Exp. Sta., Col. Park, Md., Bul. 338, Oct., 1932, A. B. Hamilton and S. H. DeVault.

"Growth and Decline of Farm Trade Centers in Minnesota, 1905-1930," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 287, July, 1932, C. E. Lively.

"The New York State 1933 Agricultural Outlook," N. Y. State Col. of Agr., Ithaca, N. Y., Cornell Ext. Bul. 251, Feb., 1933, V. B. Hart, M. C. Bond, and Others.

"Cooperative Purchasing and Marketing Organizations in New York State," Agr. Exp. Sta., Ithaca, N. Y., Bul. 544, Oct., 1932, F. A. Harper.

"An Analysis of the Loaning Operations of the Federal Land Bank of Springfield from Its Organization in March, 1917, to May 31, 1929," Agr. Exp. Sta., Ithaca, N. Y., Bul. 549, Dec., 1932, F. F. Hill.

"The Agricultural Outlook for 1933," Ohio State Univ., Columbus, Ohio, No. 62, Feb., 1933.

"An Economic Study of Sumter County Agriculture," Agr. Exp. Sta., Clemson College, S. C., Bul. 288, Jan., 1933, W. C. Jenssen, B. A. Russell, and Marvin Guin.

"South Carolina Agriculture—A Statistical Report," Agr. Exp. Sta., Clemson College, S. C., Stat. Bul. 1, July, 1931.

"Timely Economic Information For Washington Farmers," Agr. Exp. Sta., Pullman, Wash., No. 16, Mar., 1933.

"Bibliography on the Marketing of Agricultural Products," U. S. Dept. of Agr., Washington, D. C., Misc. Publ. 150, Dec., 1932, Louise O. Bercaw and Esther M. Colvin.

Balanced Food for Potatoes

(From page 9)

double-strength fertilizers are more profitable than the equivalent amounts of plant food contained in low-grade mixtures. This question was discussed by the writer in the July, 1930, issue of "Better Crops with Plant Food." Likewise it may be assumed that a well-balanced combination will result in larger profits than unbalanced ones. In this paper the advantage of better-balanced combinations is pointed out. Good practices would, therefore, dictate that if the fertilizer bill must be reduced it should come through using smaller amounts per acre of a well-balanced mixture. In another trial during the past year it was found that an application of 400 lbs. of a 3-15-18 outyielded 600 lbs. of the 3-9-18. Space does not permit incorporating the entire details of this particular experiment.

Under the conditions prevailing over a large area of the Wisconsin potato section it appears that the phosphate content should equal approximately that of potash. Both should be relatively high, particularly the potash content. Such ratios as 1-6-6, 1-4-5, and 1-5-6 represent fairly well-balanced combinations. Fertilizers now licensed similar to the 4-16-20, 3-20-20, and 3-15-18 are ones which may be recommended. The 4-8-7 was a standard in the Eastern States for some years and was also the principal mixture used by Wisconsin growers four or five years back. This mixture represents approximately a 1-2-2 ratio and has been replaced in a large measure by the higher potash carriers as a result of six years of experimental work. The 1932 results are in harmony with those secured in past years.

Potash Fertilizers Improve Quality *of* Canning Peas

POTASH improves the quality of canning peas.

Such are the findings from careful experiments conducted by the University of Wisconsin during the past two years in commercial pea-growing sections of this State. It was previously found by F. L. Musbach of the Experiment Station staff that yields of canning peas often can be greatly increased by the use of commercial fertilizers.

During the past two years attention was particularly directed to a careful determination of the effects of various kinds of fertilizers, applied at the uniform rate of 300 pounds per acre, on the quality of the peas canned from the different experimental fields. The canned peas from different plots were scored by skilled pea graders. The peas came from fields in two different sections of the State, one near Ripon in eastern Wisconsin and the other near Colby in the central portion of the State.

The soil at Ripon is a Miami silt loam. The addition of straight superphosphate (0-16-0) had considerable effect on the quality, but the use of nitrogen and potash still further improved the quality.

On the Colby silt loam soil, superphosphate alone decreased the quality, but generally increased the yields. When potash and nitrogen were added to the phosphate here, the quality almost uniformly increased with additional proportional amounts of potash; all mixtures being applied at the rate of 300 pounds per acre.

The peas from the two areas were scored as follows:

Fertilizer Treatment	Average Score at Ripon	Average Score at Colby
Blank (check)	79.3	82.9
0-16-0 (NPK)	87.3	79.4
0-16-8	86.0	82.2
2-16-4	93.2	83.5
2-16-8	91.7	84.8
2-16-12	88.7	83.0
2-16-16	95.0	85.2

It was definitely found that complete fertilizers (NPK) can increase yields sufficiently to pay for the cost of such fertilizers, besides raising the quality of the peas produced, which will usually sell at a premium. It is concluded that pea growers need have no fear of using potash on their farms, for it seems to have a definite beneficial effect upon the quality of canned peas.
—*L. Van Bossche*

Potash Tripled Cotton Yield

(*From page 7*)

the potash used. I received an average of 6 to 6½ cents a pound for my cotton from the fertilized field and an average of 1½ cents per pound less from that where no potash was used, this being due to the shorter staple and the inferior quality of it.

Because of the small, knotty bolls I found it much more difficult, of course, to pick this unfertilized cotton. The pickers didn't want to pick it and wouldn't do so as long as they could help it. I paid 30c per 100 pounds for picking where the potash was ap-

plied and had to pay 40c where it wasn't, thus making it cost me 10c per 100 more for the picking, and the pickers made less per day.

From the time the cotton was about two weeks old, that which was growing on the land receiving potash was more thrifty and grew off better. The stalks grew to an average of three times as large where the potash was applied as where none was used.

On our type of soil it is absurd to try to grow cotton without potash, and it has been my experience that 200 pounds of the 20 per cent kainit will, on an average, double the yield and frequently triple it.

Erosion Tolls 21 Times That of Annual Crops

The plant food removed from the fields and pastures of America every year by erosion is at least twenty-one times more than that removed by the crops harvested, says the United States Department of Agriculture.

The plant food taken by crops can be restored in the form of fertilizer, but that taken by erosion can not be restored, because this ruinous process takes the whole body of the soil, plant food and all. Land impoverished strictly by plant-food depletion, as sometimes results from continuous growing of the clean-tilled crops, is not worn-out land; the only worn-out land is that which has been so badly washed by erosion that it would be entirely futile to undertake its reclamation. Such land is lost to agriculture.

The Inquiring Mind

(*From page* 12)

Dr. Lyon in 1908 devised and directed the building of the battery of lysimeters which for nearly a quarter of a century has been in constant, profitable service at Cornell. This initial installation of lysimeters led to their use in other experiment stations of the country, where similar work is carried on.

By use of the lysimeter is measured the amount of water that percolates through a given depth of soil. Such determination provides valuable data on soil conditions; but Dr. Lyon has been more concerned in finding, by analysis of the drainage water, the amount of plant food lost by leaching from the soil under known cropping systems. In the lysimeter method, a small block of soil, entirely isolated by appropriate means from the soil surrounding it, is used. Effective and thorough drainage is provided. The advantages of the method are that the variations found in a large field are avoided; the work of carrying on the study is not as great as in a large field; and the experiment is more easily controlled.

The celebrated sets of lysimeters established by Lawes and Gilbert at Rothamsted Experiment Station, England, in the late seventies, consist of blocks of soil one one-hundredth of an acre in surface and 20, 40, and 60 inches in depth, respectively, isolated by means of trenches and tunnels, sup-

ported by perforated iron plates, and supported from the surrounding soil by stone walls. Facilities for catching the drainage water are provided under each lysimeter.

Lyon's Lysimeters Different

At Cornell, the lysimeters devised by Dr. Lyon are of somewhat different form, being tanks of cement sunk in the ground and each about four and one-half feet square and four feet deep. A sloping bottom is provided, with a drainage channel opening into a tunnel beneath and at one side. As the tanks are arranged in two parallel rows, one tunnel suffices for both. The sides of the tanks are covered with asphaltum to prevent solution. As the soil must be placed in the tanks, some disturbance of its structural condition occurs, but that in time is obviated, so that data obtained regarding the rate of flow and the composition of the drainage water become reliable. Experiments made with the lysimeters must, however, be of long duration. They have given Dr. Lyon results of inestimable value to soil scientists and to farmers.

In 1907, Dr. Lyon made another innovation by the laying out of small field plats on which to repeat each soil treatment four times. The plats being each only one-hundredth of an acre in area, the accuracy of experiments conducted on them depends on repetition of the tests, rather than on area of the plats, as was previously the vogue. Work on these small plats did not entirely satisfy Dr. Lyon, however, and he devised a further improvement in the technique of field experimentation in the form of "frames," which also have come into use at several other experiment stations. The need for their employment was indicated by studies he had made in previous years, relative to errors occurring in other methods of field plat experimentation. His new "frames" have proved especially useful in soil fertility experiments, and some 200 of them are now in use at Cornell.

How Frames Are Made

In making the artificial plats or frames, the soil is removed to plow depth and saved; then walls 6 inches in thickness and sunk 10 inches in the soil are built to a height of 20 inches, which allows for a rim of 2 inches above the soil when the frame is filled with 8 inches of surface soil. Two inches below the top of the wall is at least one opening about an inch in diameter for drainage of water that otherwise might stand on the surface. Tile drains also are laid outside and slightly below one wall of each frame. The foundation for the frames is graded, so that when filled, the soil in each frame will be exactly level. The frames now in use are 4 feet 8 inches by 9 feet 4 inches. They are filled with soil that has been carefully mixed

An interior view of the lysimeters at Cornell University.

and weighed, so that there will be an equal quantity of surface soil in each frame. A full description of the frames is given on pages 596-602 of Vol. 18, No. 7, of the Journal of the American Society of Agronomy for 1926.

Fame in Other Lines

While field experimentation has engaged much of Dr. Lyon's attention, his efforts in other lines has been even more important. He has gained fame by his research work on nitrogen transformations in the soil; the effects of plant growth on the accumulation of nitrates; the syntheses of nitrate nitrogen, leading to the disappearance of nitrates through the activity of the synthesizing organisms; nitrogen fixation; and nitrogen level of soil, as influenced by these various transformations.

The cause of injury to orchards, through the maintenance of sod, was shown by him and his co-workers to be due to the influence of grass in removing the nitrates, thus bringing about a lack of available nitrogen for tree growth. His bulletins, published by the Cornell University Agricultural Experiment Station, present data on many other phases of soil research; and they also are summarized in his wonderfully complete and well-arranged text-books, including "Principles of Soil Management" (with Fippin); "Soils, Their Properties and Management" (with Fippin and Buckman); and "Soil and Fertilizers" (with Buckman).

Dr. Lyon is associate editor of The Journal of The American Society of Agronomy, a Fellow of the American Society of Agronomy, and in 1912 received the Howard N. Potts gold medal and the diploma of the Franklin Institute. In 1913 he studied in the bacteriological laboratory of Professor Löhnis in Leipzig, Germany. He is a clear and concise writer. In his books for students, subjects are paragraphed in a striking and conclusive manner, of which the following is an example:

"The effects of potash are more localized than those of nitrogen and phosphorus. Potash is essential to starch formation, either in photosynthesis or in translocation, and is a necessary component of chlorophyll. It is important in grain formation, giving plump, heavy kernels. In general it tends to impart tone and vigor to a plant. In increasing resistance to disease, it tends to counteract the ill-effects of too much nitrogen, while in delaying maturity, it works against the ripening influences of phosphoric acid. In a general way, it exerts a balancing effect on both nitrogen and phosphate in fertilizing materials, and consequently is necessary in a mixed fertilizer."

Here is another of his arresting statements: "Just exactly what was the cause of the ice age is still under dispute. The most probable theory, both as to its occurrence and as to its disappearance, is that a change in the carbon dioxide content of the atmosphere took place. It is believed that doubling the amount now present would bring about tropical climate in the temperate zones, while halving it would cause frigid conditions and a probable return of the great ice fields."

Best Wishes

We should like to offer further quotations, but it must suffice to advise our student friends to "read, mark, learn, and inwardly digest" the writings of this great scientist and teacher, as eminently sound and authentic.

We sincerely hope that he may be spared to throw more light on the subjects he has found entrancing, and to dwell happily for many years yet in his charming home on "The Circle," overshadowed by the historic buildings of the New York State College of Agriculture.

So, here's long life, love, and luck to "Lysimeter" Lyttleton Lyon, of Cornell!

Fertilize Alfalfa—Then Pasture It

(*From page* 13)

However, a uniform seeding of Grimm alfalfa was secured in Spartan barley after the soil had been limed with seven yards of marl per acre and fertilized with 300 pounds of 2-12-6 fertilizer.

In 1930, the alfalfa was cut for hay, yielding less than a ton per acre. Obviously, something was wrong. The advice of George Grantham of the Soils Department was sought. Grantham long has been investigating the plant-food needs of the various crops commonly grown on the sandy soils of Michigan.

"Need More Potash"

"You need more potash for alfalfa on that type of soil," said Grantham, and following his advice, 300 pounds of 0-10-10 fertilizer were applied as a top-dressing immediately after removal of the hay. In the spring of 1932, Dr. C. E. Millar advised that the paddocks be top-dressed early in April with 300 pounds per acre of 0-14-14 fertilizer.

That these fertilizer applications were effective was evidenced by the fact that on May 17, with a better growth of alfalfa than was available the preceding season, the Guernseys were turned into paddocks to begin the 1932 grazing.

Did pasturing the alfalfa actually pay? With milk testing 4.6 per cent butterfat worth $1.25 per hundred, these cows did all the harvest work and paid approximately $20 per ton for alfalfa. As a cash crop, it was worth $12 per ton at the farm. Incidentally, the manure was left in the field.

What happened to the stand? In these experiments, the pastured alfalfa went into its fourth winter in excellent condition. One southern Michigan farmer expressed himself, "Maybe I did kill out my alfalfa by pasturing it with cattle and sheep, but I never had six years of better grazing."

Lawn-mower clippings to simulate grazing have been injurious to alfalfa, but cows, or even sheep, do not work like a lawn-mower which at one swing defoliates the plants. Judicious grazing is more comparable in final results to the harvesting of alfalfa for hay.

Even though it take a greater toll of plants than hay harvest, the grazing of alfalfa may prove profitable. There really is no good reason for keeping most fields in this section in alfalfa continuously. Four to six years ought to be long enough except on steep or very stony areas.

Will Alfalfa Carry Sheep?

Interested sheepmen have come to us with this: "Your records for grazing alfalfa with dairy cattle will hold water all right, but we want to know what will happen if we pasture alfalfa with sheep. That's what will tell the story." For years, sheep have been known as the class of farm animal under whose grazing it is most difficult for pasture to stand up. Fortunately for the many mutton and wool producers of the Midwest situated on farms where alfalfa can be grown, we have records on this very subject, worked out on the same Kellogg Farm, but on a little different soil type.

On the 14 acres where the sheep pasture tests were carried out, the soil is a Bellefontaine sandy loam. It generally has a two-inch surface layer of dark, grayish-brown sandy loam or fine sandy loam and leaf mold which is underlain by about four inches of grayish-brown sandy loam containing some small gravel. Below this comes

a layer of yellow sandy loam, then a layer of reddish-brown, coherent sandy clay which is sticky when wet. From here down, it is loose sand, gravel, or boulders with occasional spots of limestone and clay. The first four layers of soil are distinctly acid. The soil generally is droughty and of low productivity.

On this soil the problem was what plant combination would provide the best and most continuous pasture for sheep and more particularly, which one would show the most pounds of gain at the scales.

Good Pasture for Sheep

With alfalfa pasture for sheep as with alfalfa pasture for dairy cows we learned the same principle, namely, that this legume growing on a sandy, droughty, infertile soil must have plenty of lime and fertilizer, preferably at least as much potash as phosphorus, and after this has been supplied, alfalfa is outstanding as a pasture for livestock.

Outside of the check plots, the basic treatment was seven yards of marl with 300 pounds per acre of 2-12-6 in 1929. This same dose and analysis were repeated in 1930. In 1931, only nitrogen carriers were applied on three of the grass paddocks.

But in 1932, the basic treatment was changed to 300 pounds per acre of 0-14-14, as much potash as phosphorus. It should be stated in this connection that the most outstanding pasture results were secured during the season of 1932, following this treatment.

In the 1931 trials, alfalfa had 96 sheep-days grazing advantage over sweet clover, gained mostly in June, and went on to add still further to its advantage in August and September when sweet clover furnished nothing. The alfalfa and sweet clover were the same age and had been treated in the same way.

In this same experiment, alfalfa was compared with grass pastures with and without fertilizer treatment. The results were measured by grazing one-acre duplicated paddocks of each treatment with Western lambs. Alfalfa was markedly superior to the grass pastures, fertilized or otherwise, especially in net returns after deducting the fertilizer charges for the season and the cost of grain fed. The lambs paid practically market price for the alfalfa hay and harvested it themselves.

The outstanding fact gained from the 1932 trials is that alfalfa pasture as grazed by these sheep is the only one to return a worthy margin above feed and fertilizer costs. Fertilizing grass pastures under the conditions of this experiment did not pay out. The net returns from the alfalfa used as sheep pasture were well worth while and undoubtedly better than they would have been from alfalfa cut for hay and used as a cash crop at 1932 hay prices.

Bloat Can Be Prevented

Many farmers fear to pasture alfalfa on account of bloat. Both investigators and practical farmers have learned that losses from bloat may be practically eliminated by three simple practices: 1—Keep water and salt readily available at all times; 2—Give the animals a good fill on dry feed just before first turning them in on alfalfa; and 3—Keep the animals on the alfalfa continuously so they will not get excessively hungry or thirsty and overfeed.

In previous statements in this article pointing out specific returns from alfalfa pasture, there is no intention to compare it with alfalfa hay to the disadvantage of the latter. We need alfalfa hay on our farms in Michigan and although there are 750,000 acres growing in the State at the present time, there are still many Michigan farmers who could profitably grow alfalfa. And for those who have sufficient alfalfa for their hay requirements, there is still the opportunity of utilizing an additional acreage to good advantage as pasture.

Faith Anew

(*From page* 6)

a little coaxing with fertilizers and other skillful measures, the weather could be out-foxed nine times out of ten. And in the tenth time, the bins were full anyway.

And every man went out and looked over the meadows, pinching at the plant crowns, pulling at the corn silks, stroking the calves, and patting the deep fleece of the flocks. His thoughts were forward and his glance was skyward. To these men whose fathers before them fled from the terror of inaction and slavery, the ownership and suzerainty of wide acres in a Land of Freedom intoxicated them into a zest for limitless production.

While they agreed with and applauded the critic of extension systems for enhancing the bounties flowing from the horn of Ceres and Pomona, they secretly delved amain into the books and bulletins, rejoiced in 4-H endeavor, and enlisted in the finest army of food-makers that any age has ever accepted with indifference.

SO now their courage is to be tested in quite a different way, having come to the cross-roads beyond which bounty meets charity. There has to be an uprooting of old basic traditions for this year of trial, and the spirit of individual enterprise that founded farming must temporarily subject itself to cooperative control that *is* control.

If victory can be gained in that way without causing anybody to suffer unjustly more than he has already suffered, the outcome may mean the glory of a new morning in the sweet meadows and content once more for the countryman. At any rate it is not tyranny, but the application of self-discipline to correct the old "competitive cooperation."

William Allen White has said that the brood sows will throw obstacles in the path of the farm relief law, willy-nilly, because it stifles the maternal instincts and hogs do not understand clearly the pressing requirements of the hour. Possibly there are others besides the hog who also fail to sense the present responsibility resting upon farm counselors.

Yet in my State where men of varied ancestry till the soil, I find much faith in the future and a reawakened verve not wholly related to the verdant season. Our congress of nations at the plow over here is bound to demonstrate to the Old World that willing compliance with adjustments in times of stress can be attained in a democracy, and that their ancestors did not sail the seas and break the sod simply for a chance to mar freedom with selfishness.

Blood relations of our farmers living across the ocean likewise have felt the pinch, and they too must exert self-regulation for the sake of nature and themselves. A recent journal received from New South Wales might bring brother-in-misery comfort to some of my British contemporaries here. It is called "It's Nice to be a Farmer," and concludes:

It's nice to be a farmer, the life's just full of fun;
It's sweet to sell your oaten hay at 15 bob a ton;
When eggs are four pence ha'penny and wheat is one and nine,
Merino wool is seven pence—your bit of life is fine.

It's nice to be a farmer and work from dawn to dark,
A hut of slabs and wattle dabs and an elegant roof of bark;
It's nice to have your fruit trees and send your fruit to town,
And then be told your fruit is sold and you owe them half a crown.

BEIN' TOOKED

"Does yo' take this woman for thy lawfully wedded wife?" asked the colored parson, glancing at the diminutive, watery-eyed, bowlegged bridegroom, who stood beside two hundred and ten pounds of feminine assurance.

"Ah takes nothin'," gloomily responded the bridegroom. "Ah's bein' tooked."

Brown: "Did you hear about Mr. Goofus, the bridge expert, being the father of twins?"

Lester Butler: "Yes, looks like his wife doubled his bid."

"Now, children," said the teacher who was trying to boost the sale of the class photographs, "just think how you'll enjoy looking at the photographs when you grow up. As you look you'll say to yourself, 'There's Jennie, she's a nurse; there's Tom, he's a judge;' and—"

"And there's teacher, she's dead," came a voice from the back of the class.

The reason we never hear of women after-dinner speakers is that they can't wait that long.

A Scotsman, upon entering a saddler's, asked for a single spur.

"What use is one spur?" asked the man.

"Well," replied Sandy, "if I can get one side of the horse to go, the other will hae to come wi' it."

SPEEDY

Drunk (entering street car): "Shay, will you put me off thish thing when we get where I'm supposed to get off?"

Street Car Conductor: "Yes, sir, you get off right here!"

Drunk: "Gosh, here already. How time dush fly!"

Charles Lamb had no patience with prudery. Some small boys were enjoying a swim when he passed with a very prim lady. "Isn't it shocking, Mr. Lamb," she said, "to see those little boys in bathing without any clothes?"

Lamb peered in their direction. "R-really, M-madam," he stammered, "until you c-called my attention to it, I wasn't sure whether they were little b-boys or little g-girls."

HAIR-RAISING TALE

Then there was the man who went for raising rabbits and did not take into account their affectionate nature and was soon bothered by superfluous hares.

A divinity student named Tweedle,
Once wouldn't accept his degree,
'Cause it's tough enough being called Tweedle,
Without being Tweedle D. D.

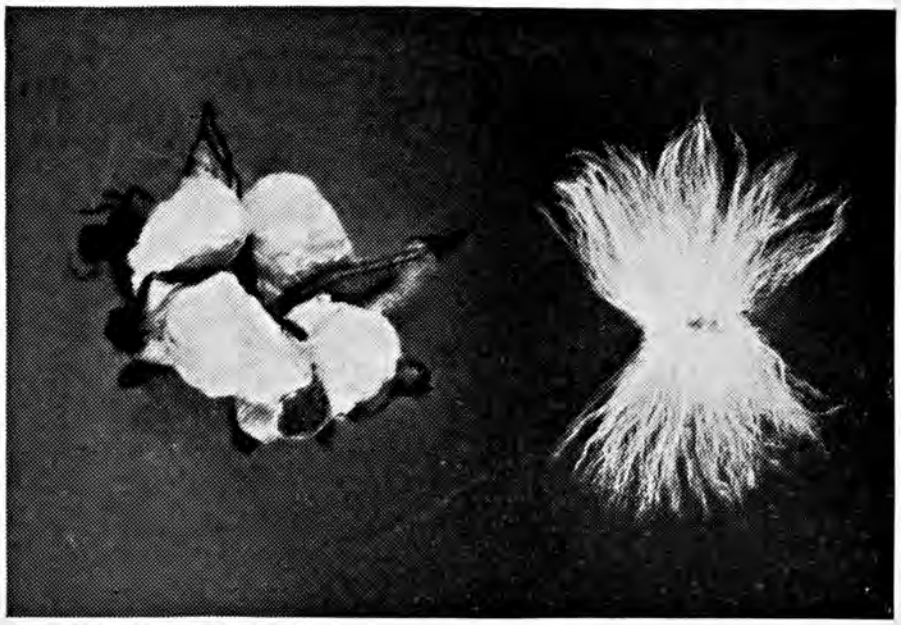
Jacob: "Why did Ikey invite only married people to his wedding?"

Abie: "Well, in that way he figured that all the presents would be clear profit."

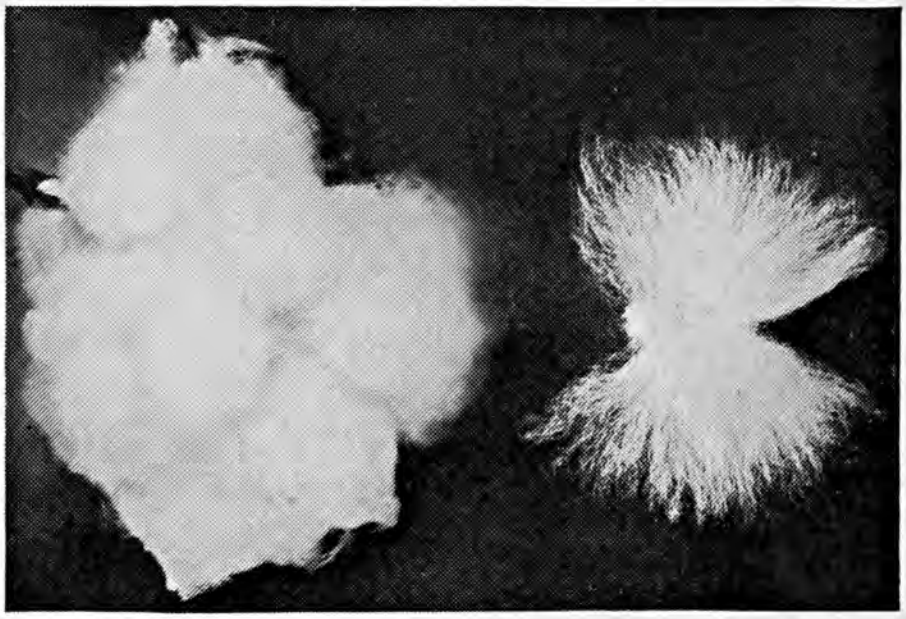
PREVENT RUST
Top-dress with Kainit

RUST did this

Both of these bolls and lint samples were taken from the same field. The whole field received complete fertilizer containing 3% potash. Part of it also was given an extra heavy application of potash. The cotton without the extra potash rusted badly and yielded only 770 pounds of seed cotton per acre. Its lint, measured seven-eighths and was not uniform, with some long and some short fibers. The cotton with the extra potash did not rust and yielded 1,640 pounds of seed cotton per acre. Its lint measured a full inch and was uniform high quality.



POTASH did this



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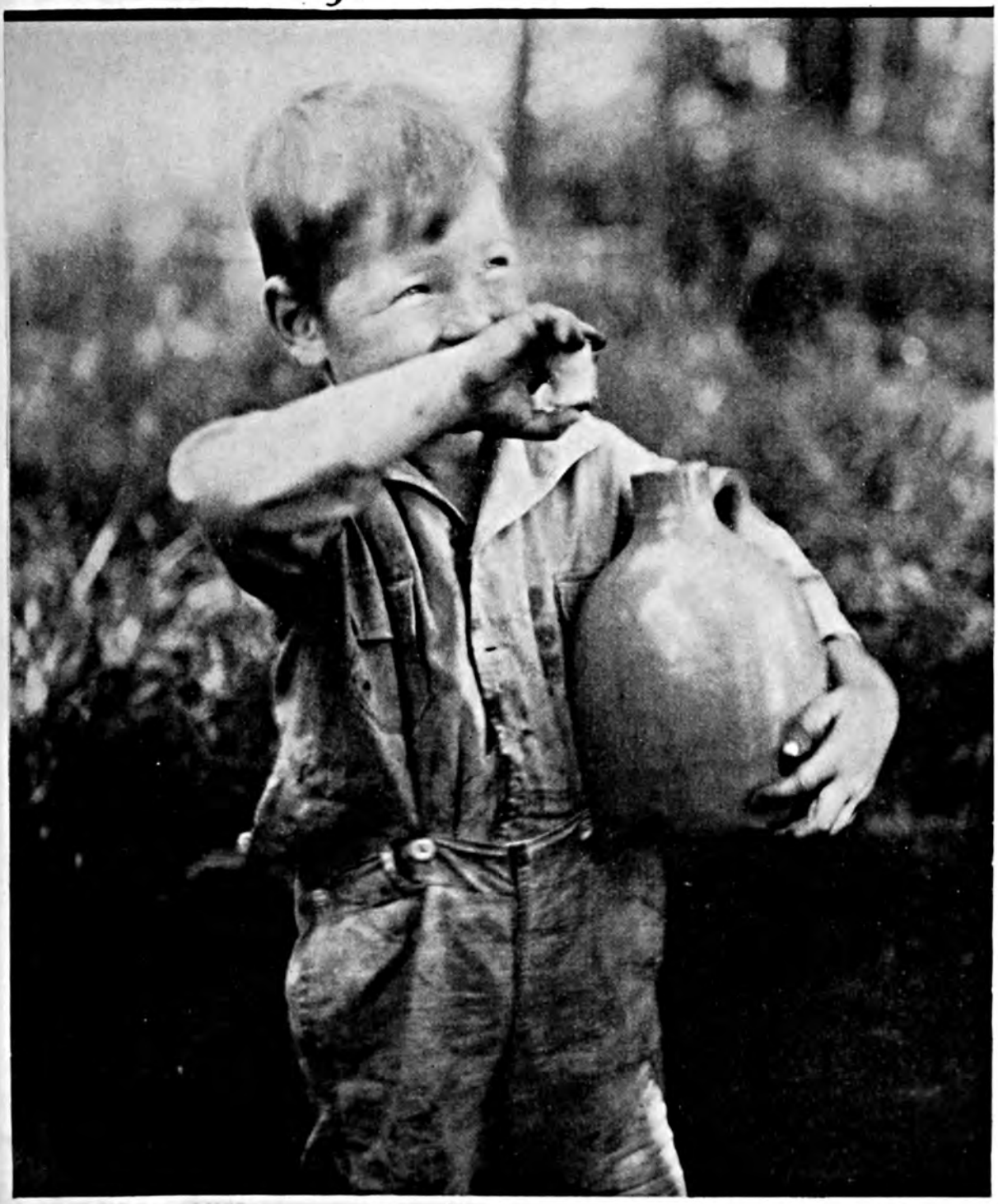

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"NOT SO BAD AT THAT!"

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Pertinent Comments on the Brain Trust.

The New Deal

By Jeff McDermid

THE fresh deck for the New Deal was cut by the nimble fingers of the so-called Brain Trust. It is not the first time that the Federal government has been blessed with brains, but it is the first time that the announcement was made in advance of performance. In previous times when the product of the cerebellum became evident in national affairs, the country awoke to its good fortune unexpectedly, like good crops or an epidemic of flush times. Nobody had deliberately set out to perform any miracles of logic or triumphs of shrewdness.

So the value lay in getting more than one bargained for, in being surprised that folks who were elected as politicians managed to survive the pressure of expediency and come through with intelligent achievement. Indeed if one examines closely, it is apparent that our elder statesmen of many decades ago who had the widest publicity attached to the dimensions of their domes suffered the most cruelly from the crude and unappreciative

proletariat. Take Webster, Calhoun and Clay, or even Bryan, Reed and Champ Clark (to deviate a trifle from the standard) and you notice at once that advance publicity regarding erudition has not garnered votes for top places as generously as the copy-books make out.

Another mighty important point in this latest addition of mental capacity to our national galaxy lies in the plain statement that these individuals were hand-picked, and not blown into office by explosions of the ballot. Another difference lies in the educational character of the Brain Trust.

Hitherto we have used colleges to train go-getters, to encourage laissez-faire to the limit, to give folks the polish with which to dazzle dollars out of somebody. Several decades ago colleges were devoted to arts and rhetoric and philosophy, but most of their graduates are dead or standing in the bread lines.

SINCE the trying times of 1929 and afterward, and perhaps for a period before that, if we trust observers, the best minds of universities have gone beyond merely declaring that something is, was, and must be wrong. They foregathered with young people whose ideals had ever been progressive, but who fast succumbed under old teachings to a dull state of acceptance and acquiescence.

The alert professors were spurred on by the challenge and the threat of the times to erect new forms in which to pour new mixtures of constructive concrete. These more awake teachers were not content to let a whole generation of youth pass in review without a question as to the why and wherefore. Other dons had been drones to be sure, and yet their flourishing signatures on faded diplomas hung in handsome offices behind mahogany desks. It was too much of course to expect the elder pedagogues to adopt new attitudes, even when the sheriff seized the mahogany desks.

For as long as there was a storage chicken in every pot and a mortgaged car in every garage, nobody seemed to care much about the social order or the growing percentage of the submerged on the one hand and the unearned increment on the other. Decadent villages and standardized hoop-la, feverish plunges for zest and inequality of opportunity—these disturbed but a very few in the eminent faculties.

And now it happens that examples of that very few are sitting at the right hand of the Law Givers and ejecting bolts of lightning upon those wayward and forgetful worshippers of the golden calf. If they surrender and come to the mourner's bench, their redemption is assured, but woe unto them if they persist in the old shell game much longer.

Many casual observers have been misled into confused ideas that the alleged Brain Trust is intent upon dictatorship. One might carry the idea to some length along this line, if it were true, and say that what occurs above the collar usually influences most human endeavor. What an empty stomach or an aching tooth demands is conveyed to the brain cells before you go to dinner or the dentist.

BUT we cannot forget that the harassed old brain is confronted with many emotions, many varied claims and rival stimuli from all members of the body, and that it is not such a free agent as one might think. Hence if we look at the Brain Trust in that same way we see that all the bunk about those super-intellegentsia being czars and despots is modified by practical conditions.

The gang, like the ganglia, reach the inner consciousness of the Brain Trust more or less regardless of cold insulation or aloofness. The gang gets in their work as the days go by, the masses mass, and the willful ones ride their hobbies, so that charted control takes on social and political color sooner or later.

No doubt there are two kinds of Brain Trustees, if we may so dub the mental healers in our national clinic. One kind of Brain Trustee is wholly engrossed in the abstract and far-flung philosophy of the game, sees only the woods and not the leaves or branches, envisages the mountains but not the soil grains, regards it as a grand game of chess with people as wooden pegs. To him the key men alone are worth consulting, as through them the combination moves and evolves. Small fry and ordinary mass mortals are helpless

in the path of great forces and have about as much to do with ultimate results as tadpoles in the cosmic whirl.

BUT leaning out of the windows of the Toplofty Tower to wave occasionally to the wayward traveler below, are the other Brain Trustees, the ones with a trifle more of the conciliatory human attitude. They may take pleasure in a parade, a demonstration, or a drive once in awhile; they may catch some delight from the sweaty heaving of the untutored bread-winning copy-cats who form the bulk of our national life. They partake a bit more of the journalist's consuming love of the real, the bizarre, the pitiful, and the emotional.

It is this second group of Brain Trustees who are probably going to do more to get the mass acquainted with or appreciative of the incense from the sacred fires than are the first group, who stir the mixture and test its potency. This is so easy to see that we need spend no time on it. Moses on a mountain was all right, but Moses tapping the rock for the weary pilgrims in the desert was better. You have to get down among folks enough to know them before you can influence them much, unless you do it by harsh decree.

In setting forth the claims made for the Brain Trust in public affairs, I do not think it necessary to go quite to the extreme of Doctor Nicholas Murray Butler, who in his zeal for the New Deal in cap and gown instead of motley, exclaims that the era of "brains instead of blockheads" is come to fortify us.

IT is quite admissible that some of the antics of the "blocs" in Congress have approached the ridiculous, but one must never lose sight of the clouds on the horizon. It is not at all impossible that if wisdom cannot overcome whims, if logic cannot defeat laissez-faire, and planning cannot satisfy prejudice by means of the brain route, our glorious independent citizenry may drift into revolt. That is, they may abandon the ship of State piloted by fraternity men in gold braid and rush up the gang-plank of the Show Boat with Huey Long in fulsome command on the main deck.

Deeper than any consideration of who is in temporary power in this crisis are the social consequences involved. It is our thesis that beneath all the fun we have been having about the Brain Trust in the newspapers and the gallery of Congress, that group of serious thinkers really do possess an abiding sense of social justice, fair play, and equality of life and opportunity. It would be for the best interests of us all, no doubt, to have their principles woven into the fabric

of our political and social economy—always checked and tempered with practical considerations, but not by expediency.

It is perfectly sound for makers of books to become molders of life. That practice began with the Bible and there has little been contributed since to throw the Bible's rule of conduct very far askew. But it takes Do-ers to put the ideals of Dreamers into active forces. Thus we have arrived at a touchy point where we must admit that by and large the Brain Trust are our best doctors. Now the question is: Who will hold our noses while the medicine is poured down or give us the ether while the operation is performed? After all, will we follow the prescription and keep the bandages on? Or will we go skylarking again and get re-infected with the same old virus?

Probably the easy-way-out through Inflation is preferred to the Brain Cure. This seems to be strikingly true in agriculture, where the adjustment program has not only taxed the brains of those who offered it but perplexed the ingenuity of the ones who are obliged to work it out. Along comes Inflation and puts up a Punch and Judy show in front of the Main Tent where the Control Circus and its Managed Menagerie has a license to play before packed houses.

THE extra nickel today looms bigger than the parity dollar of tomorrow. Bumper bushels in 1933 look promising especially if there is a shift from intangibles to material commodities in the buying market. Such stumbling blocks to far-sighted programs with world horizons in mind are regretted realities with which the Brain Trust and all its allies must cope this season and perhaps for another.

Opportunities for the exercise of brains in farming have passed through various stages. Discrimination in the choice of a region and a home-site within the region came first. Successively after that brains stepped in to save labor in mechanics and management, in soil improvement, and in livestock breeding and plant pedigree work. Brains applied by farmers themselves and their allies have for the most part been used to render material support rather than for social organization or future planning.

While farmers have been adverse to admitting that colleges or extension folks or scientific leaders contribute greatly to the efficiency with which agriculture overproduces, they are quick to point out that government "interference" has caused overexpansion and maladjustment in farming. This is somewhat inconsistent, but thoroughly human.

IT is probably team-work after all that enabled farmers to produce and deliver such big loads of provisions, the joint efforts of the practical man and the dreamer. Having been so successful in multiplying man-power to a point where it is easy for a good wheat grower to feed several hundred people with breadstuffs each year, what can the team do to keep the grower from despair and the hundreds from hunger? The Brain Trust wants to tackle that from two points—adequate wages at reasonable hours for balanced output so that hunger will be appeased, and adjusted and controlled acreage so that the grower may not break the market. If Science and Extension cannot follow such a trail in the next few years, the laboratory and the institute platform will be vacant, while the farms will languish and the factories rust.

Surely this is far too serious a period for men in high places to indulge in raillery at the expense of earnest Thinkers. Yet one day in April in the Senate at Washington there was considerable mirth and buffoonery about the formula worked out in higher mathematics by a farm econ-

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A one-year-old tung-oil orchard at the South Mississippi Experiment Station, Poplarville, Mississippi.

Tung-oil Trees

By E. B. Ferris

Vicksburg, Mississippi

IT is seldom that one finds a newly introduced crop that has so impressed the thinking public with its possibilities as has the tung-oil tree recently brought to this country from China.

While engaged for many years in agricultural experimentation, the writer first heard of this tree less than 10 years ago when its possibilities for a large section of the South were being discussed by the horticulturist of the Southern Railway at a local Chamber of Commerce meeting. This led soon after to the setting of a few trees and the planting of a few nuts on the South Mississippi Experiment Station at Poplarville. These trees when three years of age bore a few nuts and since have rapidly increased their production. Other plantings had been made previously in different sections of the South, but this generally had not been known.

The tung-oil tree appears to be native to China where it grows wild on all types of soil from the mountains to the sea, the only limiting factors being temperature and the ability of the soils to grow other crops of greater commercial value. In China the oil is expressed by the crudest hand methods, but is so highly regarded as an article of commerce that great care has to be exercised to prevent its adulteration with all other kinds of vegetable oils. It has long been exported from China to the countries of the world and especially to this country which imports annually millions of dollars worth, largely used in making waterproof varnishes that, in turn, enter into the manufacture of innumerable articles of commerce. So important is this oil in the paint and varnish trade that the manufacturers of these products have had much to do with the introduction of the tung-oil trees into

the country. It is said that no satisfactory water-proof varnish can be made without the use of some of this oil.

The possibilities for the use of this oil by American manufacturers are many, and if produced as a domestic product, its increased consumption here would be nothing short of phenomenal. The oil, however, is not the only thing of value in the nuts, the meal and hulls left as by-products having high value as fertilizers. However, being poisonous to animals, they can never equal the by-products of our cotton seed.

Study Adaptation

In very recent years scientists have been studying the possibilities of these trees for parts of the South adapted to their growth. They have been aided in every way not only by the paint and varnish manufacturers, but as well by the owners of large bodies of cut-over lands interested in finding a crop suited to such lands and one that would not in the end disturb the business of the country by further increasing its agricultural surpluses. Tung oil seems to meet the demand better than any other crop of recent introduction. Everything goes to indicate that it is adapted to all the soils of the Gulf Coastal Plain, and the fact that it was unknown to the general public five years ago and has already been planted to thousands of acres in a single county certainly indicates that it has great possibilities.

Visiting recently the experiment station where the initial plantings had been made in 1927, we were told that a single individual had already set 9,000 acres to the trees and had recently purchased an additional 13,000 acres which would be planted in the near future. The director of this station also said that within a radius of 40 miles of this original planting some 18,000 acres had already been set and that this acreage would be doubled within a year. These plantings are not only being made by large operators but by innumerable small farmers who are planting a few acres on many farms, utilizing lands not now needed or suited for general farm crops. The American Tung-oil Products Corporation has recently come into the county and already has two million seedlings. They will plant these and others that they grow on their own lands or cooperatively with local landowners, the object being to increase production and thus make a profit out of handling the crop.

Little is definitely known about the best methods of preparing and fertilizing the land or of cultivating the trees when planted. The largest operators are using immense caterpillar tractors to pull specially designed subsoil plows which on the rough cut-over lands cut all roots, tear down small trees, and actually pull up the large pine stumps. These are run on contour rows about 20 feet apart where the trees are to grow 15 to 20 feet apart. Smaller plows follow and prepare a seed-bed where the trees are set or the seed are planted where they are to grow. On such large plantings little cultivation is done, the chief care being to protect the young trees from the hazard of fire, likely to occur in fall and winter when grasses growing between will burn. The experiment station serving the section has inaugurated tests to determine the best methods for thus preparing the land.

The Best Fertilizer?

Some of the larger growers have not yet begun the use of fertilizers, but since the soils of the section are naturally deficient in all three elements of plant food, the general opinion is that the trees will have to be fertilized for successful growth. To this end the experiment station has set aside a number of plats of ground where the needed plant foods—nitrogen, phosphorus, and potassium—are varied in many ways, two remaining constant

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Learning *from* Students

By W. B. George

Lecturer on Soils and Chemistry, Kemptville Agricultural School, Kemptville, Ontario

THROUGH its agricultural school and largely through the interest and work of the first-year students at this school, eastern Ontario farmers are learning the profitable use of fertilizers. That this idea of using students as emissaries of the teachings of the school is sound is evidenced in the results on home and neighboring farms where fertilizer demonstrations have been conducted.

The Kemptville Agricultural School was established by the Ontario Government 15 years ago to especially serve the agricultural needs of eastern Ontario, roughly an area of 7,000,000 acres, one-half of which is cleared and occupied. As well as conducting courses in agriculture for farm boys and household science for girls, a 300-acre farm is operated and herds of purebred animals are maintained. The primary purpose of the farm operations, according to Professor W. J. Bell, principal of the school, is to demonstrate to the farmers of eastern Ontario how the land may be handled in a practical way to maintain and increase fertility, control weeds, and economically produce the necessary feed for livestock.

Special problems in soil management exist in large portions of eastern Ontario due to the geological history of the soil itself. Large areas are of glacial origin, the parent rock of which was naturally low in plant food. Some are composed of drift sand. On the other hand extensive areas adjacent to the Ottawa and Rideau rivers are of exceptional fertility, unsurpassed in productive power in any other portion of the Province.

A Pasture Demonstration

Left: No Fertilizer. Right: 4-8-10 applied in the spring.

Need for Fertilizers

Undoubtedly the problem of soil fertility is one of major importance and since the inception of the school has received special attention. Sweet clover and alfalfa have been utilized extensively in improving the humus content. These supplemented by commercial fertilizers have transformed what were at one time poor, unproductive fields into fertile lands producing abundant yields of cereals, clovers, and root crops.

Due to the lack of information in the proper use of fertilizers, demonstration activities were inaugurated in many sections not adjacent to the school, so that farmers might observe first-hand the effects of added humus and mineral elements.

On one farm basic slag and muriate of potash were used to improve the alfalfa crop. That potash was a limiting factor was shown in the yields secured, 100 pounds of muriate bringing the yield from 6,880 pounds of green hay on the unfertilized area to 15,520 pounds on that receiving the muriate of potash. Combinations of basic slag and potash also gave increased profit.

The residual effect on corn of fertilizer applied on potatoes the previous year. Left: 1,000 lbs. 4-8-10 Right: No fertilizer.

On another farm, yields of alfalfa were increased by more than 90 per cent by an application of 400 pounds per acre of 0-12-15. Pasture fields have responded to fertilization just as spectacularly, and as eastern Ontario is essentially a dairy section, farmers are making use of the demonstration results on a large scale.

To further the spread of knowledge on the use of fertilizers, the idea of carrying on demonstrational work through the first-year students of the school was conceived. These students are instructed in the proper procedure of applying fertilizers and are assisted by being supplied with the fertilizer and by frequent visits during the planting, growing, and harvesting seasons. Additional interest and encouragement are inspired by prizes awarded for these projects on a basis of merit in recording observations and results of the tests.

Through these "student" demonstrations, farmers in many different districts of eastern Ontario are afforded an excellent opportunity of determining the results of fertilization under local conditions.

Citing results promiscuously selected from returns during 1931 and 1932, the following will show some of the benefits derived:

Example No. 1—An 0-12-15 fertilizer applied at the rate of 400 pounds per acre on alfalfa secured a yield of 9,920 pounds of green hay, against an unfertilized yield of 5,120 pounds. In this particular case, owing to the dry season in 1931, no second crop was secured, but it is stated, "the fertilized area withstood the dry weather much better than did the unfertilized section, and when the fall rains commenced, the fertilized area thickened up and commenced growth much more rapidly than did the unfertilized area."

Better Quality

Example No. 2—Fertilizer analyzing 4-8-6 and a 4-8-10, applied at the rate of 1,000 pounds per acre on potatoes gave yields of 242 and 244 bushels respectively, against a yield on the unfertilized check plot of 180 bushels per acre. Citing from the report handed in, "The difference in the results does not show the real difference, for from the 4-8-10 plot there were fully 10 per cent more marketable potatoes than from the 4-8-6 plot." The potatoes from both fertilized plots were more uniform, of better quality, and possessed very little scab as compared to those from the unfertilized area.

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A Practical System *of* Soil Diagnosis

By A. J. Patch

Assistant Editor, Michigan State College of Agriculture

GOLD seekers who have been prospecting the richest pay dirt in the world, farm lands, will be aided in their search by a field test perfected by Dr. C. H. Spurway, soils department, Michigan State College, for determining amounts of the various plant foods present in soils. The test will perform in a few minutes analyses comparable to those which required hours and days of laboratory work.

This test shows the presence and the amounts present in the soil of nitrates, phosphorus, potassium, calcium, carbonates, ammonia, nitrites, magnesium, iron, aluminum, manganese, sulphates, chlorides, and sodium. Determinations are made by adding reagents to a soil extract obtained by treating a soil sample with water containing one drop of a solution of one part pure acetic acid and three parts of distilled water.

Dr. Spurway has spent several years in developing this test to the point where its results are accurate and its method is simple enough so that it can be used by persons who will follow directions carefully in selecting soil samples, in using reagents, and in observing the soil solution reaction when the reagents are added. The presence of the element

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Dr. C. H. Spurway and the apparatus used in the field test of soils which he has perfected.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

WHEN estimating the character of Dr. Harry Jacob Patterson, who since 1888 has been connected with the Maryland Agricultural Experiment Station and College as chemist and Director, it struck me as the antithesis of that of the Roman Centurian who said to the Lord: "I am a man under authority, having soldiers under me: And I say to this man, Go, and he goeth; and to another, Come, and he cometh; and to my servant, Do this, and he doeth it." That was the imperious declaration of a dictator; but there is not an iota of that domineering disposition in the managerial methods of Dr. Patterson.

With him, self-suppression seems to have been dominant over self-assertion. He has kept in the background, while tactfully guiding his associates, until the end desired has been attained; then he has assumed none of the credit for the kindly and diplomatic guidance he has given. While skillfully leading the experts of his staff without apparent dictation, the coordination of effort he has effected has been rewarded by highly satisfactory results, for which he has cheerfully given his associates the honor. And always he has sought the truth, borne out by facts often laboriously obtained.

Dr. Raymond A. Pearson, President of the University of Maryland, says of Dr. Patterson: "He is conservative and very thorough, almost, some people might say, to a fault. He thinks a subject through, so far as it is concerned and so far as everything else is concerned that may have even a remote relation to it. He is for constructive measures that will help farmers and their families. He looks upon agriculture not only as a fundamental industry but as a means of developing the highest type of citizenship. It is natural, therefore, that he would support science, culture, religion, athletics, and everything that together develop a high type of citizenship."

An Educated Man

A. H. Snyder, Extension Editor of the University of Maryland, writes that when a year or two ago he heard Hon. Newton D. Baker say in his presidential address at a meeting of the American Association for Adult Education, "An educated man or woman is one who by some process or other has acquired the capacity to hold his judgment in suspense until he knows the facts," he instinctively thought of Dr. Patterson. That has been exactly the course adopted by the "conservative" Director. When a conference is being held, he seldom says much before the various phases of the subject in debate have been discussed; then he gives his opinion or decision, and it evidences a mastery of the matter, based upon due deliberation and

weighing of the facts presented and their relation to allied subjects.

Like many other eminent Experiment Station workers, Harry Jacob Patterson was born on a farm. It was located near Yellow Springs, Pennsylvania, and there he entered life on December 17, 1867, the son of William Calvin Patterson and Adeline Mattern Patterson. Obtaining the rudiments of his education in the local schools, he later attended the Pennsylvania State College Preparatory School and then the Pennsylvania State College. As his father was superintendent of

Dr. H. J. Patterson

the Pennsylvania State College farm—a position he held with distinction for nearly forty years—the son early learned by observation and practice the importance of thoroughness in the management of the land. He worked willingly with his hands, under the direction of his sire, and learned to hate weeds as cumberers of the soil and robbers of plant nutrients. In time he came to see the need of weed eradication in all phases of the work he was called upon to do. It became, indeed, a part of his religion to detest sham, seek and uphold the truth, and make thoroughness his maxim in life.

It has been told of him that one day when Major Henry E. Alvord, who was Director of the Maryland Experiment Station from 1888 to 1892, paid a visit to the Pennsylvania Station, the eminent gentleman encountered young Patterson carrying a half-bushel basket of weeds and learned that they were all he had been able to find on the 400 acres composing the farm. That so impressed the Major, as an evidence of practical training in careful farming and of thoroughness, that he offered the young man the position of agricultural chemist of the Maryland institution. He had obtained the degree of Bachelor of Science from Pennsylvania State College in 1886, after majoring in chemistry. He likewise took a postgraduate course in the same institution and served as assistant chemist there from 1886 to 1888. After working as chemist of the Maryland Station from 1888, he was made Director of the Experiment Station in 1898, President of the Maryland Agricultural College 1912 to 1917, and Dean in 1925. In 1895 he married Elizabeth Hayward Hutchinson. A daughter and son have graced their home.

Delegated Leadership

On assuming the duties of Director at the Maryland Agricultural College, Dr. Patterson did not continue as head of a department or division to receive a large share of the credit for the work accomplished, but chose to entrust the leadership of each line of work to a competent chief. He devoted his efforts to keeping the work as a whole well-balanced, closely coordinated, and conducted on sound, practical principles.

A statement made by Dr. Patterson in his report of the last biennium of the institution, recently published, indicates well his attitude as Dean of the College of Agriculture. "There is no depression in education," he said. "To maintain the standards of facilities for instruction and protect the

welfare of the large number of boys and girls in college today, without increase in expense, are a serious responsibility and obligation. *The youths on the campus in 1933 are just as valuable to society as were the students during any of the past ten years.* The College has an obligation at this time to make a critical study of its activities and see that its program is thoroughly efficient."

In that assertion, we feel sure, he voiced the unanimous opinion of other earnest men in similar positions throughout the land, who find in these trying days that the facilities for education of all grades are being seriously curtailed. His statement, too, surely deserves attention and respect, for there are few Deans and Directors who understand the agricultural and rural life of their States as thoroughly as does Dr. Patterson, from his long association with its development in Maryland.

Practical and Human

When Dr. Patterson began Experiment Station work in that State, there was little specialization in research investigations, such as is known today. "He was primarily a chemist," says A. H. Snyder, "but he was a chemist for agriculture and not for any particular phase of the industry. Along with his scientific training and inclination, he has always been exceedingly practical and human. Consequently, he has been just as ready to recognize the practical and human phases of problems as he has been to see the scientific phases. With these attributes, it is not strange that his efforts in behalf of the widely diversified agriculture of Maryland have been so well balanced and along so many lines that it is next to impossible to pick out one or two phases which have attracted wide attention." All of the work done or directed has, however, been purposeful and worth while. The results, which he has credited largely to his associates, have been of real benefit to the farmers of the State, as well as of interest and profit to scientific workers in similar lines.

During the ten years Dr. Patterson served as chemist of the Maryland Experiment Station, he did a great deal of useful research work relating to the use of fertilizers. Lime was given particular attention and its uses mastered. He also conducted important investigations in animal nutrition with dairy cattle, hogs, and horses, which helped the farmers of the State to adopt and practice better and more economical methods of feeding their animals. Variety tests of grains and systems of cropping and rotation also received his careful attention. Through him the agricultural activities of Maryland became better organized and more effective, as he succeeded in having the Board of Trustees of the College and University also serve as the State Board of Agriculture, thus avoiding conflict of authority and duplication of research projects and activities in extension work.

Outstanding Accomplishments

Through his efforts and those of his associates, the growing of alfalfa, crimson clover, soybeans, and winter vetch was introduced and popularized in the State. When he began work there, none of the farmers were growing named varieties of corn; now their production is general and the average per acre yield is said to have increased eight bushels. Wheat, too, has increased in yield nearly five bushels per acre, and a disease-resistant strain of Mammoth Red wheat has been bred and found especially adapted to the coastal plains, mountain valleys, and lowlands. Soybeans, first grown on the Experiment Station farm in 1888, are now produced annually with profit on some 50,000 acres of Maryland farm land. Orchard fruit growing on a commercial scale also has increased and prospered owing to the selection of more suitable varieties and

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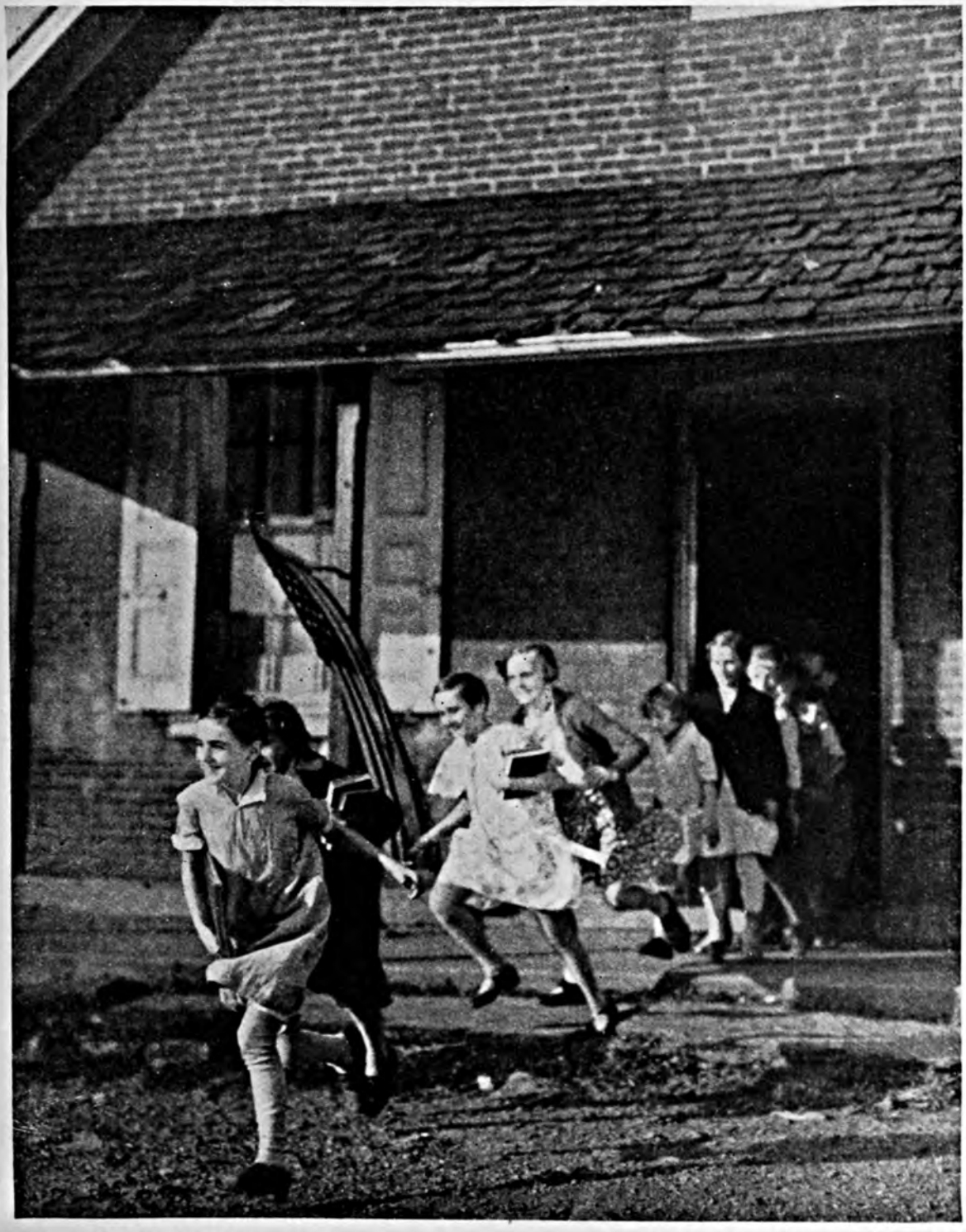
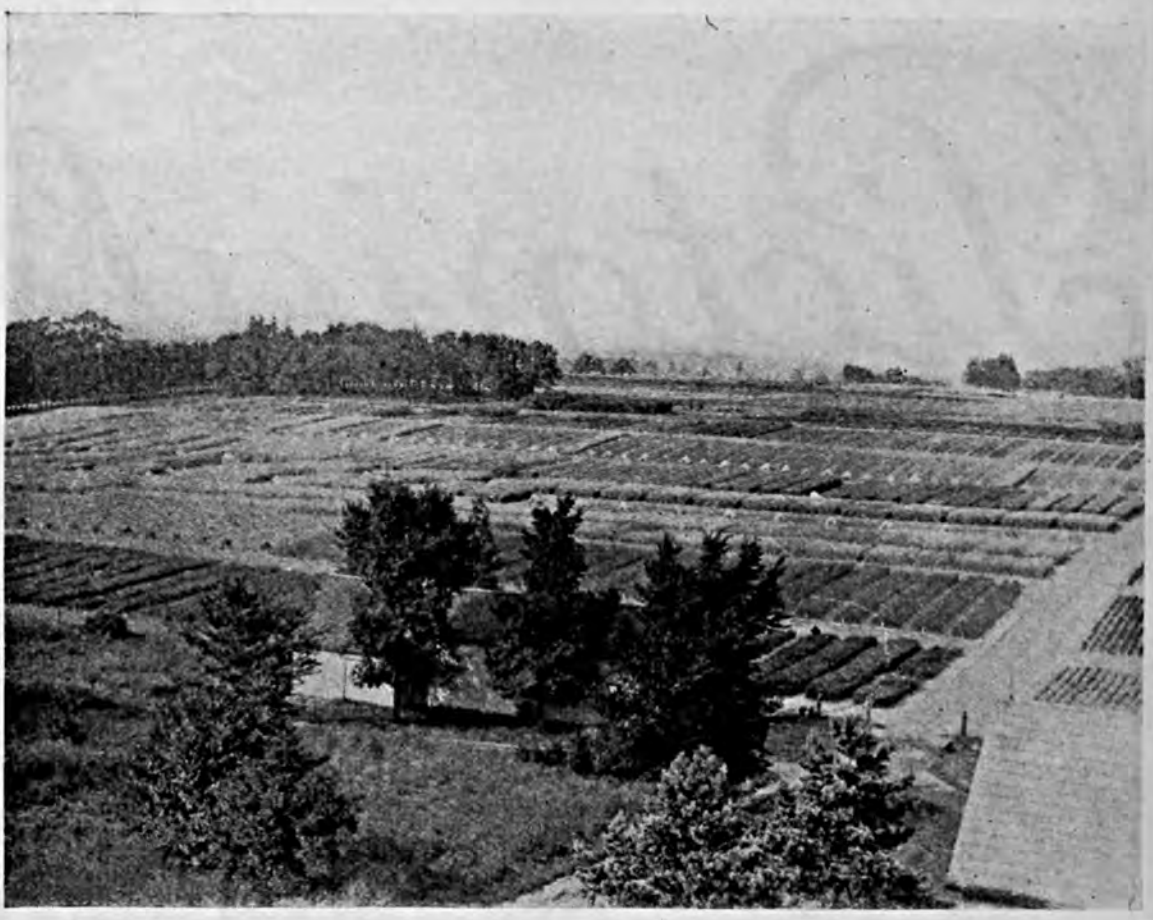
Pictorial



A JOYFUL EXODUS.

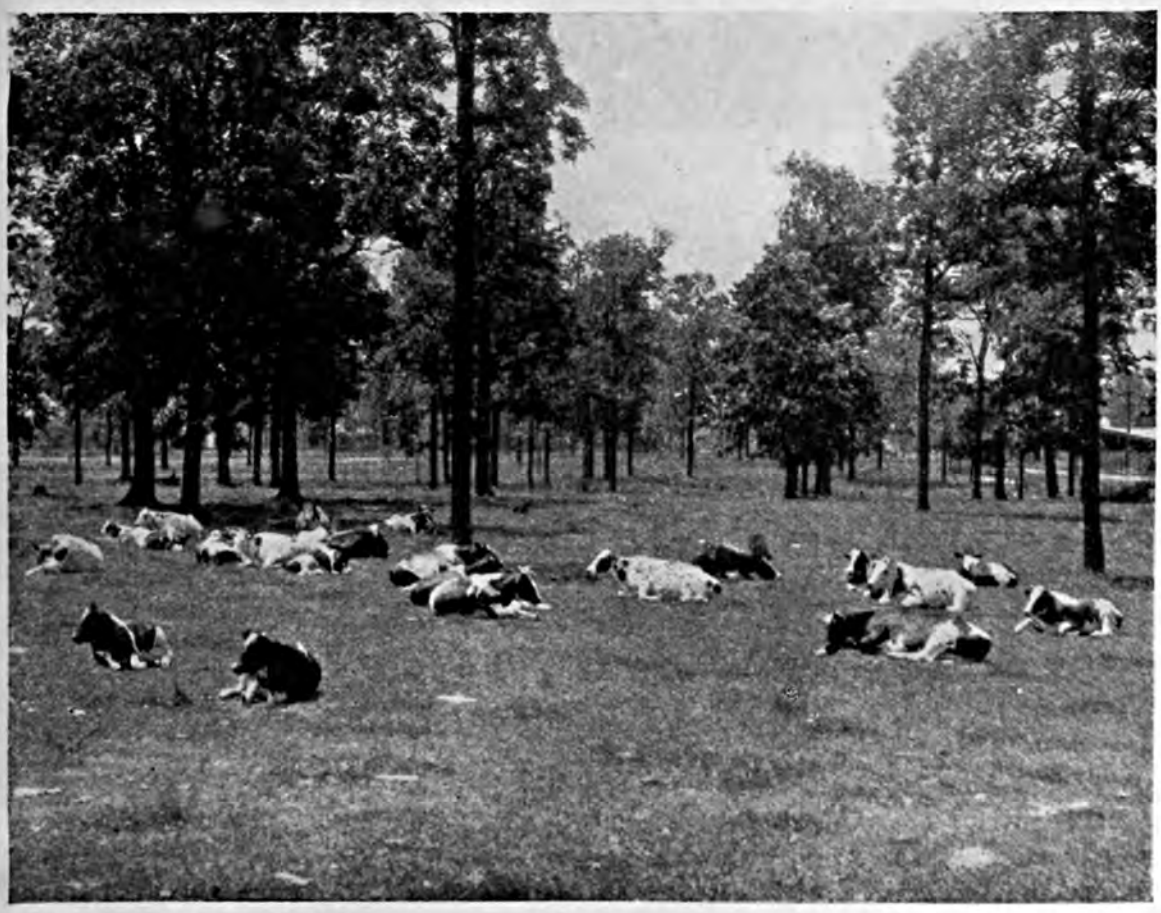


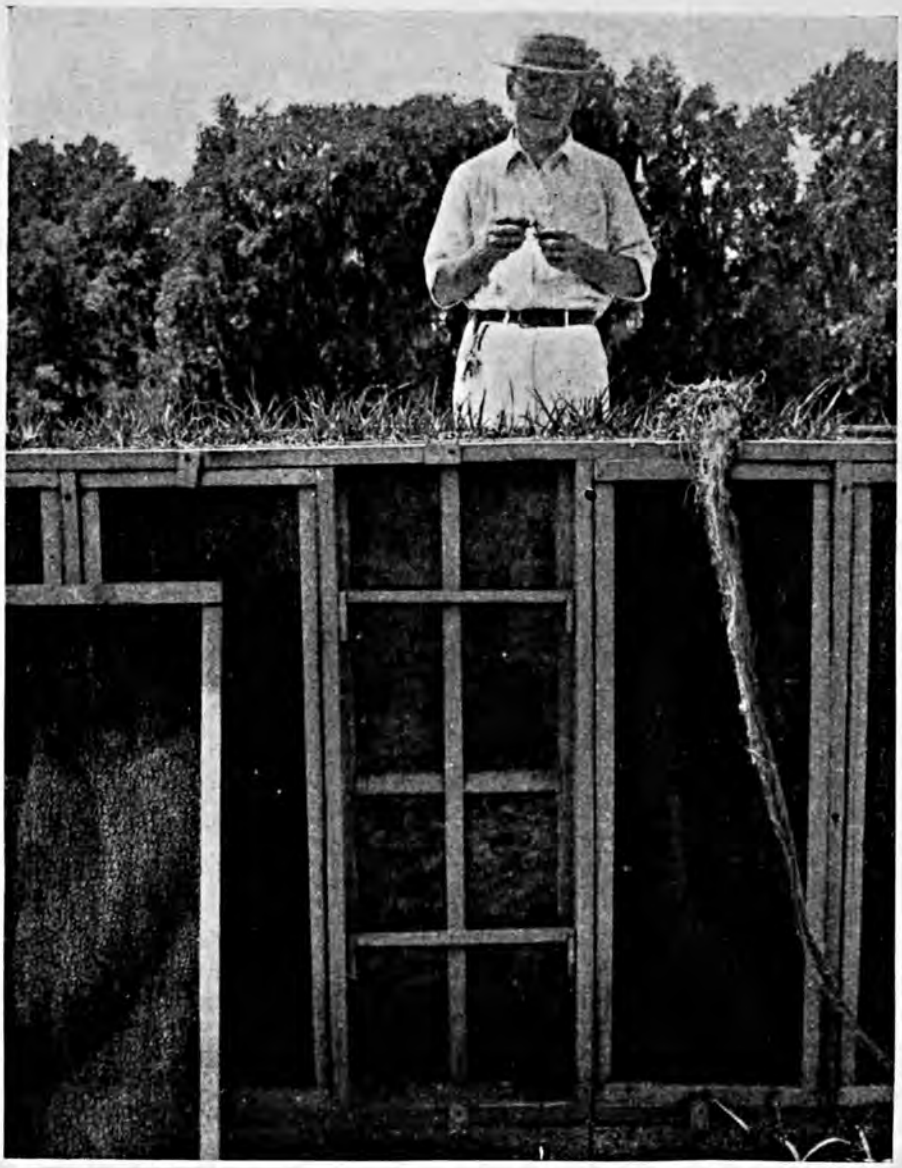
Above: A view of the experimental plots, Ontario Agricultural College, Guelph, Ontario.

Below: A shady spot in the Corn Belt which man and horse welcome on a hot summer day.

Above: Well-kept gardens provide feasts for the eye as well as for the stomach.

Below: Contented Holsteins on a Marion county, Indiana, dairy farm.





Left: Watching grass roots grow is an interesting part of an experiment being conducted by Dr. W. A. Leukel, agronomist at the Florida Experiment Station. His observations are made in a long, box-like structure, one side of which consists of panels of window glass.

Below: Many generations of lambs have been sheltered from the hot sun by this motherly hawthorne tree in Tompkins county, New York. This tree is probably more than 60 years old, has a trunk two feet in diameter at the ground, and the spread of its branches is more than 40 feet.

The Editors Talk

Congratulations and Best Wishes

The Board of Education and the Faculty are announcing the seventy-fifth anniversary of the founding of Iowa State College of Agriculture and Mechanic Arts. We wish to offer them our sincerest congratulations.

A history of those seventy-five years provides an interesting and characteristic account of the progress of agricultural education in the United States, for Iowa State College in addition to being one of the oldest State agricultural colleges in this country is today ranked among the best. Miscellaneous Publication 36, U. S. Department of Agriculture, *A History of Agricultural Education in the United States,* provides many interesting notes on the foundation of this college, among them:

> "The law also provided that—Applicants for admission must be of good moral character, able to read and write the English language with correctness, and also to pass a satisfactory examination in the fundamental rules of arithmetic.
>
> "The college year began in February and closed the end of October following. A few days of vacation were given in July. The winter vacation permitted the students to go out and teach and also made unnecessary the heating of the college building which was an expensive undertaking."

From such a humble beginning, the Iowa State College of Agriculture, through its pursuit of scientific investigations along all lines of agrarian interest with much original research and development of methods for crop and animal production and care, is now recognized as one of the leading agricultural institutions in this country.

Our best wishes for a continuance of outstanding achievement go with our congratulations on this anniversary.

A Challenge to Scientists

"Our present economic difficulty specifically challenges science to defend itself against alleged excesses of the past, and asks for a pledge to contribute with more certainty to human welfare in the future . . . . I believe the time has come for men of science to consider both the effect of current economic problems on science, and the contributions that science may be able to make to the solution of those problems."

These statements from a recent address by Secretary of Agriculture Henry A. Wallace may help to point the way for the scientist facing unthinking criticism that the tremendous increase in efficiency growing out of scientific research is largely to blame for our present economic problems.

Granting that science has no doubt made the surplus possible, Secretary

Wallace maintains that science is not responsible for our failure to distribute the fruits of labor equitably. We must charge that failure squarely up to organized society, and to the government. The job of scientific research in agriculture is not over, nor will it ever be. But now that science has magnificently enabled mankind to conquer its first great problem—that of producing enough to go around and creating abundance—science must help men to learn to live with this abundance.

Secretary Wallace calls the new job for scientists, experimenting in social control. "Research to increase productive efficiency, to widen markets, must continue," he says. "Eliminate the less important research activities in deference to the need for economy; get rid of the dead wood in our scientific organizations—but keep the men of science at the tasks which will always need doing. And add to the old job that has been begun so well, this new job of developing the machinery of social control.

"Can we, do you suppose, become as efficient in our social experimenting as we have already proven ourselves in scientific experimenting? If this can be done, we can go ahead into one triumph after another in the scientific world. If it is not done, I fear for the future of our civilization."

Secretary Wallace believes that mistakes may be made along the way; that there may be difficulty in mastering all the intricacies of an economic system that is full of puzzling contradictions; but if we operate our new social machinery with the spirit of social justice in all our hearts, he believes that it will work.

Intellectual Unemployment

The vast army of the jobless is a subject of daily discussion. Such awesome terms as "technological unemployment" bring to mind the cold statistics of the expert who says, "Mechanical improvements in recent years indicate that business in the future will require relatively fewer workers."

In industry we have an over abundance of labor, management, and facilities for making raw materials into finished goods. We witness the paradox of factories discharging men and paying bigger dividends, simply by installing new machinery. In a world with too much food, we find people suffering from malnutrition. The world is sick.

Countless remedies are being proposed for recovery. Some think the "machine" in itself is not the evil; but that more intelligence is needed in its use. Yet we wonder how many of the proposed panaceas take account of what can be accomplished through adult education. Pertinent in this connection are the words of Professor Leon J. Richardson, Director of the University of California Extension Division, who says, "What the world needs is honesty and enlightenment." He states further, "Adult education is essential to a continuing democracy; it is insurance against intellectual unemployment."

In America the tendency too often has been to regard adult education as something for the immigrant, or those lacking early opportunities. The French render the term by *education post-scolaire*, 'post school education,' the kind that supports life at its best. Three centuries ago Bacon said, "Learning taketh away the wildness, barbarism, and fierceness of men's minds."

Where education ceases there ensues catastrophe. Only when we keep our minds open to ideas and continue to learn shall we be able to cope with our full responsibility.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, and Crops. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Nutritional deficiency signs on tobacco have been very thoroughly investigated and are described in detail by J. E. McMurtrey, Jr. in U. S. Department of Agriculture Technical Bulletin 340, "Distinctive Effects of the Deficiency of Certain Essential Elements on the Growth of Tobacco Plants in Solution Cultures." Characteristic appearances of the plants when nitrogen, phosphorus, potassium, sulphur, boron, magnesium, calcium, chlorine, manganese, or iron are lacking are given. Of practical interest are observations on the rapidity and completeness of the recovery of the plants when the deficient nutrient was supplied to the plant after it had shown deficiency injury. It is significant that the author found the plants did not show the manifestations of a nutrient deficiency until some time after the nutrient became deficient. When several elements were lacking, the deficiency symptoms of one of them usually dominated the appearance of the plant.

A key to assist in the identification of the lacking nutrient from the plant appearance has been worked out by Dr. McMurtrey. The bulletin is a distinct contribution to the practical and scientific information on the fertilization of tobacco and should greatly assist in working out similar problems in connection with other crops.

"Commercial Fertilizers—Agricultural Minerals, 1932," Dept. of Agr., Sacramento, Calif., Spec. Pub. 118.

"Fertilizing Strawberries in Indiana," Purdue Univ., Lafayette, Ind., Leaflet No. 169, *March,* 1933, *Clarence E. Baker.*

"Kinds and Amounts of Different Fertilizers North Carolina Farmers Used During the Fiscal Year 1931-32," *State Col. Sta., Raleigh, N. C., Agron. Informa. Cir.* 79, *March,* 1933, *C. B. Williams.*

"Inspection of Commercial Fertilizers for 1932," *Agr. Exp. Sta., Durham, N. H., Bul.* 269, *Dec.,* 1932, *T. O. Smith and H. A. Davis.*

"Commercial Fertilizers and Soil Acidity," Agr. Exp. Sta., New Brunswick, N. J., Cir. 266, *Jan.,* 1933, *A. W. Blair.*

"Analyses of Commercial Fertilizers and Ground Bone; Analyses of Agricultural Lime, 1932," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 551, *Jan.,* 1933, *Charles S. Cathcart.*

"Experiments with Commercial Nitrogenous Fertilizers on Apple Orchards," Agr. Exp. Sta., Geneva, N. Y., Bul. 623, *March,* 1933, *J. D. Harlan and R. C. Collison.*

"Official Report on Feed Stuffs, Commercial Fertilizers, and Agricultural Lime and Limestones," for the Year 1932, *Dept. of Agr., Columbus, Ohio.*

Soils

A helpful leaflet with much practical information on the fertilization of hay lands has just been prepared by F. S. Prince entitled "Top-dressing Hay Lands" (New Hampshire Extension Circular 147, 1933). Five years' results with alfalfa show that potash was the most important component of the fertilizer for this crop even when manure was used. About 1,000 pounds of hay were produced per hundred pounds of muriate of potash applied and with average prices each dollar's worth of potash returned $3 to $4 worth of hay. The potash was applied as a top-dressing at 150 pounds per acre of muriate of potash per year.

The author brings out that a single top-dressing was not sufficient to produce best results. Each succeeding application of potash gave greater increases in hay yield, the increase the fifth year being over three times as much as the increase from the potash the first year. It is stated: "Had we measured the results for but the first year they would not have been so striking. As the years passed, however, there was less winter killing on the plots receiving potash; and the stimulated vigor and growth of the alfalfa left no doubt as to the effectiveness of this substance in promoting alfalfa yields."

When growing timothy and other grasses nitrogen was found to be of great importance. Potash was not used in the test in this case so no comparison as to its effectiveness can be made. The circular also contains a brief discussion of nitrogen carriers.

"Comparison of Methods for Estimating Available Phosphorus in Alkaline Calcareous Soils," Agr. Col., Fort Collins, Colo., Tech. Bul. 2, March, 1933, R. D. Hockensmith, Robert Gardner, and James Goodwin.

"Grass Seed Mixtures and the Soil," State Col., Storrs, Conn., Ext. Bul. 180, March, 1933, J. S. Owens.

"Soil Testing—A Practical System of Soil Diagnosis," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 132, Apr., 1933, C. H. Spurway.

"Crop Investigations on Sandy Lands," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 291, Nov., 1932, H. K. Hayes, A. C. Arny, H. K. Wilson, and LeRoy Powers.

"Crop Investigations on Peat Lands," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 292, Nov., 1932, H. K. Hayes, A. C. Arny, H. K. Wilson, and LeRoy Powers.

"Soil Management Experiments with Vegetables," Exp. Sta., Lincoln, Neb., Bul. 278, Jan., 1933, H. O. Werner.

"Evaluation of Soil Types of North Carolina for Different Crops," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Agron. Informa. Cir. 77, Feb., 1933.

"The Value of Lime on Toxaway Loam and Porter's Loam Soils," Agr. Exp. Sta., Bul. 285, Apr., 1933, C. B. Williams, W. H. Rankin, and S. C. Clapp.

"Soil Survey of Calhoun County, Iowa," U. S. D. A., Washington, D. C., Series 1930, No. 2, W. E. Tharp, T. H. Benton, and W. J. Leighty.

"Soil Survey of Kent County, Maryland," U. S. D. A., Washington, D. C., Series 1930, No. 3, H. B. Winant and J. P. Bewley.

"Soil Survey of Franklin County, Massachusetts," U. S. D. A., Washington, D. C., Series 1929, No. 9, W. J. Latimer, L. R. Smith, and Carey Howlett.

"Petrographic Methods for Soil Laboratories," U. S. D. A., Washington, D. C., Tech. Bul. 344, Jan., 1933, W. H. Fry.

Crops

"Throughout the entire history of the State of Maryland, tobacco has been one of the most important farm crops. Because of its exceptional quality and peculiar adaptation to certain uses, the Maryland crop has been in demand by buyers of tobacco." These two statements are taken from the foreword of the University of Maryland's new bulletin No. 65, "Tobacco Culture in Maryland," by W. B. Posey. A casual review of the bulletin convinces one of the thoroughness given to tobacco cultural problems in the "Old Line" State and a more careful reading discloses a wealth of practical information which undoubtedly can be applied to the growing of tobacco in other sections of the country. The bulletin is profusely illustrated and should prove most interesting to all growers.

A publication on a vital problem in the growing of another major crop is Extension Circular 303, "Control of Cotton Wilt, Root Knot and Rust," by V. H. Young and J. O. Ware of the University of Arkansas. This bulletin came into circulation in March and presents recommendations based on experimental work for the control of these plant diseases, which in Arkansas alone cause annual losses running into millions of dollars every year. Cotton growers need all the information they can get along these lines and this circular will undoubtedly find its way into the hands of a great many of them.

"The ABC of King Cotton," Univ. of Ariz., Tucson, Ariz., Ext. Cir. 75, Jan., 1933, H. N. Watenpaugh.

"Physiological Factors Affecting the Fruiting of Cotton with Special Reference to Boll

Shedding," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 46, Jan. 15, 1933, R. S. Hawkins, R. L. Matlock, and Charles Hobart.

"Report of the Agricultural Experiment Station and the College of Agriculture of the University of California, July 1, 1931 to June 30, 1932," Univ. of Calif., Berkeley, Calif., C. B. Hutchison.

"The Babcock Peach," Agr. Exp. Sta., Berkeley, Calif., Cir. 328, Jan., 1933, Geo. P. Weldon and J. W. Lesley.

"The Composition of Canning Tomatoes," Agr., Exp. Sta., Berkeley, Calif., Bul. 545, Dec., 1932, L. G. Saywell and W. V. Cruess.

"Growing Beans in Colorado," Agr. Col., Fort Collins, Colo., Ext. Bul. 328-A, Jan., 1933, T. G. Stewart and Walter S. Stratton, Jr.

"The Effect of a Lethal in the Heterozygous Condition on Barley Development," Agr. Col., Fort Collins, Colo., Tech. Bul. 1, Dec., 1932, D. W. Robertson.

"Biennial Report 1931-1932," Agr. Col., Storrs, Conn., Ext. Bul. 179, Jan., 1933, B. W. Ellis.

"Annual Flowering Plants for Florida," Univ. of Fla., Gainesville, Fla., Bul. 73, March, 1933, John V. Watkins.

"The Pollination of Avocados," Agr. Exp. Sta., Gainesville, Fla., Bul. 257, March, 1933, A. B. Stout.

"Crotalaria," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 451, May, 1933, W. E. Stokes and W. A. Leukel.

"Winter Legumes," Univ. of Ga., Athens, Ga., Vol XXXI, Ext. Cir. 207, Sept., 1932, E. D. Alexander.

"Growing the Idaho Potato," Col. of Agr., Boise, Idaho, Ext. Bul. 90, (Rev.) March, 1933, E. R. Bennett.

"Prune Maturity and Storage," Agr. Exp. Sta., Moscow, Idaho, Bul. 196, Dec., 1932, Lowell R. Tucker and Leif Verner.

"Growing and Marketing Muskmelons," Agr. Exp. Sta., Urbana, Ill., Cir. 405, Feb., 1933, J. W. Lloyd.

"Report of the Director For the Year Ending June 30, 1932," Agr. Exp. Sta., Lafayette, Ind., J. H. Skinner and H. J. Reed.

"The Response of Greenhouse Crops to Electric Light Supplementing Daylight," Agr. Exp. Sta., Lafayette, Ind., Bul. 366, Dec., 1932, Laurenz Greene, Robert B. Withrow, and Milfred W. Richman.

"Tillage Practices for Southwestern Kansas," Agr. Exp. Sta., Manhattan, Kan., Bul. 262, Nov., 1932, R. L. von Trebra and F. A. Wagner.

"Summary Report of Progress 1932," Agr. Exp. Sta., Orono, Me., Bul. 363, Dec., 1932.

"A Dairy Program for Franklin and Somerset Counties," Univ. of Me., Orono, Me., Ext. Bul. 207, Dec., 1932.

"Handbook for Potato 4-H Club Members," Univ. of Me., Orono, Me., Ext. Bul. 208, Jan., 1933.

"Seed Inspection," Agr. Exp. Sta., Amherst, Mass., Control Series, Bul. 67, Feb., 1933, F. A. McLaughlin and Margaret E. Nagle.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 15, No. 4, May, 1933.

"Fortieth Annual Report July 1, 1931 to June 30, 1932," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Andrew Boss.

"Tobacco Growing in Minnesota," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Spec. Bul. 156, Dec., 1932, H. K. Hayes and C. H. Lein.

"Forty-fifth Annual Report for the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., State College, Miss., W. R. Perkins.

"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., Reno, Nev.

"Agricultural Research in New Hampshire," Agr. Exp. Sta., Durham, N. H., Bul. 270, March, 1933, J. C. Kendall.

"Improving the Home Orchard," Univ. of N. H., Durham, N. H., Ext. Cir. 148, March, 1933, C. O. Rawlings.

"Garden Directions," Univ. of N. H., Durham, N. H., Ext. Cir. 181, April, 1933, J. R. Hepler.

"Extension Work in New Hampshire 1932," Univ. of N. H., Durham, N. H., Ext. Bul. 42, March, 1933, J. C. Kendall.

"Sweet Clovers as a Soil Improvement Crop for Orchards," Agr. Exp. Sta., New Brunswick, N. J., Cir. 269, Feb., 1933, O. W. Davidson.

"Rapidly Growing, Succulent Branches on Young Apple Trees Tend to Form Narrow Crotch Angles with the Trunk," Agr. Exp. Sta., New Brunswick, N. J., Cir. 270, March, 1933, M. A. Blake.

"Forty-third Annual Report 1931-1932," Agr. Exp. Sta., State Col., N. M., Fabian Garcia.

"Methods of Producing Sugarbeet Seed in Southern New Mexico," Agr. Exp. Sta., State College, N. M., Bul. 207, Feb., 1933, Harry A. Elcock and John C. Overpeck.

"Corn and Soybeans for Silage," Agr. Exp. Sta., Ithaca, N. Y., Bul. 548, Dec., 1932, R. C. Wiggans.

"New or Noteworthy Fruits, XI," Agr. Exp. St., Geneva, N. Y., Bul. 620, March, 1933, G. H. Howe.

"Raspberry Growing in New York State: Cultural Practices and Disease Control," Agr. Exp. Sta., Geneva, N. Y., Bul. 625, Apr., 1933, George L. Slate and W. Howard Rankin.

"Strawberries," Agr. Exp. Sta., Geneva, N. Y., Cir. 31 (Rev.), Sept., 1932, George L. Slate.

"Orchard Management," Agr. Exp. Sta., Geneva, N. Y., Cir. 121 (Rev.), Nov. 1, 1932.

"Results of Cotton Variety Experiments," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Agron. Informa. Cir. 78, Feb., 1933, P. H. Kime.

"Barley Production in North Dakota," Agr. Exp. Sta., Fargo, N. D., Bul. 264, Jan., 1933, T. E. Stoa.

"Onion Growing in North Dakota," Agr. Exp. Sta., Fargo, N. D., Bul. 173, (Rep.), Jan., 1933, A. F. Yeager.

"Leafy Spurge—Life History and Habits," Agr. Exp. Sta., Fargo, N. D., Bul. 266, March, 1933, Herbert C. Hanson and Velva E. Rudd.

"Gooseberries—Varieties, Breeding, Culture and Use," Agr. Exp. Sta., Fargo, N. D., Bul. 267, March, 1933, A. F. Yeager and E. Latzke.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XVIII, No. 162, May-June, 1933.

"Solving Oklahoma Farm Problems," Agr. Exp. Sta., Stillwater, Okla., Rept. of Okla. A. & M. Col., 1930-32, C. P. Blackwell.

"American Potato Journal," The Potato Assn. of America, New Brunswick, N. J., Vol. X, No. 5, May, 1933.

"Forty-fifth Annual Report of the Director of the Agricultural Experiment Station," Agr. Exp. Sta., Kingston, R. I., Jan. 1, 1933, Basil E. Gilbert.

"Community Production of Cotton in Relation to Yield and Staple Length," Agr. Exp. Sta., Clemson College, S. C., Cir 48, March, 1933, J. A. Shanklin, R. C. Campbell, and W. C. Jensen.

"Citrus Orchard Management in the Lower Rio Grande Valley," Agr. Exp. Sta., College Station, Tex., Cir. 67, March, 1933, W. H. Friend.

"The Effect of Sunlight and Other Factors on the Strength and Color of Cotton Fabrics," Agr. Exp. Sta., College Station, Tex., Bul. 474, Feb., 1933, Mary Anna Grimes.

"Annual Report of the North Texas Agricultural College," Agr. Col., Arlington, Tex., Vol. XVI, No. 1, Sept. 1, 1932, T. O. Walton.

"Peach Harvesting Studies," Agr. Exp. Sta., Logan, Utah, Bul. 241, Apr., 1933, F. M. Coe.

"Department of Agriculture-Immigration of Virginia," Dept. of Agr., Richmond, Va., Bul. 304, May, 1933.

"The Production and Utilization of Corn Grown Under Irrigation in Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 278, Feb., 1933, H. P. Singleton.

"Growing Trees in Northeastern Wyoming," Agr. Exp. Sta., Laramie, Wyo., Bul. 192, Dec., 1932, Paul K. Thompson.

"American Tobacco Types, Uses and Markets," U. S. D. A., Washington, D. C., Cir. 249, Jan., 1933, Charles E. Gage.

"Commercial Cabbage Culture," U. S. D. A., Washington, D. C., Cir 252, Jan., 1933, Victor R. Boswell.

"Outlines of Cotton Culture in the San Joaquin Valley of California," U. S. D. A., Washington, D. C., Cir. 256, March, 1933, J. W. Hubbard.

"The Potomac Raspberry," U. S. D. A., Washington, D. C., Cir. 259, Jan., 1933, George M. Darrow and George F. Waldo.

"Testing Farm Seeds in the Home and in the Rural School," U. S. D. A., Washington, D. C., Farmers' Bul. 428 (Rev.), March, 1933, F. H. Hillman.

"Strawberry Culture, South Atlantic and Gulf Coast Regions," U. S. D. A., Washington, D. C., Farmers' Bul. 1026 (Rev.), Jan., 1933, George M. Darrow.

"Strawberry Culture, Western United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1027 (Rev.), Feb., 1933, George M. Darrow.

"Black Walnut for Timber and Nuts," U. S. D. A., Washington, D. C., Farmers' Bul. 1392 (Rev.), March, 1933, Wilbur R. Mattoon and C. A. Reed.

"Deciduous-Fruit Improvement Through Tree-Performance Records," U. S. D. A., Washington, D. C., Farmers' Bul. 1696, Jan., 1933, A. D. Shamel and C. S. Pomeroy.

Economics

"The 1933 Agricultural Outlook for California," Col. of Agr., Berkeley, Cal., Ext. Cir. 71, Feb., 1933, H. R. Wellman, E. W. Braun, S. W. Shear, and E. C. Voorhies.

"Changes in Farming in Lake and Porter Counties, Indiana, as a Result of Nearness to Industrial Cities," Agr. Exp. Sta., Lafayette, Ind., Bul. 365, Oct., 1932, Lynn Robertson.

"Factors in the Organization and Successful Operation of Louisiana Rice Farms, 1930," Agr. Exp. Sta., Baton Rouge, La., La. Bul. 233, Jan., 1933, R. J. Saville.

"The Flaxseed Market and the Tariff," Agr. Exp. Sta., Bozeman, Mont., Bul. 272, Feb., 1933, Roland R. Renne.

"Wholesale Prices for 213 Years, 1720 to 1932," Cornell Univ., Agr. Exp. Sta., Ithaca, N. Y., Mem. 142, Nov., 1932, G. F. Warren, F. A. Pearson and Herman M. Stoker.

"The Physical Volume of Production in the United States," Cornell Univ., Agr. Exp. Sta., Ithaca, N. Y., Mem. 144, Nov., 1932, G. F. Warren and F. A. Pearson.

"The Home Market for North Carolina Cotton," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Bul. 284, March, 1933, Joseph C. Knapp.

"Roadside Marketing of Agricultural Products by Ohio Farmers," Agr. Exp. Sta., Wooster, Ohio, Bul. 521, Mar., 1933, C. W. Hauck and H. M. Herschler.

"Trends in the Apple Industry," Agr. Exp. Sta., Pullman, Wash., Bul. 277, Feb., 1933, Chester C. Hampson.

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"Farmers Opinions and Other Factors Influencing Cotton Production and Acreage Adjustments in the South," U. S. D. A., Washington, D. C., Cir. 258, Jan., 1933, T. B. Manny.

"An Economic Study of Broomcorn Production," U. S. D. A., Washington, D. C., Tech. Bul. 347, Feb., 1933, R. S. Washburn and J. H. Martin.

Sorghums of All Kinds

By E. N. Bressman

Associate Professor of Farm Crops, Oregon State Agricultural College

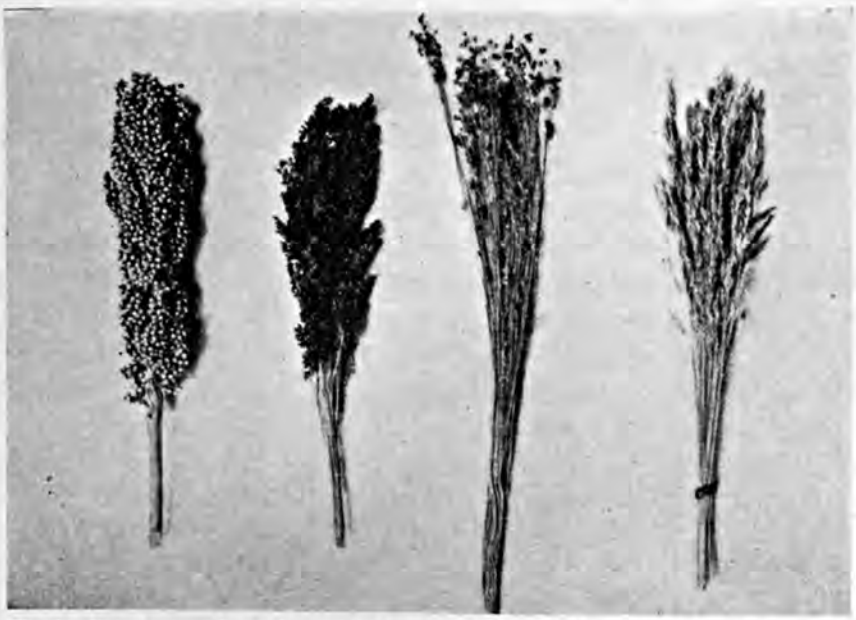
THERE are all kinds of sorghums. The types are widely different, varying all the way from the grain sorghums, used chiefly for the grain that they produce in the head of the plant, to the sweet sorghums which are used primarily for syrup. There are broom corn sorghums which, as the name implies, are used almost altogether in the manufacture of brooms, and the grass types which are used chiefly for hay and include the well-known Sudan, Tunis, and Johnson grasses. Surely no group of plants offers a greater diversification than the sorghums.

Perhaps there is no crop plant which is so little understood by the average grower, and about which there is greater confusion regarding kinds and uses of the various varieties. For this reason, many growers undoubtedly will be interested in a simple classification of this crop.

Maybe the largest and most widely grown group of the sorghums is the grain sorghum group. This group includes many different types, such as Kafir, Milo, Durra, Kaoliang, and Shallu. In turn, these various types are made up of widely differing varieties. For example, the Kafirs include Blackhull, Dawn, Pink, White, Sunrise, and other commonly grown varieties. These varieties differ greatly in not only color of seeds and glumes, but in height of growth and particularly time of maturity.

The variety Dawn is a fairly early maturing variety which is much more resistant to dry weather conditions than the ordinary Blackhull variety from which it more than likely was selected. Sunrise is another early type. The variety Dawn matured seed and made an excellent growth under western Oregon conditions during the past season. Ordinarily, one would not look for Kafir varieties to be successfully grown so far north and under conditions where the nights are so cool. There are several varieties of the Durra and Milo groups. In addition, there is Feterita, an excellent grain sorghum under certain conditions.

In general, the grain sorghums are



The leading types of sorghum: (left to right) Kafir, Sorgo, Broom Corn, and Sudan Grass.

found in the great plains of the Southwest. They are adapted chiefly to conditions which are too dry for high production of corn. They are more drought resistant than corn, particularly if dwarf, early maturing sorts are grown.

"Sweets" Have Wider Range

Sweet sorghums grow over a wider range than the grain sorghums. They are not, however, grown on such large acreages. Many growers have small patches of this type of sorghum for the production of syrup. From this standpoint, they are highly important and valuable to many farmers.

The most common early sweet sorghum is known as Amber. There are several different varieties of Amber. Variety names such as Ames Amber, Minnesota Amber, Black Amber, and Early Amber, are associated with this type. There are other varieties which are quite distinctly different, such as Sumac, which is found commonly in the South and in the West. It is reddish in color and much later than the Amber type. Another variety found chiefly in the South is known as Gooseneck, and other varieties are known as Honey and Orange.

At harvest the leaves are stripped from the stalks and the heads are topped before the stalk is harvested. The stalks are put through a roller mill to extract the juice. The juice is cooked to syrup. There are many different ways of handling the juice, and the quality depends not only on the variety but also on the method of cooking and weather conditions.

There is a tale of a man who was a young boy during the Civil War. He stated that one winter they lived chiefly on sweet sorghum, using the seed produced in the heads to make flour for various types of food and using the syrup for their only form of sweetening.

All the way from 30 to 50 million gallons of sorghum syrup are produced in the United States each year, and so the industry is no small one. New varieties are being produced, chiefly types which have a higher sugar content, and also varieties which are adapted to colder conditions. Some variety of sweet sorghum can be grown almost any place that corn will grow.

Broom corn sorghum has a very specific use. It has been grown for many years, chiefly for the production of brush or broom. There are two general classes of broom corn, known as standard and dwarf. There are varieties of both of these classes, however, and the varieties are adapted to certain environmental conditions. The most common variety of standard broom corn is known as Evergreen. Like Amber sorghum, this variety is made up of several local strains which appear to be better adapted for local and limited conditions. Another important variety which is characterized by black glumes on the seed is known as Black Spanish. It is earlier than the Evergreen variety. There are several dwarf types, one of which is commonly known as Evergreen Dwarf. It seems to do better under drought conditions than the standard types.

Market Determines Production

The price of broom corn fluctuates greatly, and so growers should be sure of a market for their product before planting this sorghum in a new region. The price varies not only with the demand but also with the quality of the product, most buyers demanding a brush that has a bright green color and is free of defective growths, which are common in fields that are not planted with pure seed.

The crop is an interesting one and is grown with best success in the Southwest. The great broom-corn producing areas of Iowa and Illinois have moved to this newer region so that the crop can be produced on land which is not so high in price.

Sudan grass is the chief hay type of sorghum. It is a comparatively new

crop in this country, having been introduced from the country of Sudan about 20 years ago. It is a grass which is primarily adapted to warm growing regions, but one which is finding favor as far north as the Corn Belt, where it produces two crops of fair quality hay in a season. It is an annual grass and chiefly differs from Johnson grass in this respect.

Sudan grass has found favor in certain sections where an emergency hay crop is desired. It is usually planted about corn planting time and makes a very rapid growth if there is sufficient heat and moisture.

Johnson grass is found chiefly in the South as it does not survive the cold winters of the Northern agricultural regions. In most places it is looked upon as a weed, for it is rather difficult to get rid of once it is established. It is perennial and easily spreads by both seed and rootstocks. It is the one sorghum that is looked on with disfavor in the great sorghum growing regions. However, it is only one out of a large number of very useful crop plants.

Tests Measure Effect of Weather on Cotton

Exposure of cotton in the field after the bolls first open rapidly lowers its grade, the United States Department of Agriculture has found after a series of color tests.

Although every cotton farmer knows that exposure lowers the grade of unpicked cotton, these tests indicate just how rapidly this lowering of grade takes place.

Newly opened bolls were tagged in a South Carolina cotton field. Cotton was picked from some each day for a long period and tested for change in color. During the first two weeks all samples picked graded strict good or good middling white or spotted. The last sample to grade in the white grades was picked on the eighteenth day after tagging. From that time on the samples graded progressively through good middling spotted, good middling gray, strict middling spotted, strict middling blue, strict low, and low middling spotted, and finally became so low in color that they could not be graded at all by the official color standards.

The Inquiring Mind

(*From page* 14)

better methods of fertilization, cultivation, and protection from noxious insects and diseases advised by the Station experts. Research work by them has proved of inestimable value to the dairy, poultry, canning, and truck-garden industries of the State. Two branch experiment stations are in operation, one at Ridgely, Caroline County, for various crops and fertility investigations, and the other at Upper Marlboro, where important tobacco investigations have been conducted in cooperation with the U. S. Department of Agriculture.

His successful activities have brought Dr. Patterson well-merited honors. In 1912 Maryland University conferred upon him the degree of Doctor of Science. He was Master of the Maryland State Grange for seven years and is Past President of the Association of Official Agricultural Chemists, a Fellow of the American Association for the Advancement of Science, and a member of the American Chemical Society and of several

honorary societies.

Dr. Patterson has not, of late years, published many bulletins under his own name as author; but has been joint author of several useful bulletins and characteristically has preferred to give the major credit to his associates, much of whose work he has inspired and supervised. Even today the bulletins he published in the early nineties will be found instructive reading for the agricultural student, and it is interesting to notice the conclusions they offered and the progress made at that time. Bulletins Nos. 89 and 91, relative to the nature, use, and effect of various fertilizing elements, gave a well-organized and thorough exposition of their subjects, to which their author had given much thought and extended experimentation. They presented many important facts of value both to scientists and farmers.

Space will not permit us further to mention a host of other interesting and valuable experimental work of this thorough laborer in the field of scientific and practical agriculture. Today, as always, he pursues "the even tenor of his way" earnestly, exactly, painstakingly, and conservatively, ever weeding the tares from the sound grain, weighing and sifting his facts, and garnering only what he deems to be the truth in all that he discovers by research and experiment.

And in all of his studies of the mysteries and products of the soils of the State which has become to him "My Maryland," he has, we feel sure, found with Coleridge that "Earth, with her thousand voices, praises God."

A Practical System of Soil Diagnosis

(*From page* 11)

or of its compound in the soil sample is shown by a change in color in the soil extract after the proper reagent has been added, and the amount of the element is shown by the degree of color change.

Dr. Spurway says, "This system of comparative soil testing has the advantages of giving a more complete soil diagnosis by means of simple chemical tests than has been commonly practiced. Fertile and infertile soils can be compared readily to ascertain their differences in content of easily-soluble components. These tests are not intended to displace the more accurately adjusted laboratory methods, but they are sensitive and accurate when they are used under the proper conditions with pure reagents and clean apparatus."

As in all soil tests, the manner of taking soil samples is important. The inventor of this test states, "Composite samples are preferable to single soil samples except that samples from widely different soil locations or soil classes should not be mixed together for chemical testing. Experience has shown that the soil content of easily soluble chemical constituents varies considerably with soils and soil locations. Usually, marked differences in this respect will be found between soil samples taken from knolls, slopes, and low portions of fields.

"Dissolved soil components move readily within the soil. They rise to the surface during drying weather and are washed into the soil by rains or by sprinkling. The magnitude of this movement is greater in porous soils than in compact soils. Soil samples taken directly from the surface of fields after a period of dry weather will usually test higher in available plant nutrients than samples taken from the same location after a heavy

rain that soaks into the soil.

"In sampling soils that have received applications of fertilizers, attention should be given to the position of placement of the fertilizer. Samples of soil taken directly from positions where fertilizers have been placed will always test higher in content of the substances used in the fertilizer, while samples taken from unfertilized locations will more nearly represent the condition of the soil before fertilization.

"Many field soils contain unusual conditions which affect rational soil sampling. Good and poor spots of various sizes are common occurrences. The washing of manure and fertilizers from hillsides denudes the slopes and enriches the depressions. The practices of piling crops, manure, or straw in fields; the burning of log piles; the droppings of pastured animals; and the presence of old building spots or feed lots sometimes markedly affect the chemical composition of the soil directly beneath these substances or places. Soil samples taken from such places will not represent the soil of the field as a whole, but tests on such samples will show the effects produced by the treatments involved.

Method of Sampling

"The nature of the soil problem under investigation will determine the method of soil sampling. It is usually sufficient to take up a small amount of soil by hand, with a small scoop, or with some other implement in sampling local, well-defined soil areas where the surface soil and any materials previously applied have been thoroughly mixed together. In taking soil samples from field locations, either the soil auger or a spade may be employed to obtain samples. The spade is more commonly used and with it, a slice of soil to the bottom of plowing depth should be taken. The slice is thoroughly mixed before a sample is selected for testing. Composite samples should, also, be thoroughly mixed before the portion is taken for testing."

The Spurway field test for soil components shows the amount present of the various materials for which tests are made. On phosphorus, a very low reaction of the soil extract indicates a soil content of four pounds or less of available phosphorus present in a layer of soil six inches deep and an acre in extent. The succeeding gradations of phosphorus content shown by the test are 8 pounds, 20 pounds, and 40 pounds per acre per six inches. Forty pounds is considered a high content of phosphorus.

How to Use Test

Dr. Spurway explains, "Many agricultural soils are low in phosphorus. The three chief effects of soil phosphorus on crops are stimulation of root growth, hastening maturity of crops, and improving the quality of seeds. Soils revert some of the phosphorus applied to them in fertilizers, and some soils have this power in greater magnitude than others. The application of 100 pounds per acre of superphosphate on certain soils may cause a difference in test results; but, on other soils, an application of 400 or 500 pounds per acre of superphosphate may be required to cause a variation in the test. The absorbing power of a soil for phosphorus must be satisfied before a considerable amount of phosphorus will be found in the soil extract.

"All soils, except mucks and peats, contain relatively large amounts of 'total' potassium but the amount available to plants may be low, especially in sand soils. A limiting amount of potassium in the soil causes marked disturbances in plants, and they may show a stunted, slow growth; the leaves become yellowish or dull colored at the edges and, finally, bronze or brown toward the centers. Plants needing potassium are easily affected by diseases."

An explanation of the manner in which the Spurway test is used for phosphorus will make clear the procedure for all elements or compounds because the only differences are in the order in which the determinations are made, the reagents added to the soil extract, and the reaction of the extract after the reagent is added.

As stated, the reagent for extracting the soil sample is distilled water and one drop of acetic acid in the proportion of one part of acid to three parts of distilled water. This is known as reagent number 1. A level spoonful of soil is placed in a clean test tube and enough distilled water is added to bring the level in the tube to the 13 cc. mark. One drop of reagent number 1 is added and the tube is agitated for one minute. The solution is filtered into 1 and 2 cc. tubes and used as needed for determining each element or compound.

The phosphorus test is made by adding five drops of reagent number 3 to one cc. of soil extract. Reagents for all tests are numbered; and number 3 is molybdate solution. One-quarter inch squares of clean, bright, sheet tin are also needed. As soon as the reagent is added to the soil solution in the tube, the tube is agitated; a square of tin is then added, and the tube is again agitated. A color change appears immediately in the tube if phosphorus is present in the soil sample. The color is blue and varies from a very light tint when the element is present in only small amounts to a deep, pronounced tint when 20 pounds or more of the element are present per acre per six inches. This test also shows arsenic, and can not be used on soils where large quantities of arsenical sprays have been used.

Bulletin on Test

The reagents used for all determinations, 18 in number, can be prepared in a central laboratory and supplied with the outfit for testing. In Michigan, outfits will be prepared for the county agricultural agents and they will make the soil tests for farmers in their counties. Dr. Spurway has attended district meetings at which the Michigan agents were given instructions in the use of the test and Michigan State College has published a bulletin which contains the color charts needed for the various determinations.

The new method of soil diagnosis will assist farmers to determine the reasons for unsatisfactory yields and will enable those using the test to make recommendations for correcting the unfavorable soil conditions. This method will not answer all questions on soils but provides a money and time saving short cut to a more complete knowledge of ways to improve soil fertility.

Tung-Oil Trees

(*From page* 8)

in every series of tests, while the third is varied. Since nitrogen is the most expensive of the three and can be obtained by growing and turning under legumes, this experiment station has included a number of tests where many kinds of summer and winter legumes are turned under annually after being grown between the trees.

The director of this station theorizes that since this tree is grown to produce oil, it may need a higher percentage of potash than is commonly used in fertilizers for the staple crops, and has run the potash in some of his mixtures up to 12 per cent. However, the

An aeroplane view of a 9,000-acre planting of tung-oil trees in Pearl River county, Mississippi. The view shows the trees planted in contour rows with occasional stretches of pines left standing.

work of fertilizing the trees in the many ways has been started so recently that no definite conclusions have as yet been drawn. The work with summer legumes has gone to show that the turning under of three crops of 6-week peas in a single season added enough nitrogen to equal 1,399 pounds of nitrate of soda, while similar tests using Crotalaria spectabilis showed it produced sufficient nitrogen to equal 1,548 pounds of nitrate of soda. This last named crop would, therefore, appear to have peculiar possibilities as a nitrogen gatherer for the tung-oil trees, since it was grown from a single seeding and it is probable that it will reseed itself from year to year and that the seed may lie dormant through the winter to germinate in the spring.

While the growing of the tung-oil tree is yet in a more or less experimental stage, everything points to the fact that it will prove a success in the end. Preparations are under way for the establishment of crushing plants that will be essential in large commercial production. Certainly it is a crop of the greatest importance to States like Mississippi where millions of acres of cut-over lands are lying idle and are not now needed for our staple crops.

The New Deal

(*From page 6*)

omist who was seeking to evolve a working plan on which to shape production control. Evidently the solons deemed it odd for anybody to look at the farm problem with logic instead of prejudice, but the real reason lies in the feeling on capitol hill that the soft soap artist cannot work up so much lather before election in the face of problems that courageous thought alone can solve.

This at least we feel to be encouraging—that the New Deal as shaped by the Brain Trust has been endorsed by thousands of humble, uneducated, patient, and bewildered victims of the Decade of Blunders. At last the College seems to emerge for them. It is no longer simply a place where the sons of idle rich or fledglings of sudden fortune may fritter their useless youth in dabbling and smattering. It is no longer a place where prexies orate on high-brow themes at commencement, and pompous industrial barons get unearned degrees. It is no longer a culture shop paid for by the sweat of underprivileged taxpayers. The few outspoken social defenders from those institutions, whether they be in the Brain Trust or merely sympathetic supporters of it, have saved the name and the birthright of the universities. By meeting the challenge of this crisis they have probably started a new Renaissance.

This alone seems to be a decided achievement. From a place of pas-

sive obedience to the accidental changes in public affairs, the educators have at last resigned their academic quietude and stripped themselves for the bouts. We can at least throw them a sponge or act as their seconds, instead of boo-ing and predicting a knock-out for logic in the tussle with laissez-faire.

Four years is a short time in which to prove that Brains can perfect what Brawn and Brutality made a mess of. Four years may also seem a pretty long time for those who await the finish of the fight. But these are not Dollar-a-Day patriots slyly packing their barrels with salt pork at the expense of the taxpayer. It isn't going to result in any scandal anyhow.

And meanwhile, the taxpayer who has a penchant for getting his money's worth from public servants can feel delighted at the present bargain. Any man who enlists as a brain worker finds it impossible to shut off the current or close the switch or run his affairs by the office clock. Hence the Absent-Minded Professor now stands forth in a stellar role. The poor cuss can't quit working for the government at 4:30 o'clock because his mainspring is usually wound up tight.

Hence the Great Idea that may save us from economic and social oblivion may have its birth outside of routine —which is more than can be expected of the hired man on his "rainy days" and Sundays.

Learning from Students

(*From page* 10)

Example No. 3—This alfalfa demonstration, conducted during the season of 1932 with 400 pounds of 0-12-15 per acre, yielded 7,680 pounds from the first cutting and 5,760 pounds from the second—totaling 13,440 pounds—as compared with yields on the unfertilized area of 4,480 pounds from the first and 2,560 pounds from the second cutting—a total of 7,040 pounds.

Example No. 4—Applications of 4-8-6 and 4-8-10 at 1,000 pounds per acre and manure at 25 tons per acre on potatoes were compared. Respective yields were 293.3, 304, and 258.6 bushels per acre, against the yield of 224 bushels on the unfertilized acre. In the report it was explained that a considerable amount of blight affected potatoes in this particular section, but the fertilized areas withstood these conditions to a much greater degree, yielding potatoes of much higher quality and a larger percentage marketable.

The residual effects of the fertilizers are noted the following year.

The educational end of the scheme is further extended when, during the annual Short Course of two weeks duration held at the Kemptville Agricultural School, one day is set aside for the discussion of fertilizer problems. The results of the demonstrations are brought out at this time, and the prizes are awarded. Outstanding men in fertilizer work, from both the scientific and practical end, are secured as speakers.

In attacking the extension problem with the added use of student demonstrations, the school officials feel that they are accomplishing two purposes. They are directing the attention of farming communities to a proper perspective in the use of fertilizers in conjunction with the proper methods of crop rotation and maintenance of soil fertility. And they are preparing students who go back to their respective communities to be leaders in bettering the agriculture of the whole community.

LACKED EFFICIENCY

An efficiency expert was sent out in the Colorado mountains to advise the miners. One old miner, driving the expert through the snow and cold, spread a buffalo laprobe over the knees of both of them as they sat side by side.

"You ought to turn the hair on the inside," said the expert; "don't you know it's a great deal warmer to have the hair next to your body?"

The old miner obeyed, and then sat there chuckling.

"What are you laughing about? Are you laughing at me?" exclaimed the expert, with an air of dignity.

"No," replied the miner, finding it difficult to restrain himself, "I was just thinking about the buffalo. What a fool he was all his life long not to know a simple thing like that!"

Father: "I won't have you standing at the door with that young man of yours."

Daughter: "But I only stayed for a second."

Father: "Nonsense! I distinctly heard the third, fourth and fifth."

CLUTCH TROUBLE

The other evening a couple hailed a taxicab. The cab went jerking along for a while and presently the driver exclaimed:

"My, what a clutch!"

"Say," came an indignant feminine voice from the rear, "will you please keep your eyes to the front. This is none of your business."

TAKING NO CHANCES

The "cullud" lady gave her name, her address, and her age; and then the clerk of registration asked this question:

"What party are you affiliated with?"

"Does I have to answer dat?"

"That is the law."

"Den you just scratch my name offen de books. Ef I got to tell dat party's name, ah don' vote, das all. Why, he ain't got his divorce yit."

Annie: "Come in and see our new baby."

Teacher: "Thank you, but I will wait until your mother is better."

Annie: "You needn't be afraid. It's not catching, teacher."

RETIRING INSECTS

"Moths are the least aggressive and assertive of insects," says a London entomologist. After viewing a pair of our summer trousers we can testify that they are willing to take a back seat.

A LONG TIME

A man from New York was peering into the depths of the Grand Canyon.

"Do you know," asked the guide, "that it took millions of years for this great abyss to be carved out?"

The man from New York was tremendously impressed. "You don't tell me," he commented. "Why, I didn't know it was a government job."

"I'll pick out a dozen"

EVERY day an army of thrifty housewives marches to market for fresh fruits and vegetables. They are quick to recognize quality and will pay a premium for it. The shopped-over culls they refuse must usually be disposed of at a loss. Wise growers will profit by this system of shopping by sending to market high-quality fruits and vegetables that arrive in prime condition to attract the housewife's expert eye.

Remember, potash is the quality-producing element in fertilizer. It produces citrus fruits with smooth tissues, fine grain, heavy sugar content and excellent finish. Potash-fed lettuce and cabbage have large, firm heads—beans make fewer short pods—peppers are freer from wrinkles, have thicker walls and stand up better on the market. Potash produces crisp, high-quality celery; smooth, firm tomatoes; early-fruiting peppers and eggplants; and more No. 1 potatoes and sweet potatoes.

Potash adds to the sweetness of watermelons and reduces white heart. Potash keeps truck crops healthy and working hard storing starches and sugars in celery stems, bean pods, potato roots and tomato, pepper and eggplant fruits. Plenty of potash in your fertilizer helps you produce the quality that gets the top price.

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19 West 44th Street
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Aug.-Sept., 1933 10 Cents

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VOLUME XIX NUMBER THREE

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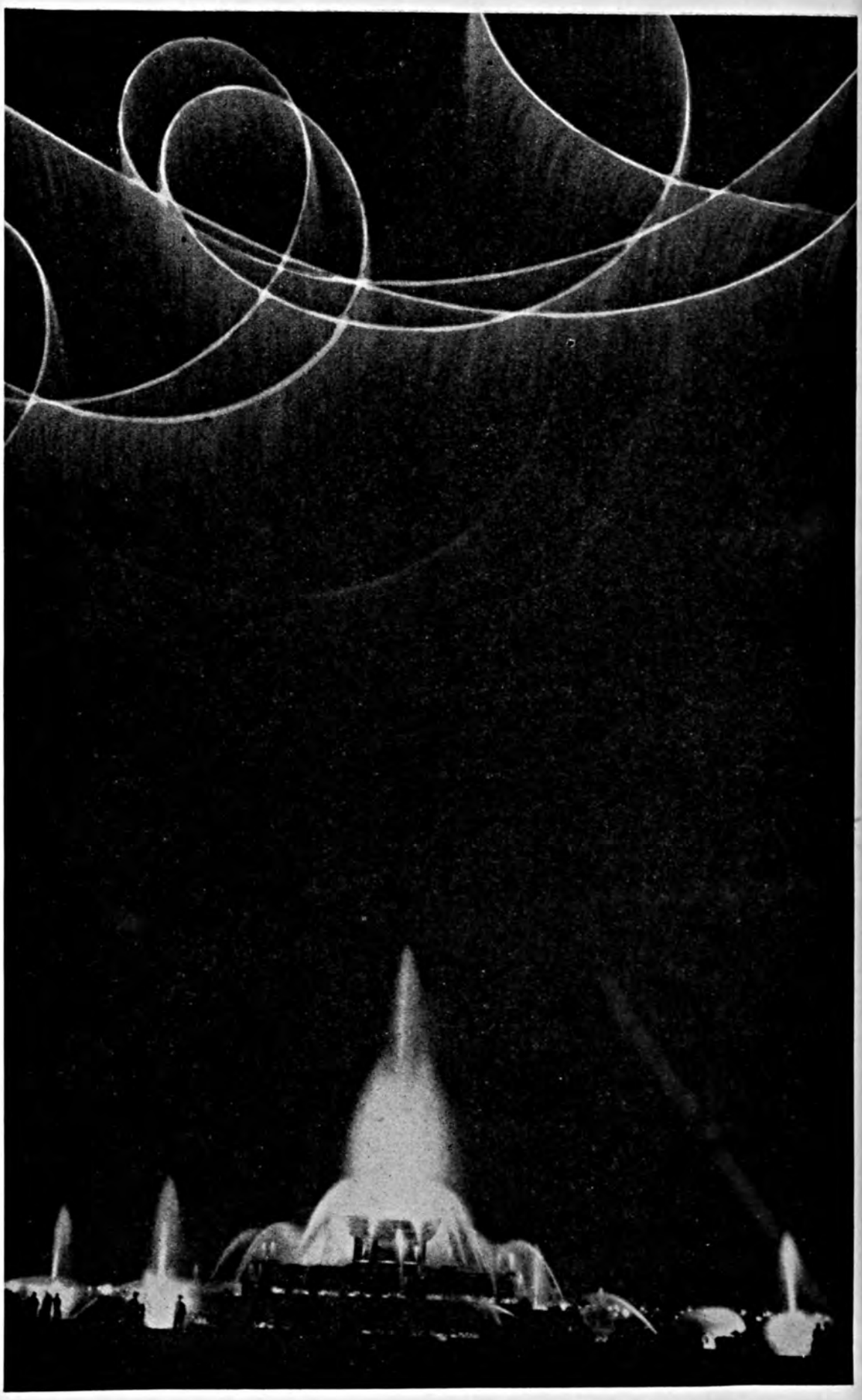

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VOL. XIX NEW YORK, AUG.-SEPT., 1933 No. 3

O. K.

By Jeff McDermid

Jeff, in Washington, sees humor as well as pathos in obtaining the much-needed approval of the government these days.

HERE I sit on a hot evening in soggy Washington, in wrinkled linens on a bench in Lafayette park. "Right ferninst" me (all rarin' to proceed but never advancing) towers the iron-faced equestrian, General Andrew Jackson, whose laconic abbreviation of "all correct" is credited with the origin of O. K. He seems to be gazing with speculative eye at the house across the park between the magnolia vistas, where in glorious, hair-pulling days of yore he himself instituted a New Deal. The paper on which he scribbled the famous misspelled comment on which we base our present lives as Federal clerks, paymasters, and journalists has long since been scattered to the winds and the dust. But within the white mansion house today there sits a successor to Jackson in the long line of O. K. artists who have used up tons of stationery for such purposes.

One who has had experience can take a short subject like O. K. and make quite a screed out of it. I presume I could have done this readily before joining the ranks of patient O. K. seekers who hang around so woefully in the corridors of the national capitol. But now I can speak with the voice of the expert and relate the circumstances with all the ardor of one who has suffered chagrin, discomfort, terror, and pride in the throes of this big game business at Washington—the hunting and capturing of O. K.'s alive. It also means that "big fists" whether armed in mail or gloved in silk have moved over the same sheet bearing your ambitious message. It gives you a better conception of the intricacies and the fine points of persuasion, if not evasion.

The Bible does not state who it was that inspected the world, the void, and Father Adam for the final O. K. As for Eve, Adam attended to that. The Good Book says so. But since Adam's time the gentle sex has assumed most of his original prerogatives in the line of making final decisions.

IT is difficult to establish exactly what an O. K. means because it has different interpretations among different people. What is O. K. to me may be N. G. to you. Literally it means satisfying the Boss, the Chief. It is the most elusive of all currencies because it has no standard.

O. K. means validity to the financier; accuracy to the journalist; relevancy and conformity to the lawyer; harmony to the musician; a good guess with flowing curves to the economist; and 3.5 per cent to the thirsty.

There are two factors involved in any O. K. One is the OK-or and the other is the OK-ee. At first thought one prefers to be the former, but in reality the latter gets the most education out of it. In those alluring pictorial advertisements that were current in pre-depression days, the smug and contented Principal Supervisor sat behind a glossy desk holding a sheet of paper with pencil poised in suspended cogitation. Across the room in hang-dog attitude stood the underling in baggy pants and dejected mien, patiently waiting for the man who had taken Our Correspondence Course in Personality to announce his fiat. Here was the embodiment of enthroned majesty and power in the shape of a Successful and Potent OK-or, contrasted with the abject figure of the OK-ee. All one had to do to become an OK-or was to exert will power and bluff so as to rise triumphant from the submerged horde of OK-ees.

Unfortunately they did not let us behind the scenes. They did not make it clear that the OK-or was up against it worse than the OK-ee. All he or any other OK-or can do with a problem or a parchment laid before him is to determine two things, viz. and to wit: (1) Does this thing sound the way I want it to sound? (2) If so, am I sure it will sound right to the million other unknown OK-ors who must ultimately settle the problem—the ultimate consumers as it were?

That goes for either publicity or policies. You write a story or draft a statement, making sure of the elemental accuracy of the dates, names, and places; and then submit it to the OK-or. If it is a limp and spineless piece that would not disturb anyone, the rubber stamp is easy to affix. But if it contains the least germ of an idea, the smallest iota of a challenge to intelligence or reason, the tiniest threat of varied opinion—in other words, if it has character—the task of the bewildered OK-or is indeed no sinecure. He wonders how much the poor OK-ee knew and held back; what disturbance the sketch would cause to friends and enemies; and whether it breeds a dunce cap or a diadem for him.

AT this juncture of contact between OK-or and OK-ee the world holds its breath; jobs tremble in the balance; and the w. k. Blue Eagle flaps its wings and prays for recovery. In short, at this meeting between the

upper and nether millstones of mentality during the O. K. process there is often danger that truth, crushed to atoms, will rise no more. Coming into the various complexities of this check and double-check trade, let us review a few classifications.

Of all forms of approval known to man that of the Multiple O. K. is the toughest. First, you go to all of the bosses and the experts and get their jumbled opinions on a given situation. No two of the opinions may be remotely alike, but that makes a dandy jig-saw for you. Then we sit down with the thesaurus and the Marquis of Queensberry rules and wrestle something down on paper. After the process is completed you take some aspirin and make sixteen carbon copies. No matter if the last four are illegible. The office boy can O. K. them.

Then you begin the marathon, the stalking process, the seat-warming, and stalling. No. 1 OK-or is at lunch; No. 2 is in conference with the other seven; and four more have hid. After a couple of days you corral half of them and get the piece all rewritten nicely. It is re-referred to the other half and they ask the lawyers in. The legal fraternity ask for a mandamus or a stay or something, shoot it full of commas, insert forty-five parentheses, and then ask you if you can read it. Not being able to, you go back and hunt up the original from the office boy, copy it again, and file it somewhere. When everybody has forgotten the topic, you keep it handy until the wind shifts. Then you release it and divide the credit where it doesn't belong.

Secondly, we have the tantalizing Delayed O. K. Most of these in the opinion of the hapless OK-ee are due to meanness and swivel-chair indifference. In truth many of them are caused by the fact that the OK-or is afraid to make up his mind. Nine times out of ten a delayed O. K. is better than one that is issued, because it gets nobody in bad and gives plenty of employment in the meantime, such as it is. Pool tables and dice would be handy adjuncts in extreme cases of Delayed O. K. Others might prefer pocket chess.

Finally we reach the Casual-Careless O. K. This holds extreme danger for the OK-ee, but it usually emanates from the office of one who holds his job lightly or doesn't give a cuss what happens anyhow. However, if he initials the document under the watchful orb of the OK-ee, his responsibility is fixed. To the free-lance with enthusiasm and verve, the contact made with this kind of an OK-or is a pleasure. It makes the OK-ee feel more like an original creator.

An irritating specimen of the OK-or is the Pass-the-Buck variety. He reads the copy, makes a few comments and scratches, and then says "If this satisfies So-and-So, my lad, it's jake with me." When So-and-So is in jail or on a vacation it means more frustration.

We suspect that the custom of the O. K. is a direct outgrowth of feudalism and militarism. Socialists abhor it; communists claim to but don't. Decisions are needful for leadership and marching orders must perforce be issued somewhere.

Probably the custom of the O. K. therefore grew out of war and politics, and has become grafted onto business. It had its birth in expediency or

strategem. In this connection we can observe with interest what happens when two rival O. K. orders meet. It happens in every campaign, whether of bullets or ballots. The generalissimo issues his ukase; the subalterns hasten to execute it; prayers go up to all sorts of gods in its behalf; the forces gather in confidence that each is right; the clash comes—and one of the O. K.'s wilts in defeat and becomes twisted around into a K. O. "The best laid plans of mice and men . . . ."

ANOTHER form of O. K. that is of the doubtful order is that of established custom or common consent. Unwritten laws, the customs of a people, legends, fetishes and hero-worship all belong in that list. They are varying, evanescent, intangible but often more powerful to sway multitudes than more substantial motives. When resisted in circles of earnest devotees by skeptics, these popular O. K.'s breed feuds and hatreds. Instances of the vagary arising from them are numerous.

The man who fairly worshipped Lindbergh turned away in a rash of bitterness when the pilot married an heiress. John L. was the pride of every bar-room until he met Gentleman Jim. Your pennant-leading team was popular until an error in the tenth with bases full. The O. K. applied under such circumstances has a feeble hold on life. It runs by the rule o' thumb —thumbs up or thumbs down!

Most amusing and least injurious of this class are the O. K.'s of legendary origin. In two short jaunts from Washington of late two of these have been noted. At Frederick, Maryland, they feature with flags and curios the little creek-side house of one Barbara Fritchie. They recite the sonorous poem about Stonewall Jackson and his brigade and make a shrine of the domicile where nothing of the kind occurred. At Ferry Farm near Fredericksburg, Virginia, you are introduced to a gnarled stump of a dead cherry tree which, they say, is the remains of that famous hatchet incident wherein the Father of His Country is held up as a Truthful James. Strung along all highways from Maine to Florida are colonial mansions that once housed Lafayette or General George. Rather disturbing to faith in the O. K.

Most disheartening of the O. K. list in this line is that of conventionality. When we were young, you recall, there were some few women of the town that our mothers shunned. Yet somehow, these lively tinted creatures back in those days of pale femininity were kind and thoughtful toward little folks like us. In many cases we trusted them and liked them far better than we did Deacon Jones or Aunt Jerusha of the Sunday school. Childish instinct has a way of forgiving many things and seeing beyond many errors to the core of reality and the heart within.

Thus we must admit that what is popular, what is applauded for the moment, or what is abjured or abused does not make a very firm or stabilized kind of O. K. Even the battle or the ballot does not establish the ultimate victory or vindication of such an O. K. Nor the lecture, the sermon, or the trip to the wood-shed with Dad.

IF we turn with some degree of expected relief to the O. K. on facts and events, we are none the less perplexed. I know well the rule of the print shop and the editorial sanctum about accuracy and the answers to who, what, when and why. But send three men to a convention or a train wreck or a wake and upon their return ask them each and severally to set down what they saw. The human equation will then bob up and give you three news stories to choose from and on which to take a chance with an O. K.

Does the test of the O. K. resolve into being true to yourself? The answer is that it does if you are heart and soul in tune and in concert with

(*Continued on page* 31)

Tomato Yield *and* Quality

By L. M. Youngblood

County Agent, North Vernon, Indiana

INDIANA has established an enviable reputation for canned tomatoes, and a liberal portion of the State's output is packed in southern Indiana. One canner expressed the kernel of the nut in this statement, "The only canners who can pack quality into a can are those whose growers deliver quality tomatoes to his factory."

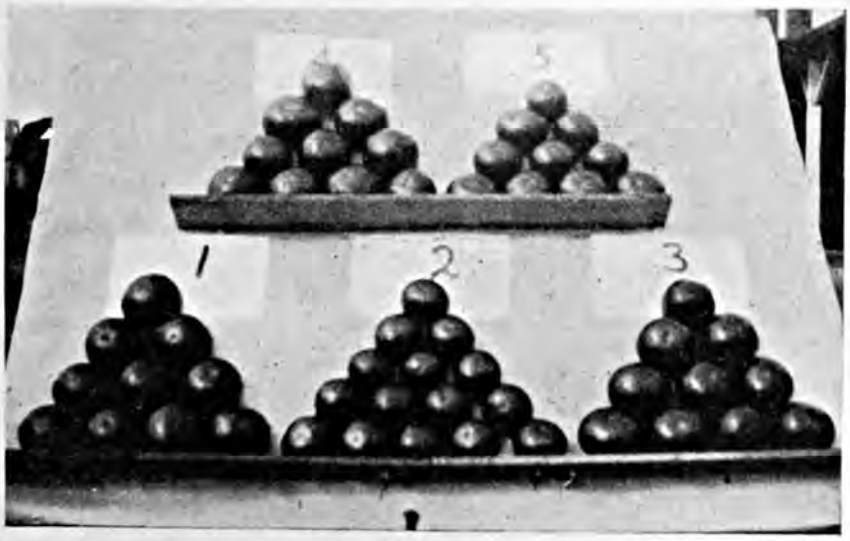
Southern Indiana growers are keenly alert for anything new that will aid them to grow more bushels of higher quality tomatoes and they perform many experiments on their own farms.

In 1930 one grower tried adding potash to his regular 2-12-6 fertilizer, an analysis which has long been a standby among Hoosier tomato growers. When the plants came on and into fruit, he thought the vines were more thrifty, that they bore a more profuse "set" of tomatoes and that the tomatoes were redder, more solid, and smoother. He called in some of his neighbors and the County Agent and they too detected the same improvements he had noticed. At the end of the season he not only had better tomatoes, but picked them all, while several of his neighbors still had unripe tomatoes in their patches.

In 1931, other growers tried this same principle of adding more potash in their tomato fertilizers and they were delighted with the greatly increased yields and the 50 per cent or more improvement in grades.

Grover Bear, a 4-H Club boy, had out two acres of tomatoes in 1931. His tomato ground is Clermont silt loam, a light-colored, fine-grained, heavy soil; and it had been manured with about 8 tons per acre. He used 500 pounds of 2-12-6 per acre on the entire field, the regulation dose of fertilizer recommended by the canneries. Then on ½ acre he used in addition

(*Turn to page* 27)



Nos. 1-2-3 tomatoes were taken from plots which received extra potash. Nos. 4-5 were fertilized with only the regular 2-12-6 fertilizer. Note the larger fruit and better color produced by the extra potash.

Southwest Soils Are Showing Potash Deficiency

By Eugene Butler

Editor, *Progressive Farmer and Southern Ruralist*, Dallas, Texas

FARMERS in this neck of the woods are meeting increasing difficulty in growing profitable crops without potash.

When I came to Texas a dozen years ago, the use of commercial fertilizer was regarded by the great majority as prima facie evidence of poor farming. Even in the ranks of those who realized the economic soundness of crop fertilization, of the three elements of essential plant food, potash was held in least esteem. Soil authorities were in agreement that there was little need for potash in the fertilization of general field crops. It was generally recommended that "clay soils and soils with clay or loam subsoils need little potash for ordinary farm crops, but that light sandy soils with sandy subsoils *may* need potash." Such was the recommendation published September 1923 in Bulletin No. 312 of the Texas Experiment Station.

Indeed there was considerable evidence back in those days that even potash-loving crops such as Irish and sweet potatoes could be fertilized most profitably without the use of any appreciable amount of potash. East Texas experiments from 1902 to 1911 with fertilizers for sweet potatoes, Irish potatoes, and strawberries indicated a marked deficiency in phosphoric acid and nitrogen but a very slight one in potash. With Irish potatoes, nitrogen and phosphoric acid gave greatest profit, although potash was beneficial to some extent. In fertilizing sweet potatoes, a mixture of three parts of superphosphate and two parts cottonseed meal, which analyzes about 2.75 per cent nitrogen, 10 per cent phosphoric acid, and ¾ of one per cent potash, was recommended. In strawberries, a mixture of cottonseed meal and superphosphate was found most profitable; potash did not pay. In fact, there seemed to be little place for potash in the fertilization of crops in the Southwest in the first quarter of the 20th century.

Times Have Changed

Times have changed. No one would now think of buying a fertilizer for truck crops that did not contain a liberal supplement of potash. And we are finding that many of those soils that formerly would grow cotton successfully when supplied with nitrogen and phosphoric acid must now have potash in their ration before they will turn out good crops. Work in recent years by N. V. Potash Export My., Inc., and the Texas Experiment Station indicates that potash has come into the crop fertilization picture in a very definite way.

For three years, 1929, 1930, 1931, N. V. Potash, under the direction of John S. Carroll and Carl Tanner, conducted a very comprehensive series of tests with the farmers of East Texas,

Sandy loam soil on the farm of H. R. White, Henderson, Texas
Left: 600 lbs. 6-8-0 per A. Yield: 369 lbs. seed cotton per A.
Right: 600 lbs. 6-8-4 per A. Yield: 531 lbs. seed cotton per A.

using potash under cotton and also as a top-dressing.

In 1929, 600 pounds per acre of 6-8-4 gave an increased yield over an equal amount of 6-8-0 of 76 pounds of seed cotton per acre. In those days we were getting 17 and 18 cents a pound for lint cotton and $30 a ton for seed, so 7 cents a pound was a fair price for seed cotton. On that price basis, the addition of 24 pounds of potash, costing $1.20, to the fertilizer mixture gave an increased yield valued at $5.32—a profit of $4.12 an acre. Equally profitable results were secured by the use of 600 pounds per acre of 6-8-8. The dollar the farmer spent for potash in the spring returned at the fall harvest with four others just like it.

For some reason, the series of tests made in East Texas during 1930 failed to include unfertilized check plots, so no comparison can be made between cotton fertilized with and without potash. However, the use of 600 pounds per acre of 6-8-8 produced an increase of 39 pounds of seed cotton as compared to an equal amount of 6-8-4. This would give a small profit with cotton at a fair price.

Results in 1931 are particularly interesting because they show what potash can do in the face of 6-cent cotton. That year, the use of 400 pounds of 6-8-4 brought an increase in yield over an equal amount of 6-8-0 of 88 pounds of seed cotton per acre. When the amount of potash was doubled, the increase in yield practically doubled. In spite of a low price of 2½ cents a pound for seed cotton (equivalent to

Sandy loam soil on the farm of H. R. White, Henderson, Texas
Left: 600 lbs. 6-8-8 per A. Right: No fertilizer
The yield on the 6-8-8 plat was 915 lbs. of seed cotton per A.

6 cents for lint and $15 a ton for seed) a dollar invested in potash brought back two dollars in increased yield.

Variation in test methods from year to year make it inadvisable to attempt to compile three-year averages covering this work. It is enough to say, however, that the use of 16 to 32 pounds of potash per acre in a 1½-2-1 or 1½-2-2 ratio with nitrogen and phosphoric acid gave a satisfactory profit regardless of a variation of 300 per cent in the price of cotton during the three-year period.

Results secured by N. V. Potash are pretty well borne out by tests made at the East Texas substations of the Texas Experiment Station. The work over a period of five years shows a very definite response to potash on soils that 10 or 15 years before gave almost negative results. Perhaps most outstanding has been the response at College Station on Lufkin fine sandy loam where the use of 16 pounds of potash per acre meant the difference between a $2.58 loss (without potash) and a profit of $2.74.

More Potash for Rust and Wilt

In all sections of East Texas, except the Coastal Prairie, farmers are getting very satisfactory results from 400 to 500 pounds of 4-6-4 or 4-8-4, and higher grade materials with a similar plant-food ratio. Of course, where cotton must contend with rust and wilt, and these diseases are becoming increasingly common, considerably larger applications of potash and a higher potash ratio are in order.

Potash top-dressing has been tried to only a limited extent in Texas. In the three years' work under Carroll and Tanner, definite response was obtained from top-dressing in those cases where insufficient potash was used under the crop, and when summer drouth did not arrive too early. However, there was no indication that potash top-dressing was needed when a reasonable amount of potash was used under the crop. In using fertilizers, Texas farmers must contend with dry weather that some years begins as early as the last of May and continues for many weeks. When this happens, top-dressings are of little value. In fact, the probability of dry weather makes potash top-dressing hazardous. Certainly it is much less certain of success in East Texas than in our eastern cotton areas where summer rainfall is not only more regular but more abundant.

In the Other States

The soils of the other States of the Southwest are showing a marked response to potash when used on general field crops. In Louisiana, potash deficiency is quite often the limiting factor in crop production. Certain soils in that State are so deficient in potash that when this plant food is eliminated, crops are practically a failure. All the soils in the State respond to potash fertilization, except the alluvial soils along the Mississippi and Red Rivers. For cotton, from 36 to 48 pounds of potash along with 24 to 30 pounds of nitrogen and 24 to 72 pounds of phosphoric acid are recommended.

In Arkansas, from 4 to 6 per cent potash in a complete fertilizer is advisable for cotton in all areas where the crop is grown. On soils where cotton rust and wilt are prevalent, higher percentages of potash should be used.

The response that the soils of this section are now showing to potash does not mean that the recommendations of 10 or 15 years ago were inaccurate. They were undoubtedly sound for the time in which they were made. Texas is merely following the path of fertilizer experience that has been trod by other States. The writer can remember when certain potash-loving crops were grown successfully on Mississippi soils without potash.

At one time the great majority of Southern soils contained large amounts

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Soil Fertility Display, Experimental Union Annual Meeting, Agricultural College, Guelph, Ontario
Pasture Fertilization — **Rooting Studies and Plant Solutions** — **The Necessity of a Fertility Balance**

A Soil Exhibit Carrying a Story

By Henry G. Bell

Associate Professor of Chemistry, Ontario Agricultural College

FARMERS today, for obvious reasons, are vitally interested in the economics of their occupation. Farming must go on, and crops must be raised. Not only this, but crops must be raised more efficiently.

To this end, the farmers that gathered at the last convention of the Ontario Experimental and Agricultural Union, held at Ontario Agricultural College, were particularly interested in an exhibit put on by the Department of Chemistry which brought to light some very definite points regarding crop growth. In this exhibit six crops —corn, wheat, barley, beans, peas, and tomatoes—were grown in solutions. One solution contained plant food simulating that found in a medium rich soil. The second series contained all but nitrogen; the third all but phosphoric acid; and the fourth all but potash. One objective of the exhibit was to illustrate the functions of the plant nutrients by their absence.

For instance, the series without nitrogen but with all the other plant-food constituents, when compared with the series containing complete plant food, showed quite definitely the function of nitrogen. Much greater stalk and leaf growth and a much more healthy and vigorous growth of root were found in all of the complete plant food jars than were found on the same crops in jars wherein deficiencies of plant food existed.

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

THE late Milton Whitney, D.A., who was Chief of the Bureau of Soils of the U. S. Department of Agriculture from the time of its organization in 1894 until June 1927, should be given credit and appreciation for devising and carrying into effect many of the plans and specifications upon which were founded and built the science to which he devoted his life with admirable enthusiasm, purpose, and industry.

A prodigious worker himself, he brought to his assistance younger men of ability and thorough training with whom he conferred daily and to whom he allotted the work of trying out his far-seeing ideas, developing those found worth while, and eventually having them applied to practice in soil management for commercial purposes. In this work he likewise spent long days of personal labor, many of them carried into the "wee, sma' hours ayont the twelve," and never for a moment did he relax his thinking and his efforts in the search for mastery of his subject.

Like Dr. H. J. Patterson, of whom we wrote in the June-July number of this magazine, Milton Whitney assumed with his colleagues a paternal rather than a domineering attitude, and so by efficient and kindly team work, attained results which were highly satisfactory and eminently useful. To them, he was an able guide and inspiring leader. While he may have appeared somewhat austere in manner, he was but trying to maintain the dignity of his position, and in fact was genial at heart. As age brought experience and a more intimate knowledge of men, he became less exacting and more gracious in mien and manner. When entrusting a young assistant scientist with an idea and receiving one from him in return, he would say, in a fatherly fashion: "Son, let us look at this thing from every view-point, test it in every way, and then decide whether it has merit and is worth developing." And so as a family matter, ideas materialized into facts, and they, in turn, into helpful hints and instructions for the guidance of workers on the land.

Beloved by Co-workers

A. H. Snyder of the University of Maryland, who did research work for a time in the Bureau of Soils, tells me that Dr. Whitney fitted up a small laboratory in his home at Takoma Park, Washington, where he worked at night. There he did a considerable amount of research, aided by some of his assistants, that resulted in the identification of many organic compounds in the soil, some beneficial, some toxic, and some inert in their effect on plants. There, too, he spent many an evening talking over the results obtained during the day and making plans for future work. In that way there grew up between the Chief and his co-work-

ers a bond of sympathy and understanding which bore fruit in unselfish devotion to the work in hand and to its successful consummation in notable achievements.

In the laboratories of the Bureau, he kept in close touch with the workers and their engagements; but there was no "pussyfooting" in his almost daily tours of inspection. So thoughtful was he, indeed, of the feelings of his "Sons" that, according to Dr. Henry G. Knight, present Chief of the Bureau of Soils, he always jingled a bunch of keys on their ring in his pocket, so that his approach never was unannounced.

Dr. Milton Whitney

He was of a rather precise turn of mind and intensely methodical; always at his desk before the opening of the office, and seldom away from the Bureau. Never taking a real vacation, it was a most important event that succeeded in luring him from Washington. Promptly at nine o'clock, nearly every morning, he would call for some one of his assistants to discuss a problem in which he was especially interested and to which he had given thought over night. He made no important decisions without a conference with other members of the Bureau; but having arrived at a conclusion, he was almost adamant in adhering thereto.

Naturally Dr. Whitney, being so fully and usefully employed, had little time for hobbies; yet we are told that he immensely enjoyed a fishing trip, was an ardent philatelist, possessed at one time of a splendid collection of stamps, and had such a genuine love of fine tools that a visit to his home usually included an excursion to the basement for an exhibition and demonstration in his splendidly equipped little work shop.

It was not strange that he took a keen interest in the raising of fine tobaccos and did much to further the interests of the tobacco growing industry, for we are informed by Dr. Knight that he was an inveterate smoker, seldom seen at any time without a cigar, and never averse to enjoyment of the fragrant weed by the members of his staff. It is reported that to arouse Dr. Whitney's ire one had only to propose the establishment and enforcement of a rule to ban smoking in the Bureau offices. To that license, perhaps, may be attributed the fact that those of his close associates who still work in the Bureau retain the cigar-smoking habit and disdain the more effeminate cigarette.

Dr. Whitney was an inspiration and sound counsellor to many a soils scientist who worked with him in the Bureau and he gained their esteem and admiration, although their ideas might not always coincide. Of these may be mentioned James M. Bell, Head of the Department of Chemistry of the University of North Carolina; Dr. Lyman K. Briggs, Chief of the Bureau

of Standards; Dr. Frank K. Cameron, Professor of Chemistry of the University of North Carolina; E. E. Free, former editor of *The Scientific American;* the late Professor F. H. King of the University of Wisconsin; W. J. McGee, geologist and soil expert; the late R. B. Moore, eminent helium and radio activity expert; W. H. Stevenson, Head of the Soils department of Iowa State College; and Professor A. R. Whitson, Chairman of the Department of Soils of the University of Wisconsin.

Early Life in Maryland

Milton Whitney came of an old Maryland family. He was born in Baltimore, August 2, 1860, the son of Milton and Anne M. Whitney. His father was at one time State Attorney for Baltimore City. Young Whitney spent his boyhood days at the family home on the banks of the Severn, in Anne Arundel county, and received his early education in the schools of Baltimore. Later, a three years' course of special work in chemistry at Johns Hopkins University, under the direction of Dr. Ira Remsen, inspired him to devote his attention to the study of soils and their relation to plant growth.

Finishing his studies at Johns Hopkins in 1883, he was made assistant chemist of the Connecticut Agricultural Experiment Station, where he gained experience and proficiency. From 1886 to 1888, he was superintendent of the experimental farm of the North Carolina Experiment Station, and acquired much practical experience in the handling of soils which proved of great value to him in his later scientific studies. It was in the report of his work at this station that he first called attention to the profound influence of the physical properties of soils upon crop production. On leaving North Carolina, he became Professor of Agriculture in the University of South Carolina, and also Director of the Agricultural Experiment Station. Serving there until 1891, he was appointed Soil Physicist of the Maryland Agricultural Experiment Station, where he did useful work and remained until 1894.

On June 30, 1891, he had married Annie C. Langdon, daughter of a prominent member of the Episcopal clergy. Of this marriage there came a family of four sons and one daughter, forming a home circle where culture and happiness reigned.

While Dr. Whitney was working at the Maryland Experiment Station, the Weather Bureau of the U. S. Department of Agriculture placed funds at his disposal enabling him to complete a full report on soil investigations. This report was published as Weather Bulletin No. 4. The U. S. Department officials were so impressed with the necessity for study of the great problems of the soil, as set forth in the bulletin that they established a Division of Soils in 1894, and selected Whitney as its head. Under his efficient management, the work of the new Division grew apace, and in 1910 Congress established it as a Bureau with him as Chief. Under his guidance, the Bureau expanded greatly and soon undertook many lines of investigation.

Initiated Soil Surveys

One of the most notable achievements of the Chief was the establishment of the Soil Survey, which had as its objective the mapping of the soil types of the entire United States. This useful organization, thanks to the enterprise of Dr. Whitney and that of many eminent men who joined enthusiastically in its furtherance, quickly proved of inestimable value, and in time more than one-third of the arable lands of the United States had been mapped, to show the location and extent of the various types of soil.

Another notable investigation, conceived and carried out under the direction of Dr. Whitney, was the study of the alkali problem of the Western lands. As a result there was devised a method for the reclamation and handling of such soils which has

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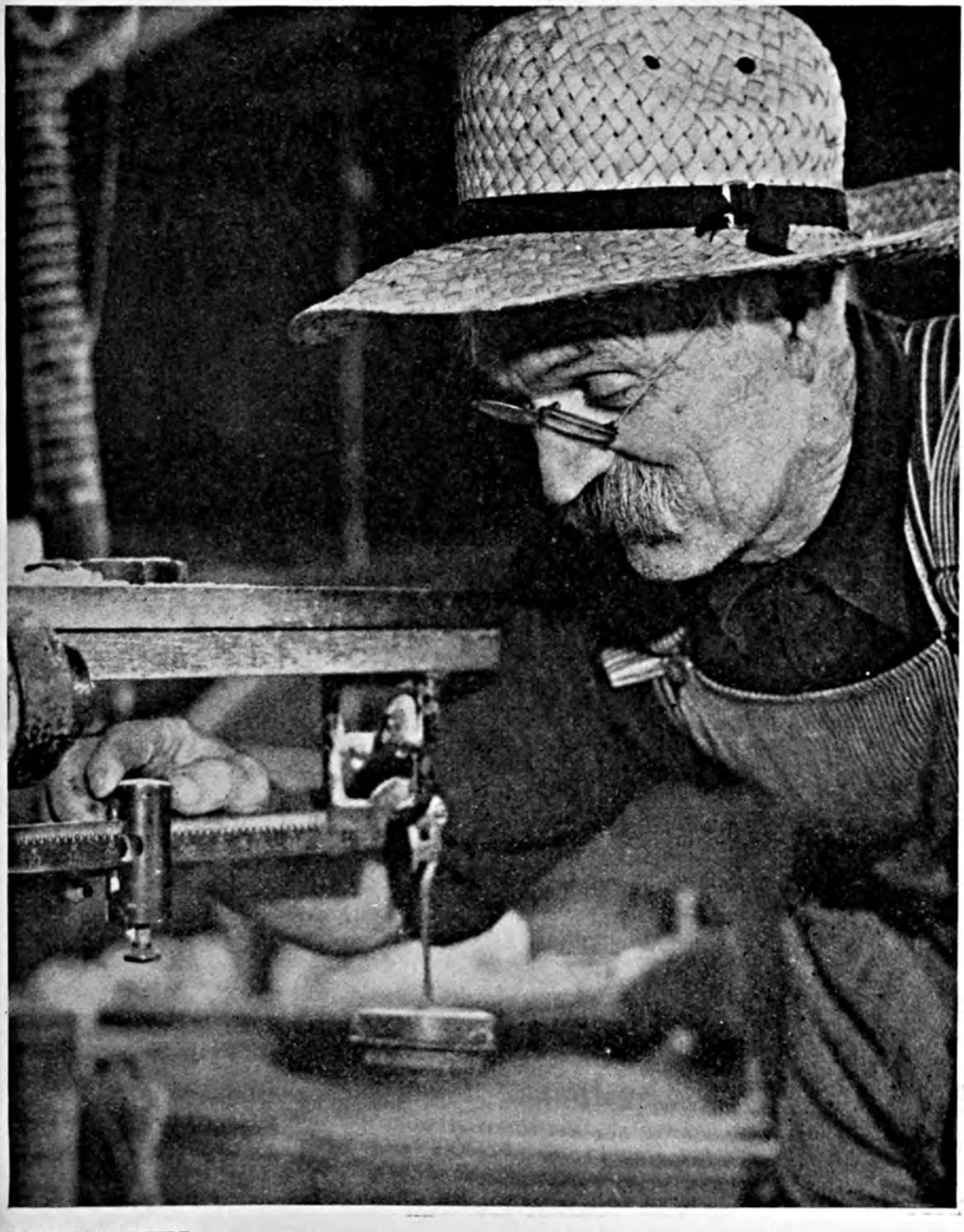
Pictorial

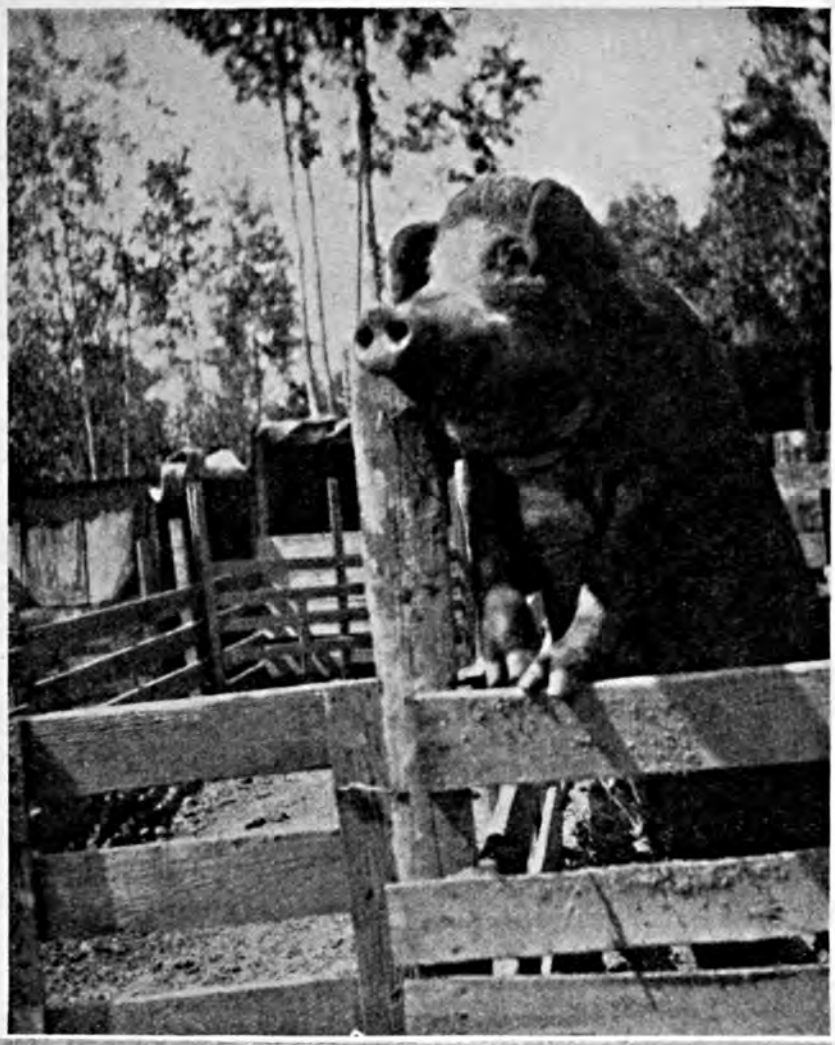


HONEST MEASURE

Above: A general view of one of Long Island's many estate gardens, showing several unemployed families at work raising fruits and vegetables. Many of the Empire State's millionaires have donated the use of their estates, and more than 160,000 such gardens are being worked by unemployed men.

Left: "Weep no mo, mah baby, de price of cotton is going up."

Right: Some swill, and not the Emergency Hog Marketing Program, is this porker's chief worry.



Below: Part of the delegation of 2,211 New York farmers who visited the Century of Progress — Chicago World's Fair—in four special trains chartered by the New York division of the American Farm Bureau Federation. It was the largest, long-haul excursion trip in the history of the N. Y. Central Lines.

Left: The center row shows what happened in an Indiana wheat field when the drill, distributing a 2-12-6 fertilizer, clogged.

Below: Four fine silos guarantee that the herd on this Connecticut dairy farm will receive plenty of succulent feed during the long winter months.

The Editors Talk

Fertilizers Go West

The World's Grain Exhibition and Conference was held at Regina in the Province of Saskatchewan, Canada, from July 24 to August 5. Included in the attendance were representatives of many countries of Europe, South America, and Asia. In conjunction with the Exhibition and Conference, the Canadian Society of Technical Agriculturists held its Thirteenth Annual Convention and the Canadian Seed Growers held their meetings previous to the conference.

In addition to the excellent exhibits of grains entered into judging competition, conferences were held every day at the Regina College. Such conferences covered a wide range of subject matter, as did the open sessions which took place at the Armory every morning. For instance, on Wednesday, ten papers were given on cereal breeding, eight on agricultural engineering problems, five on rice breeding and production, nine on soil classification and fertilizers, four on economic problems, three covered the organization and control of grasshopper campaigns, and four on meteorology. All these papers were given on the same day and the programs on the other days covered equally as large a range of matters. It was noticeable, however, that no matter how varied or how diverse the treatment of the subject, the various papers could nearly all be related to an increasing emphasis on efficiency in farm operation. Much as we may dislike being compelled to become more efficient, there is no escaping the handwriting on the wall. And it is being written very plainly.

Among the factors making for efficiency is a better knowledge of soils and the proper use of fertilizers. Not long ago the great Prairies of Western Canada were considered among the most fertile soil areas in the world; and yet the use of fertilizers in this area during recent years has received increasing attention. In line with this increasing pressure, five papers were given under the general heading of Fertilizers. Professor E. Truog of Wisconsin started the section with a paper on "Determining the Fertilizer Needs of the Soil by Chemical Analysis." This was followed by a very interesting account of the "Rothamsted Experiments on the Growth of Wheat" by Sir John Russell, the well-known Director of the Rothamsted Experiment Station.

The role of micro-organisms in relation to soil nitrogen the role of nitrogen in wheat production, and the possibilities in the use of nitrogen on small grains and grasses were discussed by other speakers. At another time under the heading of Soil Classification and Fertilizers nine papers were given which brought out the fact that there is a great variability even in the soils of the Prairie regions. So far, for instance, in the Province of Saskatchewan, 110 distinct soil types making up 22 distinct soil series have been mapped. This variability of soil type, even in what is considered the richer soil regions, indicates the necessity of regional and local studies if fertilizers are to be used profitably and efficiently in crop production.

Along the same line it is noted in the News Letter by the Canadian Government, under date of September 2, that there is a growing use of fertilizers

in Canada. Investigational work with fertilizers is carried on by the Canadian Government Experimental Farm System at its branch farms and stations, situated in every province of the Dominion. It has been found that for the majority of crops the use of a complete fertilizer mixture—one furnishing nitrogen, phosphoric acid, and potash—is best, especially in Eastern Canada and in British Columbia. To supply this fertilizer there were 60 plants engaged in making mixed fertilizers and fertilizer materials in Canada in 1932, the output of which totaled 256,633 tons. Some of this fertilizer is now being used in the Prairie Provinces where it not only has increased the yield of wheat but has matured it earlier and decreased the percentage of weeds. This is being demonstrated in a great many areas.

But in addition to a growing emphasis on efficiency, another note was sounded at the conference. It was the urgent need for the development of character, individualism, and color in rural life. Efficiency alone is apt to be a hard task-master in achieving the benefits and material profits from the growing emphasis for a more efficient agriculture. The larger problem is to conserve at the same time a vigorous character and individualism. After all it is quite possible that this is the modern problem the world over.

We Have a Birthday

With this issue our publication passes the 10-year mark of its existence. Before saying anything further, we want to thank most cordially our contributors and readers, many of them scientists of not only national but international reputation, for their fine cooperation and interest which have helped the publication find and keep its place among agricultural journals. Without such cooperation, we could not have maintained the magazine during the trying years through which the agricultural press along with agriculture is passing.

BETTER CROPS was started in September 1923, not as a farm paper, but as a journal to be edited particularly for county agricultural agents, advisers on soils and fertilizers, agronomists, experiment station workers, State and Federal bureau members, and heads of cooperative societies. It was proposed to provide these agricultural groups with thoroughly authoritative information, particularly on crop production problems, which they might not run across in other publications, and to present this material in an attractive and easily-read form. The size was made to fit the pocket or take up little space on the desk, in other words, a Pocket Book of Agriculture.

In June 1927, BETTER CROPS was combined with PLANT FOOD, which came into print in January 1926. The mission of the two magazines had been virtually identical. The first issue was dedicated to the far-seeing and untiring work of the county agricultural agents in building a permanent basis for our national agriculture.

While agriculture has been and still is going through its hardest years, we still maintain that the work of the agricultural scientist is just as important as it ever was. The steadfast interest of our readers and contributors, in turn, leads us to believe that the service which we have striven to give them in our publication has been appreciated and that our earnest desire to contribute our small part toward the betterment of agriculture has, in some measure, been achieved.

We go on from here with the same aims and purposes and the sincere hope that we may continue to have the fine support of our contributors and readers.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, and Crops. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Potash fertilizers have been found to exert a favorable influence on the quality of cotton seed by J. F. O'Kelly, W. W. Hull, and M. Geiger. The results of their work have recently appeared in Mississippi Agricultural Experiment Station Technical Bulletin No. 20, "Effects of Varying Amounts of Potash on Oil and Protein and on the Weight and Percentage of Cotton Seed." The authors believed that the effects of fertilization on the quality of the seed tended to be overlooked in favor of the more important factor of lint yield. They found that a nitrogen and phosphoric acid fertilizer decreased the oil content of the seed, while the addition of potash increased the oil content, more or less in proportion to the potash added. Since the potash also increased the yield per acre of cotton seed, the increase in oil per acre was considerable.

Potash decreased the percentage protein of cotton seed, but increased the yield per acre of seed so much that there was a greater total yield of protein per acre when potash was used than when it was not used. Potash increased the weight of the seed and tended to decrease the seed percentage. However, the latter influence was not consistent, and is not considered significant from these results. From this work it is evident that where potash increases the yield of lint cotton, it also improves the quality of the cotton seed.

The bad features connected with lodgings of corn are so well known that they need no discussion. It is therefore of obvious importance to investigate the factors favoring lodging and from this develop ways and means of reducing this trouble. N. A. Pettinger reports on his investigation of this problem in the Virginia Agricultural Experiment Station Technical Bulletin No. 46, "The Effect of Fertilizers, Crop Rotation, and Weather Conditions on the Anchorage of Corn Plants." The number of stalks that were lodged was counted and the root development or anchorage was measured by the force necessary to pull out the roots. The data obtained showed that fertilization was an important factor in connection with lodging and anchorage. The soil was deficient in all three nutrients—nitrogen, phosphoric acid, and potash. Nitrogen fertilizers when used with potash increased the anchorage slightly, but when used alone decreased it. Phosphoric acid fertilizers, especially superphosphate, markedly improved root anchorage, while potash fertilizers greatly improved anchorage. Potash, of the three elements, exerted the greatest improvement, but best all-round results were obtained on this soil when a complete fertilizer was used. The author points out that the fertilizer exerting the most favorable influence will naturally vary with soil conditions.

Comparing anchorage of corn grown continuously on the same ground with corn grown in a rotation with wheat

and hay, the author found that the corn grown in the rotation had a much better root anchorage. Weather naturally exerted quite an influence on lodging of corn, rain and wind together causing the most damage. In years of lower rainfall, wind was not so important a factor in causing lodging.

Of interest to investigators will be the extensive and well-selected bibliography included in the bulletin.

"The Effect of Variations in the Nutrient Media upon the Nitrogen, Phosphorus, and Potassium Content on Plants with Special Reference to the Tomato," Agr. Exp. Sta., Fayetteville, Ark., Bul. 288, June, 1933, R. P. Bartholomew, V. M. Watts, and George Janssen.

"The Availability of Phosphatic Fertilizers," Agr. Exp. Sta., Fayetteville, Ark., Bul. 289, June, 1933, R. P. Bartholomew.

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Lexington, Ky., Bul. 325, Dec., 1931, H. E. Curtis, H. R. Allen, and Lelah Gault.

"Registration, Labeling, Inspection, and Sale of Commercial Fertilizer; 1932," Agr. Exp. Sta., Columbia, Mo., Bul. 321, Mar., 1933, F. B. Mumford and L. D. Haigh.

"Fertilizer Experiments on 'Run-Out' Hay Land," Agr. Exp. Sta., Durham, N. H., Bul. 271, Apr., 1933, Ford S. Prince, Paul T. Blood, T. G. Phillips, and G. P. Percival.

"Retail Prices of Fertilizer Materials and Mixed Fertilizers," Agr. Exp. Sta., Ithaca, N. Y., Bul. 545, Nov., 1932, E. E. Vial.

"Fertilizer Report, 1932," Dept. of Agr., Harrisburg, Pa., Gen. Bul. 518, Aug. 1, 1933, James W. Kellogg.

"Mechanical Application of Fertilizers to Cotton in South Carolina, 1931," U. S. D. A., Washington, D. C., Cir. 264, Apr., 1933, G. A. Cummings, A. L. Mehring, J. J. Skinner, and Ward H. Sachs.

"Use of the Exponential Yield Curve in Fertilizer Experiments," U. S. D. A., Washington, D. C., Tech. Bul. 348, Apr., 1933, W. J. Spillman.

Soils

Practical and up-to-date suggestions on how to fertilize and lime muck and dark sandy soils so as to get the best results are given by S. D. Conner in Purdue University Agricultural Extension Leaflet No. 179, "Treatment of Muck and Dark Sandy Soils." After a brief discussion of the physical and chemical differences among various muck soils, the appropriate uses of lime on acid soils, and of sulfur on alkaline soils, are given. The importance of fertilizers is stressed, in which the author brings out that the fertility of the soil will be very quickly depleted by intensive cropping, unless proper fertilizers are used. He states that potash is usually the fertilizer element most needed on these classes of Indiana soils, followed by phosphate, while nitrogen is of lesser importance. Manure can be used with good results, but the weed problem, usually troublesome on mucks, is likely to be made worse by it. The analyses most suitable for use on muck are given as 0-8-32, 0-8-24, 0-10-20, 0-20-20, 2-8-16, and 3-9-18. The analyses to use and the amount per acre to apply will depend on the soil, crop, and previous treatments. For dark sandy soils, 0-20-20, 0-12-12, 0-8-16, and 0-14-6 fertilizers are suggested. In cold wet seasons, nitrogen fertilizers may be added. The place of the minor elements such as copper and manganese in fertilizing soils is also mentioned. The suggestions contained in this leaflet will be found helpful to all farmers on muck and dark sandy soils.

There is an increasing demand for information on the fertilizer needs of specific soils or fields, and to fill this need, several excellent publications and methods of testing have recently appeared. A worthy addition to this group is S. F. Thornton's recent bulletin, "A Simple and Rapid Chemical Test on Plant Material as an Aid in Determining Potassium Needs" (Purdue University Agricultural Experiment Station Bulletin No. 384.) The author uses the plant as a basis for determining the soil's need for potash. He describes plant appearances which are characteristic of an acute shortage of potash. In order to ascertain the potash needs of soils before this acute shortage develops, Thornton has devised a test whereby an appropriate portion of the plant is tested for potash by a comparatively simple chemical

test. If the plant shows only a small amount of potash, it is assumed the soil lacks available potash; while if the plant shows a large amount of potash present, the soil is considered to be well supplied with this nutrient. Yield data from experimental fields are correlated with the test results and indicate a practical reliability for the test.

"Effects of Inoculation and Liming on Soybeans Grown on the Grundy Silt Loam," Agr. Exp. Sta., Ames, Iowa, Bul. 298, Apr., 1933, R. H. Walker and P. E. Brown.

"The Winogradsky Spontaneous Culture Method for Determining Certain Soil Deficiencies," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 157, Apr., 1933, Arthur W. Young.

"Soils of Toole and Liberty Counties," Agr. Exp. Sta., Bozeman, Mont., Bul. 273, Apr., 1933, L. F. Gieseker.

"Soils of Glacier County," Agr. Exp. Sta., Bozeman, Mont., Bul. 274, Apr., 1933, L. F. Gieseker.

"Proceedings of the New Jersey Land Use Conference Held at New Brunswick, N. J., December 21, 1932," Agr. Exp. Sta., New Brunswick, N. J., Bul. 552, Jan., 1933.

"Some Facts About Soil Management in a New York Orchard," Agr. Exp. Sta., Geneva, N. Y., Bul. 629, June, 1933, R. C. Collison and J. D. Harlan.

"The Buffer Capacity of Peat Soils," Agr. Exp. Sta., Ithaca, N. Y., Mem. 146, Mar., 1933, B. D. Wilson and M. J. Plice.

"Soil Survey of The San Luis Obispo Area, California," U. S. D. A., Washington, D. C., Series 1928, No. 29, E. J. Carpenter and R. Earl Storie.

"Soil Survey of The Gooding Area, Idaho," U. S. D. A., Washington, D. C., Series 1929, No. 10, F. O. Youngs, Glenn Trail, and B. L. Young.

"Soil Survey of The Rincon Area, New Mexico," U. S. D. A., Washington, D. C., Series 1930, No. 5, A. T. Sweet and E. N. Poulson.

"Soil Survey of Suffolk and Nassau Counties, New York," U. S. D. A., Washington, D. C., Series 1928, No. 28, Clarence Lounsbury, F. B. Howe, R. E. Zautner, W. J. Moran, and P. D. Beers.

Crops

The 1933 Yearbook of Agriculture of the United States Department of Agriculture has recently been put into circulation. In the foreword its editors, Milton S. Eisenhower and Arthur P. Chew, point out that this Yearbook differs somewhat in form and content from those issued for the last six years. "It condenses the latest scientific achievements of the United States Department of Agriculture in the Secretary's annual report to the President instead of giving them extended treatment in articles by individual specialists. Space thus becomes available for describing the agricultural effects of the depression and for summarizing recent developments in farm practice." All who in the past have found the Yearbooks of much interest and great value as a source of information on our major industry will wish to obtain as soon as possible this new issue.

"Please Keep Me For Reference" is the by-line on the cover of Bulletin No. 97, "A Hand Book of Agronomy (Field Crops, Lime, Fertilizer, Soils)" which has been prepared and distributed by the Agronomy Department of the Virginia Agricultural and Mechanical College and Polytechnic Institute. There is little doubt that this publication will be kept for reference by anyone into whose hands it falls. The wealth of information contained in the publication is divided into two parts: Part 1, Crops; Part 2, General Information. In true hand-book style, the important facts for success with the various crops which can be grown in Virginia are concisely tabulated for easy and rapid reference.

"Proceedings Sixty-fifth Convention of California Fruit Growers and Farmers, Ventura, California, December 7, 8, and 9, 1932," Dept. of Agr., Sacramento, Cal., Mo. Bul., Vol. XXII, No. 1, Jan., 1933.

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Southwest Shows Potash Deficiency

(*From page* 10)

of potash. Even today their total content of potash is many times larger than that of nitrogen and phosphoric acid. But constant cropping has reduced the supply of active potash in the soil to the point of unprofitable yields. Furthermore, our methods of farming have not been of a kind that make inert soil potash available to crops. As a consequence, we have finally reached the point at which successful cropping demands that potash be given equal recognition along with nitrogen and phosphoric acid. Other States reached that stage in their agricultural experience several years ago. Texas is just now getting there.

Soil-Erosion Stations

The erosion-control stations set up by the United States Department of Agriculture to study and develop control methods effective in various types of soil serve not only for research and experiment but also for demonstration and education. At all the stations there is a more or less constant stream of visitors, many of them farmers who are considering terracing land to save it from destructive washing.

The Bethany station in Missouri reports visits by four organized parties within one week this spring. These included two classes in vocational agriculture from Missouri schools, an excursion from the University of Nebraska for all students in Agricultural engineering, and a day of intensive instruction in erosion control for the county agents of 10 Missouri counties. Erosion-control specialists regard these group visits as a particularly effective method of instruction.

Tomato Yield and Quality

(*From page 7*)

100 pounds of muriate of potash or at the rate of 200 pounds of potash per acre over and above that already applied in the 500 pounds per acre of 2-12-6. He kept an exact record of his yields on both the potash plot and on the rest of the field.

The ½ acre with the extra potash yielded 398 baskets weighing 32 pounds per basket, or 6 tons and 736 pounds of tomatoes. The ½ acre yield where the 500 pounds of regular fertilizer were used, but with no extra potash, was 249 baskets, or 3 tons and 1,968 pounds. In other words potash at the rate of 200 pounds per acre in addition to the 2-12-6 added 149 baskets to the ½ acre, or a 60 per cent increase in yield. With potash at $2.50 a hundred and the tomatoes bringing at the cannery 15 cents per basket, each $1 worth of potash returned $9 worth of tomatoes. Grove has the following to say about this crop, "The quality on the potash plot was at least 50 per cent better, and the tomatoes ripened two weeks earlier."

Other Experiences

Floyd Fewell, who delivered his tomatoes to the Dupont Canning Factory, tried the same experiment. His two acres of tomatoes were also grown on Clermont silt loam, locally known as Slash Land. His ground had not been previously manured. Where he used 500 pounds of 2-12-6 per acre, he got 76 baskets from ½ acre. But where he added in addition muriate of potash at the rate of 200 pounds per acre, he picked 103 baskets from ½ acre. In this case the extra potash brought out an additional yield of 27 baskets per acre, or 35 per cent increase. His tomatoes grown with the extra potash were also of better quality, being redder, rounder, smoother, more solid, and earlier maturing. Blight struck the entire patch or he would have had a better yield, yet the potash gave very profitable returns.

C. O. Bear, one of our consistently good tomato growers who invariably has a good yield of tomatoes to deliver, has for a long time been following the practice of plowing under a clover sod and then using 600 pounds per acre of a mixture composed of 400 pounds of 20 per cent superphosphate and 200 pounds of muriate of potash. This is equivalent to applying 1,000 pounds per acre of 0-8-10 fertilizer. This year, Mr. Bear had out four acres of tomatoes and raised the best crop of high quality tomatoes in this section. With eight tons of manure per acre and the fertilizer mentioned above, Mr. Bear actually delivered 2,636 baskets of tomatoes. That figures out 659 baskets per acre, or slightly over 10 tons per acre as an average on the four acres.

Find More Potash Pays

William Leudeman, with the same combination, delivered from one acre 11 tons and 916 pounds of tomatoes, and at the end of the canning season he exhibited several vines showing that all the tomatoes on those vines had actually ripened so that they could be delivered to the factory.

Our growers have found that this type of land, which is common throughout southern Indiana, needs more potash than is obtainable in the 2-12-6. Experience has shown that a mixture that will analyze something like 0-8-10, provided some manure or clover sod is used, greatly increases both the yield and quality, making a double gain in favor of more than the usual amount of potash. Both yield and quality are increased on the average 50 per cent. With this combination of plant foods, tomatoes ripen more evenly, do not rot so readily, are more solid, rounder, smoother; and practically all of them get ripe early enough to deliver to the factory.

The Inquiring Mind

(*From page* 14)

proved of practical importance. Then, under the direction of this "inveterate smoker" and lover of the soothing weed of which Byron wrote, "Sublime tobacco! which, from east to west, cheers the tar's labors or the Turkman's rest," commenced the study of soils with reference to their suitability for tobacco production. It was he who was chiefly instrumental in the establishment of tobacco growing under shade in the Connecticut River Valley, and that plan of cultivation was later adopted with profit in several other sections of the country.

Rescued Fertilizer Industry

Dr. Whitney also directed the Government's work in the fixation of atmospheric nitrogen, and in 1911 he gave his attention to the development of other materials for fertilizing purposes. The subject of fertilizers and their proper use always greatly interested Dr. Whitney. He recognized the necessity of rescuing the fertilizer business from the status of what he facetiously called a "scavenger industry" to that of a true chemical entity and organization. To this end, he inaugurated a vigorous investigation and study of concentrated fertilizers, both as to methods of manufacture and of application, which had most gratifying results.

Relative to this phase of Dr. Whitney's work, the "Official Record" of November 16, 1927, said: "To him fell the burden of administering the fertilizer control work under the Food Control Act, in the years 1919, 1920, and 1921. He approached the task with characteristic vigor, and through the trying post-war days worked early and late for fair treatment of both the farmer and the industry."

The Report further stated that Dr. Whitney was a man of strong convictions, and one whose vision was never obscured by petty disturbances of the immediate present. It was his constant urge upon the younger men, whose privilege it was to work close to him, that they should have the courage of their convictions; not always to be content to follow, but to lead; to realize that universal commendation is rare; and that criticism should not be feared for any work well done. His courageous presentation of his views and conceptions was, probably, the greatest influence he contributed to the furtherance of the scientific study of soils.

An Authentic Writer

Dr. Whitney was the author of numerous scientific articles and papers, published both within and outside the Department of Agriculture. His most notable publication was the book entitled "Soils and Civilization," issued in 1925. It was well received by men in his own lines of effort and by students of soil science, although not of a light and popular type. Francis Bacon once said that "Some books are to be tasted, other swallowed, and some few to be chewed and digested." The Whitney book is of the latter type, and contains much "meat" for the hungry student and for anyone who is interested with observations that have an extensive view. The book may not have been a "best seller," yet it was worth while, and we must agree with the conclusion of Thomas Fuller, who sagely remarked early in the seventeenth century, that "Learning hath gained most by books by which the printers have lost."

From a perusal of its pages, one learns that Dr. Whitney regarded the soil as not the dead, inert, and simple things often referred to as *dirt*. To him it seemed a living thing, having

many of the characteristics of an animal and requiring the same kind of intelligent and sympathetic care as an animal, to keep it in condition to render the most effective service. He compared it likewise to a factory where raw materials are converted into finished products, and asserted that it requires years of training and experience to get the most out of each particular soil type, just as it does to run any kind of factory, or any kind of engine, or to handle any breed of cattle efficiently, mine coal, shoe a horse, lay bricks, or manage a store or business.

Linked Man and Soil

His concept of the soil was a picture or an image, such as an artist might place upon canvas, or the sculptor work out on a piece of marble, or like an architect's concept of a great building, which he visualizes before he begins to draw plans that may have to be changed and modified in detail as the building proceeds. He linked the soil and man closely together in his thinking. He held that failure to maintain an average crop yield over a period of years, ordinarily blamed upon the soil, more correctly should be attributed to the man and the soil, or to their joint effort, in which case the blame should be upon the man, as he is the intelligent and directive head of the partnership. Man, indeed, should be reckoned as a part of the soil and first in the consideration, at least of the productive capacity of the soil.

Dr. Whitney deemed it the duty of the soil scientist to make a diagnosis of soil troubles and to provide the farmer with means whereby he can overcome adverse natural forces and make the soil more obedient to his will and to his needs. He believed that the soil scientist has the same relation to the partnership between man and the soil that a lawyer has to a coroporation, that the chemist has to the steel or dye manufacturer. The soil chemist does not run the farm, for he has not necessarily the experience, the training, or the intuition of the farmer; but he advises how the soil may be handled more efficiently. His training, knowledge, and experience come from observations in the field and in the laboratory. He is constantly attempting to make a complete diagnosis of the soil, to detect abnormalities, to search out weaknesses, and to prescribe methods of attack through which these weaknesses can be overcome.

He taught, too, that all of the important methods of soil control have to do with the control of the respiratory system, the circulatory system, and the digestive system of the soil, and that it is the skill with which these methods are used that makes for success or failure in the handling of the soil to obtain satisfactory results when seeds or plants of good vitality are entrusted to the soil for growth.

Space will not permit us to offer further examples of Dr. Whitney's writings and teachings, or to give in detail an account of his many activities. It should be recorded, however, that in reality he was delightfully genial in his lighter moments and, while ever a student, he could not be said to withdraw himself from his fellow men. Although we are not told that he belonged to any fraternal group, he was a member of an Episcopal church and of many scientific societies, including the Cosmos Club, National Geological Society, American Chemical Society, the Association of Chemists, and the American Soil Survey Association.

Indomitable Courage

Man's span of life is short, at best, and overwork soon weakens bodily strength and endurance. It told on Dr. Whitney as age approached. In March 1925 he suffered a severe attack of angina pectoris, as he was driving to his office. Bravely, he continued his work, suffering much, but endowed with indomitable courage, until release came early on the morning of November 11, 1927, at his home in Takoma Park, Washington.

Throughout his life, and especially

during the two years of his acute illness, the devotion of his loving wife was his stay and comfort, and in death they were not divided. While apparently enjoying perfect health, Mrs. Whitney suddenly was stricken by a heart attack on the afternoon of December 31, 1927, and passed peacefully away.

A tragic ending, to be sure; but a blissful reunion of two noble souls in the haven beyond! They rest in peace.

A Soil Exhibit Carrying a Story

(*From page* 11)

In the series containing all but phosphoric acid, there was material inferiority of growth of plant accompanied by a sparse growth of roots. A reddish tinge of stalks indicated phosphate starvation.

In the fourth series, where potash was the lacking element, growth was much poorer than where the plants received the complete fertilizer. A decidedly undersized growth of crinkly leaves denoted the lack of potash.

Adjacent to the solution bottles were bottles showing carriers of nitrogen, phosphoric acid, and potash used in the making of fertilizers.

At the top of the exhibit were six boxes containing a demonstration of relative rooting systems under different fertility treatments. Two crops, corn and tomatoes, were used in these boxes, in which coarse screen with meshes one-half inch square was inserted from bottom to top. In the first series a 4-8-10 fertilizer was applied with the top three inches of soil. In the second box the same amount of the same fertilizer was mixed with the soil at a depth of 8 to 10 inches. In the third series the same amount of the same fertilizer was mixed throughout the entire soil.

The illustrations show clearly what was to be seen after the soil was removed. The boxes where the fertilizer was applied uniformly throughout show by all odds the greatest root growth. In fact the roots of corn were three inches longer than the entire depth of the boxes and the roots were much more abundant throughout. This was true with regard to tomatoes.

It is unwise to attempt to draw extensive conclusions from these demonstrations; still they would

Root studies of corn—Left, fertilizer in the top three inches of soil; center, fertilizer at a depth of 10-12 inches; right, fertilizer throughout.

appear to illustrate one or two points. It would appear that for corn, if the seedbed is mellow and deep, best results can be obtained by mixing the fertilizers with the seedbed fairly deeply and thoroughly.

Adjacent to the solution and rooting studies was an exhibit of the results of pasture treatment. Two areas of sod were removed from the pasture of Mr. E. Ackert, Holyrood, Ontario, one from a fertilized area, the other from the unfertilized. In 1931 the fertilized field of 17 acres on Mr. Ackert's farm received an application of phosphate and potash with a spring addition of nitro-chalk. About the end of May 1932 there was a very great difference in the pasturage on the two fields. Clover and grass were nearly knee deep on the fertilized area. Actual cuttings showed a difference of more than 8,000 lbs. green weight per acre. Mr. Ackert reported that whereas the unfertilized pasture required five acres to the head, the fertilized pasture maintained almost two head to the acre.

There was a tremendous difference in the herbage as shown by the sod blocks which were on exhibit and which had been placed in the greenhouse when growth stopped last fall. Both areas were watered as required but not in excess. At the time of the exhibit in January, there was a thick mat of clover at least four inches high on the fertilized area. On the unfertilized there was a sparse growth of herbage composed of scanty, thin grass, narrow-leafed plantain (fairly plentiful), dandelion, wild strawberries, and other weeds. Experimental Union members were most interested in this exhibit and saw clearly in a practical way the different results which can be obtained by proper feeding of pasture.

The remaining part of the exhibit was taken up with a diagramatic illustration of the necessity of keeping the balance of soil conditions and plant nutrients in order to produce best quality crops. An imitation balance was erected and pans were suspended. The planks of the pan on the left bore the legend: Organic Matter; Proper Soil Reaction; Thorough Tillage; Sufficient Drainage. On them were placed cellophane bags containing carriers of nitrogen, phosphoric acid, and potash. There were also two bags of soil and one of manure.

On the right hand pan were cellophane bags of crops: wheat, barley, beans, peas, clover seed, some ears of corn, and a sheaf of alfalfa. At the back of the scale was an illustrative chart and on either end charts showing the average results obtained in the potato fertility studies which have been in progress during the past four years throughout the Province. The bright green color of the growing crops combined with a judicious choice of colors on the charts lent a pleasing and attractive effect to the whole exhibit.

The consensus of opinion was that interesting points concerning best fertility management had been effectively demonstrated.

O. K.

(*From page 6*)

the forces and events which you are working with and to which you owe allegiance.

Of course that answers only half of the problem. You may feel quite earnestly that some item or statement departs completely from the policy or the inspiration of the cause to which you and others are dedicated. If it goes against the grain to alter a message or delete a precious sentiment because the Chief cannot see it that way, you falter a bit in enthusiasm and become critical of leadership.

But pshaw! We are getting far too serious and involved with a subject that reaches into the infinite depths of philosophy. We started out with Andy Jackson astride a rearing stallion in a park and find ourselves conjuring up multitudes of obstacles to the solace of a satisfying and well-earned O. K.

IF human nature chooses to take scraps of paper, bits of blue-print, pieces of plaster, chips of wood, and bits of mosaic to work up into what each man believes to be art and success, why should we quibble with him over perfection? Each shop, each office, each home has its own brand of perfection or excellence. You are not going to get any large number of folks to agree at any one time on the result unless you are a genius.

But in the midst of these trying times of reconstruction we are eyewitness to a marvel worth stating. It is this: that the national capital has been filled with carloads of the mighty magnates and O. K. stampers of America coming down to wait their turn themselves for a star-spangled O. K. from the social-minded administration.

The private schemes and bitter rivalry among O. K. demons in business and economics has run its course toward a dead-end wall. All the petty plans and selfish maneuvers which once kept many thousand OK-ees shivering in ante-rooms have swept on to their destined finish. We are changing over from selfish seriousness to social seriousness. Things are happening easily that were laughed off the boards two years ago. The old eagle screams in hoarse acclaim because America has found itself and is resolved to write an O. K. where it will be seen and respected. Roosevelt has said to the old order of freebooters, "If you can't write your own O. K. for the benefit of the many, let Uncle Sam have a chance."

We have known for some time that America was not O. K. The preachers told us it was lack of religion and sanctity. The economists had various versions, illustrated with charts. Some lawyers claimed it was too many courts, others too many or too few statutes. The drys had a reason; the wets had more. The average citizen out of work said it was bread and meat and raiment and shelter; and that religion, law, order, and beverages were secondary issues.

By this time it looks as though material human wants have won, or at least that they are worth considering as the first stroke in making our flourishing O. K. signature to the national proclamation of prosperity.

The common man on the street who never wanted to beg is going to get a chance perhaps to earn something. He will pump blood into the arteries of commerce—he and nobody else. We have given the big bankers the job and they failed miserably, being the worst hoarders and the niftiest O. K. artists we had.

SO perforce if this O. K. furore takes hold as it is expected to, we shall erelong see this—that the well-fed, job-holding man will easily get religion again and be O. K.; that the laws will be respected more and be O. K.; and that we shall depend more upon happy home circles and less upon charts and curves and that will be O. K.

After all, there is more sentiment and psychology to any O. K. than hard sense and fundamental truth. So let's pass the word on and take the crepe off the doors. After four years of wailing and wondering, maybe we can help ourselves after all. If so, might it not be well to let O. K. stand for Our Konquest?

Teacher: "Johnny, why does Missouri stand at the head of mule-raising of the United States?"

Johnny: "Because the other end is dangerous."

APPEARANCE

Two spinsters were discussing men. "Which would you desire most in a husband—brains, wealth, or appearance?" asked one.

"Appearance," snapped the other, "and the sooner the better."

Little Betty, returning from school one afternoon, said:

"Johnny Wilson's examination papers were so good that the teacher keeps them on her desk to show visitors."

Asked about her own, she had to confess that they weren't good.

"But why aren't yours as good as Johnny's?" her mother asked. "You have the same opportunities."

"I know, mother," said Betty, "but Johnny Wilson comes from a very bright family."—*Sante Fe.*

There are at present two kinds of business men. One kind is selling out, and the other kind is out, selling.

An old negro preacher was explaining to his congregation the difference between faith and knowledge.

"Now, my bredren," he said, "hit's like dis: Dar's Brudder Johnsing a-sittin' on de front seat wid Sister Johnsing, and de five little Johnsings. She knows dey's her chillen—dat's knowledge. He believes dey's his chillen—dat's faith."

You can't tell me how far a couple has gone in a car merely by looking at the speedometer!

CAME THE TAXI

"Would you mind walking the other w'y and not passing the 'orse?" said a London cabman with exaggerated politeness to the fat lady who had just paid a minimum fare.

"Why?" she inquired.

"Because, if 'e sees wot 'e's been carryin' for a shilling 'e'll 'ave a fit."

"I want a nice present for my husband. What do you advise?"

"May I ask how long you have been married, madam?"

"Oh, about fifteen years."

"Bargain counter in the basement, ma'am."—*Wroe's Writings.*

Negro Undertaker (over telephone): "Rastus, your mother-in-law just died."

Rastus: "Is you sure 'bout dat?"

Negro Undertaker: "Shall I bury her or embalm her?"

Rastus: "Don't let's take no chances, brother. Cremate her!"

Easy: "Has opportunity ever knocked at your door?"

Mark: "No, but I certainly am on its mailing list!"—*Exchange.*

"Had a terrible time with my flivver."

"Yeah?"

"Yep. Bought a carburetor that saved 50% of gas, a timer that saved 30%, and a spark plug that saved 20%, and after I went ten miles my gas tank overflowed!"

From The Chicago Tribune—

POTATOES SOGGY? THEN BLAME IT ON THE GROWER

The cook probably gets blamed when the potatoes are "heavy and soggy," but proper blame is due the grower in most instances, according to tests of cooking qualities recently conducted by Ralph Donaldson, Massachusetts State college agronomist.

Low protein and high starch content in potatoes produces the desirable white and mealy cooked potato, it has been found. Cooking swells the starch grains and causes them to burst, but if the protein content is high then the starch does not function as usual and the soggy condition results.

Thoroughly mature "spuds" are the first requirement which is being described to potato growers. Properly fed soils, high in potash and relatively low in nitrogen, encourage the crop to desirable starch content.

POTASH PAYS ON ALL CROPS — NV — POTASH EXPORT MY. — TRADE MARK REG.

Potatoes remove from the soil more potash than both nitrogen and phosphoric acid combined. Make sure your fertilizer contains plenty of potash. POTASH PAYS!

N.V. POTASH EXPORT MY., Inc., Buckingham Bldg., CHICAGO

Printed in U. S. A.

Better Crops with PLANT FOOD

Oct.-Nov., 1933 10 Cents

The Pocket Book of Agriculture

Feeding your FRUIT

Official Evidence

Virginia:

"Those blocks in our experimental orchards that have received complete fertilizer for the past ten years are now outgrowing and outyielding other blocks. This is explained by the greater amount of organic matter produced and eventually added to the soil."

Pennsylvania:

"The value of nitrogen as the sole ingredient of an orchard fertilizer has been greatly overstressed. The plots which have received a complete fertilizer are obviously superior, in growth of cover crop or sod, in vigor of trees, and in yields, to plots which have received nitrogen only."

New Jersey:

"A complete fertilizer has always been recommended for tree fruits in New Jersey. For the past few years the Horticultural Department has recommended that in general apple growers consider as a basic fertilizer treatment, the annual use of 75 to 100 pounds of Muriate of Potash and 400 to 500 pounds of Superphosphate per acre, with the addition of nitrogen-containing fertilizers according to the needs of the variety and the orchard."

WHEN there is a deficiency of organic matter in your orchard soil: "fruit spur and terminal growth is short, the bark becomes tight, the fruit does not size up, much of the fruit cracks in summer when dry spells are followed by rains, die-back or rosette appears on the terminals, more top and root injuries occur in winter and in many cases the addition of nitrogen fertilizers gives very little response."

Don't wait for your orchard to show these signs. Plan now to use a well-balanced fertilizer. Get a luxuriant growth of alfalfa or clover. These deep-rooted cover crops carry organic matter and the essential mineral elements —potash, phosphorus and lime—to the lower root-feeding zones where the trees readily take them up. This increases the yield of high-quality fruit of better size and color and improves the foliage and tree vigor of your orchard.

POTASH PAYS ON ALL CROPS
NV
POTASH EXPORT MY. INC. OF AMSTERDAM, HOLLAND
TRADE MARK REG

N. V. POTASH EXPORT MY., Inc.
19 West 44th Street
NEW YORK CITY

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

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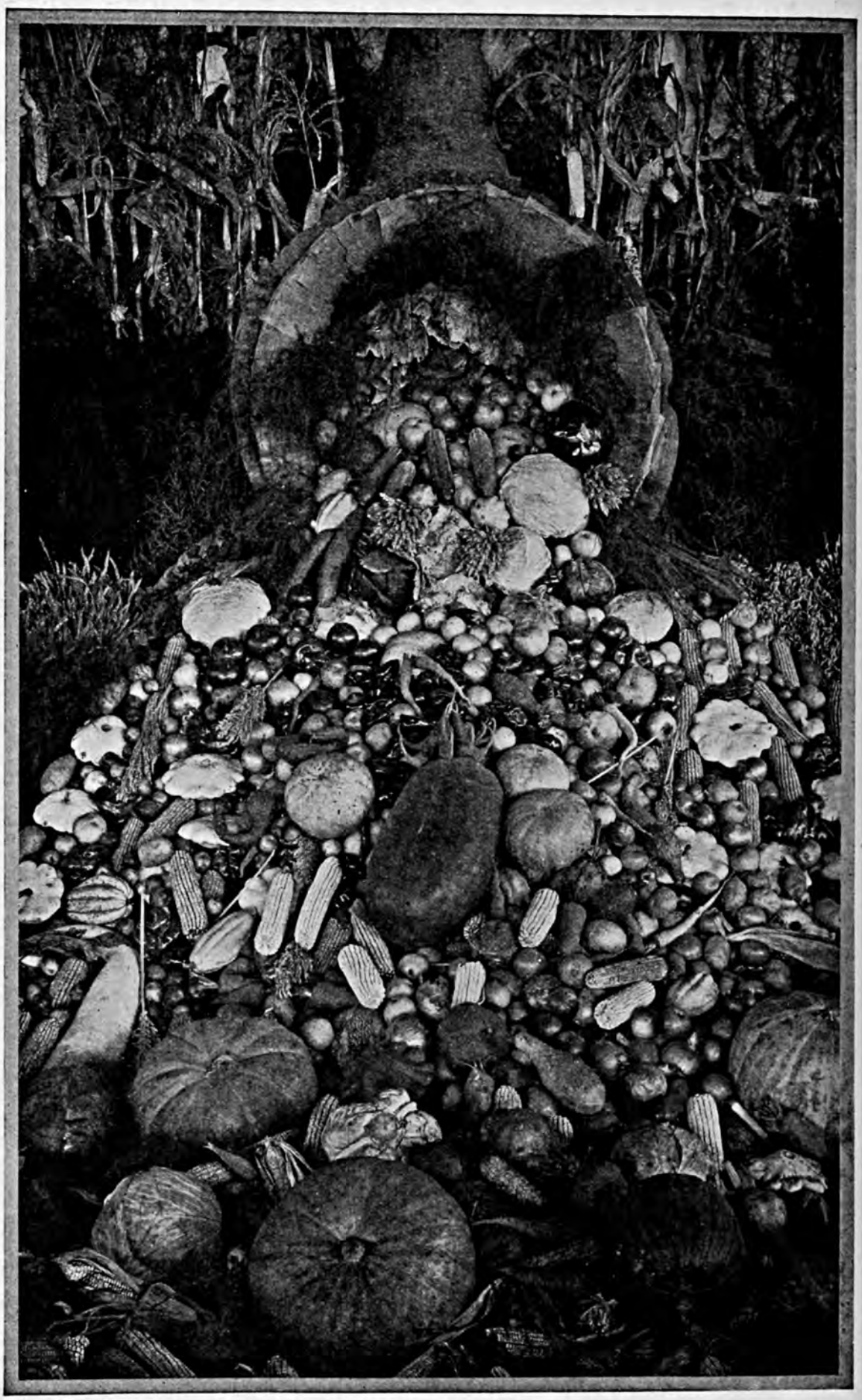

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Jeff says—"There must be co-operation in cow-operation."

Cows *and* Codes

By Jeff McDermid

THE purple cow of Burgess' fancy, the sacred bulls of Bashan, and the golden calf that Moses busted have nothing on our modern bovines in the spotlight of economic experiment.

In my barefoot days I lived humbly with cows in clover. In later years on the prairies we kept cows in corrals. I have seen cows in auction rooms, on floats in lactic pageantry, and in the gilded stables of Croesus. I have observed them in antiseptic milking parlors and watched them being clipped, oiled, waxed, curled, and manicured. I have seen them tested, pedigreed, weighed, and spayed. In short, until this season I was prepared for anything and everything to be done for, by, to, and with the cow—but so help me, the last barriers are broken down, and the ultimate is here!

Lean forward with bated breath for the latest scandal from the front. They have put cows in codes!

They tried it with pigs, but it didn't take. The sheep, lamb, and goat supply has all been utilized in Wall street. But, as the nation boasted some twenty-five million "milch" cows and "milch" is an article of commerce "inextricably intermingled," (but un-

accountably oversupplied) the only answer thus far has been to codify the country's dear old wet-nosed four-legged foster mother. She is no longer merely a scrub, or a native, or a Holstein, or something, but she is Exhibit A.

OH it's absolutely true and it's too late to do anything about it. She is snubbed up close to the legal manger and is being fed balanced rations consisting of more whereases and/or hereinunders than any blessed old bossy since Noah loaded the ark. Each bright morning the Federal boulevard is cluttered with eager young milkmen with Yale degrees, each dedicated to codifying the cow.

For every flap of the Blue Eaglet there is a glorious drip from the udder. But the eagle flaps for nothing, and it takes alfalfa to keep the cows contented. Hence if there must be codes for the one, there should be cuds—and codes—for the other. The farmer supplies the *cuds* and the lawyer provides the *codes*.

Thus mutually responsible, we tackle the milk problem on all fronts, being careful to do our most meticulous work on the southeast corner of the starboard side, lactitude unknown.

Personally, I favor this honor done to the cow. Why should she not become a rallying point for heated debate when she has for so long been expected to "give down" and shut up? We have brought all sorts of queer problems to Washington to scrap over and had queerer folks doing the scrapping. I think it is high time to inject a little bucolic sentiment into the picture, and believe me the old cow as I know her packs plenty of sentiment as well as just ordinary scent. You can get more sober folks all het up over the cow question than a dozen bridge tournaments or world series instil, especially if you talk cost of production and milk trusts. But this is getting ahead of my proper sequence.

Indeed, the plain rural cow has struck her gait, and she pastures in mighty mixed company these days when it comes to codes. Just to indicate the variety of commodities with which she is indexed on the road to recovery, I fumble through a fresh file from over yonder in General Johnson's department.

Here we have one day's edition of codes of fair competition as revised, annotated, and rubber-stamped, all ready to accompany the cow for another day of grazing. Here we have, if you please, codes for ocean pearl buttons, jeweled watches, end grain strips, men's garters, brassieres, tile and mantel arts and crafts, furring and lathing, real estate, knitted underwear, carpet padding, bolts, nuts, and rivets, fashion studios, cast-iron boilers, hospital furniture, aluminum fabricating, barbers, outdoor advertising, apartment-house janitors, armored cars, sausage casing, and millinery; and for making the cow feel natural, codes for silos, hides, and evaporated milk.

BUT you can take all the aforementioned codes in one big bundle and they won't get the publicity that our friend the mooly cow garners in a week. Why, she stands in the papers right alongside the steel trust and the coal barons when it comes to public interest. Leave it to the folks back home who joined the Holiday Association to attend to that. They have sent the old cow down here to represent them, as a symbol, I mean. Of course you can't really find a cow within some distance of Washington, which is one reason why our milk costs so much and tempts the editorial writers so often. She is here in spirit even while she remains on the ranch and adds to the crop of calves, the vats of unsold cheese, and the surfeit of butter. In short, her base is in Washington and her surplus is everywhere.

Before attaching a code to the cow's tail, it was advisable to look at a for-

mula. This formula merely stated what we knew before, namely, that given a lower unit price for milk and a higher unit price for overalls and eating tobacco, the precious old cow must turn herself inside out to out-spurt her former udder efforts. And when cow prices dropped to where anybody with a wisp of hay and a milk-stool could own one, performance counted more than pedigrees.

After conjuring awhile on this prob-

lem and the riddle of how to hold back the torrent of milk, it was decided to put the cow into a convenient place to harness her for the codes. And that convenient spot happened to be a "milk shed."

So we all foregathered in the milk shed, using law-books for herd-books. I am unaware who coined the term "milk shed" to define the place in question. It certainly is not like a watershed, for obvious reasons. And the existent health rules will not tolerate the use of an ordinary lean-to shed as a place in which to twist out the lactic juices for such high-toned areas. But "milk shed" it is and you'll have to put up with it.

I EXPECT you should be legally introduced to the cast. They are the "contracting parties" and the stage on which they intend to do the milking is called "sales area" and "production area." Way back in the wings we keep a stage-hand to rattle the thunder machine and to flash the lightning betimes. This inconsequential party is caled the "consumer." He is merely there to furnish background and local color. But he grumbles by proxy sometimes and thinks he ought to write the drama.

"Contracting producers" mean a group of fellows who decided years ago that cow-operation and co-operation belonged together instead of being exploited separately. They gravitated around milk sheds and built up protective walls to keep out the milk produced by other cooperators in the manufactured zones. When the glass tank cars entered the picture and milk came from greater distances, the cooperatives set up base and surplus plans for economic control and bacteria-counting experts for physical control. This displeased the exponents of the open market, flat prices, and flies in the strainer. Their idea was to buy every heifer in sight, work their families to death, dump every drop on the city market, and demand fifty per cent of the retail price or better—or else take cost of production based on the highest estimate on hand and strike if the public refused to pay it. Hence when you say "cooperating producers" now, you mean what are left of the original gang who have managed to resist the pleas and clubs of the nonconformists.

"CONTRACTING distributors" mean whatever you choose to name them. They may be snipers, malefactors of entrenched privilege, greedy cream-skimming slickers, exponents of the classified racket, members of the milk monopoly; *or* they may prove to be harassed managers obliged to cater to the morning demands of thousands, with arrogant labor unions, broken bottles, stalled motors, and cutthroat competition to face.

"Spreads" are what watchful zealots for the public weal carefully scan when trades and agreements are brewing. One idea is to narrow the spread

to quash the trust, and what often happens is that you play into the hands of those best able to trade on decimal fractions because of preponderant volume. Just how one may put a foot on a farm and another in town and not spread some in the process has not been fully explained. Maybe if the producers would don suits of mail and use some of their idle trucks and husky sons to bust the grip of the milk drivers a litle nick might be made in the w. k. spread. Or we can return to the days when every farmer toted his milk to town and dispensed it from fly-specked pitchers.

"PRODUCER - DISTRIBUTOR" means a man who is too blamed independent to take what the market offers in a group. He helps himself to "parity" and uses as much oleo as he pleases either on pancakes or pistons. When you talk surplus to him, he says he has none. You can't pin him down as a distributor because he is a producer, and you can't get him het up on farm distress because he cashes in on milk tickets and snaps his fingers at the pitch-forking spellbinders. The only way to get his nanny is to inform him that he and his cows are codified and that hereafter his milk must sell above a minimum.

"Production area" means and signifies almost invariably a rural territory so badly hit by drought that even the milk has to be watered, where every teat is mortgaged, and every calf has the scours.

"Sales area" is the region bounded on the one hand by the chain store and on the other by the roadside stand, wherein there is the sunrise advent of the bewildered milkman and his nag, fifteen to a city block, doing yeoman duty as distributors but reneging on the job as collectors.

Perhaps you imagine that all is clear navigating after the "contracting parties" are ready, and that when you say "agreement" you mean agreement —the synonyms for which are harmony, accord, and brotherly love.

However, and nevertheless, be not misguided by our popular Nervous Restless Attitude. The contracting parties are often frustrated by the "contrary parties." There's more to this milk business than a can, a customer, and the barn-yard pump.

Folks who are about as well teamed up as Primo Carnera and Mahatma Gandhi or as mutually sympathetic as Hugh Samuel Johnson and Henry Ford are expected to lay aside their warpaint and come peaceably to be glossed over with the lacquer of resolve and the varnish of resignation.

Men whose mutual hatreds for a decade have turned freshly-drawn, double A grade milk into curdy clabber in a split second; who have tormented each other's organizations over the backs of innocent kine during the delightful days of rural cooperation—these are the belligerent and stubborn cohorts who thrust themselves into the dairy agreements. And if nobody gets killed or no profits are cut, the fracas will be a victory for all!

BUT you fail to have a true index to the situation by that inference alone. The scrappy and prejudiced attitudes of many erstwhile native-born and true-blue cooperators and their associates on the selling end had been worn down pretty blunt by the exigencies of the hour. The irresponsible third party, the last vestige of the laissez-faire era, the price-shaving demon—he it is who united the warring factions when decent methods failed to bring peace. He auctioned off the cream and peddled out the milk. He gave premiums and sold loss leaders. Nothing but a code could hold him from removing the breeches and the socks from the industry. When one is exposed with recumbent pants, one has to step lively or get swatted.

The "chiseler" nicking his grooves in price levels is a result of the bad

(*Continued on page* 31)

Left—no treatment. Right—200 lbs. 45% superphosphate, 200 lbs. muriate of potash, and two tons of lime per acre. The fertilizer doubled the yield and returned the investment with 380 per cent profit.

Interest—300%

By C. J. Chapman

Professor of Soils, Wisconsin College of Agriculture

A FARMER who can make a profit on any investment, with prices for farm produce where they are, may well be looked upon as some sort of a magician. But, unbelievable, as it may sound, there are still investments that a farmer can make which will pay a handsome profit. If I were to tell you that by investing $10 per acre in fertilizers for alfalfa a farmer with whom I am well acquainted made 380 per cent interest on his investment within a period of three years, you probably would say it couldn't be done, but I am going to present the facts.

And I want to say right now that there is no crop grown in the State of Wisconsin at the present time which offers greater opportunity for the profitable use of fertilizers than alfalfa. A ton of alfalfa hay is worth more than the average ton of milk at present prices. Alfalfa is one commodity that has not fluctuated in price to any considerable extent during the past few years. There is no surplus of good alfalfa on our dairy farms today; in fact, less than 15 per cent of our hay acreage in Wisconsin is devoted to the alfalfa crop.

My enthusiasm has been quickened by the past three years of dry weather. Alfalfa has come through in most cases, while clover and timothy seedings have failed by the thousands of acres. The total hay crop harvested in Wisconsin in 1932 was two million tons short of the five-year average. I recommend fertilizers for alfalfa and clover seedings this coming spring without hesitation under a wide range of soil conditions in Wisconsin, and

firmly believe that such a practice is sound and economical.

I am going to tell you now the story of a farmer who had to be shown first that money invested in fertilizers for alfalfa would pay. Alfalfa on his farm had been a fickle and rather uncertain crop. He could get a catch and a fair yield for a year or two, but it soon faded out of the picture, yields would drop, and it generally met with an early death, due to starvation and winter-killing. This farmer lives at Mazomanie, Wisconsin. His little farm is located on the edge of the village. The soil is a sandy loam. I am especially interested in this farm and in the farmer as well. In the early days I presume this interest was centered around one of his good-looking daughters, but for the past 13 years, more because Joseph Sharratt is my father-in-law. At any rate, I wanted to see some good alfalfa on this farm, and I set out to show that it was possible to grow it.

In the spring of 1928 I took samples of soil from the field he proposed to seed to alfalfa. We analyzed these samples in our laboratory for total nitrogen, total phosphorus, available phosphorus, total potassium, and acidity. We also took subsoil samples from this field and tested them. For results of these analyses see Table I.

The subsoil at two feet was calcareous, showing no acidity at all. In fact, it contained limestone gravel.

These analyses indicated that this soil was very low in its content of available phosphorus, and I was reasonably sure that it needed potash as well. Sixteen thousand pounds of total potassium is considered low. The need for lime was not so clearly indicated. While the surface soil showed a slight-plus degree of acidity, yet the subsoil was less acid, and at two feet contained an abundance of lime. The treatment then, I decided, should include both phosphate and potash, and in order to check on the need for lime I decided to run a trial strip, using lime in addition to the phosphate and potash.

Trial plots were laid out on this field, and fertilizer and lime treatments were worked into the soil in advance of seeding. Forty-five per cent superphosphate was used at the rate of 200 lbs. per acre, muriate of potash at the rate of about 200 lbs. per acre, and on one plot lime, in addition to the phosphate and potash, was applied. One plot received phosphate only.

Harvests were made of the alfalfa in 1929, 1930, and 1931. Two cuttings were taken each year. The story of what the fertilizer did is told in Table II below.

(*Turn to page* 27)

TABLE I—Soil proved to be low in available phosphorus and potash.

	Total Nitrogen	Total Phos.	Avail. Phos.	Total Potassium	Acidity
Surface soil	2,260 lbs.	1,000 lbs.	30 lbs.	16,640 lbs.	Slight plus
Subsoil	1,740 lbs.	740 lbs.	12 lbs.		Slight

TABLE II—The increase from phosphate plus potash was nearly four times the gain from phosphate only.

Total yield for three years for the plot receiving phosphate and potash was	15,845 lbs. per acre.
The plot receiving the two tons of lime in addition to the phosphate and potash gave a calculated total yield of	16,350 lbs. per acre.
The plot receiving phosphate only yielded	9,909 lbs. per acre.
The check plot, adjacent, yielded only	8,103 lbs. per acre.

Picayune — An Inspiration

By E. B. Ferris

Vicksburg, Mississippi

AT a time when business conditions were so bad over the country as a whole, it was refreshing to go to Pearl River county, Mississippi, and particularly to Picayune, and see the agricultural activities that have been developing for several years and are now going on. The writer first saw the place called Picayune when it was typical of the meaning of the word, a small coin of little value. At the time, it was merely a wide place in a log road with a small railroad station and a single store the only evidences of what is now a thriving small city of some 5,000 inhabitants, with miles of paved streets and buildings that would do credit to any city several times its size. Lumber made the place, but unlike most towns of its kind, its leaders determined that it should not degenerate with the exhaustion of the pine forests.

The town and county were fortunate in having leaders who did not depend upon side capital and labor to come in and develop the lands left by the sawmills. Knowing the possibilities of the soils and seeing the developments in other sections similarly blessed naturally, they set to work to develop the lands agriculturally. In some respects these leaders faced conditions that differ from those which confronted the large sawmill operators of the past in that there were no more pine forests to conquer or rather to keep their capital active. However, too much credit cannot be given the capitalists who owned this timber since they appear to have felt it their patriotic duty to leave as much potential wealth in the county as they found on coming to it.

With this evidently in mind, these capitalists set about to find means of converting these once timbered lands into dairy farms, orchards, and plantings of other trees that may bring more wealth into the country annually than nature brought in the hundreds of years required to produce the long-leaf pine forests, granting they were the finest the world has ever seen. To this end they spared no expense in finding the crops that

(*Turn to page* 30)

Top-dressing, with fertilizer, strawberries in the world's largest strawberry patch, belonging to L. O. Crosby, Picayune, Mississippi.

Siebert Amsler and Robert Brandenburg demonstrating the pot tests for detecting soil plant-food deficiencies. In order to confirm the results, they also made tests on the plant tissues for nitrates, phosphates, and potash.

It Pays to Know

By Siebert Amsler and Robert Brandenburg

I AM Robert Brandenburg and this is my team-mate Siebert Amsler. We comprise the demonstration team from the Rensselaer High School of Jasper county, Indiana, and will demonstrate, for your approval, a simple way to detect soil deficiencies and the plant-tissue test for nitrogen, phosphorus, and potash in corn plants which we have grown in pot tests on soil from our own farm, as a part of our study in Vocational Agriculture.

The plant-tissue tests were recently developed and published by the Purdue Agricultural Experiment Station and given to the farmers of Indiana to assist them in "letting the corn plant tell the soil fertility story." By using these plant-tissue tests, very good results are obtained. It is economical and profitable for every farmer to follow a sound soils program, which includes using the proper amounts of fertilizer, lime if needed, legumes, and a good crop rotation.

We are greatly interested in these tests because we expect to follow up these pot tests on corn plants in our corn fields to see whether our corn is getting enough of the right kind of plant food from our soil.

We have planned to run some fertilizer plots with corn, leaving several rows unfertilized for check plots and then comparing these with the various fertilizer treatments. We will use these very same plant-tissue tests on the corn plants from these field plots

and see if the plants are getting enough of the three plant-food elements, nitrogen, phosphorus, and potash. By using these plant-tissue tests on the plants from these pot experiments, we have been able to determine what plant foods our soil needs for corn. We are guided by this information in laying out our field fertility plots.

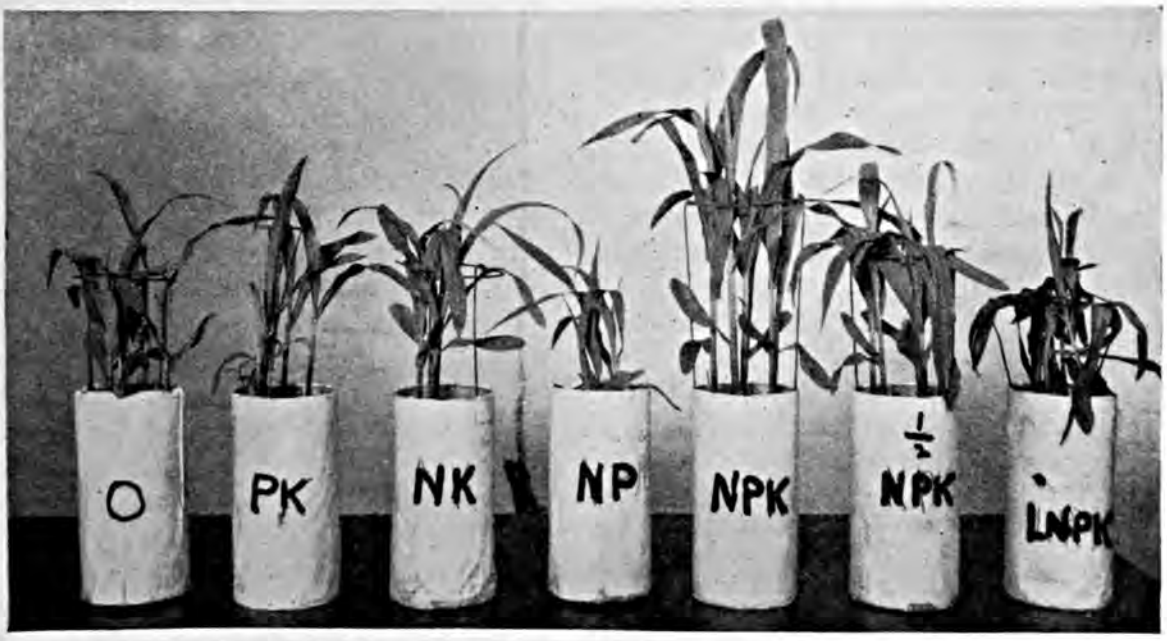
Each of us brought in about three gallons of dirt from a representative part of the field where we will grow corn. After drying the soil, we filled each of these cans with two pounds of soil. Then we thoroughly mixed different fertilizer materials with the soil in these pots.

To the first can we did not add any fertilizer, marking it 0, meaning no treatment. (Second boy holds up cans as mentioned.) To the second can we applied ¼ teaspoonful of ammonium sulfate and ½ teaspoonful of muriate of potash and mixed it thoroughly, marking it NK. To the third can we added one teaspoonful of 20 per cent superphosphate and ½ teaspoonful of muriate of potash, marking it PK. To the fourth can we added ¼ teaspoonful of ammonium sulfate and one teaspoonful of superphosphate, marking it NP. To the fifth can we added ammonium sulfate, superphosphate, and potash at the same rate as before, marking this can NPK. To the sixth can we added two teaspoonfuls of hydrated lime and the same amount of nitrogen, phosphate, and potash fertilizer materials as before, marking this can LNPK.

My team-mate, Siebert Amsler, will now show you the results of these various pot treatments and also the plant-tissue tests.

Amsler—I would like to call your attention to the fact that the best part of these tests is to note the differences in the height of the plants and leaf color symptoms. My team-mate will now show you the can marked NPK, to which all three fertilizer materials were added. I have here the can to which only phosphorus and potash were added. It is marked PK. You will observe here the effect of nitrogen starvation on the plants in this can. These plants are reddish about the base of their stems and the leaf is a paler yellow-green color than the leaves in the can having the nitrogen. This yellow-green color is characteristic of plants needing nitrogen. It is necessary to make the tissue tests for nitrate-nitrogen in order to be sure of

(*Turn to page* 28)



The need for potash was shown by the greatly stunted plants in the NP pot; phosphorus by the plants in the NK pot; and nitrogen by the plants in the PK pot, when all three of these pots are compared with the check pot receiving NPK.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

SOME years ago I asked a small boy who it was that gave his elder brother the idea for an invention he had patented, and he answered: "Himself. He just thinked, and thinked, and thinked 'til it came to him."

That is exactly the way in which M. J. Funchess, Dean of the School of Agriculture and Director of the Agricultural Experiment Station of the Alabama Polytechnic Institute at Auburn, has originated the unique plans and projects by which he has brought his institution into the limelight, and achieved notable success in helping the farmers of his State to better their methods of crop growing and improve their social welfare. He is a profound thinker and searcher for the truth in everything he has undertaken. "Facts for Farmers" has been his slogan, and so exact and authentic have been his conclusions and his advice, that he has become known, affectionately and admiringly, as "Facts Funchess" to his students and to the thousands of farmers who have sought and benefited by his wise counsel and leadership.

To him the ability to think, and to think to a purpose, is an attribute of supreme importance. That estimate he has inculcated upon his students as one of the chief aims which should inspire them to seek a higher education. He urges them to think for themselves and believes that the type of student who complains because the instructor is not doing for him a certain amount of thinking he should do himself will never be of much value to his community or his State. Such men, he finds, usually handle commonplace jobs and are being directed by someone who has learned to think. It is little wonder, then, that Director Funchess has gathered around him a staff of research men each of whom has individuality and is a thinker rather than a supine "yes man" who is content to carry into effect another's ideas and never originates new ones that may aid in the successful culmination of an experiment or extended research investigation. He has the ability to work *with* his staff and to inspire in them the unselfishness, enthusiasm, and enterprise which brings out the maximum capacity of each for helpful team-work.

Service Comes First

As a teacher, Director Funchess has never held out the prospect of monetary gain as the chief inducement for higher education, although he recognizes the value of increased earning capacity in the graduate student. Always, he has held and advised that State institutions can render their most important service by training men for leading positions in all lines of endeavor, with the idea that the ultimate effect of the work of a well-trained group of public officials will make the State a more prosperous economic unit and raise the level of average intelligence to a point that is

reasonably satisfying to the people. He rightly regards the purely selfish viewpoint that concerns only increased earning capacity as too narrow to justify the expense of a State-supported college or university. He thinks it highly important that practical as well as scientific facts should evolve, and is not prone to express his views upon the basis of experimentation alone, but prefers to state the facts ascertained. P. O. Davis, executive secretary of the Alabama Polytechnic Institute, believes that Director Funchess' favorite passage of Scripture is, "Know the truth and the truth shall make you free."

Dean M. J. Funchess

As to the experimental work of his Station, Director Funchess is keenly interested in the various phases of technical research, and he expects the technical and practical phases to be so coordinated that the results obtained may be of practical value to the farmers of the State. In that worthy purpose he has been eminently successful, as evidenced by the widespread improvements which have been made in the farming industry of Alabama, and it would be difficult to find elsewhere more efficient, unselfish, and patriotic research men than those who now are working with him, rather than under him.

Marion Jacob Funchess was born April 9, 1884, in Orangeburg, South Carolina, the son of Jacob S. Funchess and Ella Mariah Andrews, who represented long-established and reputable families of that Southern State. He was reared on a farm and educated in the local schools, where early he decided that a higher education would be well worth while. He entered Clemson College of South Carolina on leaving the district school, and in 1908 graduated with the degree of Bachelor of Science. In 1909 he was appointed assistant professor of agriculture at the Alabama Polytechnic Institute, and soon decided that further education in some leading institution outside of the Southern environment would round out his scientific and practical knowledge of agricultural subjects. He became a graduate student of the College of Agriculture of the University of Wisconsin, where he majored in agronomy under the guidance of Professor Ransom A. Moore. In 1911 when he was given the degree of Master of Science by the University of Wisconsin, Professor Moore said of him, "Young Funchess will be sure to make his mark, as he is earnest, honest, and thorough in his work and possessed of good executive ability." Professor A. R. Whitson of the same institution, under whom he studied soil science, was equally impressed with his industry and ability and took pleasure in helping him in his work.

On returning to Alabama he married Agnes Eloise McCants, a native of South Carolina, who was educated in Columbia College of that State and is an active worker in the Methodist church, of which her husband is also a member. They have four fine children—a son and three daughters.

Resuming his work as assistant pro-

fessor of agronomy at the Polytechnic Institute, he was made associate professor in 1912 and full professor in 1915. In 1921 he became Head of the Division of Agronomy, which position he filled until 1924; then he was appointed Dean of the College of Agriculture and Director of the Experiment Station. Since he assumed his official position and has been kept more than ordinarily busy, he has managed to find time for active service as a member of the Rotary International of Auburn, the American Society of Agronomy, the American Association for the Advancement of Science, and the Alabama Educational Association. He is also a member of Alpha Gamma Rho, Phi Kappa Phi, and Gamma Delta fraternities, and is a York Rite Mason.

Achieves His Purpose

As one can see from a glance at his portrait, "Facts" Funchess is a most emphatic fellow. When he has thought a project to a definite conclusion, that settles it; and he goes ahead with it against all obstacles, until his purpose is achieved. And he has a man's job before him in Alabama, which has been a "one-crop State," cotton being the staple and standard product. The growers of that most useful commodity have considered themselves by inheritance and experience past masters of the art of its production, and today are loath to believe or understand that their methods may not be perfect and that it would be possible to improve the quality of cotton besides increasing its per acre yield. The land long devoted to the crop naturally has been depleted in fertility, nitrogen being chiefly deficient, and it has been the aim and effort of Director Funchess and his able assistants to prescribe properly compounded fertilizer mixtures to supply the lacking elements and improve and enhance the product in a profitable manner. The growing of legume crops has been energetically urged, with satisfactory results, as a means of nitrogen supply, large areas having been devoted to the planting of hairy vetch and Austrian winter peas.

During the autumn of 1932, it is said, more seed of those legumes was planted in Alabama than in all of the other States of the Union combined. This year (1933) Alabama farmers have purchased for planting approximately 60 per cent of the available world supply of hairy vetch and Austrian pea seed, the reason being that research work done at the Experiment Station has proved the value of these legumes as nitrogen suppliers for soil improvement.

In addition to the main Experiment Station at Auburn, which has been greatly expanded and improved and its scope of work enlarged, five substations and ten experimental fields have been established under the leadership of Director Funchess, giving Alabama one of the broadest and most complete research systems in the country.

Research in Soil Fertility

When Professor Funchess went to Auburn, his time was entirely devoted to teaching; yet he was intensely interested in research work, so that he planned and started the Cullars' Rotation experiment in 1911. It is one of the three oldest experiments in the Southern States, and has as its purpose the study of the effect of phosphorus on the yield of important Alabama crops. It includes a comparison of superphosphate and rock phosphate as a source of phosphorus in the cropping system with winter legumes, together with a study of the effect of legumes in the cropping system. The purpose and progress of the experiment are well set forth in Bulletin No. 232 of the Experiment Station. Simliar work has been done and is in progress regarding the other essential fertilizing elements including potash, which is much needed in Alabama, and lime which has given fine results on many of the acid soils of the State.

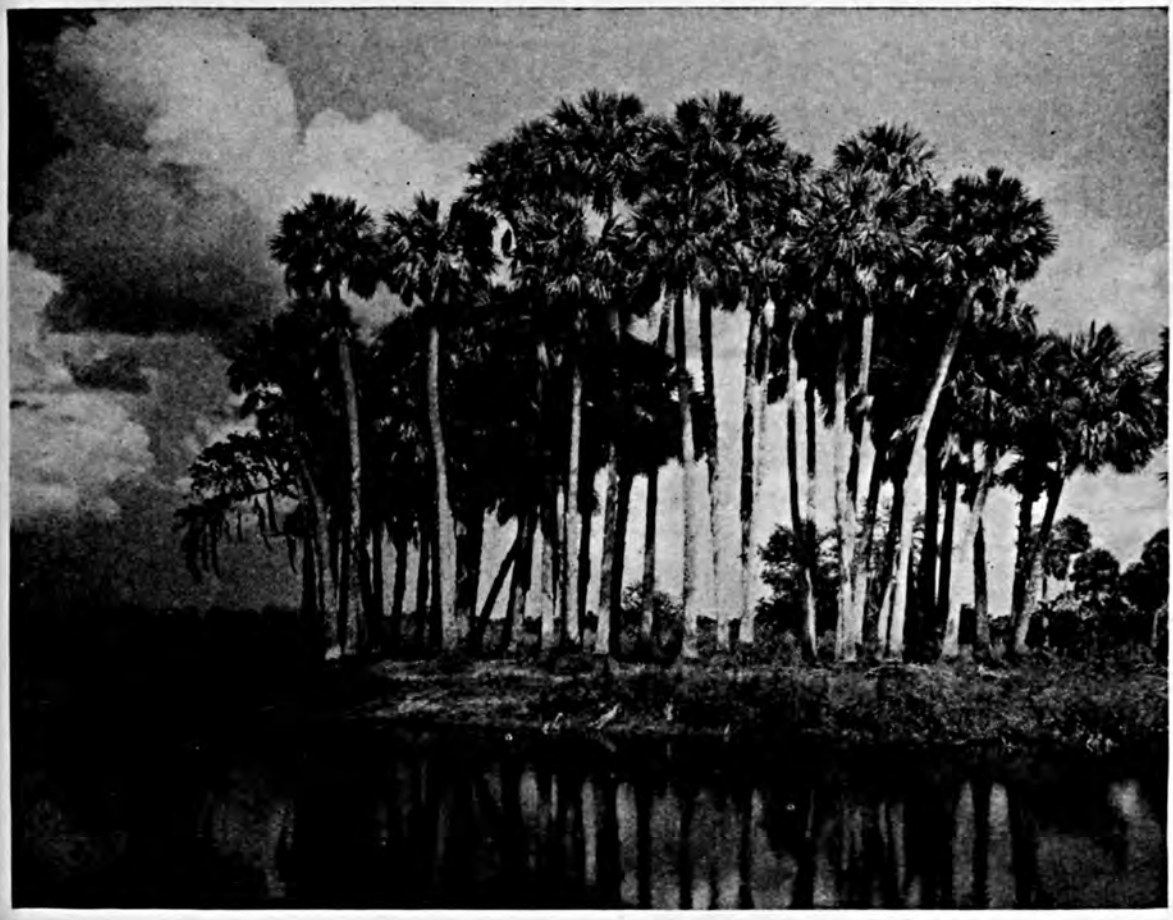
While Alabama may still be called

(*Turn to page 26*)

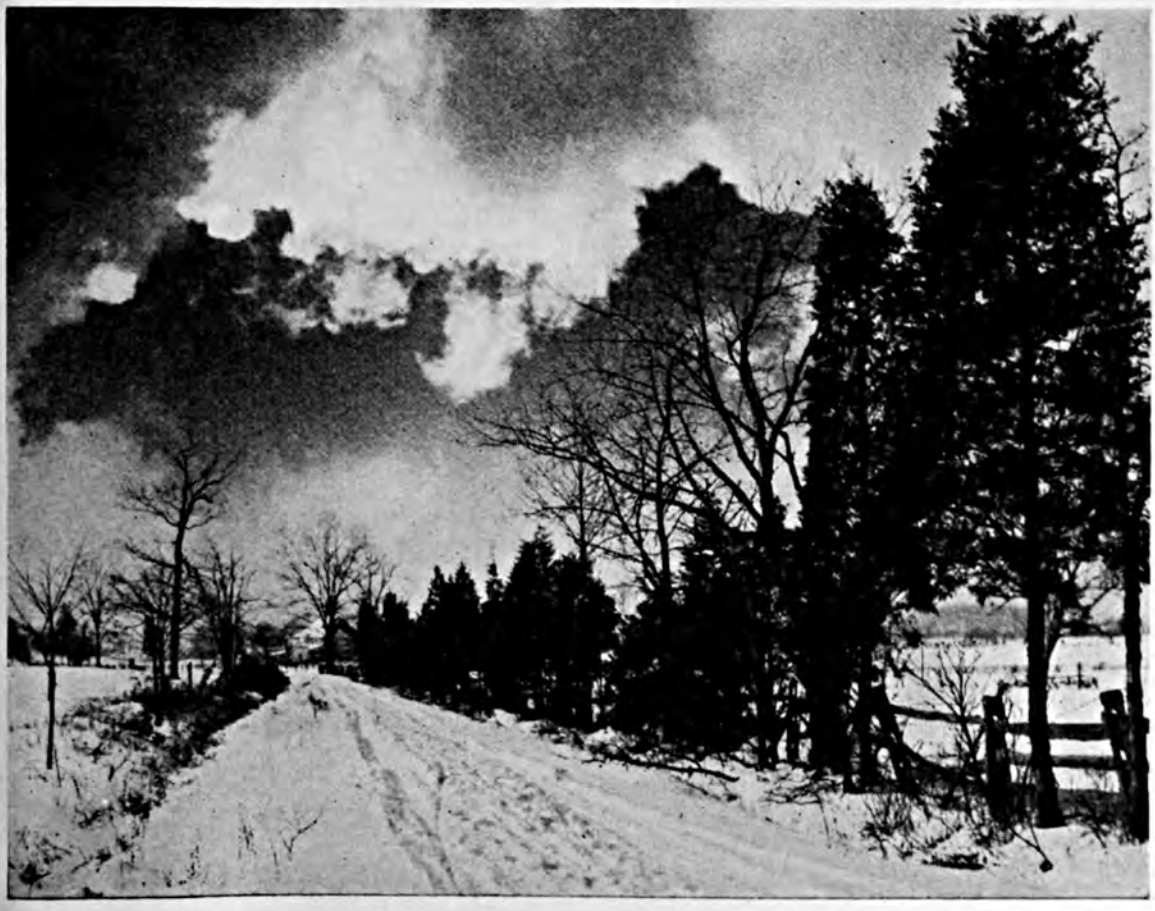
Pictorial

COME ON! LET'S GO!

When ducks head South, it's high time for corn to be in the shock.



Sunny climes call feathered travelers away from snowy fields and cold winds.



Above: Traps are being oiled to garner the muskrat crop, no mean source of income to American agriculture.

Left: Not old enough to join in the season's sport, these eager pups are being consoled by their youthful owner.

The Editors Talk

The Present Need for Fertilizers

With very low crop prices and money or credit hard to get, if either can be got at all, many farmers have had to use much less fertilizer on their crops than in recent years. Consequently fertilizer consumption has dropped off to 50 per cent of a normal usage. But as Dr. H. G. Knight, writing in the "Scientific Monthly" on "Research in the Bureau of Chemistry and Soils" points out, consumption of other standard products, such as steel, has dropped 80 per cent. Confronted with a difficult problem, the farmer, the industry that serves him, and his advisers have done well to maintain consumption at its present level.

Another fertilizer season will soon be here. The problem of the amounts and kinds to use will have to be faced all over again, and it will probably be a hard problem for the majority of farmers. Many undoubtedly will do their utmost to use sufficient amounts of the best fertilizers for their crops. But others may be more or less satisfied to let well enough alone and use little fertilizer, if any at all.

The danger of this attitude is pointed out by Professor R. M. Salter in a recent issue of the "Ohio Farmer." He reports that in the fall of 1932 farmers used about half as much fertilizer on wheat as they averaged for the five years preceding 1930. Fortunately the following season was very good for a wheat crop. The result was that Ohio farmers obtained better than an average crop, even though it had received less fertilizer than any crop in the last 20 years. The writer points out that if farmers continue to trust to a good season, rather than to fertilizers, statistically the odds are against them, for seldom is an unusually favorable season followed by another equally as good. The author recommends wherever possible a reasonable increase in the fertilizer used on wheat.

The same might be said about a number of crops for spring planting. Signs of nutritional deficiencies have been noted in tobacco and corn fields. Cotton rust has been prevalent in the South. The maintenance of national soil fertility is approaching a critical stage.

A fertile soil is an asset at all times—good or bad. The most effective means of conserving this asset is to maintain present fertility while it is possible to do so at a reasonable cost in land management. If fertility is allowed to run too low, a profitable agriculture may no longer be possible on such land. This point is brought out by Dr. Knight in the article already referred to:

"While it is possible for the farmer for a brief period of time to reduce the scale of fertilizer application as an economy measure, this can be continued only for a short period before the fertility of the soil has been so reduced that profitable agriculture is no longer possible. It is the more essential that fertilizer use be continued if agriculture is to be lifted out of its present depression. It has been abundantly shown by scientific experimentation with fertilizers that through their use the cost of production can be materially reduced."

The maintenance of soil fertility, the lowest cost of production per unit, and the production of quality crops that can successfully compete in domestic and world markets all demand the proper use of sufficient fertilizer. It is hoped that this need will be recognized and that everybody concerned will help the farmer to count on using a reasonable amount of fertilizer for his future crop production.

New Test for Fertilizers

It is highly important in many cases to know the effect of a fertilizer mixture on the soil reaction. Realizing this need Dr. W. H. Pierre, agronomist of the West Virginia Agricultural Experiment Station, has recently developed a method.

The method consists of burning off all organic matter—the animal or vegetable matter—in the sample of fertilizer being tested, and then determining the amount of acid-forming and alkali-forming elements left in the sample. Thus can be told what the fertilizer will do to the soil besides enriching it with nitrogen, phosphorus, and potash.

"Mr. Pierre has made a real contribution to soil science," says Emil Truog of the Soils Staff of the University of Wisconsin, as reported in the Press Bulletin of that University. "The method should tend to encourage manufacturers to make fertilizers better suited to farm needs. In the past, there has been no ready method for determining the value of fertilizers in this manner."

As noted by Dr. Pierre, in common with other soils workers, no recognition is now given, either by State control officials or by most fertilizer manufacturers, to the influence which mixed fertilizers have on soil reaction. He believes that because the acid or alkali action of any mixed fertilizer is one of the most important properties of a fertilizer, it should be recognized as such and that there should be State control laws governing the sale of the product.

Undoubtedly this is an important subject meriting serious consideration on the part both of fertilizer manufacturers and experiment station workers.

New Service of the U.S.D.A.

The Bureau of Agricultural Economics of the United States Department of Agriculture is now publishing farm prices every week. For some years the Bureau has estimated and published every month the prices farmers receive for important farm products and the prices they pay for what they buy. The weekly service is an aid in developing and carrying out the administration's program for agriculture and meeting the vital interest of the whole nation in the improvement of the position of agriculture among our industries.

An example of the information given in these weekly bulletins and of the variation in the farmer's position from week to week may be noted in the following: The index of the prices of farm products on October 11 was 69 compared with 71 on October 4, and of prices paid by farmers for commodities bought 116.5 on October 11 compared to 117 on October 4. This put the exchange value of farm products for commodities farmers buy at 59 on October 11, compared with 61 on October 4.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Tomato growers will be interested in the carefully conducted experiments reported by M. M. Parker in Virginia Truck Experiment Station Bulletin 80, "Tomato Fertilization." Various fertilizer analyses covering a range of 0 to 6 per cent ammonia, 0 to 10 per cent phosphoric acid, and 0 to 12 per cent potash were used. Several tests were run over a period of years and from the data it is concluded that 1,000 pounds of 4-10-6 fertilizer is the best for average conditions in the Tidewater section of Virginia. Where the soil is very fertile, 2-10-6 may be substituted for 4-10-6. Where any of the three elements were omitted from the fertilizer, there was a decided drop in yield, showing that a complete fertilizer is needed. Manure when available gave very good results when used in conjunction with liberal amounts (500 to 1,000 pounds) per acre of complete fertilizer.

"Study of Rice Fertilization," Agr. Exp. Sta., Fayetteville, Ark., Bul. 291, June, 1933, L. C. Kapp.

"Quarterly Bulletin, Fertilizer and Seed Report," State Bd. of Agr., Dover, Del., Vol. 23, No. 2, Jan.-June, 1933.

"Commercial Fertilizers," Agr. Exp. Sta., Lafayette, Ind., Cir. 196, May, 1933, H. R. Kraybill.

"The Use of Cyanamid as a Source of Nitrogen for Sugar Cane in Louisiana," Agr. Exp. Sta., Baton Rouge, La., La. Bul 237, June, 1933, A. K. Smith, Jr.

"Experiments with Phosphate Fertilizers on Montana Soils," Agr. Exp. Sta., Bozeman, Mont., Bul. 280, July, 1933, Edmund Burke, Iver J. Nygard, and William McK. Martin.

"Fertilizers and Manure for Corn," Agr. Exp. Sta., Knoxville, Tenn., Bul. 149, June, 1933, C. A. Mooers.

"Fixation and Penetration of Phosphates in Vermont Soils," Agr. Exp. Sta., Burlington, Vt., Bul. 356, June, 1933, V. L. Weiser.

"The Composition and Distribution of Phosphate Rock with Special Reference to the United States," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 364, June, 1933, K. D. Jacob, W. L. Hill, H. L. Marshall, and D. S. Reynolds.

Soils

Among farmers one frequently hears the "old-timers" remark that "we don't get the yields around here that we used to." The cause is laid to a number of things such as more disease, more crop pests, different seed, different weather and seasons, different types of farming, and less fertile soil than formerly. All of these are probably influential to some extent in causing lower yields, but depleted soil fertility is possibly the most important. The extent to which the fertility of a soil may be depleted when unfertilized is shown in a recent publication by H. Jenny ("Soil Fertility Losses Under Missouri Conditions," Missouri Agricultural Experiment Station Bulletin 324). He was able to study two continuous fields, one of which has been continuously cultivated for 60 years, while the other is a virgin prairie and has been in grass continuously, with pasturage and some hay the only crop removal from it. The typography of the fields was such that there was very little erosion, so that plant-food

loss occurred only through cropping and leaching. No fertilizer or manure has ever been used on these fields. Analysis of the soils showed that the cropped field contained about one-third less nitrogen, organic matter, and exchangeable bases (available potash, lime, and magnesia) than the virgin field. Other properties of the cropped field also were less favorable than those of the virgin field. The author points out that rebuilding this soil will be costly. The logical conclusion may be drawn that it is much better economy to maintain the fertility of the soil by means of fertilizers, crop rotation, and manure or green manure, than to deplete the soil and then try to rebuild it.

The primary importance of cover crops in the productivity of an apple orchard is stressed by F. N. Fagan, R. D. Anthony, and W. S. Clarke, Jr. in Pennsylvania Agricultural Experiment Station Bulletin 294 entitled, "Twenty-five Years of Orchard Soil Fertility Experiments." Basing their conclusions on this long-time orchard fertility experiment, the investigators believe that the efficient management of the fertility of the orchard is dependent upon maintaining or increasing the organic matter content of the soil. Fertilization of the orchard is thus more a matter of fertilizing to obtain a good cover crop than directly fertilizing the tree. The use of complete fertilizer greatly increased the yield of cover crops on the orchard and this was reflected in increased tree growth and yields. A favorable fertilizer treatment shows first in increased cover crop growth. Later, leaf color is improved, followed by increased branch growth and circumference, and finally, increased yields result. For the complete effect of the fertilizer to be obtained, several years may be necessary. The authors also give interesting and valuable results of using various cover-crop systems in the orchard. Tree fruit growers will find this publication contains much practical information on the soil management of the orchard.

"Soil Fertility Studies," Agr. Exp. Sta., Fayetteville, Ark., Bul. 290, June, 1933, Martin Nelson.

"The Classification and Evaluation of the Soils of Western San Diego County," Agr. Exp. Sta., Berkeley, Cal., Bul. 552, June, 1933, R. Earl Storie.

"Ford County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rept. No. 54, Apr., 1933, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Jackson County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rept. No. 55, June, 1933, E. A. Norton, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Soil Management and Fertilizers for Indiana Fruit Crops," Agr Exp. Sta., Lafayette, Ind., Ext. Leaflet 185, June, 1933, Monroe McCown.

"Effects of Inoculation and Liming on Alfalfa Grown on the Grundy Silt Loam," Agr. Exp. Sta., Ames, Iowa, Bul. 305, June, 1933, R. H. Walker and P. E. Brown.

"Soil Survey of Iowa—Pocahontas County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Rept. No. 69, June, 1933, P. E. Brown, A. M. O'Neal, and H. R. Meldrum.

"Soil Survey of Iowa—Butler County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Rept. No. 70, June, 1933, P. E. Brown, J. A. Elwell, H. R. Meldrum, and R. E. Bennett.

"Soil Survey of Iowa—Sac County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Rept. No. 71, June, 1933, P. E. Brown, C. L. Orrben, H. R. Meldrum, and R. E. Bennett.

"Soil Survey of Iowa—Calhoun County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Rept. No. 72, June, 1933, P. E. Brown, T. H. Benton, W. J. Leighty, and H. R. Meldrum.

"Agricultural Land Classification and Land Types of Michigan," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 231, Apr., 1933, J. O. Veatch.

"Proceedings of the First Missouri Conference on Land Utilization, University of Missouri College of Agriculture, February 23 and 24, 1933," Agr. Exp. Sta., Columbia, Mo., Bul. 323, Apr., 1933.

"Dry Land Crop Production at the North Platte Experimental Substation," Agr. Exp. Sta., Lincoln, Neb., Bul. 279, Feb., 1933, L. L. Zook.

"The Effects of Acidifying Amendments on Impermeable Soils," Agr. Exp. Sta., State Col., N. M., Bul. 210 (Tech.), May, 1933, C. W. Botkin.

"Relations Between Orchard Soils and Cover Crops," Agr. Exp. Sta., Geneva, N. Y., Bul. 632, July, 1933, R. C. Collison.

"Soil Inoculant Service," Agr. Exp. Sta., Geneva, N. Y., Cir. 137, Mar. 1, 1933, H. J. Conn and A. W. Hofer.

"Maintaining Fertility of Grande Ronde

Valley Soils," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 311, *Mar.*, 1933, *W. L. Powers and D. E. Richards.*

"Grades of Peat and Muck for Soil Improvement," U. S. Dept. of Agr., Washington, D. C., Cir. 290, *Aug.*, 1933, *A. P. Dachnowski-Stokes.*

"Soil Survey of The Oceanside Area, California," U. S. Dept. of Agr., Washington, D. C., Series 1929, *No.* 11, *R. Earl Storie and E. J. Carpenter.*

"Soil Survey of Hart County, Georgia," U. S. Dept. of Agr., Washington, D. C., Series 1929, *No.* 12, *G. L. Fuller.*

"Soil Survey of Worth County, Georgia, U. S. Dept. of Agr., Washington, D. C., Series 1929, *No.* 13, *Robert Wildermuth, S. W. Phillips, J. A. Kerr, A. L. Gray, and W. D. Lee.*

"Soil Survey of Hancock County, Mississippi," U. S. Dept. of Agr., Washington, D. C., Series 1930, *No.* 4, *Clarence Lounsbury, E. B. Deeter, S. R. Bacon, and J. T. Miller.*

"Soil Survey of The Basin Area, Wyoming," U. S. Dept. of Agr., Washington, D. C., Series 1928, *No.* 27, *James Thorp, E. G. Fitzpatrick, T. J. Dunnewald, and F. T. Gorsuch.*

Crops

The "Report on the Agricultural Experiment Stations, 1932," prepared by the Office of Experiment Stations and issued by the United States Department of Agriculture, brings up to date information on the practical benefits of recent experiment station work. The authors, J. T. Jardine and W. H. Beal, present in interesting short paragraphs results of experimental work under headings of such varied interest as, "Increasing the Efficiency of Crop Production," "Protection Against Insect Pests and Plant Diseases," "Feeding, Breeding, and Management," "Improvement in Farm Structures and Equipment," Waste Products and By-products," "Improving Marketing," "Cooking Quality and Palatability of Foods," "Housing and Home Conveniences," and many others. The publication is a concise confirmation of the tremendous role experimental and research work plays in the improvement of our agriculture.

"Pruning and Training Tomatoes in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 292, *June*, 1933, *Victor M. Watts.*

"Genetic Relations of Red Plant Color, Leaf Shape, and Fiber Colors in Upland Cotton," Agr. Exp. Sta., Fayetteville, Ark., Bul. 294, *June*, 1933, *J. O. Ware.*

"Monthly Bulletin of the Department of Agriculture," Dept. of Agr., Sacramento, Calif., Vol. XXII, No. 6, *June*, 1933.

"Chemical Investigations of the Tobacco Plant—IV. The Effect of the Curing Process on the Organic Acids of Tobacco Leaves," Agr. Exp. Sta., New Haven, Conn., Bul. 352, *June*, 1933, *Hubert Bradford Vickery and George W. Pucher.*

"Changes in Composition of Florida Avocados in Relation to Maturity," Agr. Exp. Sta., Gainesville, Fla., Bul. 259 *(Tech.) May*, 1933, *Arthur L. Stahl.*

"1932 *Report Cooperative Extension Work in Agriculture and Home Economics," Univ. of Fla., Gainesville, Fla., Wilmon Newell.*

"Work and Progress of the Agricultural Experiment Station for the Year Ending December 31, 1932," *Agr. Exp. Sta., Moscow, Idaho, Bul.* 197, *May*, 1933.

"Onion Culture," Agr. Exp. Sta., Urbana, Ill., Cir. 410, *June*, 1933, *J. W. Lloyd.*

"Asparagus," Agr. Exp. Sta., Lafayette, Ind., Ext. Leaflet 176, *May*, 1933.

"Profits in Tomato Picking," Agr. Exp. Sta., Lafayette, Ind., Ext. Leaflet 181, *May*, 1933.

"Growing Tomatoes For the Early Market," Agr. Exp. Sta., Lafayette, Ind., Ext. Leaflet 182, *June*, 1933.

"Snap Beans For the Canner," Agr. Exp. Sta., Lafayette, Ind., Ext. Leaflet 183, *May*, 1933.

"Report of Moses Annex Farm, Bedford, Indiana," Agr. Exp. Sta., Lafayette, Ind., Cir. 187, *June*, 1933, *H. J. Reed and H. G. Hall.*

"Marketing Indiana Sweet Potatoes," Agr. Exp. Sta., Lafayette, Ind., Bul. 370, *Jan.*, 1933, *Fay C. Gaylord and Harry M. Cleaver.*

"Factors Affecting Experimental Error in Field Plot Tests With Corn," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 163, *June*, 1933, *Arthur A. Bryan.*

"The Relation of Moisture to Respiration and Heating in Stored Oats," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 165, *June*, 1933, *A. L. Bakke and N. L. Noecker.*

"The Effect of Certain Cropping Systems on the Yield and Quality of Havana Tobacco," Agr. Exp. Sta., Amherst, Mass., Bul. 297, *June*, 1933, *A. B. Beaumont, M. E. Snell, and E. B. Holland.*

"Sudan Grass as an Emergency Pasture on Light Soil," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 240, *July*, 1933, *A. B. Dorrance.*

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 16, *No.* 1, *Aug.*, 1933.

"Grape Growing in Minnesota," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 297, *Mar.*, 1933, *W. G. Brierley and W. H. Alderman.*

"Better Methods for Growing Alfalfa," Agr. Exp. Sta., Columbia, Mo., Bul. 326, July, 1933, W. C. Etheridge and C. A. Helm.

"A Comparison of Irrigated and Non-irrigated Seed Potatoes," Agr. Exp. Sta., Bozeman, Mont., Bul. 279, May, 1933, F. M. Harrington.

"Annual Legumes For Cheap Milk," Univ. of N. H., Durham, N. H., Press Bul. 168, Feb., 1933, Ford S. Prince.

"Establishing a Strawberry Planting," Agr. Exp. Sta., New Brunswick, N. J., Cir. 281, Apr., 1933, J. Harold Clark.

"China Asters," Agr. Exp. Sta., New Brunswick, N. J., Cir. 289, June, 1933, C. H. Connors.

"Orchard Management with Notes on Varieties," Agr. Exp. Sta., State Col., N. M., Bul. 209, May, 1933, A. B. Fite.

"Chemical Compositions of New Mexico Pinto and Bayo Beans," Agr. Exp. Sta., State Col., N. M., Bul. 213, June, 1933, Mary L. Greenwood.

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"Hardy Flowers, Shrubs, Trees, and Vines for Washington Homes," Agr. Exp. Sta., Pullman, Wash., Ext. Bul. 181, June, 1933, J. Raymond Herman.

"Roots for the Dairy Cow," Agr. Exp. Sta., Morgantown, W. Va., Bul. 256, June, 1933, H. O. Henderson and K. S. Morrow.

"Grasses, Alfalfa, and Sweet Clover at the Archer Field Station," Agr. Exp. Sta., Laramie, Wyo., Bul. 195, Mar., 1933, A. L. Nelson.

"Currants and Gooseberries—Their Culture and Relation to White-Pine Blister Rust," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1398 (Rev.) Jan., 1933, George M. Darrow and S. B. Detwiler.

"Planting and Care of Lawns," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1677, (Rev.) Apr., 1933, H. L. Westover and C. R. Enlow.

"Agricultural Investigations at the Huntley (Mont.) Field Station, 1927-1930," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 353, May, 1933, Dan Hansen, A. E. Seamans, and D. V. Kopland.

"Root Development of Cotton Plants in the San Joaquin Valley of California," U. S. Dept. of Agr., Washington, D. C., Cir. 262, Mar., 1933, J. W. Hubbard and Fred W. Herbert.

"The Use of Winter Legumes in the Southeastern States," U. S. Dept. of Agr., Washington, D. C., Tech. Bul. 367, June, 1933, A. D. McNair and Roland McKee.

Economics

A graphic picture of the advancement in agriculture during the last two decades is to be found in a new Ohio Bulletin No. 526, "Twenty Years of Ohio Agriculture, 1910-1930." While the changes are confined to this one commonwealth, the reader of this bulletin will sense applicability to other sections and find most interesting information on a period in American agriculture of which the author, Dr. J. I. Falconer, Chief of the Department of Economics, says: "Probably no period has seen a greater advance in the facilities for farm life than that from 1910 to 1929." The bulletin is one which should find a prominent place in the library of anyone interested in the history of our greatest industry.

"The Human Factor in the Management of Indiana Farms," Agr. Exp. Sta., Lafayette, Ind., Bul. 369, Aug., 1932, Walter W. Wilcox and O. G. Lloyd.

"Annual Fluctuations in the Price of Corn," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 164, June, 1933, Geoffrey Shepherd.

"Prices on Farm Products in Maine," Agr. Exp. Sta., Orono, Me., Bul. 364, Mar., 1933, Charles H. Merchant.

"Trends in Cherry Production in Michigan," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 237, June, 1933, G. N. Motts, C. A. Scholl, and J. W. Chapin.

"Farm Organization as Affected by Mechanization," Agr. Exp. Sta., Bozeman, Mont., Bul. 278, May, 1933, E. A. Starch.

"Efficiency Studies in Dairy Farming," Agr. Exp. Sta., Durham, N. H., Bul. 275, May, 1933, H. C. Woodworth, C. W. Harris, Jr., and Emil Rauchenstein.

"Taxation of Agriculture in North Carolina," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Tech. Bul. 43, June, 1933, G. W. Forster and Marc C. Leager.

"An Economic Study of the Cherry Industry with Special Reference to Oregon," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 310, Feb., 1933, Milton N. Nelson and George L. Sulerud.

MISSOURI FARMERS FIND KOREAN LESPEDEZA USEFUL

(Farm science State by State—MISSOURI)

The task of changing the prevailing system of farming in a region is one in which Governments have often failed, but it frequently happens that a new plant can do this in a few years. This is what has happened in Missouri within the last 10 years, since the introduction of Korean lespedeza by the United States Department of Agriculture.

In this new system of farming Korean lespedeza promises to reduce the acreage of corn to a large extent in the regular rotations, the grains—mostly barley—being used for feed instead of corn. The system is simple; farmers sow winter grains as usual, sow the lespedeza on the grain in the spring, harvest the grain, graze the lespedeza during the summer. It reseeds itself in September in time to disc the land and plant fall grains again.

This rotation has been worked successfully over a wide area, from Missouri to North Carolina. It has found more application, however, in States where livestock feeding is a major part of the farm business. The Missouri College of Agriculture has fostered the use of Korean lespedeza in this manner for several years and has made trial plantings all over the State. Missouri farmers grew approximately a million acres this year. Other States in the corn belt are trying the plan.

The lespedeza program offers three advantages—it improves the soil where the clovers will not grow unless limed; it provides good pasture during the summer; and by doing this removes a heavy burden from permanent pastures. It fits in well with wheat, oats, or barley.

Korean is similar in many respects to common lespedeza, a native of the United States, known in many sections as Japan clover. The Korean matures seeds earlier and makes more growth. In feeding value it ranks with sweetclover, and is close to alfalfa.

LACK OF POTASH CAUSES CORN TO TURN YELLOW

LAFAYETTE, Ind., August 12.—Many spots and even whole fields of corn are at present showing a sickly appearance with the lower blades striped with yellow and green or almost entirely yellow with the edges dry and dead. This condition is quite prevalent in the dark sandy and muck soils of northern Indiana and may be found in light as well as dark colored lands in central and southern Indiana.

This condition is due to a lack of potash and will always show up when the corn plant is unable to get potash, according to S. D. Conner, of the Purdue University soils and crops department. It may be aggravated by either excessively dry or excessively wet weather. At this time it is too late to help the present crop, Conner stated, but farmers should know that it is a good time to look over their fields with the idea of correcting this condition in the future.

On soil where the corn shows this yellow condition, higher percentages of potash should be used in the fertilizer. For wheat 200 to 300 pounds per acre of 2-12-6 would be good and where the potash deficiency is very great 2-12-12 would be better. For corn 100 pounds of 0-12-12 per acre dropped in the row or near the hill will take care of mild cases of potash deficiency. Where the corn is very poor 200 pounds of muriate of potash broadcast should be used in addition to the 0-12-12.

Barnyard manure contains potash,

and five to ten-ton applications of manure will take care of the potash needs. On the Purdue farm at Lafayette on untiled land without potash or manure this condition is very bad. Near the tile lines where the corn roots deeply, it is able to get more potash from the subsoil than is the case between the tile where the roots are shallow. On this farm, potash is adding 10 to 15 bushels of corn to the acre. On very badly deficient land heavy potash fertilization has added 40 to 60 bushels of corn to the acre.

The yellowing of corn from lack of potash may be easily distinguished from the yellowing of corn due to lack of nitrogen. The potash-deficient corn shows green mid-ribs and veins with yellow strips between and on the edges. Nitrogen-deficient corn shows a yellow mid-section with greener edges. The Agronomy Department of the Purdue Experiment Station, as well as the county agricultural agents, will be glad to examine corn plants as well as soil samples and advise farmers who desire such service.

The Inquiring Mind

(*From page* 14)

a "one-crop State," it produces in addition to cotton considerable crops of corn and hay, while livestock and livestock products are also important items in the farmers' program. The actual sales or money returns to the farmer from such commodities, however, are relatively small when compared with the receipts from cotton, and Director Funchess is, therefore, insisting that a new agricultural program must be developed in the State to improve the unsatisfactory condition which exists there at present and is largely responsible for the poor conditions experienced by business men in the towns and cities.

The new program he proposes is imperatively necessary, since boll-weevil damage and bad seasons have seriously reduced crop yields and intensified the general depression. Throughout the country the commanding position of American industry is based almost entirely upon work of the industrial research laboratories, and Director Funchess sees clearly that, if agriculture is to progress, the farmers' business must be the beneficiary of a similarly enlightened plan of development. Agricultural research is, therefore, imperative; but it need not necessarily include the production of more cotton but should include research to further the production of a better quality of cotton at a lower cost. It should likewise include experimental work with dairy cattle and poultry, and the production of more corn, hay, feed crops, livestock, and livestock products. The Director is earnestly trying to bring about more diversified farming in his one-crop State. And in all of the research work proposed and being undertaken, he wisely insists that *the major object must be the production of a better product at a lower cost.*

He also is teaching that agricultural research must include the conservation and improvement of the soil and of its forests, the study of all kinds of pests and diseases of plants and animals, the introduction of new crops, and the improvement of the old ones. It is with this purpose that he looks to the people of his State for larger funds to continue and extend the research work of the Experiment Station. He is firmly convinced as he says, "It is most probable that economic salvation will come quickest by supplying the individual farmer with sufficient knowledge of his own problems to enable him to meet competition and work out his own salvation. The nearest to a permanent

solution, therefore, may be found through the establishment by research of a real workable agricultural program. Industry has pinned its faith to such a development, and agriculture cannot be developed on any other basis."

Director Funchess has written many practical as well as scientific bulletins for the instruction of Alabama farmers and to help them inaugurate and foster the new program of crop and livestock production he rightly considers vital to their success. Many others of like type and value have come from the pens of his associates as a result of their research work, and the educational campaign thus founded and conducted is already having a salutary effect.

P. O. Davis tells us that busy "Facts" Funchess finds recreation by fishing and playing golf. He has made a hole-in-one and once was fortunate enough to catch two bass on a plug, at one cast. We are glad to know that he finds time for play, for it would be a pity indeed were such a dynamic and useful executive and research worker to wear himself out, by excessive effort, before he has seen the consummation of his hopes for the betterment of the farmers and farming industry of Alabama.

We respect and commend Director Funchess for the vision and capacity he has shown in his responsible position, wish him many years of fruitful work, and feel assured he will find true that: "He most lives who thinks most, feels the noblest, and acts best."

Interest — 300%

(*From page* 8)

In other words, there was an increase of nearly four tons more alfalfa on the fertilized plots receiving both potash and phosphate, but less than a ton gain for the phosphate only. At $12 per ton, four tons of alfalfa are worth $48.

You will ask immediately, "What was the cost of the fertilizer treatment for the combination of potash and phosphate?" At the time these fertilizers were applied, 200 lbs. of 45 per cent superphosphate cost about $5; and 200 lbs. of potash were about $5. Thus, an investment of $10 per acre really netted a gain of $38, or principal returned with 380 per cent profit.

The lime treatment, it appears from the experiment, was not essential. In fact, this was indicated by the initial test for acidity. By stimulating a strong growth of alfalfa on such soils through the use of fertilizers, the alfalfa seedlings can get their roots down into the subsoil where they secure ample supplies of lime. Remember, the subsoil showed very little acidity; in fact, at two feet the subsoil contained lime.

Such demonstrations give us all renewed confidence in our recommendations. They back up our confidence in soil tests, and recommendations based on these tests. We now have a new test for available potash which promises to shed further light on the probable need for potash fertilizer. This test has been recently worked out by Professor Emil Truog and Dr. Norman Volk of the Soils Department of this University. We recently ran an available potash test on one of the check plots of this field and found that the supply was low, an average of only 152 lbs. per acre.

We are urging farmers, more than ever before, to have their soils tested in advance of seeding fields to alfalfa. "Save by testing" is our motto. Find out first if your soil needs lime. Don't waste good lime on fields that do not need it. We like to test the subsoil

as well as the surface soil. In fact, I am convinced that a test of the subsoil down to a depth of 36 inches is important. See what it revealed in the case of the soil on this field which was seeded to alfalfa—a slight acidity in the surface, but at two feet the soil was calcareous. Had Mr. Sharratt just proceeded on the assumption that alfalfa needed lime, he would have spent in the neighborhood of $4 per acre with but very little return for this lime. The test for available phosphates did show a great need for phosphate fertilization, and the test for total potassium indicated a very low total content of this element. The more recent test for available potash by our new method confirms our initial assumption that potash was needed—in fact, potash proved to be the outstanding need, although phosphates were unquestionably needed to enable the potash to be effective.

I am convinced that anything short of adequate soil preparation and proper fertilization for alfalfa is a waste of time and money. Better do what you do, and do it well, than to only half do a job and thus multiply your chances for failure.

A poster bulletin now being used in Wisconsin's great alfalfa campaign.

It Pays to Know

(*From page* 11)

this symptom because some plants starved for potash will have somewhat the same appearance. The test for nitrates will be demonstrated in a few minutes.

My team-mate will show now the can to which nitrogen, phosphorus, and potash were added, marked NPK. I will show you the can to which were added nitrogen and phosphorus only, marked NP. You will observe here the symptoms of potash starvation. The plants without potash are extremely short, with small, spindly, weak stalks and small flabby leaves. Please note that in this test these differences in height show the greatest need of this soil is for potash. The second greatest need is for phosphorus.

I now will show you the can to which were added nitrogen and potash, marked NK. Comparing this with the NPK can, you will observe that with phosphorus added the plants were able to grow larger and are heavier stalked and darker green.

In all cases the NPK pot serves as a check and the needs of the soil for nitrogen, phosphorus, or potash are distinctly observed by these differences in height and leaf color symptoms when each one of these plant foods is omitted in the other treatments.

(Each boy now proceeds to make tests on the plant tissues.)

Brandenburg—My team-mate, Amsler, will now explain how we make these tests.

Amsler—We will make first the test for nitrate nitrogen to see if the plants are getting sufficient nitrogen from the soil.

(Boys make nitrate N tests, first boy on the NPK and second boy on the PK treatment.)

I am testing the PK treatment pot, and my team-mate the NPK pot. We first take a green leaf and cut it with a pair of scissors into small pieces, letting them fall into a small dish. We then pour on a few drops of a 1 per cent solution of diphenylamine in sulfuric acid, and stir with a glass rod. A blue color indicates that the plant is getting an abundance of nitrogen, and a colorless or light green shade indicates the inability of the plant to get sufficient nitrogen from the soil. My test shows that the plants are not getting enough nitrogen from the soil, as indicated by the light yellow-green color of the solution. My team-mate's test shows the plants to which nitrogen was added to the soil. They are getting plenty of nitrogen, as the test solution shows a deep blue color.

Little Available Phosphorus

Next will be the phosphate test.

I will test part of the stem from the NP treatment pot, and my team-mate a stem from the NK pot. We first take a representative plant and cut it into small pieces and place them in a vial about ¼ inch deep. Then we add enough of the phosphate test solution to fill the vial about ⅔ full. Then add two or three crystals of stannous chloride and shake vigorously. A deep blue color indicates plenty of phosphorus. (Boys hold up vials.) My test solution is a deep blue color showing that the plant is getting plenty of phosphorus from the soil. My team-mate's solution is yellowish green, showing that the plants are not getting sufficient phosphorus from the soil in the NK pot.

The results of this test show definitely that the soil supplies very little available phosphorus and in our field work it will be necessary to use phosphorus in our fertilizer.

We will now make the potash test. (Each boy begins work.) I will make my test on the NP pot and my team-mate on the NK. Potash has been added to the soil in his pot while mine only contains the nitrogen and phosphate fertilizer materials.

First take a green leaf and fill the large vial with cut portions of the leaf up to the first mark, equivalent to 1 cc. Then add the potash test solution up to the second mark, 10 cc. Shake well. Add 5 cc. ethyl alcohol up to third mark and shake again. If the solution remains clear, the stunted plants are not getting sufficient potash from the soil. If the solution becomes cloudy and a precipitate forms, then the plants are getting potash from the soil. (Boys hold up vials.) My plant is not getting sufficient potash as indicated by the clear solution. My team-mate's test shows that his plant is getting some potash from the soil shown by the cloudy, yellow precipitate.

Potash Most Needed

By comparing the results of this potash tissue test and observing the extremely stunted plants in the NP pot in comparison with the NPK pot, it is very evident that potash is the major deficiency in this soil for corn plants.

Please refer to and study the plants and you will observe that the following plant foods are needed: potash as shown by the greatly stunted plants in the NP pot; phosphorus by the plants in the NK pot; and nitrogen as shown by the plants in the PK pot, when all three of these pots are compared with the check pot receiving NPK. These tissue tests confirm these deficiencies in height of the plants in the various pots and also the characteristic leaf symptoms displayed by the plants.

It is not possible to make any recommendations as to definite fertilizer analysis, but the results of this test serve as a guide in selecting those analyses which may do the greatest good. In our field tests we are planning to use a large quantity of potash and superphosphate.

Are there any questions? We thank you for your kind attention.

Picayune—An Inspiration

(*From page 9*)

were adapted to soil and climate, going to far-off China for the Tung Oil tree and to sections closer home for crops that thrive and bring value to soils of like character. Strawberries are one of these crops and it was only necessary to study condiditions around Hammond, Louisiana, some 75 miles away and possibly the largest strawberry center of the South, to convince these men that the crop would do equally well at Picayune. However, another country of the Far East, Japan, furnished the Satsuma orange, a crop that is fast making this Picayune territory a rival of Florida and Southern California.

The rapid development of this strawberry industry was forcefully brought to our attention recently while attending to duties in no way connected with their growth and at a place some 25 miles north of Picayune. A railroad extended this far and beyond was used to haul logs to the mills at Picayune. Trucks loaded with pine straw continued to go in one direction and to return empty. Curiosity prompted the inquiry as to what it meant. We were told that they were hauling this straw to the log road to be loaded in cars and shipped to the berry fields at Picayune for mulching the plants. This led further to a quick trip into Picayune where the agricultural agent of the Southern Railway gave the information that berries were shipped this year from 1,300 acres in the Picayune territory and that the largest single field of strawberries in the world might be seen there, this field containing 550 acres planted two rows to the bed, the equivalent of 900 acres with only one row to the bed, the most frequent way of planting. These 1,300 acres had increased from 326 acres grown the year before when 39 carloads of berries were shipped, returning about $20,000.

This great increase has been partly due to the obligation L. O. Crosby seems to have felt to provide work for his laborers at a time when it was not profitable to operate his sawmills. The labor was used at a living wage to prepare the land and set the plants.

Increase in plantings of Satsuma oranges is fast making this Picayune territory a rival of Florida and Southern California.

However, berries alone have not been the only crop, nor he the only grower who has planted them. Several years before he set a large acreage to Satsuma oranges, asparagus, and Tung Oil trees, besides developing large dairies and poultry plants in several directions from Picayune. One of these dairies has possibly the finest herd of registered Jerseys in the entire South, with a $25,000 bull at its head and cows, heifers, and other bulls that have won prizes at the leading cattle shows over the country. From these dairies certified milk was being sold in the city of New Orleans, some 45 miles to the south, delivered there daily in specially built milk trucks. As early as January 25 asparagus was being shipped and was bringing the fancy price of $5 per box. An expert had been employed to supervise the growing of these many crops and we were shown a recent circular from him telling how the growers should fertilize and mulch their berries and recommending a 4-10-7 as a commercial mixture possibly best suited to the growth and fruiting of the berries.

In this Picayune territory, Mr. Crosby's former partner in the lumber business, Lamont Rowlands, has already planted 9,600 acres to Tung Oil trees and is said to contemplate almost as large an additional acreage in the near future. From 100 acres planted to Satsuma oranges, Mr. Rowlands shipped in the fall of 1932 about 20 cars of fruit. In order to encourage the further planting of lands to Tung Oil trees, Mr. Rowlands has established a large nursery and on account of the general scarcity of ready money everywhere is offering to swap these trees for any kind of product the farmers may have—cattle, hogs, sheep, potatoes, syrup, and the like. Picayune became famous for its peaches long before it started so heavily into Tung Oil and strawberries and the Peach Harvest Festival has for several years been an annual feature.

Truly the spirit of Picayune is good for the blues and the slogan that heads the stationery of many of the local business houses, "Every moon is a harvest moon in the land of Picayune," seems peculiarly appropriate, for in addition to the crops mentioned and stressed, they grow all the common farm crops of the State along with summer and winter vegetables, pineapple pears, and pecans in quantities that would astonish the average small grower.

Cows and Codes

(*From page* 6)

conditions in the country not, as some believe, the chief cause of them. An accumulation of unfair profits on the one hand and the specter of unemployment and dwindling savings on the other has forced many consumers to consort with chiselers.

Fighting the chiseler by license enforcement was the hue and cry in the early stages of the milk agreements. But coincident with this demand came the breaking out of old sores in the profit-taking history of dairying. In the light of public opinion (to which governments should not but *do* take heed) there has been a newer and a fresher viewpoint taken on means whereby old abuses may at least be prevented from recurring. We may not know exactly what to do, but we have learned pretty well what *not* to do. I think that in the long run somebody's chestnuts will stay in the fire until they burst!

The bad effects of the chiseler in putting milk producers in the quick-

sands of unstable prices has been amply proven. But in proving that, we have uncovered quite a little fresh grit. It has been shown that in some large city markets in recent years the incomes of two dozen or so executives and managers of corporations have equalled the gross income of more than 900 farms that furnished the men at the hub with their axle grease. On the same market perhaps the union labor working as drivers of milk routes have received minimum weekly wages equal to the current value of a long ton of fresh milk produced in the same seven days.

WHILE organized capital after its profits and organized labor after its preferment skimmed the cream from the market, the agonized farmer took the whey and wondered why.

Yet one who surveys this field calmly and carefully has no judgment or capacity if he gives way to bitter prejudice. Complete correction of the troubles in the milk business cannot come through isolated agreements. Producers themselves must be wide awake to their shortcomings as well as alive to their rights. They have been prone to follow the maudlin reformer without enough internal adjustment.

It is therefore folly to hope for reform through codes of fair practice in the milk business while the entire credit structure and the business objectives of the country require a new deal, whatever that may be and however it may come. In plainer words, when a dose of purgative is needed, why ask for a "milk shake"? You'd simply spend your money without desired results.

There is indeed fresh and vivid hope and joy in the latest movement of the Government, that aiming at removal of burdensome price-breaking excesses and diverting them to the needy. In my travels among the producers of milk and the processors of butter, the usual question was: Why reduce production when there are hundreds starving at our doors?

To resort to that shabby criticism that in using surplus for relief we are making the farmer pay the bill is contrary to the honest warmth of farm opinion as I know it. Farmers know they are only contributing their share toward this fund and that employed consumers pay most of the rest. It is a mutual job. Farmers never shirk their duty. And by casting their bread upon the waters it will come back with more butter and cheese on it than when it was first floated. (We hope.)

On the whole, therefore, I am glad the old cow is in a code. She doesn't know it and keeps on swatting flies and dropping calves regardless. But the effect on her owners and the stewards of her products may prove wholesome and corrective.

I know it is tough for an industry that bragged so long about living on a date-palm and spring-watered oasis to be plunged foot-sore and thirsty into the drifting desert. I know it is difficult for these producers with high standards and expensive methods to survive the crisis. But I also know that recovery for them is not apt to come through embargoes and tariffs alone, or even codes for cows. There must be a sincere and searching readjustment, perhaps a renunciation of old theories and hobbies.

WE are trying compromise measures now, compromising with necessary expedients to fit the machinery we have used so long. So after all, the ordinary dairy cow is only one member of a herd of cows subject to dehorning and clipping. The others are sacred cows which have been milked to death by every sort of industry imaginable. Our old cow can't be controlled until the whole herd is renovated.

Let's keep her well pastured and bedded down, but for Pete's sake we must get abortion out of the rest of the drove or we're sunk!

ELEVEN AGES OF MEN

The eleven ages of men expressed in menu style, run about like this:

Milk.

Milk and bread.

Milk, eggs, bread, and spinach.

Oatmeal, bread and butter, green apples, and all-day suckers.

Ice cream soda and hot dogs.

Minute steak, fried potatoes, coffee, and apple pie.

Bouillon, roast duck, scalloped potatoes, creamed broccoli, fruit salad, divinity fudge, demi-tasse.

Pate de foies gras, wiener schnitzel, potatoes Parisienne, egg plant a l'opera, demi-tasse, and Roquefort cheese.

Two soft-boiled eggs, toast, and milk.

Crackers and milk.

Milk. —*Typo Graphic.*

He: "Let's get married or sumpthing."

She: "We'll get married or nothing!"

WRONG SIDE

Little Algernon (to the old lady who has just arrived, and whom he has never seen before): "So you're my grandmother, are you?"

Old Lady: "Yes, on your father's side."

Algernon: "Well, you're on the wrong side; I'll tell you that right now."—*Texas Weekly.*

The reason we never hear of women after-dinner speakers is that they can't wait that long.

HE SCENTED A BARGAIN

Sandy Macpherson and Maggie, his wife, stopped in front of a restaurant window in which was hung a card bearing the words, "Luncheon from 12 to 2 p.m., 1s. 6d."

"We'll have our lunch here, Maggie," said Sandy. "Two hours' steady eating for 1s. 6d. is no' sae bad."—*Weekly Scotsman.*

He: "I had to come clear across the room to see you, so now I wanna kiss you."

She: "Gosh, I'm glad you weren't in the next block."

TEN REASONS WHY

There is usually only one reason why a man buys, but with a woman it might be any one of ten (so they say)—

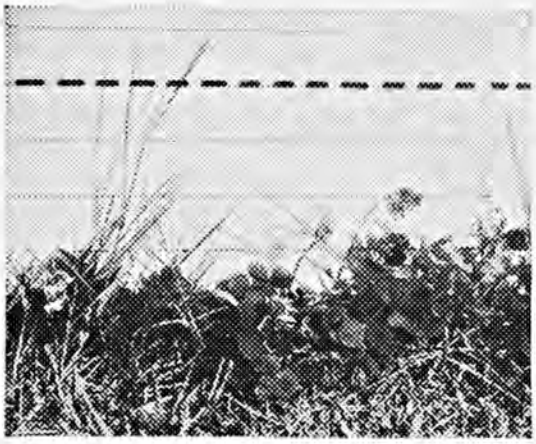
1. Because her husband says she can't have it.
2. Because it will make her look thin.
3. Because it's on sale.
4. Because it comes from Paris.
5. Because her neighbors can't afford it.
6. Because she can't afford it.
7. Because nobody has one.
8. Because everybody has one.
9. Because it's different.
10. Because.

COMPLETE EXAMINATION

Girl: I have broken my glasses. Will I have to be examined all over again?

Optician: No, only your eyes.

Good Green FEED



Part of this pasture *at left* received lime and superphosphate. The other part *at right* received lime and well-balanced fertilizer—this increased the green weight yield 7,411 pounds per acre during a dry season.

IT'S a big help to any dairyman to have plenty of good green feed, especially if this feed is produced in his own pasture at low cost. This is why so many progressive dairymen have found that it pays to give each pasture acre 600 pounds of potato fertilizer, broadcast when grass first starts in the spring.

Well-fertilized pastures often yield four to five times as much green weight. Good potato fertilizers, containing plenty of potash, crowd out weeds with succulent grasses and clovers, rich in minerals and protein.

A fertilized pasture not only gives you more good green feed, it also furnishes many extra grazing days. By getting cows out of the barn fifteen days earlier in the spring it more than saves the fertilizer cost by reducing feed bills when money is scarce. Profits begin to pile up when you extend grazing further into the summer dry spell and start grasses quicker in the fall.

You will never know how good your pasture can be until you fertilize it. The most important cash crop on the dairy farm deserves good treatment. Have pride in your pasture. Fill it with clovers and good grasses. Get June grazing early in May. When grass first starts this spring broadcast 600 pounds of potato fertilizer per acre. Your cows will thank you with extra milk.

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Dec. 1933-Jan. 1934 10 Cents

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60 lbs. Muriate of Potash 150 lbs. Nitrate of Soda 350 lbs. Superphosphate	**891.74**
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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. Stinchfield, *Managing Editor* Sid Noble, *Editor*

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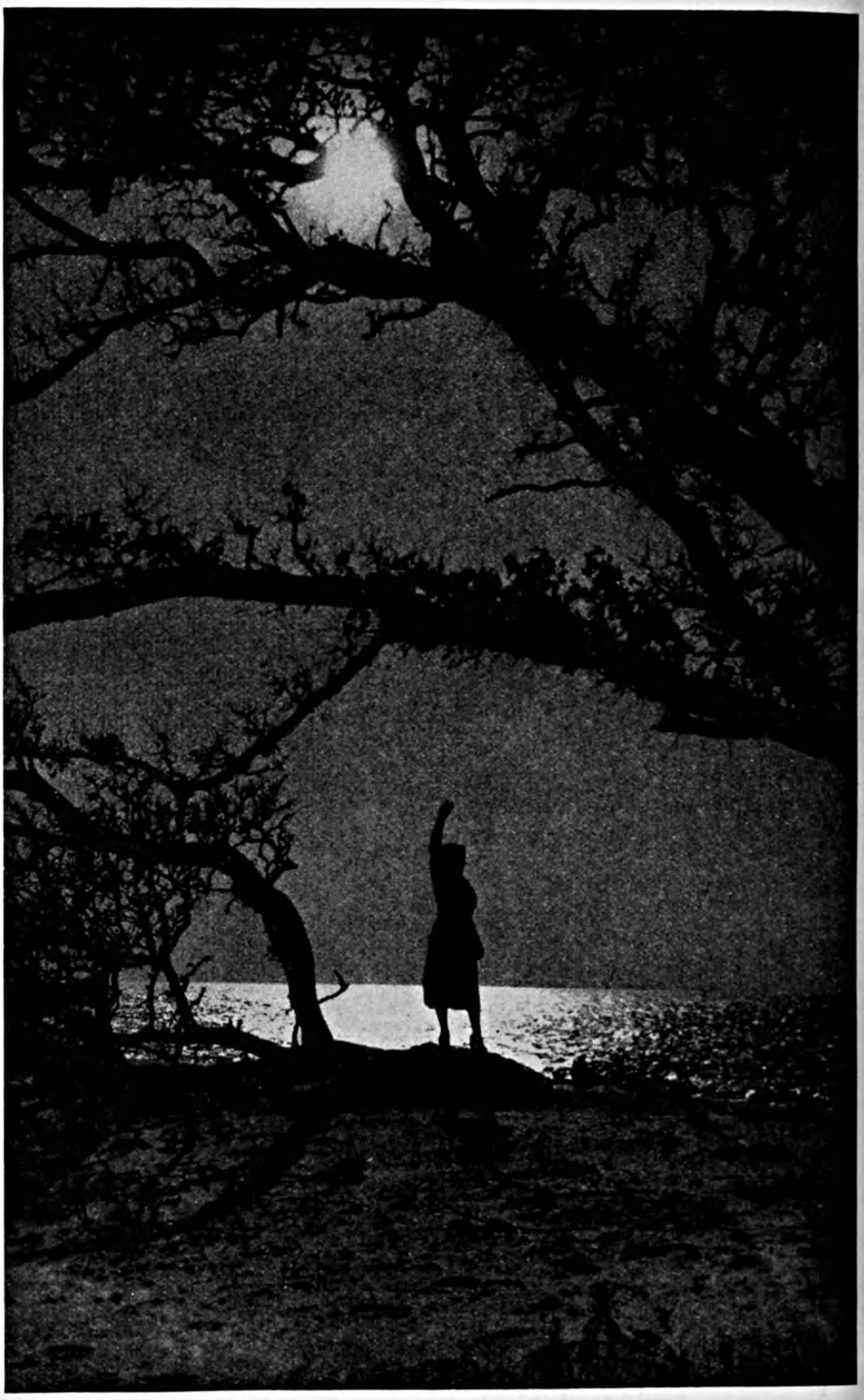

MANY OF US WISH WE TOO MIGHT SALUTE A SOUTHERN CLIME.

Better Crops with PLANT FOOD

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Jeff extends Greetings

Wreaths & Resolves

By Jeff McDermid

JUVENILES are not the only ones who spoil their angelic Christmas behavior soon after New Years. If we made the Holidays more than a truce amid hostilities or its spirit more than a fleeting sentiment in a world of resentment, there would be less broken trinkets and fewer forgotten resolutions.

Starting out in the year 1934, we all admit regardless of creed or partisanship that: (1) the past century has seen more new man-made marvels of a kind to upset preconceived ideas of physics and chemistry and bromidic logic than any similar period since Father Time dulled his scythe in the grass of Eden; and (2) that no age has produced more abuse of privilege along with greater diffusion of education. Granted likewise that we are largely agreed on making another January resolution, I am sure it will be as acceptable as any if we raise a toast and sign the pledge in Germanic language — "Etwas Neues" — Something New.

Then let it be the slogan while the need prevails! Etwas Neues! Some-

thing New—not merely something freshly varnished, brightly tinseled, quaintly gay, and temporarily ravishing; not a shibboleth to become shabby, a code to become corroded, or a vintage vision that ends in a racking headache. Not the decorations of a festive tree, soon to be boxed away and put in the attic against another revel. Not the smears of a bold signature soon defaulted, nor the toys of which we soon shall tire. Not the animation of the hectic hour, soon jaded, nor the unbalanced hopes of the ultra-optimist. But a calmer, sounder, deeper, more universal, and homely spirit which will make the ensuing months fruitful of the greatest good to the greatest number.

Probably the greatest upheavals and changes in social and civic life have come through stern resolves that never showed up on New Years Day. There has been no sharp line of demarcation between the period when evils ceased or waned and right triumphed or became ascendent. This is because individuals may rashly lay plans and make promises, while the scene shifts slowly and majestically in the mass of opinion and custom. Yet nobody at present can fail to hear a ground swell of some portentous kind, presaging some mighty alteration in the rules of the game. Perhaps it is because so many feeble personal resolutions and aspirations have been so long submerged, and so many Christmas holidays have been followed by fifty-one more weeks of injustice and disillusionment.

FROM long custom it has been common to chant the chorus of the bells at this interval of the year—ring out the old, ring in the new. Of late the cash register has done most of the ringing, however, and the clang of the holy bells has been lost in the clamor of commerce. Certain classes of society, certain types of minds, have refused to reject the old, however indecent and moldy; and others in the minority have yearned to usher in the new but lacked the power or the plan to perform the change.

On the whole we may be heartily thankful for the past. It points out our mistakes and provides a heritage of tradition to give us the "guts" to do and dare. Call the latter family pride, ancestral glory, or patriotic fervor—it matters not; the answer is that the high lights of achievement and character give the lie to those who say our nation cannot emerge with safer programs of social control.

I AM quite aware that able critics could out-argue me easily on using our national history as a bolster for confidence in our ability to meet present problems. They would no doubt point out that some battles were lost because generals indulged in liquid courage, or that some members of congress sold out to special privilege or were too dumb to match the hired wits of the wealthy.

But I shall not meet them on this ground nor refer to the sad winter at Valley Forge and such ordinary examples. I am persuaded that a nation's inherited qualities often suffer as do sports and hybrids, and that distorted specimens often develop from pretty sound preceding stock. Yet we have had many examples of public statesmanship that molded policies leading to higher conditions for humanity. If this were not so I might be in prison for debt and you might be in the stocks for talking too freely.

My contention in this humble treatise is that the real worth of a nation in any era and the inherent qualities which provide the pressure for reform and improvement come from the common run of folks, like yours and mine through the ages. Such discerning citizens pursuing the humble roles of life detect the false from the true in statesmanship regardless of the newspapers; but still more important than that, they afford the living examples to their associates which in

the end determine the final destiny of the country through its mass opinions. I need not paraphrase Abe Lincoln in this connection, only to say that "fooling all of the people all of the time" is impossible because of humanity's tendency to sprout upward.

It is idle to refute this by citations of recent mob violence or of how expectant some folks got on December 5 over Utah's legislation. You might as well try to disprove Franklin's place in history by his susceptibility to the gentle sex. In fact it was right on this

warped line of deduction that we got mired in prohibition fervor. Being "social" and being socially-minded are two quite distinct attributes of human character. And every time excesses are evident the majority of folks rebel and soon correct the cause of it. This has no bearing in our discussion of the inherent faith we must have in the right-minded attitudes of citizens, and without it we would not produce any statesmen.

There is no truer test of the power of tradition in our country than in evidences of self-sacrifice by ordinary citizens. We need not argue the fine points of the secret causes for a war to give credit to the ones who suffered willingly because of it.

My Father and four of his brothers and three of my Mother's brothers served in the Civil War. I had a dear friend who died at Chateau Thierry.

THE letters from my uncles saved tenderly by Mother on the old farm through the anxious days and the mute testimony of the empty sleeve, the shattered nerves, and the broken youth that was never repaired come back to me as ample proof of their unselfish devotion to ideals.

One of my uncles had planned to study law with his savings from hired labor had the war not interrupted his plans. During the stern campaigns and the camaraderie of the campfire and from associations of ill repute on the lower banks of Old Man River, he acquired a craving for hard likker. It swept his life away and made his a sacrifice of soul as well as body. Yet he stood to the last on dress parades in the old Grand Army hall with noble salute to Old Glory. Deeper than the scars of experience was the tradition of his tribe, to respect and honor the flag for what it represented.

My Father had an inventive turn of mind and liked to ponder over books. Denied proper education before the war, he came out of it a man obliged to perform a man's tasks. He had slept in fever swamps and rotten bayous, tramped with Sherman on weary rounds, and contracted chronic palsy and defective eyesight.

I can see him now as he was in middle years, bending over the oilcloth in the kitchen trying hard to decipher books he yearned to read with ease so that he might devour many of them —but in vain. And again I remember the wrapping paper he saved and smoothed out for drafting his pet idea, perpetual motion. I can see those queer circles yet, drawn in ragged lines, with the problem of the self-rotated wheel forever unsolved but rekindling his zeal to fresh efforts each

winter evening.

Simplicity and foolishness maybe; perhaps provincial and impractical. But as an example of kindly, trusting, constant optimism and the power of man to grope upward against bitter defeat—these, I say, are my heritage, homespun and clumsy as they are.

It is my conviction that every man who reads this will treasure similar memories of those who walked the common road and made it brighter by their presence—not just for Christmas, which they did, but forever and always.

NOT only do we honor this tradition, which we all possess in some degree, because it gives us courage and confidence in ourselves, but the errors and tragedies suffered by those before us sharpen our zeal for making restitution. We must take "revenge" upon the evil shadows that beset the past generation and banish them from the one to come. This, in short is national and personal tradition applied to the statecraft of the hour.

Continuing on the theme of begetting Something New, let's say a word for tolerance. I suppose more books have been written about tolerance and there remains less of it in everyday life than any of the other virtues. You can trace it all down through the ages, if you can find it.

In every noble experiment ever devised and docketed by man, the spirit of intolerance has usually crept in sooner or later. If you can't get into a fuss with a man over his religion or his choice of cigarettes, you may at least charge him with being in cahoots with chain stores or the implement trust.

I reckon after all that there are probably three places in these United States where tolerance exists by force of circumstances. These are the jails, the asylums, and the Congress. In the first instance tolerance lasts from thirty days to a lifetime, in the second it persists until one is cured, and in the third it survives at least two years.

It might be argued that if we had no intolerance, there would never be anything New and that lovers of precedent and status quo might thereby eternally have their way. Still what a sad world it would be if all of us were reformers! There must be just enough resistance and just enough clash of opinion to fry out the fat. Those who see their way clearly up one side of a problem often overlook the 'tother side. The ardent plans of theorists may need a test in the fire of experience. Progress is best secured through nicely adjusted differences.

With human nature as it is designed and operating, I have no fear of our getting to a place where we all agree on everything. Privately, I should like to be counted out when we approach that point. Not even the New Deal will divorce us from divers opinions, even if they are reduced to silent mental rejection of Control Boards or secret disgust at maximums and minimums. Personally I still adhere to the ancient legend that the only place this side of Christmas where we can find teetotal agreement is in Valhalla. Hence my definition of tolerance is to be open to conviction by somebody you are sure is wrong.

By following that system we will get not only Something New but Something Permanent, which is far better. Ergo, I learned more in five minutes from a kid that licked the time out of me than the sissy who always said "yes."

IN marshaling the forces for a search for the Holy Grail of a better social order, no test is more desirable than Tenacity. We have witnessed of late many breaks in the ranks of those who joined up in the early days to the Salvation Army of Political Experiment.

Like the backsliders I used to observe with childish zest back in the

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The cotton at the left in this picture of Jim Williams' field in Shelby county, Tennessee, received no fertilizer. The cotton at the right received 400 pounds of 9-0-15 applied as a side-dressing on June 7.

Potash Prevents Wilt *and* Rust

By L. A. Niven

Memphis, Tennessee

BECAUSE cotton wilt and rust are so wide-spread in much of the cotton-producing territory, particularly in the Mid-South, any steps that may be taken to control them are of the utmost importance to the cotton grower. These diseases have been with us for many years, but in recent years they have become much more prevalent. On thousands of acres of land, cotton production on a profitable basis has been made absolutely impossible by these two diseases if uncontrolled. This is true of much ground that is quite fertile and capable of producing high yields of cotton and very profitable yields if these two troubles were controlled.

In southeastern Missouri where cotton is grown and in the eastern half of Arkansas, practically all of the lands are susceptible to wilt or rust, or both, with the exception of the heavy black waxy land, which does not constitute more than 20 per cent of the cultivated land of that territory. Most of the land on which rust and wilt are prevalent is light sandy loam, dark sandy loam, and gray silt loam, with a limited amount of what is commonlv known as crayfish land.

I recently interviewed several cot-

ton farmers in the territory mentioned above, in order to get at what the producers of cotton were doing to overcome these troubles.

In Dunklin county, Missouri, Mr. T. H. Masterson told me that in 1932 he had 13 tenants, whom he required to use 20 per cent kainit under their cotton, applying 125 to 150 pounds per acre. He did this because he knew that cotton when grown on this land was attacked by wilt and rust and that kainit would largely control both of them. At the end of the season each tenant, without exception, gladly paid the cost of the kainit, because it had increased the yield sufficiently to make it highly profitable to him. In 1933 Mr. Masterson used 50 tons.

The use of potash to control wilt and rust of cotton was started in southeastern Missouri by County Agent C. R. Talbert of Dunklin county, just a few years ago. Mr. Talbert, asked by Mr. P. A. Moxley what to do for his cotton that was dying, secured 200 pounds of kainit in 1926 and put on a demonstration on Mr. Moxley's farm. The potash increased the yield so much, in fact considerably more than doubled it, that the use of kainit has been on the increase in that whole section since that time.

In 1927 Mr. A. T. Douglas, a ginner in this community, bought and sold a carload of 20 per cent kainit. In 1928 he sold four cars and in 1930 he sold 800 tons. Even though the price of cotton has gone down since 1930, the use of kainit is still general, because it has proved profitable even with low-priced cotton. The use of kainit in this section has also proved to be reasonably profitable on land where rust and wilt are not present.

Claude Moxley, son of the Mr. Moxley who used the first potash in Dunklin county to control rust and wilt, told me that his fields will make only about 500 pounds of seed cotton per acre without potash and 1,500 pounds where he uses 200 pounds of 20 per cent kainit. In 1932, because of finances, he could buy only a small amount of potash and therefore applied it thinly and to only a portion of his acreage. Wilt and rust were so

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Claude Moxley, Senath, Dunklin county, Missouri, used 150 pounds of 20% kainit on the cotton to the left (1932 crop). The cotton at the right received none. "This kainit," said Mr. Moxley, "made 1,500 pounds of seed cotton per acre. The yield without it was 500 pounds of cotton per acre. The kainit cost me only about $2.00."

Weeds Are a Nation's Menace

By O. C. Lee

Purdue University

Plants with underground rootstalks, such as the Canada thistle, should be sprayed while confined to small patches.

WEEDS are exacting an increasingly greater toll from farmers year by year. A recent estimate placed the annual damage caused by weeds in the United States at several millions of dollars. If anything is ever to be accomplished in coping successfully with the weed problem, it must be done by attacking the fundamental causes of the situation. The use of clean seed to prevent the introduction of new weeds and prevent multiplication of those already present must be practiced. The land must be kept in a state of fertility to make conditions favorable for crop growth. And, lastly, every possible method of weed killing should be practiced, namely, cultivation, clipping, and the following of crop rotations.

To secure a proper perspective of the situation let us take a glance backward. When the pioneer settlers broke the rich prairie sod or cleaned the wooded areas for cultivation, little if any difficulty was encountered with weeds since very few really troublesome weeds are native. For example, of the nineteen weeds listed as noxious in the Indiana seed law only three, bull nettle, bracted plantain, and white top, are natives. With the cultivation of the land, noxious weeds began to appear in increasing numbers, most of them being European plants that were introduced in impure seed, until today practically every farm in the State is infested with the weed plague.

The weed situation is not a local one, to be sure. In New York and Pennsylvania, for instance, there are literally hundreds of farms abandoned to Canada thistle. In the extensive Red River Valley of North Dakota and Minnesota a single weed, the perennial sow thistle, is the limiting factor between profit and loss on thousands of farms, and the presence of the pest has caused a complete change in agriculture. I have personally seen hundreds of acres of land in Washington, Idaho, and Oregon so

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A World Record

By Dr. Wallace Macfarlane

Berkeley, California

FOR the third time, the peat soils of the Stockton Delta region of California have produced a world-record yield of potatoes. Two of these record yields have been established by Weyl-Zuckerman & Company of Stockton.

For several years R. C. Zuckerman, manager of field operations of Weyl-Zuckerman & Company, has steadily increased the yield of potatoes on their Henning Tract by continually improving his method of culture and fertilization. This year on the McDonald Tract, owned jointly by the Holly Sugar Company and Weyl-Zuckerman & Company, after the use of the most improved methods at their command, there appeared to be a record yield of potatoes. At maturity a few acres were dug to ascertain yields, which proved to be in excess of 600 sacks per acre. These test diggings led Mr. Zuckerman to believe that on some of the selected acres of this tract he would be able to show a yield in excess of the previous world records.

To try out for a record, an acre was selected adjoining one of the test rows previously dug. This acre was surveyed by John Burke, civil engineer of Stockton, whose survey was checked by Charles Widdows, also a civil engineer of that city. The acre was dug under the supervision of the Agricultural Commissioner of San Joaquin county and weighed by a Deputy of the Sealer of Weights and Measures. It yielded 693.5 sacks. The actual weight reported by the Deputy Sealer was 69,352 pounds net, equal to 1,155.8 bushels, of which 97% were No. 1 potatoes.

After going over the 140-acre field, it was the opinion of those present at the digging that the whole field would

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A 5-ton crop of spinach was grown by using 1,000 pounds of 9-3-10 fertilizer. On the check plot a half-ton crop was grown.

Grow a New Crop

SPINACH was a new crop for the vegetable growers of the Troutdale district, Multnomah county, Oregon. Contracts were offered them by a reliable concern to grow 130 acres of spinach at $22 per ton, delivered at a nearby station.

S. B. Hall, who has been county agent in Multnomah county for 16 years, did not sit idly by. He recognized in spinach a vegetable crop that would permit double cropping. It would, if successful, prepare the land for fall cauliflower, pay for the cost of commercial fertilizer for both crops, and leave a little spring cash in the pockets of vegetable growers. It would provide another income period for the cauliflower and cabbage growers of the Troutdale district.

Hall knew, as a result of his long experience and many fertilizer trials in Multnomah county, that plenty of commercial fertilizer would be essential to the success of the spinach crop. He met with growers and strongly recommended that each acre planted to spinach receive 1,000 pounds of a 9-3-10 fertilizer. Growers accepted the recommendation. Numerous check plots where no fertilizer was applied showed that fertilizer made the difference between success and failure with the crop. On the fertilized acreage spinach yields varied from 2 to 8 tons per acre. On the unfertilized plots the crop was not worth harvesting.

County Agent Hall did not stop with this recommendation and its adoption, which made the difference between profit and loss for spinach growers, but he established a series of fertilizer trials in which rates of application were varied as well as the composition of fertilizers applied, so that better and more accurate information might be available for another season.

Fifty growers viewed the results of the demonstrations on a field-inspection tour in May.—*Courtesy of Extension Service Review, U. S. D. A., Washington, D. C.*

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

WHEN on April 25, 1927, Dr. Thomas Forsyth Hunt of the College of Agriculture of the University of California unexpectedly passed away on board the Steamer "Wilhelmina" on his way home from Honolulu, the farmers of his adopted State and of America lost one of their sincerest and most sympathetic friends.

To him, the farm home was of supreme importance. With Theodore Roosevelt, he held that the children should be treated not as a by-product of the farm, but as the object for which the farm exists. He believed that any type of farming that does not lead to a successful home is a failure, and that farming is not a satisfactory business for an unmarried man or for people without prospective children. These original ideas he kept in mind, and it was his aim throughout his most eventful and purposeful life to do everything in his power to help found farm homes on a happy and prosperous basis and to educate the home builders for intelligent management and ideal citizenship.

The Product per Man

It was his firm conviction that the success of American agriculture does not depend primarily upon the yield per acre, but upon the product per man. Land, in his opinion, should be sold only to persons whose experience and temperament qualify them to succeed, and who have the proper motive for wishing to settle in the open country. Naturally, therefore, he taught that the primary purpose of better farming is not necessarily cheap food, however important that may be, but should be the production of a virile, educated citizenship. "Efficiency and morality," said he, "may not be synonymous terms, but they are mighty good chums."

Benefit of Counsel

Often he impressed upon the faculty of the Agricultural College and Experiment Station that while it is the function of the farmer to raise things, it is the function of the College, through its investigations, "to minimize and stabilize the risk." He considered it the first duty of the college to promote efficient production in order that food may be both abundant and cheap and in order that the largest possible proportion of the population may have leisure for other things; but such a policy as the only aim of the college, would surely lead to peonage, if not to slavery. As the farmer no longer relies wholly upon his hands, every possible effort should be made to help his head and his heart in his farm and home life and work. That, surely, is a creditable incentive for every agricultural teacher and worker, and it is being splendidly carried into effect in the club work of various kinds now function-

ing throughout the country and in which Dr. Hunt took such an active and inspirational interest wherever he happened to be serving in educational and managerial positions.

He wished his associates in the College and Experiment Station to regard their leadership as one not of control, but of counsel. Were that idea adopted, it would be natural for the farmer to bring not only their trials and troubles but also their hopes and aspirations to the body of

Thomas F. Hunt

men and women constituting the staff of the institution and an intimate part of their daily life.

It was ever the purpose of Dr. Hunt, in his teaching, lectures, and writings, to help place farming and the farm home on a higher plane. He believed that discontent flourishes largely in proportion to the inability of people to rear and educate families, and he did his best, by his work in behalf of farmers, to banish such discontent. He knew well that an unsuccessful farmer is not an asset to the State, and contended that the fertile land of the United States should be reserved for those who wish to rear and educate children, as well as to raise food and clothing materials. It would, therefore, be to the interests of the people of the cities, as well as those of the country, to provide conditions of ownership and development that would cause intelligent, capable Americans to seek homes in the country.

A successful system of agriculture in a country which has universal free public school education, in his opinion, could only exist permanently where there was a successful and attractive family life in the country. He advised, therefore, that it would be incumbent upon the faculty of the College of Agriculture to see that progress shall be permanent; that prosperity shall not be transitory; that in material, moral, and social ways the children of the land shall be left a heritage that will cause them to rise and call their counsellors blessed. The idea that people who live on the land should be upstanding, God-fearing, intelligent, and well-educated was not, to him, mere altruism. He held that those attributes were to be desired and fostered, for the reason that the grandchildren of the people who now occupy the land will occupy the cities and should have the proper background and training for the positions they will have to fill in the world's work.

Early Life in Illinois

Thomas Forsyth Hunt was born in Ridott, Illinois, on January 1, 1862, the son of Thomas Marshall Hunt and Mary A. Kirk Hunt. After receiving his preparatory education in the local schools, he became a student at the University of Illinois under the late Professor George E. Morrow, and in 1884 received the degree of Bachelor of Science. Afterward, he served as Assistant Illinois State Entomologist

until 1886; then he was an Assistant in Agriculture until 1888 and from that date to 1891 Assistant Agriculturist at the Illinois Agricultural Experiment Station.

On August 22, 1888, he married Juniata G. Campbell and two children, Theodore Morrow and Marion Juliet, blessed their union.

From 1891 to 1892, he was Professor of Agriculture at Pennsylvania State College; and from 1892 to 1903, was Professor of Agriculture at Ohio State University and Dean of the College of Agriculture from 1896 to 1903. From 1903 to 1907, he was Professor of Agronomy at Cornell University, and then Dean of the Pennsylvania School of Agriculture and Director of the Experiment Station from 1907 to 1912.

In 1912 he was appointed Professor of Agriculture, Dean of the College of Agriculture, and Director of the Agricultural Experiment Station of the University of California at Berkeley. He served as Director until 1919 and as Dean until June 30, 1923. At that time, desiring to devote more time to teaching and writing, he resigned as Dean, but continued work as Professor of Agriculture until the time of his death on April 25, 1927, when returning from Honolulu where he had attended the Pan-Pacific Conference on education, reclamation, rehabilitation, and recreation, as a representative of the University of California.

Credit to His Vision

Dr. Hunt's tenure of office at the California Agricultural College and Experiment Station marked a great expansion in teaching and research. The present system of agricultural extension functioning there, with its far-reaching ramifications, had its inception in the first few years of his administration and is a credit to his vision and enterprise. At the time of the World War he was chosen as a member of the U. S. Commission on Agricultural Conditions in the Allied Countries, and in 1920 he was a delegate of the United States to the International Institute of Agriculture in Rome.

He was a hard worker, a prolific writer of station reports, bulletins, and circulars, and a valued contributor to the farm press. He was, too, the author of some useful agricultural textbooks including: "Soils and Crops on the Farm" (with Morrow), "A History of Agriculture and Rural Economics," "The Cereals in America," "How to Choose a Farm," "The Forage and Fiber Crops in America," "The Young Farmer" (with Burkett), and "Soils and Crops" (with Burkett). His specialties were farm management and field crops. Regarding them, and everything pertaining to better living, he was a wise counsellor to his many students, who sorely missed his leadership and will ever cherish his memory.

Reorganized and Initiated

When Dr. Hunt returned to the Pennsylvania State College of Agriculture and Experiment Station in 1907, he at once reorganized the whole course of study. Up to that time there had been but one general course in agriculture. To this course he added courses in agricultural chemistry, agronomy, animal husbandry, dairy husbandry, botany, forestry, and horticulture. Later he organized a Department of Rural Education and a division of Landscape Gardening in the Department of Horticulture. Another of his innovations was a useful course on meat cutting in the Department of Animal Husbandry. He was instrumental in the inauguration of Agricultural Extension in Pennsylvania before the Smith-Lever Act was passed, and was instrumental in securing the railroad trains for agricultural instruction. The initiation of soil survey work of the farm lands was another of his achievements, and as head of the School of Agriculture he added three additional farms to the

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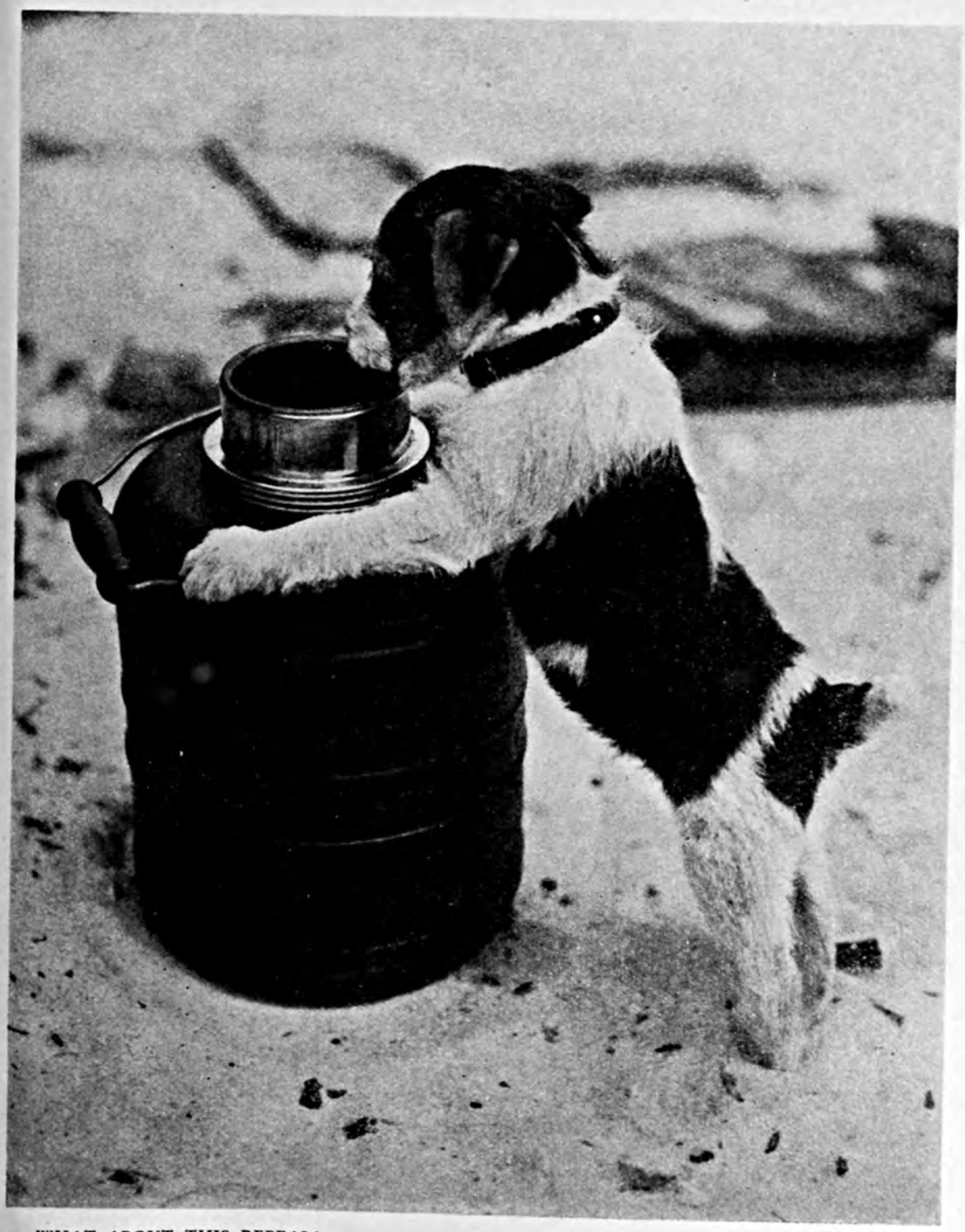
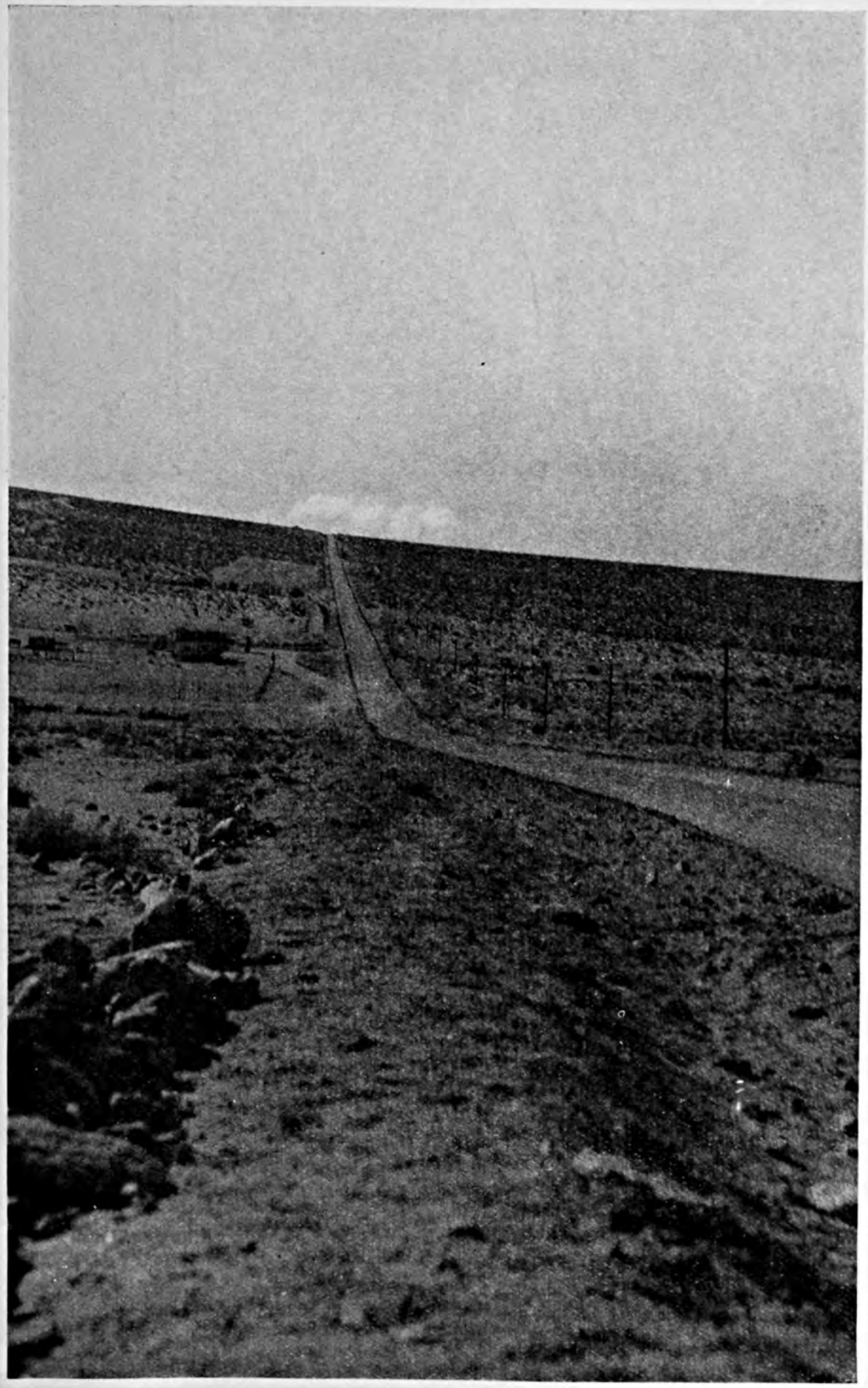
Pictorial

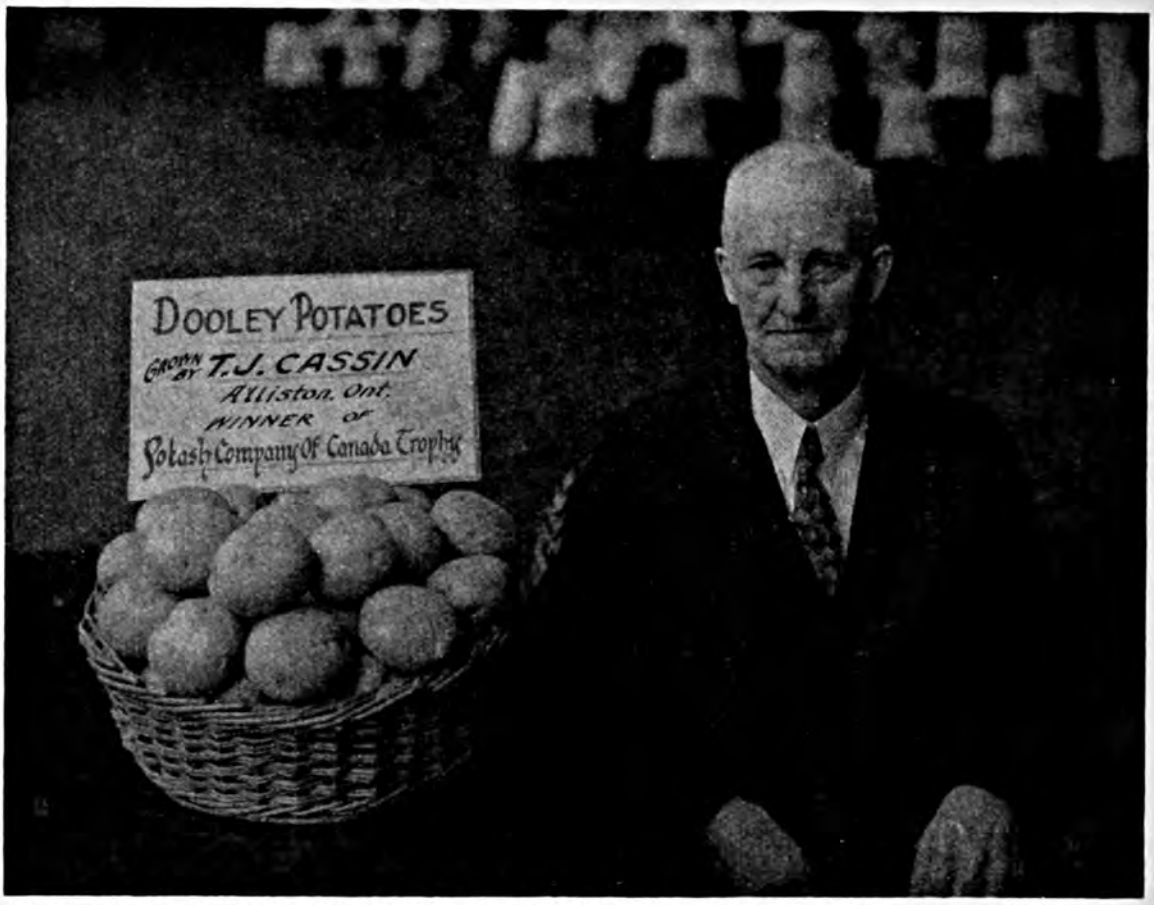


WHAT ABOUT THIS REPEAL?

Winter—An Eastern Road, near Lansdale, Pennsylvania



Winter—A Western Road, Mojave Desert, California



Above: Mr. J. T. Cassin, Alliston, Ontario, and the basket of beautiful potatoes on which he was awarded the Potash Company of Canada's Trophy for 1933.

Below: Another beautiful crop—a field of narcissi in Florida. A 4-6-10 fertilizer at the rate of 1,600 pounds per acre was used on these bulbs with splendid results.

The Editors Talk

The Need for Science in Agriculture

Who has not heard about two blades of grass growing where one grew before? For years it has been the historic justification of the application of scientific teachings to agriculture, and many are the leaders and teachers that have gone up and down the land proclaiming this truth. Now, question the critics of scientific work, two blades of grass and over-production having been accomplished, why continue so much scientific work? Why make a bad situation worse?

Superficially and viewed from a close and narrow range, there might appear to be some truth in this criticism. It is especially encouraging and reassuring, therefore, to note in the recent report of the Secretary of Agriculture and in the information for the press given out by the U. S. Department of Agriculture that the Secretary points out that science does not cause the surplus problem. After discussing the necessity of a long-time land program to replace emergency production control, the Secretary emphasizes the need of matching progress in the application of science to production with progress in the application of science to distribution.

Efforts to balance production with demand and to prevent useless farm expansion suggest to many farmers, the report says, that agriculture has a quarrel with science; for science increases the farmers' productivity and thus tends to increase the burden of the surplus. Secretary Wallace declares on the contrary that the quarrel is not with science but only with the incompleteness of its victories so far. Gains in technical efficiency, if not supported by scientific economic adjustments, cause trouble. However, the remedy, Secretary Wallace declares, is not to put a brake on science but to open new channels into which economic energy may profitably flow.

It would seem to us that there will always be a more and more urgent need for scientific work in agriculture. Agriculture is moving towards a definite goal, a growing efficiency. While temporary measures may be taken to help the farmer, in the long run a successful agriculture will depend on the degree to which agriculture in its individual units and from the national viewpoint, is efficiently managed. And greater efficiency in the production of crops, livestock, and agricultural products and their successful marketing means a great deal more research.

The production of large crop yields or great quantities of any product is no longer a problem. Enough is already known to produce any quantity of any crop or agricultural product required. But to produce the maximum quantity at the lowest cost of production and to obtain the best price in any given domestic or world market are quite different matters. Efficiency in production and distribution demands hard work; it demands more research, not less; it demands research on an increasingly broader basis, often to include more than a single State; it demands a correlation of research and experi-

mental work to properly estimate relative values, to avoid duplication and confusion, and to give strength and validity to the results of research so that it will act as a motive force to the practical man on a regional and national basis.

Science has led the way to an improved agriculture. The methods of past scientific research may be inadequate to present needs. But this simply means that with a changing world and changing problems, the scientific approach has to be broadened and strengthened. There was never a greater opportunity for the contributions of men scientifically minded than at present. But it means too that scientific men have to measure up to the opportunity.

Long Service to American Agriculture

Following a Presidential extension of his service for six months, Dr. William A. Taylor, Chief of the Bureau of Plant Industry, retired on December 30 after more than 42 years in the United States Department of Agriculture. He served under 10 Secretaries, beginning in the administration of J. M. Rusk. Secretary Wallace in a letter of appreciation to Dr. Taylor says that "few men in the field of science have gained—or deserved—greater world-wide respect."

Dr. Taylor has represented the Government in many important capacities and is the author of a large number of scientific bulletins and articles. His list of accomplishments covers a vast and varied field. BETTER CROPS WITH PLANT FOOD congratulates Dr. Taylor on his long and faithful service and wishes him every happiness on his retirement.

Effective as of January 1, Knowles A. Ryerson was appointed to succeed Dr. Taylor as Chief of the Bureau of Plant Industry. Born in Seattle, Washington, Mr. Ryerson studied at the University of California. Since then he has had a wide and varied experience in foreign and domestic fields, being on his appointment in charge of the Division of Foreign Plant Industry. We wish him and his associates every success in his new position.

A Record Potato Crop

Using standard and commercial methods of culture, and avoiding entirely any special plantings or larger quantities of seed and fertilizers, Weyl-Zuckerman and Company of Stockton, California, produced the 1933 world-record potato yield—1,155.86 bushels per acre. A picture on another page gives a good idea of what the field looked like after digging.

The acre was surveyed by competent authorities, and the potatoes were dug under the supervision of the Agricultural Commissioner of San Joaquin county and weighed by a Deputy of the Sealer of Weights and Measures. The yield per acre was therefore as accurate as could be obtained.

Certainly the growers are to be congratulated on this fine achievement. It demonstrates the possibility of lowering the cost of production by standardizing efficient commercial methods so that top yields are produced per unit of arable land.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The recommendations for the common types of tobacco in Virginia, North Carolina, South Carolina, and Georgia for 1934 have been released by the committee of agronomists representing these States. For Bright Flue-cured tobacco on heavy and more productive soils, 3-10-6 (N-P-K) fertilizer at 800 to 1,000 pounds per acre is recommended. On light or less productive soils, 3-8-6 at 1,000 to 1,200 pounds per acre is suggested. When high topping is practiced and heavy yields are expected, the potash may be increased to 8 to 10 per cent and the fertilizer applied at 1,000 pounds per acre with good results. For Dark tobacco (Sun-cured and Shipping), 3-8-3 at 600 to 1,000 pounds per acre is suggested and on plant beds, 4-8-3 is recommended. Other analyses of similar ratios can be used. In addition to the recommendation of analyses, information on "sand drown," chlorine, sulphur, sources of plant foods, and the control of downy mildew or blue mold disease of tobacco is included.

"Pasture Investigations — Second Report," Agr. Exp. Sta., Storrs, Conn., Bul. 186, June, 1933, B. A. Brown and R. I. Munsell.

"Pasture Investigations—Third Report," Agr. Exp. Sta., Storrs, Conn., Bul. 187, July, 1933, B. A. Brown.

"Pasture Investigations — Fourth Report," Agr. Exp. Sta., Storrs, Conn., Bul. 189, Aug., 1933, B. A. Brown.

"Effect of Quickly Available Nitrogen on Returns From Strawberries on Norfolk Sandy Loam," Agr. Exp. Sta., Raleigh, N. C., Agron. Infor. Cir. 82, Sep., 1933, R. A. Lineberry, J. J. Skinner, H. B. Mann, and C. B. Williams.

"Commercial Fertilizers," Agr. Exp. Sta., Burlington, Vt., Bul. 361, Aug., 1933, L. S. Walker and E. F. Boyce.

"Effects of Time of Planting and of Fertilizer Mixtures on the Curly-top Resistant Sugar-beet Variety U. S. No. 1 in Idaho," U. S. D. A., Washington, D. C., Cir. 273, July, 1933, A. W. Skuderna, C. E. Cormany, and L. A. Hurst.

Soils

A method for grading the relative agricultural value of soils on a numerical basis has been proposed by R. E. Storie of California. He judges the soils under three general headings, character of soil profile, texture of the surface soil, and soil-modifying conditions. The latter includes such factors as drainage, alkali, acidity, fertility, erosion, typography, etc. A value from 1 to 100 per cent is given for each of the three general heads, depending upon the favorableness of the soil properties under consideration. The product of these percentages is the rating of the soil. In case a whole farm is to be rated, the rating of each soil on the farm is multiplied by the acreage of the soil. The resulting values for each soil are added and this is divided by the total acreage. The result gives the rating for the farm. Details on this interesting method of grading soils and farms are given in University of California Agricultural Experiment Station Bulletin 556, 1933 "An Index for Rating the Agricultural Value of Soils," by R. Earl Storie.

"Potassium in Calcareous Soils—Part I—Solubility and Availability; Part II—Some Properties of Replaceable Potassium," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 50, Aug. 1, 1933, W. T. McGeorge.

"The Soils and Crop Production in Genesee County, New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 567, June, 1933, A. F. Gustafson, D. B. Johnstone-Wallace, F. O. Underwood, and J. Oskamp.

"Soil and Field-crop Management for St. Lawrence County, New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 570, June, 1933, A. F. Gustafson, D. B. Johnstone-Wallace, and F. B. Howe.

"Correcting the Unproductiveness of Acid and Alkaline Muck Soils for the Growing of Vegetable Crops," Agr. Exp. Sta., Ithaca, N. Y., Bul. 572, June, 1933, G. M. Tait and J. E. Knott.

"Soils in Relation to Fruit Growing in New York—Part III—Some Physical and Chemical Properties of the Soils of the Hilton and Morton Areas, Monroe County, and Their Relation to Orchard Performance," Agr. Exp. Sta., Ithaca, N. Y., Bul. 575, July, 1933, Joseph Oskamp and L. P. Batjer.

"Character and Behavior of Organic Soil Colloids," U. S. D. A., Washington, D. C., Tech. Bul. 377, July, 1933, M. S. Anderson and Horace G. Byers.

"Soil Survey of The Nogales Area, Arizona," U. S. D. A., Washington, D. C., No. 6, Series 1930, T. W. Glassey.

"Soil Survey of Crawford County, Iowa," U. S. D. A., Washington, D. C., No. 30, Series 1928, T. H. Benton and M. H. Layton.

"Soil Survey of Erie County, New York," U. S. D. A., Washington, D. C., No. 14, Series 1929, Arthur E. Taylor, F. B. Howe, C. S. Pearson, and W. J. Moran.

"Soil Survey of Midland County, Texas," U. S. D. A., Washington, D. C., No. 31, Series 1928, E. H. Templin and J. A. Kerr.

Crops

Two important additions to forage literature become available by the circulation of a new Illinois Bulletin 394 "Sweet Clover in Illinois," by O. H. Sears, J. J. Pieper, and W. L. Burlison, and Ohio's Bulletin 137 "Alfalfa in Ohio Farming," by R. D. Lewis, J. A. Slipher, and C. J. Willard. Both of these publications treat fully the results of important experimental work on the profitable culture of these two crops in the respective States. There is much information in each applicable to other sections of the country.

"Ornamental Trees," Agr. Exp. Sta., Gainesville, Fla., Bul. 261, June, 1933, Harold Mowry.

"Relation of the Root System of Pecan Trees to Nursery and Orchard Practices," Agr. Exp. Sta., Experiment, Ga., Bul. 176, June, 1933, J. G. Woodroof.

"Some Effects of Severity of Pruning on Growth and Production in the Concord Grape," Agr. Exp. Sta., Urbana, Ill., Bul. 393, July, 1933, A. S. Colby and L. R. Tucker.

"Corn as a Silage Crop," Agr. Exp. Sta., Urbana, Ill., Cir. 409, June, 1933, W. B. Nevens.

"Forty-fifth Annual Report of the Agricultural Experiment Station of the University of Kentucky for the Year 1932," Agr. Exp. Sta., Lexington, Ky., Thomas P. Cooper.

"Irish Potato Investigations," Agr. Exp. Sta., Baton Rouge, La., La. Bul. 239, Sep., 1933, Julian C. Miller and W. D. Kimbrough.

"The Small Vegetable Garden," Univ of Md., College Park, Md., Ext. Bul. 70, Sep., 1933, W. R. Ballard.

"Experimental Projects—Thirty-ninth Annual Report, July 1, 1931, to June 30, 1932," Agr. Exp. Sta., Bozeman, Mont., F. B. Linfield.

"Studies of Feed Value of Early Hay," Agr. Exp. Sta., Durham, N. H., Sta. Cir. 41, May, 1933, Ford S. Prince, Paul T. Blood, and G. P. Percival.

"Amount of Mulch Material Required by Apple Trees," Agr. Exp. Sta., New Brunswick, N. J., Cir. 286, June, 1933, M. A. Blake.

"Elberta and its Selfed and Chance Seedlings Lack Hardiness," Agr. Exp. Sta., New Brunswick, N. J., Cir. 287, June, 1933, M. A. Blake.

"The Care of Evergreens," Agr. Exp. Sta., New Brunswick, N. J., Cir. 288, June, 1933, C. H. Connors.

"The Relative Vigor and Productivity of Potato Plants from Basal and Apical Sets," Agr. Exp. Sta., Geneva, N. Y., Bul. 633, Aug., 1933, F. C. Stewart.

"Corn Breeding," Agr. Exp. Sta., Raleigh, N. C., Agron. Infor. Cir. 81, Sep., 1933, G. K. Middleton and P. H. Kime.

"Report of Conference on Strawberry Investigations, Held at Chadbourn, N. C., and Willard, N. C., May 2 and 3, 1933," Agr. Exp. Sta., Raleigh, N. C., Agron. Infor. Cir. 83, Sep., 1933.

"Dependable Fruits—Varieties for Commercial and Home Use," Agr. Exp. Sta., Wooster, Ohio, Bul. 528, Sep., 1933, C. W. Ellenwood and J. S. Shoemaker.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XVIII, No. 165, Nov.-Dec., 1933.

"The Feeding Value of Artificially Dried Young Grass," Agr. Exp. Sta., Burlington, Vt., Bul. 350, Jan., 1933, J. A. Newlander.

"Rootstock Effects with Cherries," Agr. Exp. Sta., Burlington, Vt., Bul. 352, Mar., 1933, M. B. Cummings, E. W. Jenkins, and R. G. Dunning.

"A Study of Natural Reproduction in Vermont Forests—II. The Effect of Thinning on White Pine Reproduction," Agr. Exp. Sta., Burlington, Vt., Bul. 354, June, 1933, George P. Burns.

"The Carbohydrate Contents of the Maple Tree," Agr. Exp. Sta., Burlington, Vt., Bul. 358, June, 1933, C. H. Jones and Jennie L. Bradlee.

"The Feeding Value of Artificially Dried Young Grass—II," Agr. Exp. Sta., Burlington, Vt., Bul. 359, June, 1933, O. M. Camburn.

"Forty-sixth Annual Report, 1932-1933," Agr. Exp. Sta., Burlington, Vt., Bul. 360, July, 1933, J. L. Hills.

"Chemical Composition of Pasture Grasses in Vermont," Agr. Exp. Sta., Burlington, Vt., Bul. 362, Sep., 1933, J. A. Newlander, C. H. Jones, and H. B. Ellenberger.

"Agricultural Seed," Agr. Exp. Sta., Burlington, Vt., Bul. 365, Oct., 1933, Anna S. Lutman.

"Forty-fifth Annual Report, 1932," Agr. Exp. Sta., Knoxville, Tenn., H. A. Morgan.

"The Storage and Seasoning of Pecan Bud Wood," Agr. Exp. Sta., College Station, Tex., Bul. 478, Aug., 1933, Fred R. Brison.

"Important Steps in Growing Grain Sorghums," Agr. Exp. Sta., College Station, Tex., Cir. L-8, E. A. Miller.

"The Katahdin and Chippewa Potatoes," U. S. D. A., Washington, D. C., Cir. 276, July, 1933, C. F. Clark, William Stuart, and F. J. Stevenson.

"Report of Extension Work in Agriculture and Home Economics in the United States, 1932," U. S. D. A., Washington, D. C., June, 1933, C. W. Warburton and C. B. Smith.

"Huron Timothy," U. S. D. A., Washington, D. C., Leaflet 99, Aug., 1933, Morgan W. Evans.

"Pima Egyptian Cotton in Irrigated Rotations at the Yuma Field Station, Bard, Calif.," U. S. D. A., Washington, D. C., Tech. Bul. 369, Aug., 1933, Stephen H. Hastings and Edward G. Noble.

Economics

"A sufficient and suitable supply of roughage to meet the demands of the dairy herd on each farm is fundamental to the dairy industry of the State. The raising of this roughage is an integral part of the dairy enterprise. It therefore involves the whole farm organization and makes necessary the study of the problems as to what forage crops to raise, and the methods used for their economic production and handling."

The above is the introductory paragraph of New Hampshire's new Station Bulletin 273, "Roughage Production in New Hampshire," by M. F. Abell. The material presented is divided under the following three major headings:

(1) What roughage should be grown?

(2) Silage production — management and costs.

(3) Hay production—management and costs.

These headings alone provide an index to the information of wide range and interest supplied in the bulletin.

"Farmers' Cooperative Associations in Florida, II. Organization and Management," Agr. Exp. Sta., Gainesville, Fla., Bul. 263, June, 1933, Marvin A. Brooker and H. G. Hamilton.

"Farm Prices of Cotton Related to Its Grade and Staple Length in Selected Local Markets in Mississippi, Seasons 1928-29, 1929-30, and 1930-31," Agr. Exp. Sta., State College, Miss., Tech. Bul. 21, Mar., 1933, L. D. Howell, Lewis E. Long, John S. Burgess, Jr., Milliard L. Garner, and R. C. Soxman.

"Facts on Fruit and Vegetable Farming in New Jersey, 1926-1931," Agr. Exp. Sta., New Brunswick, N. J., Bul. 555, June, 1933, Allen G. Waller and John W. Carncross.

"Some Rural Social Agencies in Ohio—A Study of Trends, 1921-1931," Agr. Exp. Sta., Wooster, Ohio, Bul. 529, Sep., 1933, C. E. Lively.

"Ohio Agricultural Statistics, 1932," Agr. Exp. Sta., Wooster, Ohio, Bul. 530, Sep., 1933, A. R. Tuttle, R. E. Straszheim, and P. P. Wallrabenstein.

"Land Utilization as a Basis of Rural Economic Organization," Agr. Exp. Sta., Burlington, Vt., Bul. 357, June, 1933, C. F. Clayton and L. J. Peet.

"A Study of the Organization and Management of Early Potato Farms in Eastern Virginia," Agr. Exp. Sta., Blacksburg, Va., Bul. 289, Apr., 1933, C. W. Crickman, Henry T. Wingate, and J. J. Vernon.

"Wheat Futures—Volume of Trading, Open Commitments and Prices from January 2, 1930 to December 31, 1932," U. S. D. A., Washington, D. C., Stat. Bul. 41, Sep., 1933.

"Car-lot Shipments of Fruits and Vegetables from Stations in the United States for the Calendar Years 1930 and 1931," U. S. D. A., Washington, D. C., Stat. Bul. 42, Sep., 1933.

"Proposed Revised Federal Grain Standards," U. S. D. A., Washington, D. C., Misc. Publ. 173, Sep. 1933.

A World Record

(*From page* 10)

average well over 500 sacks of No. 1 potatoes per acre. These phenomenal yields were obtained under standard commercial operations.

The particular type of California Delta soil which Mr. Zuckerman is farming responds remarkably well to phosphoric acid and potash. Hence the steadily increased yields that have been obtained, not only on Mr. Zuckerman's properties but on other properties in this section, can be attributed quite largely to the continued use and cumulative effect of phosphoric acid and potash fertilizers. Three world-record yields of potatoes have been established with these types of fertilizers and naturally, as might be expected with world-record yields, with splendid cultural practice.

The seed bed on McDonald Island was prepared by one of the pulverizing machines designed and built by R. C. Zuckerman. The planting was the standard practice for this locality, 10 inches by 30 inches. Ten sacks of seed potatoes were planted per acre. This seed was grown on the Zuckerman Brothers' ranch at Klamath Falls, Oregon, and was of the "Eastern Pride" type. The entire acreage was fertilized with 1,000 pounds per acre of Gaviota 0-15-12 fertilizer (that is to say 15% phosphoric acid and 12% potash) produced by the Pacific Guano and Fertilizer Company of Berkeley, California. The seed was planted April 1, 1933, and the crop was harvested September 18, 1933, making 170 days growing time.

Mr. Zuckerman has not only been progressive in his cultural methods, but has patented a potato planter and fertilizer drill which plants and fertilizes three rows at one operation. The fertilizer drill was set so as to apply the fertilizer two inches below the seed over a width of 10 inches, thoroughly mixing the fertilizer with the soil to a depth of 8 to 10 inches. This is Mr. Zuckerman's usual method of applying fertilizer. One of these fertilizing and planting machines plants and fertilizes 12 to 15 acres per day.

The outstanding feature of this world-record yield is that it was produced with the standard method of culture, planting, and fertilizing used by Weyl-Zuckerman & Company. Most other records have been established with special planting, using larger quantities of both seed and fertilizer per acre, and at harvesting the fields were combed to obtain every potato in the field. In this instance, the field was planted, fertilized, irrigated, and harvested under their regular commercial system. The field was dug only once with standard equipment, which makes this record yield all the more remarkable.

The potato digger used on the Weyl-Zuckerman ranch was invented by Mr. Zuckerman. It digs three rows at a time. Rollers beneath the conveyors leave clean potatoes on well-packed soil.

Weeds Are a Nation's Menace

(*From page 9*)

The main objective in cultivation is weed control.

badly infested with the European bindweed as to prohibit the profitable growing of crops. In fact so serious is the pest that banks refuse to take land infested with it as collateral.

The startling figures and facts here presented are not intended to be sensational or to scare the farmers. They are recorded with the object of awakening farmers to a true realization of the situation that weeds may no longer be looked upon with the present air of indifference arising from the feeling that they are a necessary evil, an attitude created by the familiarity that has bred contempt. Instead the weeds in the field should be considered as robbers that should not be tolerated, and that seriously reduce crop yields.

Survey the Problem

Let us take a trip over the farm and make a study of the general weed problem with the idea in mind of putting into practice the most practical and best known methods of weed control and eradication. It is true that ridding a farm of weeds is by no means a short-time job. Constant fighting will eventually win the fray.

Near the home in fence rows, along roadways, and in waste places, we often find weed nurseries where millions of weed seeds are produced each year. Keep in mind that weeds are not stationary and that seeds produced in out of the way places will move into the fields and increase the weed toll. A simple remedy for their control is at hand and requires only a few hours' work for which the farmers will be well paid. Hitch the horses to the mowing machine and plan to cut all such weed patches. Experience has shown that two clippings each year are essential. The first cutting should be made in June to prevent seed formation on the earlier plants. Again in August, the mower should be utilized for weed clipping purposes. Many farmers have demonstrated that mowing in early June and again in August will prevent most weeds from going to seed and allow the grass to secure the upper hand.

Fertilize Pastures

Then there is the weedy pasture that has been seriously reduced in carrying capacity as weeds have replaced the bluegrass. Experiments, demonstrations, and experience all point to this as primarily a soil improvement problem. The chances are that in addition to the leaching factor, you have robbed the soil bank by removing from the pasture in the form of milk and other animal products certain mineral elements that are necessary for the development of the grass. In other words, the soil has gradually become less fertile, permitting the weeds to enter since weeds are nature's effort to cover up sterile places. The problem usually can be solved by the addition of a few hundred pounds of a good fertilizer. Clipping of weeds in pastures is also essential. Cutting them will not only prevent seed formation, but will retard their growth.

Let us now turn to the attention of the timothy meadow with its mass of weeds. Here again two suggestions are in order. In the first place, if possible to grow clover on the field, always include this legume in the timothy seeding since the clover, by adding nitrogen to the soil, encourages the stand of timothy which in turn has a distinct tendency to exclude the weeds. The second suggestion is to cut the timothy early, thereby setting the weeds back to an almost unbelievable extent while at the same time securing more palatable and nutritive feed.

Use Pure Seed

Perhaps you are having difficulty with weeds in the clover field. Most weeds of the clover field owe their origin to impure seed. The necessity of using pure, weed-free seed cannot be overemphasized. It is through this channel that new and dangerous weeds are introduced from other sections of the country. To prove this point we need only to recall the European bindweed which has recently been introduced into the Midwest through alfalfa and clover seed from the Pacific Northwest. Weedy clover fields should be clipped in May when the weeds are taller than the clover. This clipping should be made high enough to save the clover and yet cut weeds.

Two suggestions for weed control are in order for the corn field. First, spend more time in seed-bed preparation when millions of weeds can be destroyed, with comparative ease. Keep in mind that weeds are most easily killed when they are small. Second, use gopher blades or knives in place of shovels when cultivating. A set of knives can be purchased for a few dollars and are efficient weed destroyers when kept sharp. Many farmers are learning the truth of the principle that after the preparation of the seed bed the main object of cultivation is the destruction of weeds.

Careful preparation of the seed bed will also apply to controlling weeds in oat and wheat fields. Oftentimes disking of the ground is substituted for plowing, with an increased weed growth as the result. Many of these weeds, such as mustard, peppergrass, and milkweeds, can be destroyed by plowing. Fields that are badly infested with winter annuals should by all means be plowed before sown to oats. We can profit by the experience of the North Dakota and Minnesota farmers that have found spring plowing a prevention for the growth of many oat-field pests.

During our weed tour around the farm, we must not neglect patches of Canada thistles, wild morning glory, quack-grass, and other creeping root perennials which are oftentimes found on all parts of the farm. The time to eradicate them is when they are still confined to small patches, and the method is spraying. Chlorates are the most effective spray materials to use on such weeds that resist other means of control. A few pounds of chlorate applied will prevent further spread.

Occasional weeds with deep, fleshy tap roots, such as dock, mullen, and burdock, are best disposed of by cutting under the crown with a spade or spud. The spud is an implement resembling a chisel with a long handle.

Constant Vigilance

Now that we have made the rounds and discussed the general farm weed problems, the next step is to put it into practice. Some will say that cleaning up the weeds on a farm is an endless job; others have and will continue to keep their farms as free from weeds as possible. The up-to-date farmer realizes that in order to get the most out of his investments he cannot allow weeds to take their annual toll and increase to the point where crop production will be unprofitable. Constant fighting, using as ammunition, clean seed, cultivation, clipping, and fertile fields to keep the upper hand, is the solution to the enormous weed problem.

The Inquiring Mind

(*From page* 14)

College Farm, by purchase and leasing. During his administration, the present Horticultural Building was erected in 1908, and he directed the setting out of the experimental orchard. His activity in agricultural extension work and the inauguration of a Farmers' Week brought him into close contact with the farmers of the State and gained him their good will.

Professor F. D. Gardner, Agronomist of the Pennsylvania Agricultural Experiment Station, considered Dr. Hunt a rare combination of business man and scientist whose entire life was devoted to agricultural education and research, with a view to the betterment of American agriculture and the American farm. He tells us, too, that Dr. Hunt early won a prominent place in the American Association of Agricultural Colleges and Experiment Stations. He was active on many important committees and was for several years a member of the standing committee on instruction in agriculture.

Suggested Graduate School

It was he who first suggested that the association should organize and establish a Graduate School. The first Graduate Session, which resulted, was opened at the Ohio State University in 1902, and others then functioned in alternate years until 1916. They were held at the Agricultural Colleges or Universities in the States of Ohio, Illinois, Iowa, Michigan, Missouri, and Massachusetts. At the first session in Ohio, Dr. Hunt acted as registrar. "Wherever he served," writes Professor Gardner, "Dr. Hunt was held in high esteem and looked upon as a man of fine personality and high ideals. Relatively few, during his period of service, were his equal, and he had no superior in the field of scientific agriculture in his time."

When Dr. Hunt moved to California in 1912, he found the new environment invigorating and the opportunities afforded by his position as Dean and Director of the College of Agriculture and Experiment Station inspiring. Always a prodigious worker, he tackled his new tasks with enthusiasm and admirable vigor. One of his first acts was to gather round him some of the workers with whom he had previous acquaintance, and he soon built up a great faculty of eminent scientists.

Started Extension Work

In 1913 he brought to California Professor B. H. Crocheron, who organized the Department of Agricultural Extension which grew to be one of the greatest and most efficient in the country. Another of his appointees, Professor J. W. Gregg, is now Professor of Landscape Architecture in the University of California and is widely known as a foremost landscape designer. His notable work has included the designing of the campuses at the Universities of Berkeley and Los Angeles. Professor C. F. Shaw, now head of the Soil Technology Division of the University, was also appointed by Dr. Hunt and gained his esteem and confidence by his faithful and efficient work. In all other departments of the University there are eminent and progressive chiefs who with their associates carry into effect the purposes of the College of Agriculture expressed in the inscription on Hilgard Hall which reads, "To Rescue for Human Society the Native Values of Rural Life."

Dr. Hunt's associations with the faculty were, on the whole, pleasant, but there were honest differences of opinion between him and some members relative to the conduct of the

College of Agriculture. Professor Edwin C. Voorhies of the Department of Agricultural Economics was intimately associated with Dr. Hunt, and tells us that the differences of opinion arose relative to the question whether the chief attention should be paid to fundamental research or to that and its applied phases. Dr. Hunt believed strongly in scientific research, but held also that its findings should be carried to the farmers, and so he was a strong champion of agricultural extension. His entire career on the Pacific Slope was by no means smooth; but he had the courage of his convictions, bravely contended for what he deemed right, and succeeded notably in many of his efforts.

A Fine Executive

Professor Voorhies considered Dr. Hunt an excellent administrator who had the happy faculty of knowing how to delegate duties to other people and then hold them responsible without interfering in their work. He was a leading agricultural economist as well as a trained agronomist. Professor Crocheron once said of him, "Dr. Hunt can see a greater distance through a stone wall than any man I have ever known." His clearness of vision was well exemplified by the fact that the predictions he made, in several lectures to the faculty regarding the events which would follow the world war, proved correct. While he could not be called a "good mixer," and had not joined many associations and clubs, he enjoyed the respect of both the agricultural and non-agricultural population of California. His public addresses always attracted large audiences of interested hearers.

Withal, he was a most charitable man, but secretive in his acts of kindness. He loved to help his students and made many sacrifices in that connection. We are told that he joined a social fraternity for the simple reason that he liked the lads composing it. He took a keen interest in Alpha Zeta, the agricultural honorary fraternity, and made it a point to entertain its members once or twice a year at his home. He was also a member of Sigma Xi fraternity. He was an ideal "home man," seldom went to gatherings other than those of the University, but often welcomed a few of his close personal friends at his home. Profoundly religious, in an unassertive way, he attended the First Congregational Church in Berkeley, and had a kindly Christian influence upon his students.

In a practical way, Dr. Hunt interested himself in every phase of crop, fruit, and stock raising in California. At one time he made the problem of alkali prevalence in the soil a matter of careful study. He was an early advocate of sorghum growing. He advised that one of the simplest ways of making possible an increased meat production in California would be the raising of sorghums, either for grain or silage. He said that if food products were to be increased and the price of foods lowered, there must be a starting point somewhere, and that starting point would be where the plow enters the ground. There were many thousands of acres of land producing, under a scanty pasture, perhaps less than 50 lbs. of beef per acre, which might, if planted to grain sorghums, produce from 400 to 1,000 lbs. of pork, or their equivalent in milk and eggs

A Wise Prophet

During the period of the World War, Dr. Hunt offered much good and practical advice regarding crop growing and food production; but he was dubious as to the way in which his suggestions would be received. His comments on this subject were, indeed, prophetic. He concluded his report to the State Council of Defense with the following notable paragraph: "And now, finally, the pity of it all is that very little attention will be paid to most of these recommendations. There will be in the hands of the American public,

during the next two or three years, more money and instruments of credit per capita than there ever were in any nation of the world, and *there is every reason to believe that this country is to witness the most prosperous times and the most riotous living that it has ever known.* In the meantime it is our allies who will suffer. 'For what shall it profit a man if he gain the whole world and lose his own soul.' "

His prediction relative to inordinate prosperity and the orgy of riotous living proved only too true; but happily he did not live to see the inevitable aftermath of world-wide depression. We wish he might know, however, that the wise counsel he gave to farmers during his life of devotion to their cause did not fall on deaf ears. Today, they revere his memory, not only in California, but in the other States in which he labored; and if one should seek his monument and epitaph, it could be best found in the farm homes and fields of the country.

Potash Prevents Wilt and Rust

(*From page* 8)

bad that his yields were unprofitable where potash was not used. In 1933 he was determined to use kainit on any ground planted to cotton, because he simply could not afford to have his yield of cotton cut to one-third due to a lack of this small amount of fertilizer. Although he is growing the D & P L 4 cotton, which is supposed to be somewhat wilt-resistant, his cotton wilted badly where he didn't use potash. Where he did use it the disease was nearly 100 per cent controlled.

In one of his fields in September 1933, I saw one row which did not receive any potash. The remainder of the rows in the field received it at the rate of 300 pounds of the 20 per cent kainit per acre. I stepped off 30 feet of row space on the unfertilized and 30 feet on the row immediately adjoining which received the fertilizer. An actual boll count was made, and on the fertilized stalks there were 390 bolls as against 172 where no kainit was used. The bolls on the fertilized row were on an average at least a third larger. There was not a good stand on the unfertilized row, because many of the young plants died of wilt before reaching any appreciable size. The result was not more than a third as much cotton from the unfertilized as from the fertilized cotton.

Several farmers in Dunklin county told me that potash fertilizer not only increased the quantity of cotton, but the quality as well. One said potash-fertilized cotton on wilt-infested land consistently produced a staple from 1/16 to ⅛ inch longer than where none was used, which meant an increase in price of at least ½ cent more per pound when sold. Another said that the knotty and small bolls brought about by wilt and rust considerably increased the cost of picking. To put it another way he said the cost of the kainit was paid for by the reduction in picking cost, as the large, healthy bolls were so much more easily picked than the diseased ones.

In Greene county, Arkansas, Mr. John Frye was about to abandon one of his fields five years ago, as far as cotton production was concerned, because of the prevalence of wilt and rust. His county agent put on a test on this farm, having Mr. Frye apply on two acres 400 pounds per acre of

a 4-8-6 fertilizer, plus 100 pounds muriate of potash. The result was a yield of a bale per acre. Adjoining land without any of the fertilizer produced approximately one-eighth bale per acre. Mr. Frye said that had it not been for the potash fertilizer he would have been through with cotton on that farm, whereas he now averages close to a bale per acre by using fertilizer, and when the seasons are normal.

Mr. Ben Lincoln, county agent of Greene county, Arkansas, said that on land in his county that was susceptible to rust and wilt an application of 150 to 175 pounds of 20 per cent kainit had, on an average, doubled the yield. He said that on much of the land where rust and wilt are not present, the use of potash has been found profitable.

Aids Wilt-resistant Varieties

At the Marianna Experiment Station, Marianna, Arkansas, where work with cotton is featured, the tests clearly show that by using those varieties of cotton that are somewhat wilt-resistant and by applying liberal amounts of potash, practically 100 per cent control of wilt and rust is secured. Rowden 40 is the variety of cotton that seems to be best adapted to the lands of this experiment station, and by planting this variety and fertilizing with 100 pounds of muriate of potash per acre, Director Whitaker states that practically 100 per cent wilt control has been secured, even where the wilt was quite bad. I found several tests which clearly indicated that an application of 100 pounds of muriate of potash on this station farm, along with varieties that are fairly resistant to wilt, would produce a yield consistently from three to four times larger than where a susceptible variety was used and no potash applied.

No Longer Any Doubt

There is no longer any doubt about the tremendous value of potash in controlling both wilt and rust in cotton, and wherever these diseases are prevalent there is no sense in trying to grow cotton without the liberal application of potash, because for every dollar intelligently invested it will return several dollars.

In many other sections of the South wilt and rust are just as prevalent as in southeastern Missouri and Arkansas. These experiences could be multiplied hundreds of times, because the information that potash will control these diseases is rapidly becoming general knowledge on the part of cotton growers, and they are using it in constantly increasing quantities.

Potash made the difference in this cotton at the Marianna, Arkansas, Experiment Station. Left: 6-8-0 applied at the rate of 600 pounds per acre under cotton before planting. Right: 6-8-6 at the same rate of application.

Wreaths & Resolves

(*From page 6*)

old M. E. meeting house, these fellows got the "pow-wow-er" and whooped it up for a housecleaning as long as the soft soap lasted. When the Boss switched from Lux to Gold Dust, they began sneezing and laid down their mops.

Tenacity is easier for some folks to acquire if they are paid for it. It all depends in what form they are reimbursed. The Chamber of Commerce style of reward is not suited to those seeking Something New. It's the tenacity of John the Baptist rather than that of a Shylock which finds its true return in social statecraft.

IS there after all a better time to dedicate ourselves to a constant search for Something New than at the anniversary of the time when Wisdom followed the Star to locate the Truth at last in a barren stable?

Despite the material setback of recent Yuletides, we have gained much ground in comparison to the days when the other Wise Men sought the first New Deal. For in those benighted times the lives of a thousand men counted for less than the meal ticket of one today. In those 1,933 anniversaries of the Natal Day which the world has known, progress has been recorded in every art, science, and social standard worth the name. As Christmas came to mean more to the world, the moral tone of the times improved. As the succeeding Christmas lights expanded, their increasing brilliance drove the hungry wolf packs farther from the door.

Yet through the ages it has been a contest between the Believers on the one hand and the King Herods and Pontius Pilates on the other. Old Herod personifies those who have sought to kill the Idea before it was born. His kind have bobbed up on every occasion attempting to browbeat and defame the reformer or the liberal.

But although they delayed the coming of the Magna Carta, the Renaissance, world discovery, the American Revolution, labor reform, the emancipation of the slaves and the freedom of speech and of the press, the victory finally went to the invincible power of leadership inspired by mass demand.

The Pilate obstructionists are those who wash their hands of responsibility one way or the other, but who invariably reserve the right to criticize and jibe at the failure which they anticipate for the New Idea.

To the most of us, of course, abstract philosophy does not carry great punch. The hungry cannot be fed on hopes or platforms and the jobless cannot be provided with an honest living on theory. So no doubt the most intense interest centers still on the usual meaning of Christmas. This is what joy, comforts, or benefits are derived from the occasion.

A GOVERNMENT that softens the hearts of its citizens with gifts naturally fits them to listen more attentively to a general social adjustment program. The only danger in it is that we develop "easy-come" do-nothings. Yet the danger from that in this country is not so great as in some older lands. Christmas was brighter anyhow to many citizens since Santa Claus disguised as Uncle Sam has taken his pack of donations, credits, and public works out to the victims of the machine-and-money madness.

Therefore it becomes a question of what effect these generous presents will have upon the body politic. Judging by what we know of the recovery program in agriculture, the payment of taxes, interest, and honest debts have been foremost. This discloses the underlying worth of the average in-

dividual, and bears out what we pin our faith upon.

If the individual accepts the better times fully aware of the causes that made bad times and desirous of voting to correct them, this Christmas party will not have been in vain. If this generosity inspired by a desire to stir men to action fails to arouse them, can we retain leaders hopeful and resolute enough to see it through?

WE are trying, it seems, to approach an ideal state of affairs by means of practical ends. We are trying to make the Government more than a tax-collection agency, although for the time being we depend on taxes to help adjust emergencies. We are trying to make statecraft more than warcraft and diplomacy, although to reach that goal we must have generals keen enough to swap horses or sock the enemy.

So we trimmed the Christmas tree with gifts bought under the sign of the Blue Eagle, and feel that there is a spirit of sacrifice for the common welfare stirring as the New Year dawns.

Those who ponder too deeply on a few errors of statecraft or let themselves be aroused to frenzy over the mouthings of some disgruntled politician are wasting time. In the manufacture of anything New there are some discarded patterns, some thumping of fingers and scraping of flesh, a litter of shavings and saw dust. There are long hours of drafting and designing, periods of standing still to think things out, intervals of hesitation and testing, and finally the finished article is ready to function.

Our worst enemies are those who join Herod and Pilate in urging haste, immediate completion, instant delivery. Sweat shops do that, not skilled, well-paid labor. If we are to provide ourselves with Something New to last us all our lives and be handed down in trust to our children, we desire a precious heirloom, not a cheap bauble.

Meeting expediency and immediate need is one thing and laying firm foundations for a shelter to humanity in the years to come is quite another. But we must see that the house we build has room for recreation and music and art as well as dogmas and budgets.

The average American has had too little time for culture and pure enjoyment, and this is Something New which he deserves. Chasing around in cars and loafing in pool halls are not satisfying, any more than is being obliged to sink into bed stone tired after hard work at small pay. As Will Durant says, we have need to be less Roman and more Grecian.

We have looked up to material things and wage scales and economic legislation until our eyes are weary. The old gewgaws of other holidays grow stale. The old forms of political "protection" have been quicksands. The home-folks know that and we pin our faith on them, rather than upon some of their elected spokesmen.

AND finally, the holiday season is synonymous of sweetness and light. Your dour-faced, Calvinistic uplifter has no welcome on our hearthstones. Our pursuit of the social ideals we crave must be set to music Allegro, with cheerful song and time out for warmth and jest. For these are part of the new picture we all hope to paint and the realm in which we all hope to dwell. Anything else than this would be distasteful, even irreconcilable with the spirit of the holidays that should be preserved and perpetuated through the year.

So poke the fire, light the candles, and enjoy to the fullest the season's cheer. But do not draw the shades, for if there is ever a time to let our lights of hope and confidence in each other shine out upon the snows of despond, this is the hour.

My heartiest wish for readers of BETTER CROPS WITH PLANT FOOD is Better Times with social justice.

EXPERIENCE

A general and a colonel were walking down the street. They met many privates, and each time the colonel would salute he would mutter, "The same to you."

The general's curiosity soon got the better of him, and he asked:

"Why do you always say that?"

The colonel answered:

"I was once a private and I know what they are thinking."

"Well, my boy, what did Santa bring you?"

Three-year-old: "Aw, I got a little red chair, but it ain't much good. It's got a hole in the bottom of it."

Judge: "Are you positive that the defendant was drunk?"

Officer (growling): "No doubt."

Judge: "Why are you so certain?"

Officer: "Well, I saw him put a penny in the patrol box on Fourth Street, then look up at the clock on the Presbyterian Church and shout: 'Gawd! I've lost fourteen pounds weight!' "—*Typo Graphic.*

IMMATERIAL

Math. Prof.—"Now, if I subtract 25 from 37 what's the difference?"

Little Willie—"Yeah! That's what I say. Who cares?"

THEIR LOSS

A drunk was swaying back and forth on the sidewalk when the cop stepped up and asked him what he was doing and where he lived.

"Right there," he said, pointing to a house, "but I rang the bell and (hic) nobody anshered."

"How long ago was that?" asked the cop.

"Oh (hic) a couple of hours."

"Well, why don't you try again?"

"Aw t-hell with 'em—let 'em wait."

It is said if every boy in the United States could read every girl's mind, the gasoline consumption would drop fifty per cent.—*The Broadcaster.*

Two Scotchmen took dinner together in a restaurant. After dinner, the waiter brought the check. The two sat and talked for a couple of hours, after which conversation failed, and they merely smoked in silence. At one a.m. one of them got up and telephoned to his wife.

"Dinna wait up any longer for me, lass," he said, "it looks like a deadlock."

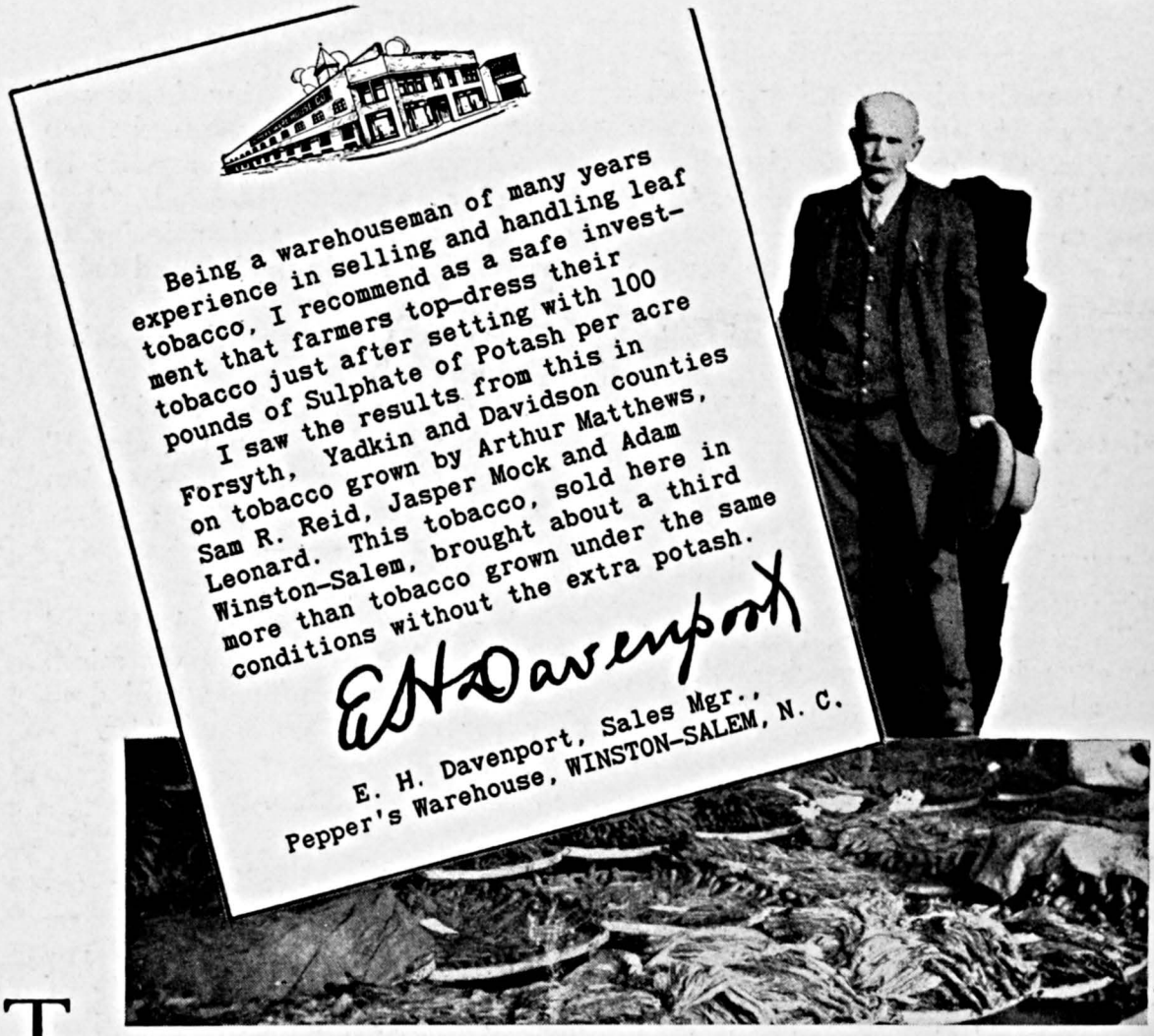
He: "They tell me the Colonel is a Sexagenarian."

She: "The old fool! And at his age, too!"

Tobacco given plenty of

NV SULPHATE OF POTASH

brought a third more money



THE total fertilizer used by the farmers mentioned by Mr. Davenport analyzed about 3-8-8 to 3-8-10. Tell your fertilizer man that you want such a mixture this season. If you use 3-8-3, apply 200 pounds of **NV** Sulphate of Potash with each ton of fertilizer used. Extra potash can also be applied as a top-dresser—100 pounds of **NV** Sulphate of Potash per acre at the first plowing.

Tobacco is a potash-loving crop. Extra potash adds extra pounds to every acre and extra quality to every pound. **NV** Sulphate of Potash is the quality-producing element in fertilizer. It helps your tobacco produce less trash and more cash—bigger yields of smooth, high-quality leaf which brings the best prices. Give your tobacco plenty of **NV** Sulphate of Potash. IT PAYS!

POTASH PAYS · NV · POTASH EXPORT MY. OF AMSTERDAM, HOLLAND · ON ALL CROPS · TRADE MARK REG.

N. V. POTASH EXPORT MY., Inc., Hurt Building, Atlanta, Ga.

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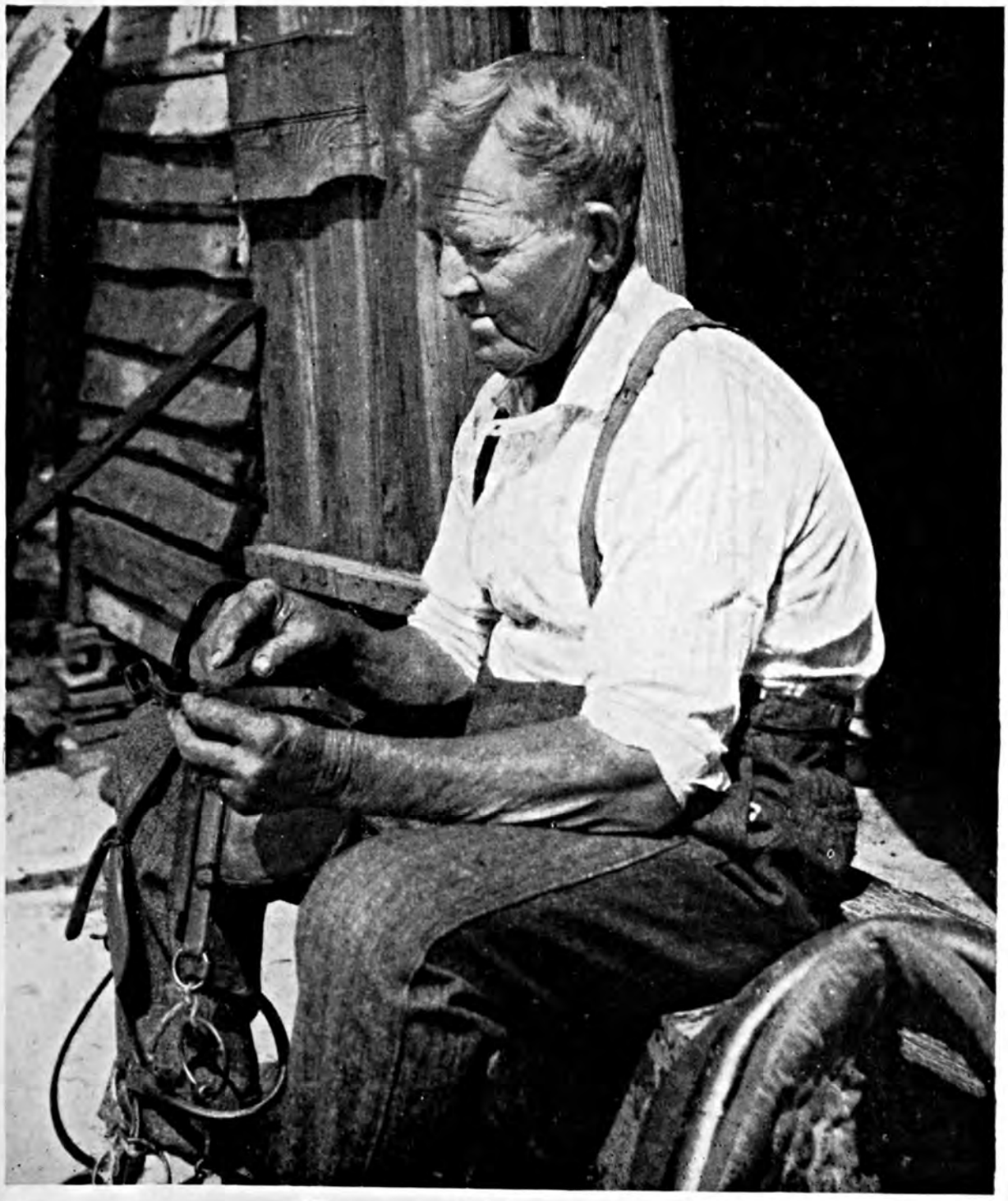
Better Crops WITH PLANT FOOD

Feb.-Mar. 1934 10 Cents



Spring Fertilizer Number

NV

SULPHATE OF POTASH is the QUALITY element

POTASH HUNGRY
Typical fruit from a tree which received unbalanced fertilizer containing insufficient potash.

BALANCED FERTILIZER
Typical fruit from a tree fertilized with a balanced mixture containing plenty of potash.

THIS photograph was made on September 14. Note that although the fruit is still quite immature there is already a striking difference in quality. The quality of your citrus fruit largely depends on the fertilizer you use. **NV** Sulphate of Potash is the quality-producing element in citrus fertilizer. It will pay you to make sure that your fertilizer contains sufficient quantities of this element to produce smooth, well-shaped fruit with fine finish, high color, excellent texture and a large volume of juice and sugar. Give each tree 20 pounds of mixed fertilizer containing 10% potash, or apply four pounds of **NV** Sulphate of Potash per tree. Potash pays in increased yields and improved quality.

N. V. POTASH EXPORT MY., Inc., Beans Building, San Jose, California
Agents: **Wilson & Geo. Meyer & Co., San Francisco**

MAKE SURE YOUR FERTILIZER CONTAINS AT LEAST 10% POTASH

1 Citrus fruits remove from the soil more potash than both nitrogen and phosphoric acid combined.

2 Nitrogen produces volume, phosphoric acid maturity, but potash adds the quality that gets the top price. All three are demanded in a well-balanced fertilizer to keep your grove producing regular crops of high-quality fruit.

POTASH PAYS ON ALL CROPS — NV — POTASH EXPORT MY. — TRADE MARK REG.

3 Potash is the quality-producing element in your citrus fertilizer. It develops smooth tissues, fine grain, heavy sugar content and causes your fruit to put on excellent finish. POTASH PAYS!

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

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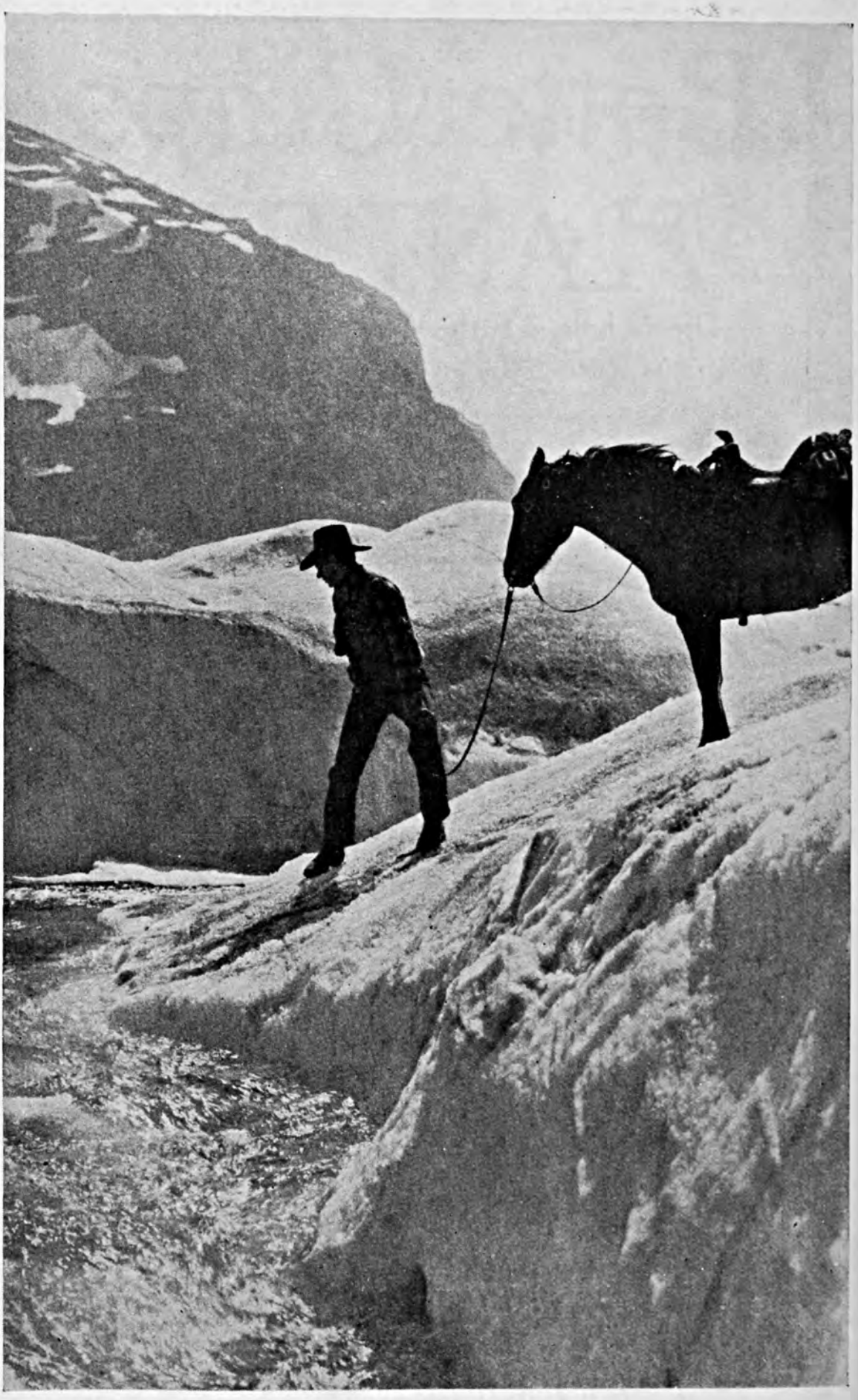

SPRING REACHES THE HEIGHTS

Better Crops with PLANT FOOD

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VOL. XIX NEW YORK, FEB.-MAR., 1934 No. 6

"We have two roads to try out," says Jeff.

Plans *and* Planners

By Jeff McDermid

"ATTACHMENTS to the planter" has been a familiar phrase in the mechanics of the farming and fertilizing industry. But the rude legal phrase of the same wording, often accompanied by a "lien on the land," has ushered in a new survey of agriculture and soil fertility. Whether a soil is suffering or sufficient is a question temporarily in abeyance until the perplexities of the planter receive attention.

Two years ago the theory of the industrial renaissance took fragile shape around a newly coined word, "technocracy," which has not survived or taken vigorous root. Not so with farming. Progress has been made in "Agadjustment." Agriculture took its name from old Agricola, an expansionist of the imperial age of Roman colonization. We may emerge before long with a new prefix for the ancient and honorable craft of agriculture, with the "culture" part retained in a broader sense than before.

Agadjustment is not an attack on efficiency. It is purely a dramatization of voluntary cooperative planning, with rewards or inducements for compliance in social discipline. The planter must become a planner. In so doing he and his associates, although guided by a mutual responsibility, are in no wise asked to discount the findings of science as they are found in livestock breeding or plant and soil improvement.

AT the close of the dormant winter season when the old stirrings of farming fever come to husbandmen along with their spring tonics and seed catalogs, it is a good time to think this over. Old frenzies and free-lance competitive drives are gone, and all elements in the soil-sustaining trade must joint partnership with the New Drift which, God willing, will free us from the erosion and the hard-pan of recent barren seasons.

Involved in the problems of the present relating to fertility are the original scientific investigators, the extension field forces, the independent sales agencies, and the trial and demonstration work done with practical farmers.

Determination of hydrogen-ion concentration of soils, characteristics of colloidal material in profiles of certain distinctive soil groups, further studies in nitrogen fixation, and the evolution of new measures, new discoveries, and new tests—these are the fruits of the pure scientist. I have known many such earnest and disinterested men, retiring and reticent, but fired with fascination and zeal. Their work may rightfully continue, divorced as it usually is from the immediate clamor of commerce. The soil scientist should pursue his way undisturbed just as the milk scientist, the flour scientist, or the textile technician continues to enlarge the boundaries of knowledge and open the mysterious realms of the unknown and the hazardous. Without them the well would run dry of the "white corpuscles" which protect the blood stream of all arts and crafts from insidious enemies beyond the scope of economics to combat. There are some evils which logic or economic graphs cannot exorcise or overcome. To abandon those weapons of defense is the last thing asked for by the sponsors of Agadjustment.

I am quite aware that many of these cloistered scientists are themselves eminently practical men, who cannot help scanning the field to observe the use to which their research is put. But to many it is glory in achievement, in the satisfaction found in solutions to vital problems, that will always be like working at their art for art's sake.

We may well ask ourselves where agriculture would be today without the pioneer searching minds of valiant soil scientists whose discoveries have put us in the lead among nations in yield per man. It seems to me apparent that the answer is that we would be obliged to have more farmers instead of wondering if we have too many. Soil scientists have not erred toward progress for mankind by making it possible for each farm operator using proper soil treatment to grow more food efficiently.

THINK it over. Frustrated plans and miscalculated management in agriculture still contribute to the gamble of farming and the uncertainty in the sum total of its harvests, but if farmers had kept step with the achievements of agricultural science, fewer farmers could have supplied us all with plenty of food and been assured of a good income above costs. Your alert agricultural scientist is like the forward scholar whose progress to a higher grade is retarded by the slowness of his fellows.

But only about one farm in ten the country over accepted the newer soil improvement systems and put them into practice. The same holds true, perhaps in less measure, of livestock

(*Turn to page* 44)

Recent Developments in Fertilizing Muck Soils

By Dr. Paul M. Harmer, Muck Specialist

Michigan State College

THE advancement in the knowledge of the proper management of muck and peat soil has been very rapid during comparatively recent years. It is a far cry from those desolate wastes, which were a large factor in the North Central States in obstructing the northern movement of the prairie schooners of pioneer days, to those same areas at the present time, supporting fields of high-yielding special crops growing from highly productive muck soil. Even after our country had become well settled, those same areas of swamp and marsh land were for many years largely idle, in some sections of the Northern States often occupying a considerable proportion of the farmstead, yet contributing little or nothing in monetary returns to the owner.

While it is true that celery was first grown on muck soil near Kalamazoo, Michigan, more than 75 years ago and that peppermint was grown successfully on muck nearly 60 years ago, the commercial importance of these crops was not recognized for many years

These crops were crossed with 1,000 pounds per acre applications of different fertilizer mixtures, applied broadcast and disced in. In the foreground an 0-12-24 mixture was used; beyond that a strip was left unfertilized; while just beyond that an 0-8-32 mixture was applied. The crops from left to right are spinach, leaf lettuce, and head lettuce.

Table 1. Showing Effects of Ashes, Lime, Commercial Fertilizer, and Manure on Yields of Several Crops on a Michigan High-lime Muck Soil[1]

Plot No.	1898 Treatment Pounds per acre	Yield in pounds per plot—1899					
		Radishes	Onions	Squash	Sugar Beets	Potatoes	Turnips
1	Leached ashes 10,000[2]	29.0	0.2	5.0	93	2.2	47.2
3	Nothing	48.2	3.4	26.0	26	2.5	17.7
4	Air slaked lime 4,000	28.7	0.9	1.2	20	2.0	14.2
5	Commercial fertilizer[3] (1898-400) (2.1-11.2-1.6) (1899-200)	36.2	9.0	48.5	17.5	5.6	8.0
7	Farm manure 20 loads	87.2	19.7	195.5	124.5	7.1	92.5

[1]From Michigan Experiment Station Bulletin 181-1900.
[2]Ashes analyzed 1.43% P_2O_5; 0.36% K_2O; 26.92% CaO.
[3]A commercial mixture, having an analysis of 2.1-11.2-1.6, was applied on Plot 5 at the rate of 400 pounds per acre in 1898 and 200 pounds in 1899.

afterwards, and their fertilization with commercial mixtures high in potash content was a practice adopted much later. The discovery of the role of potash in plant nutrition and of the potash mines in Germany about the middle of the nineteenth century, together with the successful substitution of potash for farm manures by Rimpau in the early sixties, on his high-lime muck lands of southern Germany, failed at that time to have any effect on the methods of fertilization of the muck soils of this country. Farm manure continued to be the only source of plant food for more than 40 years. In fact, as late as 1900, the institution from which I write published a conclusion, based on experiments conducted in 1898 and '99, that "complete fertilizers do not give results that will warrant their purchase in considerable quantities for muck land." It is evident from some of the data that led to this conclusion, and which are given in Table 1, that the very low potash content of the mixture was at least partly responsible for the fallacy in the recommendation.

Shortly before 1900, investigations on muck land in the United States, apparently first started by the Wisconsin Agricultural Experiment Station, to be followed by others by the Experiment Stations of Illinois, Indiana, Minnesota, New York, Oregon, Michigan, and other States, showed the value of properly balanced mineral fertilizers. The great increase in their use in the last 15 years has resulted to a large extent in the displacement of manure, by commercial mixtures high in potash, in the fertilization of our muck soil. In some of the more intensive phases of muck farming, annual applications of a ton or more per acre of high-analysis mixtures are not uncommon at the present time.

Types of Muck Soils

Recent developments in the management of muck soils show that, in addition to the regular fertilization with nitrogen, phosphate, and potash, the use of other materials is sometimes necessary. In addition to the use of fertilizers, the application of such materials as sulphur, lime, copper sulphate, manganese sulphate, and ordinary salt is frequently required for the production of profitable yields of the best quality crops. In the absence of some of these materials, the crop may be a complete failure or the yield greatly decreased, even when the proper amounts of nitrogen, phosphate,

and potash are used. For that reason, the use of these added materials is considered in the following discussion.

Investigations made both in Europe and in America have shown definitely that the reaction or lime content of a muck soil is very important in determining the crop adaptation and the fertilizer needs of that soil. While in the Northern States there is considerable correlation between the reaction of the soil and the native vegetative growth, a close study of the soil is always advisable before beginning reclamation. Thus we find an abundant growth of the swamp blueberry and the leather leaf (Cassandra), the dwarf tamarack and the black spruce, definite indications of a very acid muck soil. In other cases, however, we find that the vegetative growth may be determined largely by the reaction of the surface soil and that the muck underneath may have a decidedly different reaction. For that reason we advise Michigan muck farmers, who desire to send in samples of their soil for testing, that each surface sample, taken at a depth of three or four inches in the plowed layer, should be accompanied by another sample taken at a depth of eighteen inches to two feet.

As a result of the testing of any muck sample, the soil represented by that sample is placed in one of three groups:

1. Very strongly acid muck (low-lime), pH generally 4.5 or less;
2. Not acid to strongly acid muck (high-lime), pH range 7.0 to 4.6;
3. "Alkali" muck (very high-lime), pH 7.1 or higher.

The Use of Lime

In general the muck soil belonging to Group 1 will require an application of ground limestone before satisfactory yields of most crops can be grown —the swamp blueberry and the cranberry being exceptions to this rule. The actual degree of acidity at which lime will be required apparently depends on three factors, namely, the reaction of the underlying soil into which the plant roots penetrate, the lime content of the soil, and the kind of crop which is being grown. When lime is needed, the required application may range from one to eight or more tons per acre, depending on the degree of acidity and the depth to which it extends.

The second group includes a large

Table 2. Showing Effects of Different Fertilizer Mixtures and of Manure on Yields of Several Crops on Michigan High-lime Muck Soils[1]

Fertilizer Application Rate per Acre Radishes & Onions 1,500 lbs. Sugar Beets, Potatoes, and Turnips 600 lbs.	Yield per Acre—1922					
	Winter Radishes Tons Ingham Co.	Onions—Huron Co.		Sugar Beets Tons Gratiot Co.	Potatoes Bus. Eaton Co.	Turnips Tons Ingham Co.
		Bus. Marketable	Per Cent Culls			
0-0-24	12.9	412	19.4	11.1	185	12.5
Nothing	4.1	115	44.9	8.0	56	6.7
0-8-0	7.0	497	6.0	7.6	54	5.6
0-8-24	13.6	736	4.2	14.3	259	15.9
Manure (20 loads[2] (12 loads	13.7	191	37.4	11.6	238	14.8

[1]From Michigan Experiment Station Special Bulletins 136 and 168.
[2]Manure application 20 loads per acre for radishes and onions; 12 loads for sugar beets, potatoes, and turnips.

proportion of our most productive mucks. If the sample of soil should fall into this group, no lime would be needed, unless, as occasionally happens, the high-lime muck is underlain by a low-lime muck in the second foot of soil. If the muck is well supplied with lime, with a reaction varying from no acidity to medium acidity throughout its depth, no lime would be needed. In fact, an application of lime would be likely to decrease yields of a number of crops that might be grown. Such a condition resulted from the application of leached ashes ($CaCO_3$ equivalent, 48.1 per cent) and of air-slaked lime on several crops in the experiment reported in Table 1, although it apparently was not recognized at the time of the experiment.

The third group of alkaline muck soils is a relatively small group, but, because of the fact that these soils are really too sweet for the production of a number of crops, we should place them in a class by themselves. Of the crops which may not do well on this soil, we should mention onions, spinach, lettuce, radishes, tomatoes, squash, and celery. If the muck is well supplied with moisture, however, the celery will do fairly well. Crops which seem quite tolerant of the alkaline reaction include sugar beets, table beets, mangels, Swiss chard, cabbage, mint, and carrots. If the soil is quite alkaline the table beets, carrots, cabbage, and potatoes, as well as many general crops, will not do so well, unless the reaction is made more acid.

The Use of Sulphur

The application of sulphur flour has been found a very effective method in correcting this unproductive condition of "alkali" muck soils. The rate of application required will depend on the degree of alkalinity and the depth to which the alkalinity extends. If the alkalinity has resulted from the burning off of the surface layer of muck soil, the alkaline reaction may be confined to the plowed layer alone, in which case the soil underneath may have an acid reaction. If the pH of the plowed layer is not higher than about 7.4, while the reaction of the underlying soil is around 6.0, it is possible to correct the toxic condition by deep plowing for a few years, so as to get the underlying soil mixed with the plowed layer, in the meanwhile growing crops which are more tolerant to the alkaline reaction. If the alkaline reaction extends to a considerable depth and the degree ranges from 7.5 to 8.0, an application of from 1,000 to 2,000 pounds per acre of sulphur flour may be required, especially if such crops as onions, celery, spinach, potatoes, and lettuce are to be grown. If the reaction becomes more alkaline with increase in depth, as is frequently true when the alkalinity of shallow muck is caused by underlying marl, an annual light application of sulphur may be needed

Celery on well-fertilized alkaline muck. From left to right the jars received (1) no sulphur, (2) 1,000 pounds, and (3) 2,000 pounds per acre of sulphur flour mixed thoroughly with the muck.

The field from which this muck was secured had a reputation throughout the large productive muck area in which it was located as never having produced a satisfactory crop. In the greenhouse these jars of spinach were uniformly given before planting 1,000 pounds per acre of a 3-9-18 mixture and in addition from left to right in pounds per acre: (1) sulphur 500, (2) sulphur 500, copper sulphate 100, (3) nothing except the fertilizer, (4) copper sulphate 100, and (5) manganese sulphate. Copper sulphate turned the trick. With this information given him, the farmer used copper sulphate in his fertilizer mixture on his onions the following year and secured a very good yield.

in addition to the heavier initial application, in order to take care of the ever-increasing alkaline reaction caused by the underlying alkaline material coming to the surface. Although it is advisable to apply the sulphur several weeks before a crop is to be grown, there is not much danger of any injury from its application even just before seeding, provided it is thoroughly disced into the soil. Sulphur should never be applied on muck soil which is already quite acid, unless blueberries or cranberries are to be grown, since the increase in the acidity may be such as to be harmful to most crops.

The Use of Copper Sulphate

The beneficial effects of light applications of copper sulphate were first reported by the Florida Experiment Station as a result of investigations with their Everglades soil. Following that report studies made by the Cornell and Michigan Experiment Stations showed similar outstanding benefits from its use on the northern muck soil. As yet the benefit from the copper sulphate is not thoroughly understood, but it appears likely that minute quantities of the copper are of actual benefit to the plant itself, possibly in some role in the photosynthesis of the plant.

In addition to a marked increase in yield, the benefits from copper sulphate include a healthier top growth of most crops, better color of all tops, as well as of the bulbs of onions and roots of carrots, together with an improved flavor of several crops, including carrots, lettuce, onions, and spinach. These benefits are largely confined to the acid muck soil. On the very strongly acid mucks, nearly all crops are benefited from its application. On the medium to strongly acid muck soils, most crops will show a benefit. On the slightly acid mucks, which have a pH around 6.0, such crops as spinach, lettuce, carrots, onions, potatoes, and tomatoes are likely to be considerably benefited, while several other crops generally will show some response. On the less acid mucks and even on the slightly alkaline mucks, spinach and lettuce may respond to the copper sulphate application.

If the spinach crop on an acid muck burns up badly in a few days of hot weather, it is a fairly good indication that copper sulphate will be beneficial on that muck. If the onion tips on the acid muck die back badly during hot weather and if the color of the mature bulbs of the yellow varieties is yellowish-green rather than the de-

sired yellowish-brown, it is quite certain that copper sulphate will improve the crop. If the carrots have a lemon-yellow rather than a rich orange-yellow color, it is also evidence that copper will help. While an application of as little as 10 pounds per acre will give a marked benefit, it is generally advisable to apply about 50 pounds per acre. The copper sulphate can be purchased mixed in the fertilizer, so that the small quantity can be uniformly applied, at no additional cost for spreading than is incurred by the spreading of the fertilizer. While both the powdered and the small granular forms of copper sulphate are satisfactory, the "snow" form mixes readily with the fertilizer and spreads uniformly on the ground.

The Use of Salt

For many years occasional farmers in the sugar-beet section of Michigan have reported that the use of common salt is beneficial to sugar beets on their upland soils. In 1924 work was started at Michigan State College to determine whether or not salt would be beneficial to crops on muck land. As a result of these several years of investigation, the use of salt, along with a fertilizer mixture high in potash, on muck land which has not been heavily fertilized for several years past, can be recommended for five crops. Four are members of the beet family; namely, mangels, sugar beets, table beets, and Swiss chard. The fifth is celery.

An application of from 500 to 1,000 pounds per acre is apparently sufficient for these crops. This recommendation applies to celery only on land which has not been heavily manured or fertilized in the past. Continued use of the salt for celery is not advisable after one or two thousand pounds per acre have been applied. If the potash in the fertilizer which has been used on a given muck in past years has been in the form of a salt-bearing kainit rather than as muriate, it is probable that none of these crops will respond to a salt application on that muck. The benefit from a salt application is not so likely to be secured on an alkaline muck as on one which has an acid reaction. Because of a slight toxicity of salt toward certain other crops, it is advisable to make the salt application just preceding the beet crop, preferably about every third or fourth year in the rotation.

The benefit from the salt does not appear to be due to any substitution of the soda in the salt for potash, but rather to an actual need for salt by these crops. While two or three of the several other crops under study have shown slight benefits from salt, the results have not been sufficiently consistent to warrant recommendations for them.

The Use of Manganese

Experiments with manganese in the form of sulphate have shown a crop response to that element on only a very small proportion of our muck soils. These are usually mucks which have an alkaline reaction, either naturally or due to the use of alkaline irrigation water or to the application of lime where it is not needed. The deficiency is evident in a chlorotic condition of the leaves, especially with such crops as radishes and spinach. Generally the deficiency can be corrected cheaply and permanently by the application of sulphur to increase the acidity, which in turn increases the availability of the soil's manganese. In exceptional cases an application of 100 to 200 pounds per acre of manganese sulphate is necessary.

The Use of Fertilizers

Of the three fertilizer constituents, nitrogen, phosphate, and potash, nitrogen generally is not so important in muck-land fertilization as are the other two, since the natural nitrogen content of high-lime muck generally ranges from two and one-half to four per cent. Because the nitrogen content of the very strongly acid muck

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Plots at Wynne, Arkansas, August 29, 1930, fertilized with 600 lbs. of a 6-8-12 fertilizer (left) and the same amount of a 6-8-0 fertilizer (right). Note increased vigor and absence of cotton wilt and "rust" in the 6-8-12 plot. There was 54 per cent of cotton wilt in the 6-8-0 plot in contrast to 21 per cent in the 6-8-12 plot.

Potash Hunger Follows Legume Hay Crops

By Dr. V. H. Young

Plant Pathologist, Arkansas Agricultural Experiment Station

IN the sandy alluvial areas of the South it is a common observation among farmers that cotton often "rusts" badly when planted on land that has previously been used for production of legumes, especially lespedeza, for hay. This observation is entirely in line with the findings of soil scientists who have known for many years that when legumes are utilized for hay, large amounts of potash and phosphorus are thereby removed from the soil. Since the "rust" of the cotton farmer is almost sure to be "potash hunger," his belief regarding "rust" on cotton following legumes seems well founded.

Work at the Cotton Branch Experiment Station in Lee county in eastern Arkansas during the past five years has shown that cotton affected with "rust" or potash hunger also becomes highly susceptible to attack by the cotton wilt fungus, and that potash applications, either in the form of kainit or muriate of potash alone or in mixed fertilizer as the particular situation demands, not only control potash hunger but also greatly reduce the amount of

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

TO the late Professor George E. Morrow should be given the credit for laying the foundations of a sound program of agricultural education and research in the State of Illinois. When he went to the Illinois Industrial University at Champaign in January 1877 as professor of agriculture, work in his line of effort was in its infancy. There was no blazed trail for him to follow, and he had to devise his own plans and methods in the face of the indifference, if not the outright opposition, of some of those whose interests he desired to further.

In those early days it was the general belief of the farmers on the broad prairies of Illinois that the fertility of the land was inexhaustible. They knew that the rich, black soil formed from the luxuriant growths of grasses, which from the beginning of time had flourished, fallen, and decayed, lay in beds four feet or more in depth under their plows, and they could not imagine that its humus and stores of nitrogen ever could be depleted.

But Professor Morrow knew better than that. He foresaw that inevitably the time would come when the ruinous policy of continued robbery of the soil's fertility would be made manifest by diminished crop returns; therefore, he began to teach and preach the sound doctrine of crop rotation, clover growing, stock raising, use of manure, and improved methods of cultivation.

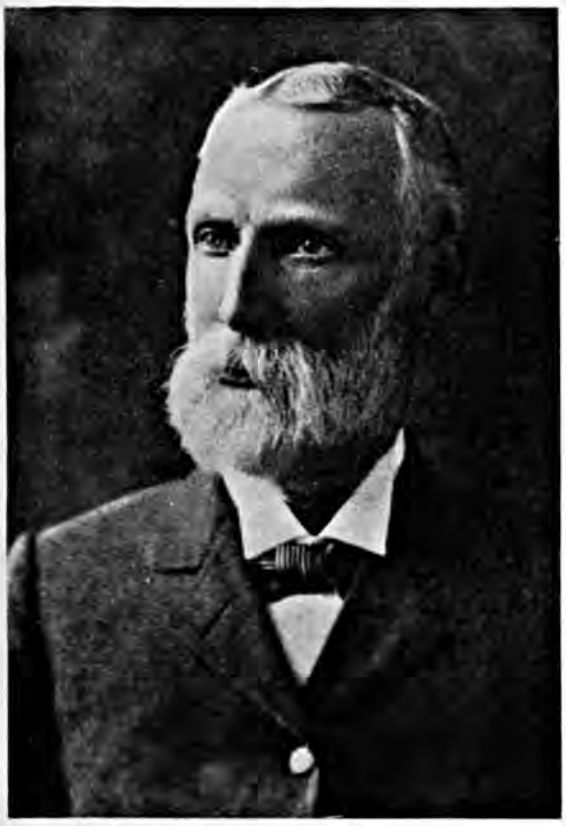
For years his wise advice fell largely upon deaf ears, and the farmers continued to belittle "book larnin," experimentation, and scientific research. Progress naturally was slow, but it was steady, and at length the effect of Morrow's pioneer efforts became apparent. Others, who splendidly continued his work under more favorable auspices, finally brought the Illinois College of Agriculture and Experiment Station, as the institution had been named in 1888, to the position of light and leading it holds today. Looking back, they are proud to acknowledge the debt of gratitude the farmers of Illinois owe to Professor Morrow.

The Morrow Plots

One of his first moves for the betterment of Illinois agriculture was the establishment of the plot system of testing the varieties of grains and forage plants, and for 53 years these plots have continued to contribute valuable facts to the knowledge of crop production and cultural methods. These plots, we believe, were the first instituted in America on an extensive scale, and the work they have accomplished must be considered well worth while, considering the records made. They set a good example for other experimenters to follow, and their plan of investigation has been widely adopted.

It was perhaps from the Rotham-

sted Experiment Station in England that Professor Morrow took his cues for the establishment of the Illinois testing plots, for he visited that celebrated institution in 1879 and derived much inspiration from the advice and example of its scientific managers, Lawes and Gilbert, who became internationally famous for their scientific research work in agriculture. In 1889 he made a second study trip to Europe, and in 1892 he visited the agricultural institutions of the Pacific Slope. Always, he was seeking new ideas and a fuller understanding of all matters pertaining to agricultural education; therefore, he was also a persistent student of books, reports and bulletins, besides being a prolific writer for the agricultural press and a popular speaker at farmers' gatherings in Illinois and other States.



Professor George E. Morrow

Another creditable phase of Professor Morrow's work was his effort to improve farm animals for earlier maturity and the production of meat of better quality with less waste. He had come to the conclusion that there was no sense in feeding steers for three years or more until the carcasses became overloaded with tallow. In the eighties, and before that time, it was the common practice to market steers that were three years old and unprofitably heavy. In attaining great weight, excessive quantities of feed had to be used, so that there was little profit in the feeding process. At the same time, the consumers began to demand smaller cuts, better quality, and less rank fat. Naturally, therefore, a different type of steer and better methods of feeding had to be devised, and Professor Morrow helped materially in the work. Indeed, he was one of the chief advocates and founders of fat stock shows. Of these, the earliest was that held in the old Exposition Building on the lake shore at Chicago, Illinois.

Sponsored Baby Beeves

Professor Morrow aided in establishing the show and in making it a success. It became, in due course, the chief school for the education of stockmen, farmers, and consumers in all matters pertaining to the production and fitting of beef cattle. There, in 1880, a steer called "Nels Morris" was exhibited, at a weight of 3,125 pounds, and was shown the following year still weighing 2,900 pounds. This animal was fed for the late John B. Sherman, General Manager of the Chicago Stock Yards Company, by that grand old Scot, James Thompson, with whom the writer was well acquainted.

Professor Morrow had contended, as he told Professor W. J. Fraser of the Illinois Experiment Station, that a steer could be made to weigh 1,000 pounds at 1 year of age, 1,600 pounds at 2 years, and 2,000 pounds at 3 years, and he was right; but later he came to see that the 3-year-old was unprofitable and no longer in demand, and that ripe yearlings were most desired. The result of this early work by Professor Morrow, Alvin H. Sanders, editor of the *Breeders' Gazette*,

and others gradually led to the popularity of the "baby beeves" of today, and to a more profitable utilization of feed by steers of finer type and earlier maturity. The benefits of their work to the stock breeder, the butcher, and the consumer have been inestimable.

Native of Ohio

George Espy Morrow was born on the home farm near Foster, Ohio. His father was John Morrow, and his mother Nancy Espy, both natives of Ohio. George was the youngest of nine children. His great great grandfather was a Scot by blood, Irish by nativity, and a Covenanter in religion. He came from Londonderry, Ireland, a generation before the Revolution, and settled in Adams county, Pennsylvania, where he farmed lands that a century after his death were shaken by the guns of the battle of Gettysburg. His only son, John, also a farmer, was influential in his district and took a prominent part in local politics. His son, Jeremiah Morrow, grandfather of George Espy Morrow, left Pennsylvania in 1794 and settled in Miami county, Ohio, where he grew corn on the fertile bottoms of the Little Miami River and served usefully as a surveyor. While prominent in politics, farming was his chief employment, and he introduced Marino sheep in his locality, paying $300 for the two purebred foundation ewes for his flock. John Morrow, George Espy Morrow's father, was the eldest son of this pioneer of Ohio and became a fairly successful farmer. The parents of his wife, Nancy Espy, were neighbors of the Morrows.

A Diligent Student

George entered the common school of his home district in 1846, and was a diligent student. In 1856 he enrolled for a course of study in Maineville Academy, from which he graduated. During his school-boy days he frequently made trips with his parents to Cincinnati, 20 miles away. Two horses drew the carriage, or the wagon when supplies had to be purchased. His grandfather was President of the first railroad running out of Cincinnati; was the first and for 10 years the sole representative to Congress from Ohio; and also had served his State as Governor. Another drive George took with his father was to Columbus, Ohio, where in 1839 his grandfather had laid the cornerstone of the State Capitol.

After graduating from Maineville Academy, young Morrow taught in that school during 1858, and again in 1860 and 1861. Then came the Civil War. He enlisted in Company E, 2nd Ohio, as a private of volunteers and soon was made a corporal. Having been wounded at Perryville, Kentucky, where a rifle bullet pierced his arm in 1863, he was discharged at Minneapolis, Minnesota, where he had been sent to recuperate his strength. Returning home for a brief visit, he then entered the Law School at Ann Arbor, Michigan; finished the course in law; and graduated March 28, 1866. During his college days he enjoyed several visits with his mother's uncle, James Espy, who was noted as a meteorologist and as the author of the book entitled "The Philosophy of Storms." Many instructive lessons on that subject were given George by that savant, who recommended him highly for his intelligent comprehension of the problems discussed.

Turned to Journalism

It was while a law student at Ann Arbor that he met Sarah Gifford of Cambridge, New York, whom he married in Detroit, Michigan, in 1867. They had a family of four children, and the writer is indebted to two of the daughters, Miss M. M. Morrow of Zenia, Ohio, and Mrs. Garrett T. Seeley of Evanston, Illinois, for much of the historical matter embodied in this sketch.

While qualified to practice law, young Morrow had a greater liking for newspaper work. When he saw

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Growing Importance of Potash in the Corn Belt

By G. P. Walker

Purdue University Agricultural Experiment Station

WHEN we note in Illinois Experiment Station Bulletin 362 that on 9 of the 11 experiment fields on light-colored soils and 4 of 15 on dark-colored soils, the soil treatment including liberal applications of potash has come to be the most profitable in the grain-farming systems, we get a new conception of the increasing importance of potash in our Corn Belt agriculture. These facts assume greater significance when we realize that 15 years previously not a single one of these fields showed such a response to any fertilizer treatment.

On practically all these fields the annual crop values for the combination of lime, residues, and mineral fertilization have been higher in recent years than those from the livestock system with sole dependence on lime, legumes, and manure for maintaining crop-producing power. With this situation extending even to some of the soils of the great Illinois prairie which the generation before us thought to have inexhaustible fertility, we have real food for thought. It

Effect of fertilizer on corn yields, Bedford Experiment Field, 1932. Each shock is the produce of one-twentieth acre.

Lime alone	Lime, phosphate	Lime, phosphate, and potash
33.7 bus. per acre	40.1 bus. per acre	55.8 bus. per acre
63% sound	80% sound	90% sound

seems fortunate that those who started out to demonstrate the permanence of a system of agriculture built on the three-cornered base of lime, legumes, and phosphate also included potash in the field-plot layout. Otherwise the "permanent" system might already be in the discard for a number of important soil types.

Indiana Corroborates

In Indiana we have a similar picture. On the Soils and Crops Experiment Farm of the Purdue University Agricultural Experiment Station, an excellent sample of good central Indiana "black and clay" corn land, the continued use of liberal applications of potash has increased the five-year spread of 2 bushels per acre over phosphate alone during the period, 1914-1918, to 19 bushels during the last five years. Some nitrogen is added with the potash in this experiment, but its importance may be discounted since it fails to give consistent or significant corn increases anywhere else on this farm.

On the black sandy loam soil of the Pinney-Purdue Experiment Field in northwestern Indiana, where little potash effect was evident in 1920, the last five years show a potash increase of seven bushels per acre over the phosphate-alone treatment. In fact the phosphate on limed land is now producing little better corn than the lime-alone treatment. On the muck experiment field in this same section, the use of muriate of potash at the average rate of 150 pounds per acre per year has been justified in the increased yields of corn, soybeans, and potatoes in the rotation by showing a greater margin above cost than half this amount. This double dose of potash with a small amount of phosphate has produced average yields of 28 bushels of corn, 7 bushels of soybeans, and 100 bushels of potatoes per acre more than the unfertilized land and the difference is increasing with the years.

In southern Indiana on the typical "gray flat" land of the Jennings County Experiment Field, average corn yields of 50 bushels per acre for the last five years with lime and phosphate treatments have been raised to 62 bushels by the addition of potash costing $1.92 per acre in the rotation. It was on this same soil type that last year's winner of the Indiana five-acre corn contest grew his yield of 141 bushels per acre with heavy applications of phosphate-potash fertilizer supplementing manure applications as a part of his soil-fertility program. On the gray-colored loamy soil of the Purdue-Vincennes farm, 32 pounds of actual potash per acre have averaged a nine-bushel corn increase for eight years.

On the Bedford farm on heavy yellowish-gray Bedford silt loam, soil phosphate was the all-important mineral plant-food for raising crop yields for a number of years. On wheat, soybeans, and clover it is still by far the most important item in raising the productive power of this rolling land in rotations where clover is used regularly. However, beginning about 1922 a definite trend in corn yields toward an increasing response to potash fertilizer began to be apparent. During the last four years the application of 36 pounds of actual potash per acre in the rotation has produced an increase of 10 bushels of corn per acre. A four-year running average curve of corn yields for the phosphate and phosphate-potash treatments shows a gradual widening of this difference, indicating that the yield response to potash will be greater as cropping of this soil continues.

A Poor Saving

Many corn fields showed lack of fertilizer the past two years in their spotted, uneven condition, with areas of stunted, off-colored, and unhealthy corn plants. This was especially true in the dark sandy loam and low-lying black soil areas bordering on muck where high ratio potash fertilizer had

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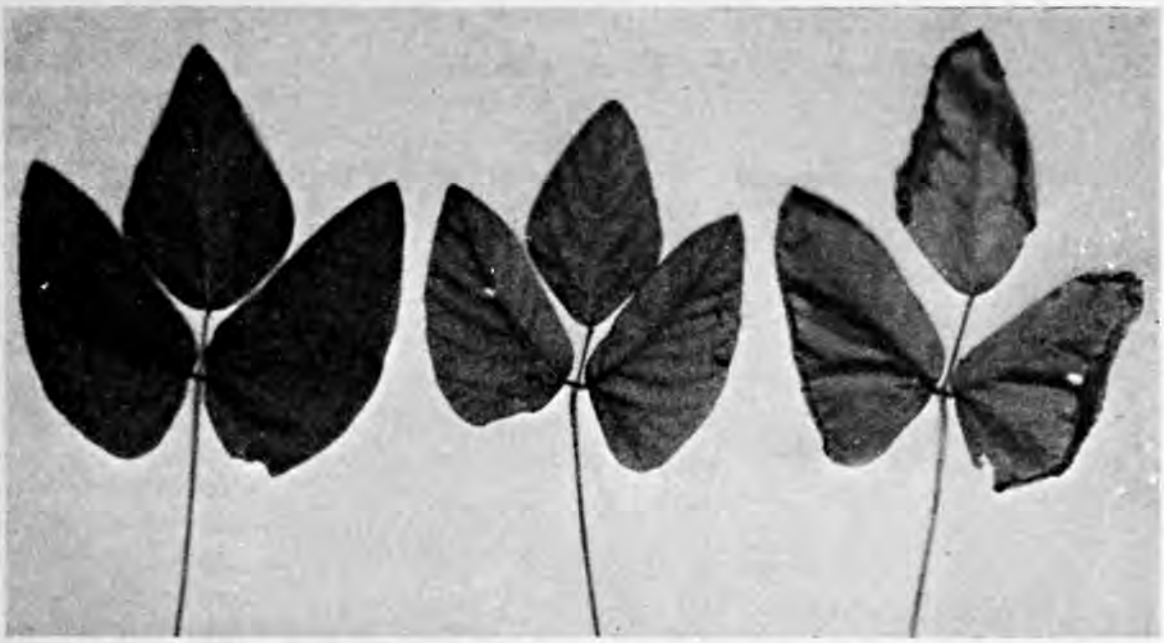


Magnesium and potash-deficiency symptoms in velvet beans. Left—normal leaf. Center—magnesium-deficiency symptoms: green veins with light green to yellowish color between veins. Right—potash-deficiency symptoms: yellowish-white color around margin which finally becomes yellowish-brown and dies around the entire leaf. The leaves are often puckered.

Some Soil Problems

Potash, Magnesium, Manganese, and Iron Needs in Coastal Plains Soils, and the Remedies

By A. B. Bryan

Editor, Clemson Agricultural College of South Carolina

IN the Coastal Plains areas of South Carolina not only truck crops but various field crops are being studied from a new angle of plant-food needs, particularly the deficiency of these soils in magnesium, manganese, potash, iron, etc. These studies are leading agronomists and other specialists to a fuller realization that changes in soil-fertility practices are bringing about decided changes in many of the soils, so that they are depleted of several of the so-called minor plant nutrients, especially magnesium, manganese, and iron.

The depletion of the available supply of these elements of plant food has resulted in almost complete crop failures in many instances and large money losses among growers of truck crops especially, and the importance of some remedial action is understood by all.

Before undertaking a discussion of this matter of minor plant foods in Coastal Plains soils, let us call attention to the latest results of studies re-

garding the potash needs of these same soils. Since the Coastal Plains areas in South Carolina and other States are important in extent and in production of corn and truck crops, it is well to hear the latest facts as to the need of corn for potash. These facts, established by Dr. H. P. Cooper, head of the Agronomy Department of Clemson College, are the more important now when cash-crop acreages are being reduced and more attention is being given to sustenance farming.

There are many situations in the Coastal Plains soils, and even in the Iredell soils of the Piedmont areas of the South, where without potash corn is often a complete failure. This is particularly true on much of the old gum and cypress swamp and savannah areas which have been drained and cropped for a number of years. Yet when potash is added to the fertilizer, these soils often produce more corn than any other land on the farm. Thus much of the potentially good corn land in the South, which is very low in available potash, is redeemed from almost complete corn-crop failure.

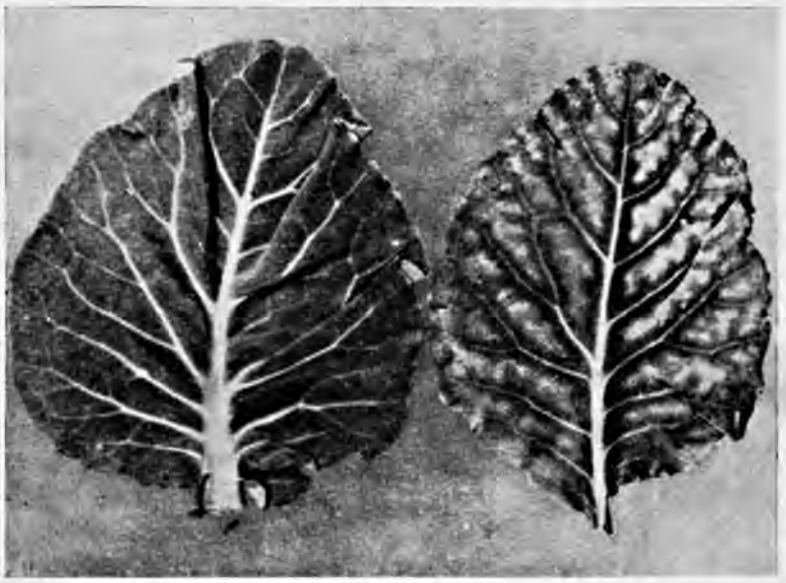
It is pointed out that corn and other grain crops following cotton (which is usually fairly well fertilized with a potash-containing formula) seldom show serious potash deficiency. On the other hand, the naturally low lands too wet for cotton under boll-weevil conditions have had no such fertilizer and Dr. Cooper's comprehensive tests show fine effect on corn yields of 150 pounds per acre of 14 per cent Kainit and 50 pounds of ammonium sulphate at planting time plus 50 pounds of ammonium sulphate as a side application to the growing corn. Yields of only 3.5 bushels of corn per acre without potash were jumped to 28 bushels with the potash.

The typical symptoms of this potash deficiency are a yellow color of the entire leaf blade and a dying around the margin of the leaf.

Truck Crop Troubles

With climatic conditions in the Southeastern States very favorable for production of late fall, winter, and early spring vegetable crops, a large vegetable-growing industry has developed particularly along the coast. Typical of this development are the areas around Charleston and Beaufort in South Carolina.

In the early days of this industry there was a relatively large amount of barnyard manure available for application to the vegetable crops. As the acreage of vegetable crops increased, there was less manure available for each acre of vegetables grown; therefore it became necessary to find a substitute for barnyard manure. Mixed chemical fertilizers in large quantities were used as this substitute. Formerly, mixed chemical fertilizers contained considerable quantities of organic nitrogenous com-



Magnesium-deficiency symptoms in cabbage leaf.

Left—normal leaf. Right—magnesium-deficiency symptoms: areas around veins retain their normal green color long after the area between the veins becomes bronze, yellowish-white, or almost white in color.

pounds, such as cottonseed meal, blood, and numerous other similar organic materials. The demand for some of these materials as animal food has limited their use in chemical fertilizer mixtures and they have been partly replaced by synthetic nitrogenous compounds.

Here is what Dr. Cooper has to say about the effect of these practices on some of the best truck soils:

"Use of relatively large amounts of commercial fertilizer per acre has resulted in depleting the soil of several of the so-called minor plant nutrients, such as magnesium, manganese, and iron. The addition of sulphates or chlorides results in the formation of soluble sulphates and chlorides of these metals and enhances the outgo of these metals in the drainage, particularly during rainy growing seasons. The depletion of the available magnesium and manganese through excessive leaching of these materials from acid soils has resulted in almost complete crop failures in many instances, and a large amount of potentially good truck soil has been abandoned. If these deficiencies are not supplied, still larger proportions of potentially good truck soil will be abandoned or used for the production of crops which require less intensive cultural methods. Adequate scientific assistance will enable farmers to grow profitable crops on many of the areas which do not at present grow successful crops."

Corn leaves, showing typical potash-deficiency symptoms.

Left—normal leaf. Right—leaves showing stages in the development in the potash-deficiency symptoms.

Crops commonly affected by a deficiency of magnesium are cabbage, potatoes, tomatoes, beans, peas, spinach, radishes, collards, turnips, and corn. This magnesium deficiency is one of the major factors in lack of satisfactory growth of many of these crops, especially on light gray sandy soils that are low in organic matter, and Dr. Cooper asserts that this magnesium deficiency is annually costing many individual farmers in South Carolina alone many thousands of dollars each.

Since most farmers are not familiar with the magnesium-deficiency symptoms, which are very similar in various crops, it may be said briefly that the disorder is characterized by the veins of the leaves retaining their normal green color long after the areas between the veins change to a yellowish-white or almost white color. The lower leaves often, if not usually,

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Saving Hungry Soils

By C. J. Chapman

Professor of Soils, Wisconsin College of Agriculture

AN old college roommate, whom I hadn't seen for many years, dropped in on me the other day. His profession for the past 18 years has been that of ministering to a sinful world; saving souls, so to speak. My profession for the past 18 years has been that of ministering to wayward soils; I have been trying to save soils.

Saving souls and saving soils may not appear to be analogous, but when it comes right down to fundamentals, this old roommate of mine and I have been engaged in closely related fields of endeavor.

Hungry soils and hungry souls go hand in hand. As I look at the map of the State of Wisconsin, I can visualize hundreds and thousands of farmers who are just eking out an existence, where crop failures and poor yields have left them with barns and granaries empty and silos half filled. Their economic plight is directly associated with social conditions in these communities. Lack of income has made it difficult to maintain the rural churches and other institutions for social betterment. And so I argued with this old roommate that the starting point in the saving of souls is the saving of soils on our farms.

And it is not a hopeless task. There is an increasing number of farmers right in these blighted areas whose barns are well filled with alfalfa hay, who have fine herds of cattle, and who are making a good living. I have in mind right now a farmer in central Wisconsin, on light sandy soil, who in 1932 sold nearly 100 tons of alfalfa hay as a cash crop and still had enough left to feed his herd of livestock. He started liming and potashing years ago.

This man lives at Almond, Wisconsin. His name is Ed Rath. In a recent letter to me he makes the following statement: "In 1923 I started to raise alfalfa on a two-acre piece of land. I spread about 3 tons of lime to each acre and 20 lbs. of Grimm alfalfa seed per acre. The stand was very poor. The next year I turned it over and added 200 lbs. of potash. The results were very good. In 1925 I bought a lime sower and roller. That spring I sowed 20 acres of alfalfa without any nurse crop, as this was a sandy, worn-out piece of land. At present I have all of my 280-acre farm limed and 150 acres of alfalfa. I think it pays to use potash on poor sandy soil for a sure catch. In 1932 I raised about 150 tons of alfalfa and sold 91 tons and carried over 8 tons. In 1933 (due to dry weather) I had only about 50 tons, but I will have hay to sell again this spring."

Lime and Potash

There are many farmers who in recent years have applied the miracle-working stuff, marl and potash, to their hungry soils, and who have transformed sandbur deserts to waving fields of alfalfa. You ask these men the question, "How did you do it?" and their answer inevitably is, "Lime and potash."

On the sandy soils of central Wisconsin, and for the most part the sandy loams of the entire State, potash is the life-giving elixir for these run-down soils. With potash, lime, and some phosphate, we now find it pos-

sible to grow this deep-rooted, drought-resisting, long-lasting alfalfa crop that is reclaiming thousands of acres of land in this State.

But now, as I look at the map of the State of Wisconsin, I can visualize other areas where crops are irregular, spotted, and poor. I am now thinking of the areas of the level, dark-colored soils, most of them sandy loams, where, as one drives through these sections in the summertime, he sees the yellow, stunted, potash-starved fields of corn, the scant and weak growth of timothy, the fields of grain where the straw crinkles down and lodges, with very light yields of chaffy grain. Thousands of acres of this type of soil can be found in western Outagamie, Winnebago, and eastern Shawano, Waupaca, and Waushara counties. Here, for the most part, the soil is well supplied with lime, but we have found by chemical tests, and by field experiments as well, that potash is the chief limiting element to production.

We don't need to confine our travels to any particular section in Wisconsin or the Midwestern States to see evidence of potash starvation. Field after field of corn on our low bottom muck and peat soils shows this evidence of potash hunger. The stunted, yellowed, dwarfed corn, and the spotted, irregular growth of this crop on many of these fields are positive evidence of potash starvation.

Even on our upland heavier silt and clay loams we are beginning to see some evidence of potash hunger. It is true that where stable manure has been used regularly in the rotation, there is little need for potash, but unfortunately there are fields on many farms in Wisconsin that haven't seen a forkful of manure for the past 40 years. Back forties, ridge fields, and isolated tracts a long way from the buildings, where it has been difficult or impossible to haul manure, have suffered, and here the use of potash, along with phosphates and lime, is needed to bring these soils back to profitable production.

Sometimes we feel that we are not making any progress in the matter of educating and informing farmers in matters relating to the fertility of their soils, and indeed it is a long, slow, laborious process. But then when we

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125 lbs. of 0-20-20 fertilizer per acre applied with an attachment on the corn planter made a difference of a good crop and practically no crop on the two rows not fertilized. Otto Havercorn, Fond du Lac, Wisconsin, owner of the farm, says that the fertilized corn made a good 10 tons of silage per acre, well eared. The two rows unfertilized never did amount to anything. Scrubby, short, yellow, and dwarfed, with only a few nubbins. This soil is a heavy, black, high-lime clay loam.

Fertilizing the Lawn

By J. W. Turrentine

U. S. Department of Agriculture, as told to U. V. Wilcox,
Washington Correspondent and Special Writer

TOO often the lawn, flowers, and shrubs are given a moderate or heavy fertilizer treatment in the early spring and then expected, by continued watering during the drier months, to produce a maximum of foliage or flowers without regard to plant-food needs during the later part of the season. This may result in a less luxuriant growth during the fall and a weakened condition with which to go into the winter months.

The point I would make is that lawns and shrubs are constant and heavy users of plant food and their fertilization in other than spring months should be considered.

Ready Response

Well-established blue grass or other lawns may do fairly well for a few years with little fertilizer treatment, provided the soil is naturally of high fertility. Usually, however, the effect of fertilizer treatment can be seen readily very soon after the lawn is started, whether by sodding or a new seeding.

A striking illustration of this was seen recently on a newly sodded lawn in a suburb of Washington where no fertilizer had as yet been applied. A neighbor who was successfully using high-nitrogen fertilizer on his own lawn conceived the idea of making a demonstration of the value of such fertilizer by writing the street address on the lawn in question with the fertilizer used on his own lawn. It was only a few days until the color of the grass began to change and in about 10 days the street address "611" could easily be read from the roadway. The demonstration "demonstrated" the value of fertilizer treatment on the new lawn.

The need of additions of plant food for old established lawns is even more serious since the numerous mowings are usually removed from the lawn and little, if any, return of fertility made. In the case of shrubs, perennial and annual flower beds, and porch and window boxes, very little fertility is returned by leaves or dead stems, hence the removal of plant food in the course of years become considerable.

If well-rotted stable manure is available, it may be used as top-dressing for the grass in the early spring or worked thoroughly into the soil around shrubs and flowers. Manure does not contain any great amount of plant food as compared with high-grade fertilizers, but it contains the decaying organic matter and myriads of bacteria which are very helpful. The increasing difficulty of getting well-rotted manure and the danger of introducing objectionable weeds almost eliminate consideration of the use of this material in towns and cities. Because of the difficulty in obtaining good manure for lawns and plantings and the high cost of inferior strawy material, the use of commercial fertilizers is being practiced widely and with excellent results.

Use Complete Fertilizers

In making a new lawn seeding, the liberal use of a complete fertilizer containing nitrogen-phosphate, and pot-

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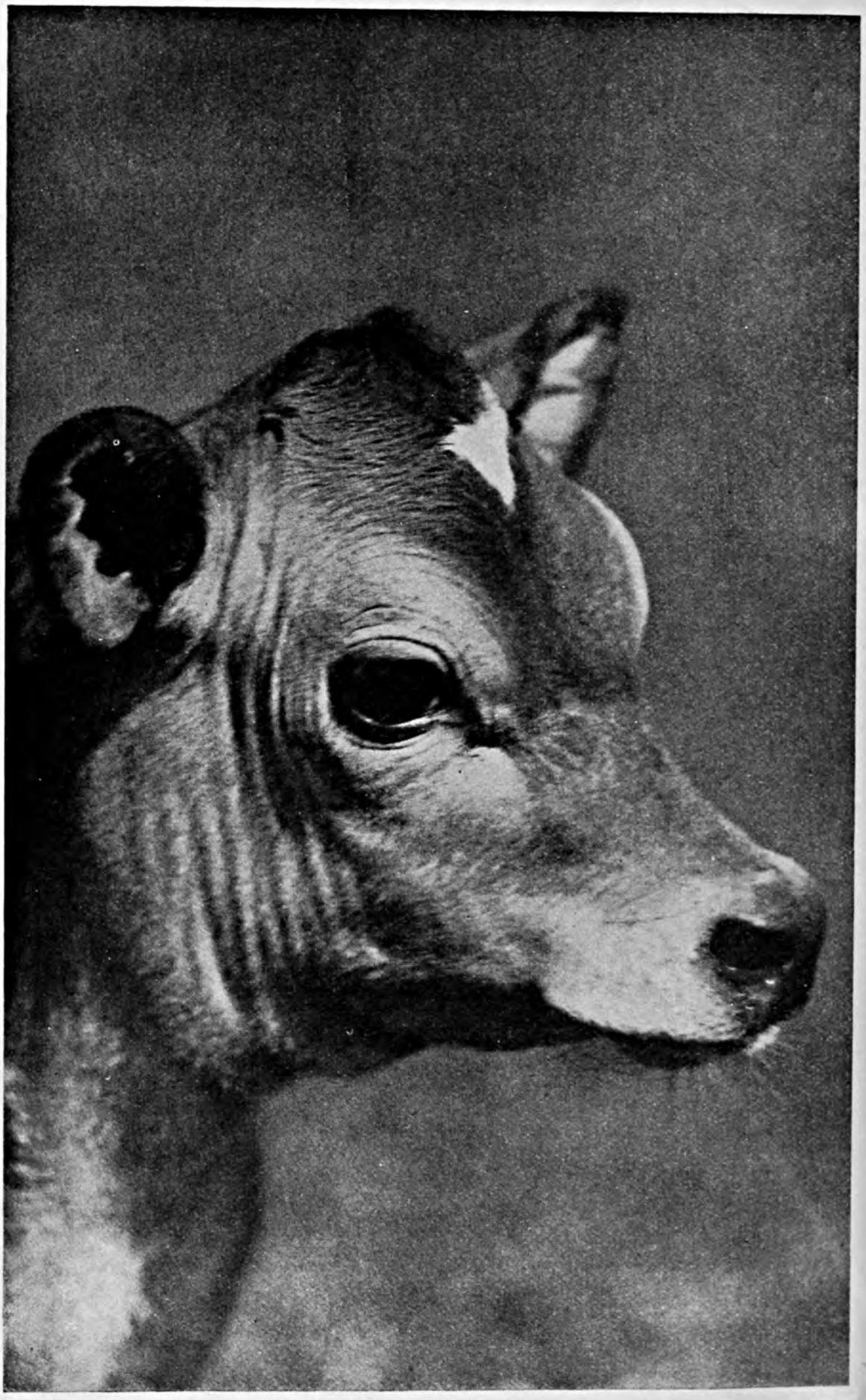
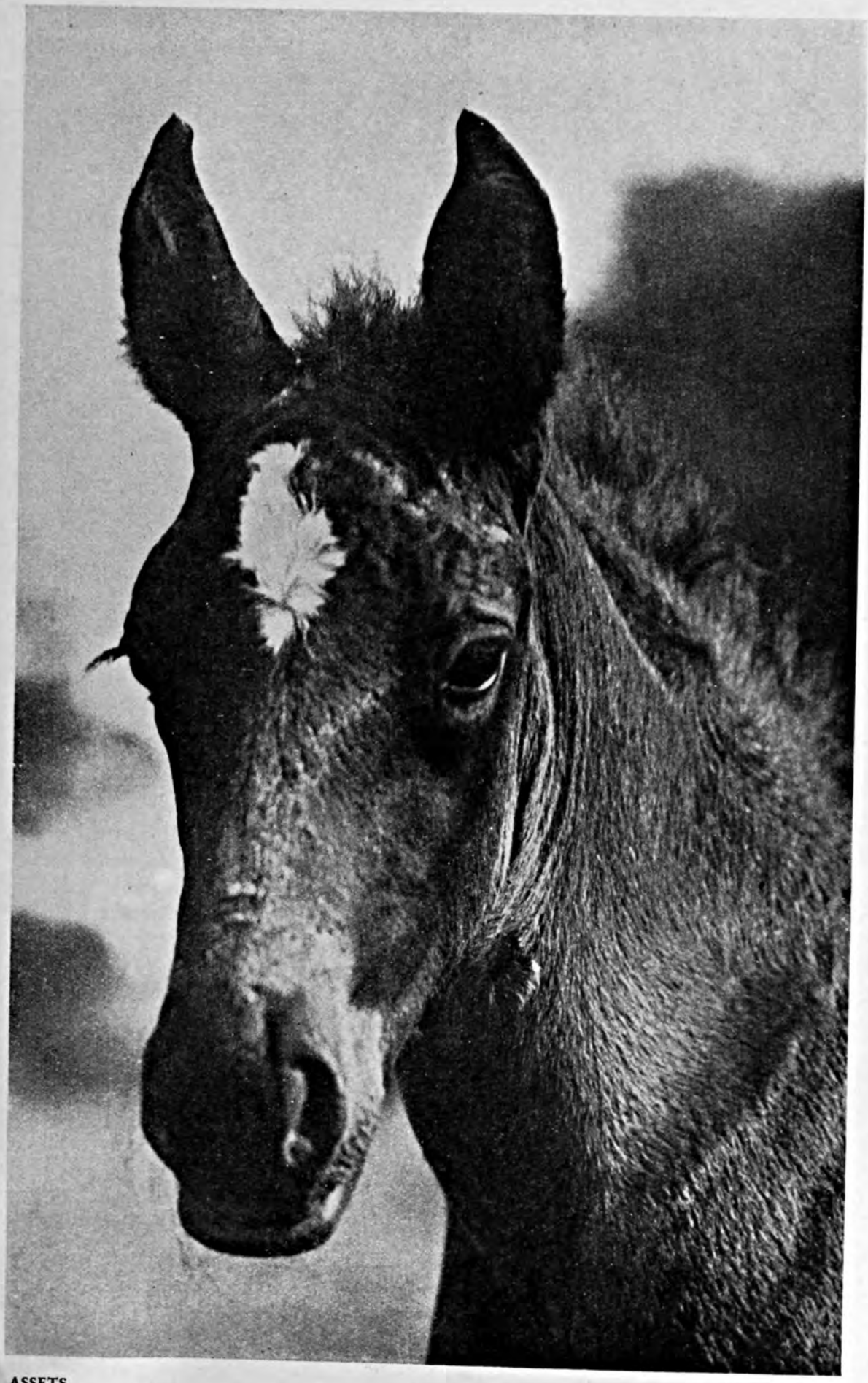
Pictorial

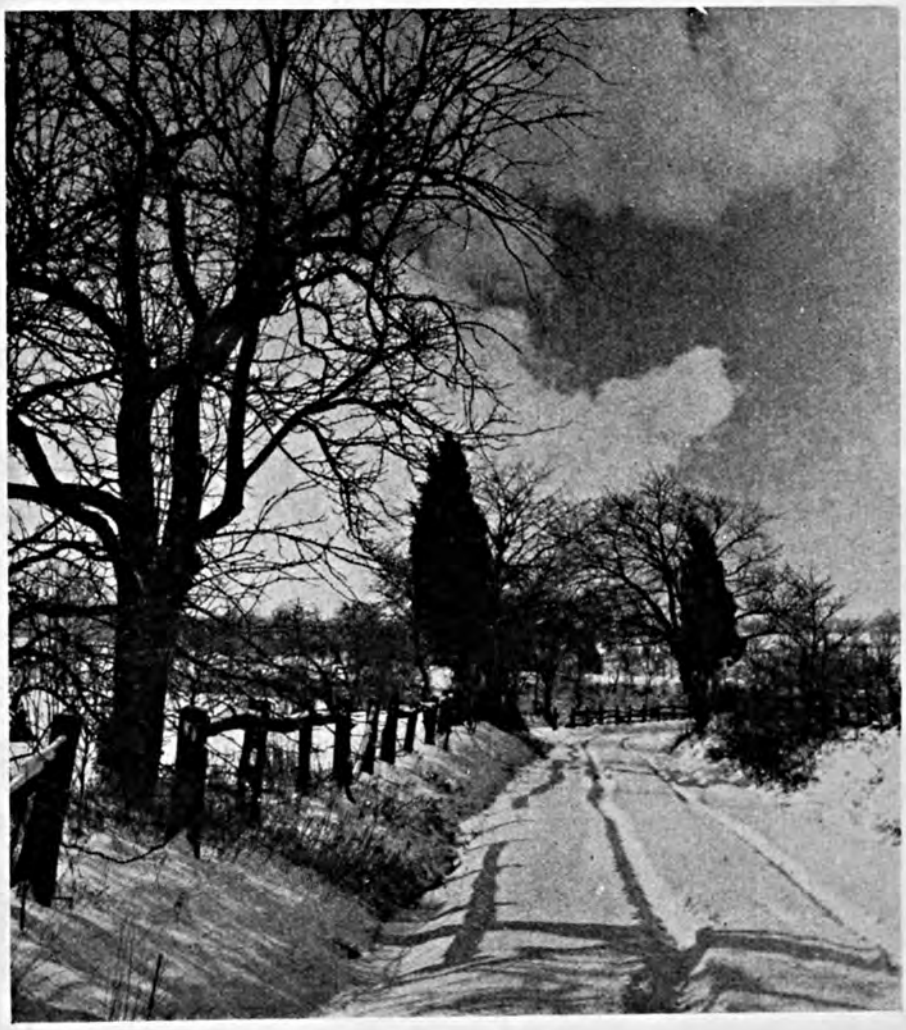
A SPRING LESSON



FARM



ASSETS



TOWN

and

COUNTRY

The Editors Talk

Then and Now

A year ago the outlook for farm prices was dark indeed. For 3½ years prices farmers received for their products had constantly declined and were lower than the prices of other commodities. But in February 1933 the long decline ended and in March the index of farm prices as a whole started upward. The farm situation was more hopeful; the outlook brighter. 1933 ended with the farm income approximately $1,240,000,000 more than in 1932, or an increase of 24 per cent.

What is the outlook now? In a word, while the agricultural outlook is much better than a year ago, the improvement in farm income has been uneven both as regards types of agricultural industry and as regards territories, demanding a close study of local and regional conditions in relation to all agricultural problems.

The increase in crop prices on the whole has been maintained better than the prices of some other agricultural products, as for instance the prices of beef cattle and hogs. This is shown in the following figures: In December 1932 the price of cotton was 5.4 cents per pound in comparison to 9.6 cents in December 1933. For the same period corn increased from 18.8 cents per bushel to 42 cents; potatoes from 36.8 cents to 69.4 cents per bushel; whereas in strong contrast, during the same period, the price of beef cattle per hundred pounds declined slightly from $3.41 to $3.12. Concurrently the price of hogs changed from $2.73 per hundred pounds to $2.92.

The "Agricultural Outlook for 1934" published by the Bureau of Agricultural Economics in cooperation with other agencies in emphasizing this variability notes that "The rise in individual farm-product prices has varied greatly, depending primarily upon the influence, in relation to each commodity, of currency depreciation, increase in domestic demand, and alterations in supplies."

With the suspension of gold payments in the United States, there was an immediate response in the prices of most export and import commodities. The index of farm prices of grain advanced from 36 per cent of the pre-war average in March to 94 per cent in July, while cotton and cottonseed advanced from 48 to 84 per cent. The advance in the price of export and import commodities, such as wheat, cotton, and wool, resulted primarily from the fact that, after adjustments for changes in exchange rates, prices of products entering into international trade must be approximately equalized in all countries once account is taken of transportation costs and other factors influencing the flow of these commodities in international trade.

Regarding the other group of commodities not influenced in the same degree by import and export prices, the outlook notes that "Unlike the rapid advance in prices of export commodities, most of the commodities whose prices are largely determined by changes in the level of domestic demand have advanced in price only about as rapidly as the income of urban con-

sumers." Heavy marketing has tended to check advances in the prices of some of these commodities.

Of essential importance regarding possible trends in 1934, the outlook notes that "In view of the recent marked advance in prices of nonagricultural products and the accompanying decline in prices of farm products, it seems probable that during the coming year prices of farm products will rise in relation to prices of nonagricultural products. The program of the National Recovery Administration appears to have hastened price advances in manufactured products partly as an adjustment to higher production costs. After most of those adjustments have been made, competition in the face of surplus productive capacity will probably retard price advances of nonagricultural goods to a slower rate relative to prices of farm products and other raw materials. . . .

"In summarizing these various influences on prices it appears that farmers in 1934 may anticipate a somewhat higher level of prices for their marketable commodities as well as improvement in the exchange value of their output."

This is indeed a welcome interpretation. But a note of caution is added. "It should be borne in mind that the extent and character of the price rise will be affected by future monetary and credit policies which may alter substantially the conclusions drawn from any analysis of present conditions." The outlook for an improvement in farm purchasing power is certainly much better this March than a year ago; but the fundamental fact of interdependence remains, between city and country, between one county and another. After all it is possibly by helping the other fellow a little that we shall help ourselves the most.

Cotton Bags Popular as Consumer Packages

Cotton is an important export crop. For many years the carry-over of cotton has been a problem. It is, therefore, gratifying to know that an increased domestic use for cotton is reported by the Bureau of Agricultural Economics.

They note that consumer packaging of farm products in cotton bags has been increasing rapidly. More than 10,000,000 cotton bags were used in 1932 in consumer packaging of potatoes. In 1928 only about 500,000 cotton bags were used for this purpose.

In a printed pamphlet just issued on the subject the Bureau says that cotton bags make attractive packages; they supply a suitable surface for brand names and make possible effective advertising; they are durable and little affected by moisture; they represent minimum tare weight; and they have a high salvage value.

In connection with its researches looking toward increased use of cotton, the bureau, in cooperation with North Carolina State College developed a duplex cotton fabric that has open-mesh and close-mesh sections, the open-mesh section permitting consumer inspection of the contents of bags made of this fabric, and the close-mesh portion providing a surface for brand names.

A survey by bureau representatives recently disclosed that farm products in consumer-size cotton bags are being received in a large number of markets. Some wholesalers and retailers said they believe that the small cotton bag is rapidly becoming the principal type of container for merchandising potatoes, onions, and citrus fruit.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Commercial Fertilizers—Report for 1933," Agr. Exp. Sta., New Haven, Conn., Bul. 355, Oct., 1933, E. M. Bailey.

"Report of Analyses of Commercial Fertilizers," Dept. of Agr. and Immigration, Baton Rouge, La., Fert. Dept., Season 1932-33, Harry D. Wilson.

"1933 Fertilizer Analyses and Registration," Dept. of Agr., St. Paul, Minn., H. A. Halvorson.

"Analyses of Commercial Fertilizers, Fertilizer Supplies, and Home Mixtures for 1933," Agr. Exp. Sta., New Brunswick, N. J., Bul. 557, Nov., 1933, Charles S. Cathcart.

"Commercial Fertilizers in 1932-33," Agr. Exp. Sta., College Station, Tex., Bul. 487, Dec., 1933, G. S. Fraps and S. E. Asbury.

"Effect of Manure and of Phosphorus Fertilizer on the Yield and Composition of Alfalfa Hay," Agr. Exp. Sta., Logan, Utah, Bul. 247, Jan., 1934, D. W. Pittman.

Soils

"Soils of Henderson, Hidalgo, Milam, Nacogdoches, Navarro, Wichita, Willacy, and Victoria Counties," Agr. Exp. Sta., College Station, Tex., Bul. 482, Oct., 1933, G. S. Fraps.

"The Effect of Different Colloidal Soil Materials on the Efficiency of Superphosphate," U. S. D. A., Washington, D. C., Tech. Bul. 371, July, 1933, Philip L. Gile.

"The Decomposition of Hydrolytic Peat Products Including Ammoniated Peat," U. S. D. A., Washington, D. C., Tech. Bul. 389, Oct., 1933, I. C. Feustel and H. G. Byers.

"Report of the Chief of the Bureau of Chemistry and Soils, 1933," U. S. D. A., Washington, D. C., Henry G. Knight.

Crops

"Aiding Arizona's Agriculture," Agr. Exp. Sta., Tucson, Ariz., 44th Annual Report for the Year Ending June 30, 1933, P. S. Burgess.

"The Forty-sixth Annual Report of The Colorado Agricultural Experiment Station For the Fiscal Year 1932-33," Agr. Exp. Sta., Fort Collins, Colo., E. P. Sandsten.

"Wheat Production in Colorado 1926-1932," Agr. Exp. Sta., Fort Collins, Colo., Bul. 404, Sep., 1933, D. W. Robertson, Alvin Kezer, J. F. Brandon, J. J. Curtis, Dwight Koonce, and Wayne W. Austin.

"Dormancy in Small-grain Seeds," Agr. Exp. Sta., Fort Collins, Colo., Tech. Bul. 5, Aug., 1933, G. W. Deming and D. W. Robertson.

"Pasture Investigations (Fifth Report) A Resume of Thirteen Years of Research," Agr. Exp. Sta., Storrs, Conn., Bul. 190, Aug., 1933, B. A. Brown.

"Report of the Director for the Year Ending June 30, 1933," Agr. Exp. Sta., Storrs, Conn., Bul. 192, Sep., 1933, W. L. Slate.

"Report of the Director, Agricultural Extension Work in Indiana, July 1, 1932, to June 30, 1933," Purdue Univ., Lafayette, Ind., J. H. Skinner and T. A. Coleman.

"Chemical Composition of Herbage from Massachusetts Pastures," Agr. Exp. Sta., Amherst, Mass., Bul. 300, Oct., 1933, J. G. Archibald and E. Bennett.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 16, No. 2, Nov., 1933.

"Fifty-fifth Annual Report of the North Carolina Agricultural Experiment Station For the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., State College Sta., Raleigh, N. C., R. Y. Winters.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIX, No. 166, Jan.-Feb., 1934.

"Biochemical Investigations of Certain Winter Pears," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 316, June, 1933, James C. Moore.

"Forty-sixth Annual Report of the South Carolina Experiment Station of Clemson Agricultural College, For the Year Ended June 30, 1933," Agr. Exp. Sta., Clemson College, S. C., Dec., 1933, H. W. Barre.

"Varieties of Rice for Texas," Agr. Exp. Sta., College Station, Tex., Bul. 485, Nov., 1933, R. H. Wyche and H. M. Beachell.

"A Comparison of Wheat Varieties in Eastern Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 289, Oct., 1933, O. E. Barbee.

"Reed Canary Grass for Wisconsin Lowlands," Col. of Agr., Madison, Wis., Ext. Cir.

264, *Dec.*, 1933, *E. D. Holden and A. R. Albert.*

"Lespedeza," U. S. D. A., Washington, D. C., Leaflet No. 100, *A. J. Pieters.*

"Sugarcane for Sirup Production," U. S. D. A., Washington, D. C., Cir. 284, *Oct.*, 1933, *E. W. Brandes, S. F. Sherwood, and B. A. Belcher.*

"Community Production and Distribution of Cotton Planting Seed in a One-variety Cotton Community," U. S. D. A., Washington, D. C., Cir. 286, *Sep.*, 1933, *J. E. Hite.*

"Variety Tests of Sugarcanes in Louisiana During the Crop Year 1931-32," *U. S. D. A., Washington, D. C., Cir.* 298, *Oct.*, 1933, *George Arceneaux, I. E. Stokes, R. B. Bisland, and C. C. Krumbhaar.*

"Varieties of Common White Wheat," U. S. D. A., Washington, D. C., Farmers' Bul. 1707, *Oct.*, 1933, *J. Allen Clark and B. B. Bayles.*

"Varieties of Club Wheat," U. S. D. A., Washington, D. C., Farmers' Bul. 1708, *Oct.*, 1933, *J. Allen Clark and B. B. Bayles.*

"Commercial Possibilities of Japanese Mint in the United States as a Source of Natural Menthol," U. S. D. A., Washington, D. C., Tech. Bul. 378, *Aug.*, 1933, *A. F. Sievers and M. S. Lowman.*

"Report of the Secretary of Agriculture 1933," *U. S. D. A., Washington, D. C., Henry A. Wallace.*

"Report of the Chief of the Bureau of Plant Industry, 1933," *U. S. D. A., Washington, D. C., William A. Taylor.*

Economics

"Plan and Prosper Campaign," Agr. Exp. Sta., State College Station, Raleigh, N. C., Special Cir., Jan., 1934, *Governor J. C. B. Ehringhaus.*

"A Study of the Corn-Hog Reduction Plan," Agr. Exp. Sta., State College Station, Raleigh, N. C., Ext. Cir. 196, *Jan.*, 1934, *W. W. Shay.*

"Costs and Practices in Establishing Walnut Orchards in Oregon," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 315, *June*, 1933, *A. S. Burrier and C. E. Schuster.*

"Present Land Uses—Washington—Types of Farming Series, Part I," Agr. Exp. Sta., Pullman, Wash., Bul. 288, *Oct.*, 1933, *Rex E. Willard and Neil W. Johnson.*

"Farm Systems in Northwest Wisconsin," Agr. Exp. Sta., Madison, Wis., Bul. 426, *Aug.*, 1933, *D. R. Mitchell and P. E. McNall.*

"American Tobacco Types, Uses and Markets," U. S. D. A., Washington, D. C., Cir. 249, *Aug.*, 1933, *Charles E. Gage.*

"The Agricultural Outlook for 1934," *U. S. D. A., Washington, D. C., Misc. Pub.* 182, *Nov.*, 1933.

"Sweetclover in Great Plains Farming," U. S. D. A., Washington, D. C., Tech. Bul. 380, *Sep.*, 1933, *M. A. Crosby.*

"Grade, Staple Length, and Tenderability of Cotton in the United States 1928-29 *to* 1931-32," *U. S. D. A., Washington, D. C., Stat. Bul.* 40, *Sep.*, 1933.

Surveys Point Way to Improved Cotton Crop

(Farm Science State by State—SOUTH CAROLINA)

Given a true picture of the kind of cotton it was growing, South Carolina, in 1928, started a systematic campaign to increase its output of longer-fiber cotton. The success of the campaign is shown by the drop in the production of excessively short-fiber cotton from 11.2 per cent of the 1929 crop to less than one half of 1 per cent of the 1932 crop. Aside from the actual dollars-and-cents value of this improvement, South Carolina has profited greatly by the improvement of the general attitude toward its cotton.

For generations preceding the World War, American cotton had an enviable reputation in world markets. The decade which followed the war, however, saw some of this prestige lost. With high prices for all cotton and the problem of making crops in competition with the bollweevil, the main consideration was to make cotton—not necessarily to make it good. The planting of varieties of inferior staple increased greatly because they matured early. The decline in staple quality of American cotton which followed became the subject of common discussion among cotton people at home and abroad. By 1927 the situation had become so serious that Congress directed the United States Department of Agriculture to set up machinery for assembling thoroughly

and systematically facts on the grade and staple of the crop. With the aid of the State experiment stations, the cooperation of a great number of gins, representing production over the entire cotton belt, was obtained.

The early results of the work disclosed the presence of enough cotton of inferior staple to cause concern, but they also revealed the places where efforts for improvement could be concentrated for best results. Planters in areas that were raising excessively short-fiber cotton have followed the plans suggested by Federal and State specialists to raise the State's average, largely through planting pure seed of selected varieties.

The correlated results of the surveys have charted the way to better cotton and mirrored the progress made in each section. Figures thus obtained show that cotton has gained about one thirty-second inch in fiber length for the country as a whole and one sixteenth inch in South Carolina.

Cabbage Seed for Nation Comes from Small Area

Most of the cabbage seed produced in this country comes from the Puget Sound region in western Washington. In recent years commercial production of cabbage seed has shifted more and more to the Skagit Valley, a relatively small area only a few miles south of the Canadian line where growers make a business of this specialty.

Lack of rainfall in the growing season is ordinarily considered a serious handicap in farming, but in the Skagit Valley it seems to be the secret of success, the factor that gives these growers an advantage over competitors. Two of the most serious diseases affecting cabbages are known as black leg and black rot. Seed from the Skagit Valley has usually been free from infection.

J. C. Walker of the United States Department of Agriculture has discovered that the organisms that cause these diseases are usually carried from infected plants to healthy plants by the splashing of rain, and rarely if ever through the soil or by the wind. The Skagit Valley has an adequate supply of moisture but it rarely rains in the months from May to September when cabbage is maturing. This accounts for the fact that seed produced there is free from these two serious cabbage diseases.

Potash Hunger Follows Legume Hay Crop

(*From page* 11)

cotton wilt in a large number of cases.

Since cotton "rust" and cotton wilt are apt to be especially severe when the potash of the soil has been removed with legume hay, the cotton farmer on the sandy alluvial soils of the South is finding that by a proper adjustment of his fertilizer applications to supply the depleted potash, and if necessary phosphorus, of the soil he is able to control both "rust" and cotton wilt. At the same time, by restoring the balance between nitrogen on the one hand and potash and phosphorus on the other, he can secure the full benefits of the nitrogen reserve in the soil built up by the nitrogen-fixing bacteria of the legumes.

Fertilizing the Lawn

(*From page* 22)

ash, but relatively high in nitrogen, is to be recommended. Most fertilizer dealers can supply such mixtures as 4-8-4 or 5-8-5 which are fairly well suited for seeding-down treatment. This fertilizer should be worked into the top inch or two of soil before seeding the grass or if the grass already has been seeded the fertilizer can be applied as a top-dressing and thoroughly wet down to carry it as much as possible into the soil.

For Different Plants

As a rule large amounts of phosphate and potash encourage the growth of clovers, while large amounts of nitrogen encourage the growth of grasses like blue grass, bent grass, timothy, red top, and fescue.

One of the best guides to follow in determining the need of nitrogen is that of leaf color. Lack of important plant food is nearly always manifested by light green or yellowish-green leaf color. Its abundance generally is indicated by dark green color of leaves and in the case of most grasses, dark blue-green color. This indicates health and vigor and is greatly to be desired.

The use of additional nitrogenous fertilizers such as sulfate of ammonia or nitrate of soda will bring up the nitrogen content and further favor growth of grasses. Later fertilization may consist chiefly of sulfate of ammonia or nitrate of soda alone, but it should be kept in mind that lawn crops, like all other crops, require phosphorus and potassium as well as nitrogen. An annual spring application of a good complete mixed fertilizer, containing nitrogen, phosphate, and potash, and frequent light applications of nitrogenous materials later in the year often are found to be the best fertilizer treatment for lawns.

In applying all fertilizers, it should be remembered that they are largely inorganic salts of high concentration and capable of "burning" the grasses if improperly applied. If possible, scatter the fertilizer just before or during a rain, or follow the application by thorough watering. Sprinkling is not sufficient, as it requires a real soaking to remove the concentrated plant food from the tender leaves of the grass and carry it into the soil. Care should be taken not to scatter fertilizer when the grass is wet with dew or rain since a small amount of moisture will partially dissolve the chemicals and result in "burning" of the grass.

With proper fertilizer treatment of the lawn, a number of desirable results may be expected: first, a decidedly darker green and more healthy color of the grass; second, a more rapid and vigorous growth; third, a deeper and stronger development of the root systems.

Deep, spreading root systems are especially desirable for the common lawn grasses since they are less affected by dry spells and consequently not so likely to require constant watering except in extended dry periods. Some may complain that fertilization makes it necessary to mow the lawn too often, but this is very desirable from the standpoint of securing and maintaining a thick stand and a heavy sod.

Lime for Clover

If clover is wanted in the lawn, an abundance of lime will be highly beneficial. Few of the ordinary lawn grasses are highly sensitive to slight or moderate soil acidity and are not greatly benefited by liming unless the soil is distinctly acid. It should be remembered that weeds like dandelions and plantain are checked by a fairly high degree of soil acidity which is not noticeably injurious to the growth

of bent grasses, fescues, and blue grass if sufficiently provided with plant food. Excessive acidity is detrimental to blue grass and clover and should be corrected by liming.

For Shrubs and Flowers

Use of fertilizer on plantings of shrubs and flowers is a somewhat different practice than in the case of lawns. In order to keep a mellow, friable surface-soil beneath such plants, well-rotted manure, lawn clippings, peat moss, or other forms of vegetation should be worked into the soil.

Ordinarily this will only partially take care of the plant-food needs of such plantings, and it is advisable to use additional fertility in the way of commercial fertilizers. For this purpose complete mixtures, bone-meal, dried sheep manure, ammonium sulfate, sodium nitrate, or others are used.

There are no definite rules as to the amount of fertilizer to apply, but from two to four tablespoons of a complete fertilizer high in nitrogen may be considered a moderate application for good-sized shrubs, rose bushes, or similar plants. With such materials as ammonium sulfate, sodium nitrate, or other quickly soluble fertilizer, smaller amounts should be used and applications made more frequently. The fertilizer is best scattered broadcast at a distance of several inches from the base of the plant and should then be incorporated with the surface soil by some sort of cultivation. Mulching with manure leaves may be done after the fertilizer is applied. The soil then should be thoroughly soaked.

Saving Hungry Soils

(*From page* 21)

visit a few of the farms where our recommendations have been put into practice, where farmers have followed our advice and have gotten results, we know that the influence of our extension work and educational service is being felt.

This past year we have tested in our laboratories over 4,000 samples of soil, and have reported our findings to the farmers who sent in these soil samples. Thousands of samples of soil have been tested in the field at our "soil-testing clinics" which are being held by county agents and Smith-Hughes teachers of agriculture in our high schools. We know that we are reaching, each year, thousands of farmers through this soil-testing service, and feel that it is a most effective means of actually getting farmers to carry out and put into practice our recommendations.

Due to unfavorable weather conditions for the past two or three years in the State of Wisconsin, our clover seedings have failed by hundreds of thousands of acres. Alfalfa seedings, however, have come through in most districts 100 per cent where the soils were properly fitted and fertilized. We have developed an acute feed shortage in many districts of the State. Prices for dairy products have fallen to very low levels. Farmers have found it difficult to buy feed. But in the face of all these obstacles, the dairy farmers of Wisconsin are making a supreme effort to increase their acreage of alfalfa and thus cut their feed costs.

This spring will see the largest acreage of alfalfa seeded on Wisconsin farms in history. In fact, we expect to see alfalfa in Wisconsin go over the million-acre mark in 1934. Farmers have found that alfalfa, with its long, deep roots, will stand drought and make satisfactory yields of hay in spite of dry weather, if fertility conditions are favorable. I estimate that better

than 500,000 tons of lime, marl, and paper-mill lime refuse will be used this year in fitting new fields for alfalfa. We have stressed the importance of soil fertility and plant food along with our lime-alfalfa campaign. "Have your soils tested first" is our slogan. We are now testing for available phosphorus and potash as well as acidity.

A Good Investment

Some farmers argue that they can't afford to buy fertilizers or lime, and yet many of these same farmers are spending half of their milk checks every month for feed. I argue that it is better economy to spend a little money for fertilizers and lime and grow this feed right on the farm than to spend so much for purchased feeds. A dollar spent for fertilizers will frequently come back tenfold.

Right now dairy farmers are being offered the greatest inducement in history to grow a few more acres of alfalfa. We are advising our Wisconsin farmers who qualify under the corn-hog program to use the money they get out of their contracted corn acres and buy alfalfa seed, lime, and fertilizer. Think of it! Here the government comes along and tells the farmer that if he will cut down 20 per cent on corn, that it will not only buy the alfalfa seed, but will give him enough money to buy sufficient lime and fertilizer for an equivalent number of acres of alfalfa. Here is the opportunity we have been waiting for for years,—and in the hilly, rolling districts of Wisconsin this corn, corn, corn-silo business has about wrecked these farms. It is about time we seeded some of these hillsides to alfalfa, and thus keep our soils at home. Another 25 years the way some of these farms have been handled, and there wouldn't be any soil left on these hillsides. A little verse comes to my mind which tells this story pretty well:

Countless worn-out farms remind us
We must farm our soils to stay,
And departing, leave behind us
Fields that have not washed away.
When our sons assume the mortgage
On these farms that had our toil,
They'll not have to ask the question,—
"Here's the farm, but where's the soil?"

And the program for cutting down our dairy herds is going to offer about the same inducements. In my opinion it would be good business to sell some of the scrub boarder cows and buy fertilizers with the money, and now the government is proposing to pay a bonus on every cow sold, in the pro-

Barley responds to fertilizer.

Left—200 lbs. of 0-20-20 **Right—no treatment**

The fertilizer increased the yield 20 bushels per acre. The field, on the farm of Albert Radicle, Hortonville, Wisconsin, hadn't grown a satisfactory crop in 20 years. It is typical of the potash-hungry soil in western Outagamie county, Wisconsin—black, level sandy loam, high in lime, low in potash and phosphates.

gram to cut the dairy surplus. This will enable farmers to feed the balance of their herds better. Why not take the bonus money and buy lime and fertilizers and plant more acres of alfalfa?

The Good Will Survive

I know that a lot of people are saying that this triple A program is simply paying farmers to become more efficient, and that the net result will be as much produce as ever. But even if their prophecies come true, we certainly will have accomplished something if we cut our costs of production. Wisconsin farmers have been spending twenty to thirty million dollars a year for feed. This bill should be cut in half by growing more of the protein feed on the farm. Dean Chris L. Christensen of the Wisconsin College of Agriculture recently said, "We have learned to grow two blades, and now perhaps we must learn to grow three blades on a restricted acreage."

When it is all said and done, the good farmer is the one who will survive. The government doesn't propose to subsidize the inefficient farmer. When government aid has been withdrawn, we all know that the farmer who has been doing a good job of farming will stay in business; but the man who has taken the government aid and squandered it, and lived along in his shiftless way, will find himself in a tough spot when he falls back on his own resources.

Soil fertility is the key to prosperity. We have been living on our fat for the past few years, but right now we are getting down pretty low on our reserves. There are thousands of acres of hungry soils in this State, soils that have great potential capacity, and yet they are only producing 50 per cent yields. On many of these soils, lime is the first weak link; on others, phosphates are needed; but more and more we are finding that potash, in addition to lime and phosphate, is needed to balance fertility, not only on the sands, black bottom loams and sandy loams, mucks, and peats, but even on our upland silt and clay loams. Potassium is the vitalizing element that makes our deserts bloom and our black bottom soils bound back with bumper crops.

Farmers find it necessary to repair their machinery when it breaks down. Why not repair our soils? My motto is, "Repair the soil first." And really it is not a repair charge, but rather a permanent investment when we buy lime and fertilizers for our dairy farms. While it is true that the sale of farm produce does remove some plant food, yet every ton of lime, phosphate, or potash that is applied to the farm becomes a part of the fund of circulating currency, where crops grown are fed, and the manure returned to the land.

Soil Banks

There was a time when farmers thought it was good business to take the earnings of their farms and invest this money in bonds and other securities. I know a farmer who for years has been doing this very thing, but many of these 7, 8, and 9 per cent interest rate securities have defaulted. In fact, this farmer has lost close to $20,000 in the past five or six years in some of his bad investments. But right on his farm, through demonstrations, I have shown that it was possible to invest in potash and other fertilizers, and not only recover the principal, but make 200, 300, and 400 per cent interest on the investment. Is there any bank in which we may invest our money that is more secure than the soil? My advice to farmers is that if you bank in the soil, you will have soils you can bank on.

HELL RAISER

Tough Soph: "Rat, you are about the greenest thing I have ever seen. Why look at the hay seed on your coat."

Meek Rat: "Them ain't hay seed, wise guy, them's wild oats."

Growing Importance of Potash in the Corn Belt

(*From page* 16)

been used previously but left off when there was no money to buy.

The financial stringency also resulted in a demand for lower ton cost of fertilizer and some tendency to meet price competition by lowering the analysis. Unfortunately potash usually suffers a greater proportionate cut than phosphate in this situation especially where small grain is to get the fertilizer. It is hard to justify higher analyses of potash for small grain alone as there is relatively less response to them. However, it should be remembered that corn is our big crop and agronomists insist on potash in wheat fertilizer for the crops that follow.

The fertilizer attachment on the wheat drill is the practical and cheap way of getting the potash distributed throughout the root-feeding area for the benefit of both the clover and corn crops. For the portion applied in the row or hill for quick action on the young plants, both phosphate and potash act as "starters" in developing vigorous young plants.

Of the upland soils, the gray flats and high-lime black sandy loams are the first to show acute need for potash for corn production. The rolling soils are subject to erosion which uncovers new layers of subsoil potash and this subsoil potash is available to plants, especially to vigorously feeding legumes like sweet clover, soybeans, and lespedeza. Highly efficient nitrogen gatherers, of which sweet clover is an outstanding example, contrary to the opinions and theories of a generation ago, seem to hasten the time when commercial potash must be added to the soil-management program in order to maintain or increase corn yields over a long period of years. This is especially true on the more level areas where there is little erosion to uncover new subsoil layers and crops are obliged to continue to take their supply of food from the same surface.

The livestock man who conserves and distributes manure in an efficient way has less need to be concerned about his potash supply than his neighboring grain farmer on the same type of soil. However, on fields far removed from the buildings and on farms with little stock to insure a reasonable manure supply, the efficient allotment of funds for purchase of supplemental mineral plant food will, on many of our long-cropped Corn Belt soils, include an increasing ratio for potash.

The Inquiring Mind

(*From page* 14)

a thing of interest, he said intuitively, "What can I say about it?" Thus he came to put his ideas and impressions upon paper, and did so in effective and convincing style. He also became a fluent speaker and always was interesting as a ready conversationalist. During his service time in the army, he began writing letters to the "Cincinnati Gazette." This gave him his first experience in newspaper work, and his accounts of the battles in which he fought attracted wide attention because of their accuracy and clearness

of description. Accuracy, indeed, was one of his most creditable attributes. He loved the truth and showed sterling integrity in all of his undertakings.

Turned to Agriculture

It was, however, agricultural writing that engaged his best efforts. On the home farm he had seen much of the primitive methods of farming, and so he early advocated improved machinery for the farmer. He lived to see this become available and used on practically every farm in the land. Too, he worked for better labor-saving equipment in the farm home, for he considered that of as great importance as better implements for work in the barn and in the field.

Following his bent for farm paper work, in 1865 he became an editor of "The Western Rural" which at that time was published in Detroit, Michigan. In 1868 Milton George, proprietor of the paper, moved the office to Chicago. Morrow went with him, but soon decided to branch out for himself; therefore in 1869 he went to Madison, Wisconsin, and there became publisher and editor of "The Western Farmer." As the paper did not prove financially successful, he rejoined Milton George on "The Western Rural" until in 1876 a new opportunity presented itself, and he served for one year as professor of agriculture at the Iowa Agricultural College at Ames, Iowa.

In 1877 he assumed a like position in the University of Illinois at Champaign. In 1881 he took direct charge of the University farms, and in 1888 became the first agriculturist of the reorganized experiment station. There he remained as Director of the Station until 1894, when he resigned and in 1895 went to the Agricultural and Mechanical College at Stillwater, Oklahoma, to organize its experiment station. He expected this appointment to be temporary, but soon he was made President of the College and Director of the Experiment Station and served in that position until June 1899. Then, being in ill health, he resigned and went to live on his 212-acre farm near Paxton, Illinois, where he died on March 26, 1900. He was buried at Mt. Hope Cemetery in Champaign, Illinois. The funeral service was held in the Presbyterian Church, at Champaign, of which he had been a devout member, elder, and Sunday School Superintendent for many years. The respect in which Professor Morrow was held was evidenced by the great number of leading citizens, professional associates, acquaintances, and local farmers who attended the service.

A Livestock Judge

Professor Morrow was an ideal gentleman in every sense of the word, yet not proud or austere. Indeed, he was remarkably affable, readily made friends, retained them, entertained them as a story-teller, and imparted valuable information on the various subjects which had engaged his attention. He was an admirable judge of livestock and often served in that capacity at the Illinois State Fair. In memory, we can see him at work, tall, slim, exceedingly active, and striving to the best of his ability to render honest and impartial decisions in the judging ring.

In Great Britain, perhaps it was, that he noted the judges weed out the less excellent animals in a large class of cattle or horses, relegate them to the "gate," and thus set apart a *"short leet"* from which they finally selected the prize-winners. He was practically the first to inaugurate that practical way of judging livestock in America, and so painstaking and particular was he in his adjudicating work, that we have seen him return again and again to the discarded animals, and their disconsolate exhibitors, and make a last and even more careful scrutiny to make "assurance doubly sure."

Writing in 1895, that eminent scientist the late Dr. Thomas J. Burrill of the University of Illinois said of

Professor Morrow's standing as a scientific and practical agriculturist and educational worker: "In several respects he is the foremost man in the United States, in these lines, and in naming the foremost half dozen of our countrymen who stand highest in general among such specialists, there are few, I am sure, who would leave him out."

Relative to his ability as a speaker, Professor S. A. Forbes of the university wrote in 1895, "He has been, on the whole, the most effective farmers' institute lecturer we have had in Illinois." Professor Burrill was even more emphatic when he wrote, "As a speaker before agricultural societies, institutes, etc., he easily stands first of any in the Union." After Professor Morrow's death, the faculty of the Oklahoma Agricultural and Mechanical College adopted resolutions in which he was referred to as a "tower of strength to the great interest to which he devoted his activities as a scholar of wonderful range of learning," and they declared that "through all the future history of this institution his name will be honorably associated with its early struggles and triumphs."

Thoughtful of Others

Professor Morrow was not only affable and genial, but ever thoughtful of the feelings of others. He had a kindly regard for Professor Eugene Davenport, his successor as Dean and Director of the Illinois College of Agriculture and Experiment Station. When that able, practical, and aggressive educator, scientist, and executive arrived at Champaign, Professor Morrow used his best efforts in helping him to succeed. Dr. Davenport has told the writer that Professor Morrow was careful to have him on the ground in time for the local farmers' institutes and introduce him to the audiences in a most cordial manner.

He says, "Wherever Professor Morrow went, he took especial pains to speak well of me, as I heard from many a source. I said to him one day, 'Why do you say so many good things about me? You do not know me well!' His reply was characteristic of the man: 'Why, Professor Davenport, I want my successor to succeed,' all with that twinkle of the eye which I learned to know so well.

"Let's Take a Ride"

"As the spring and summer wore on, he would come often to the office, which I asked him to treat as his own, and say: 'You have done enough for one day. Let's take a ride.' His horse would be at the curb and he would head for some of his many friends in the region, all, I am bound to believe, for the sake of introducing me to his especial friends. He was a student of agriculture and a philosopher by nature and training. No one knew better than he that the current slogan, 'Illinois soils are inexhaustible,' was sadly untrue, so he began a series of rotation experiments in 1879. They are still in progress, and there corn is raised year after year with no fertilizer, also in rotation with corn and oats, and with corn, oats, and clover. These are the oldest agricultural plots in America.

"Besides these rotation plots," continues Dr. Davenport, "which were designed to test fertility questions, especially with reference to corn, which was but one of the crops in the Rothamsted experiments, he did much work relative to the methods of cultivation, and showed that the common practice of deep cultivation was wrong and that the shallower the better, so far as good crops were concerned. He was a pioneer in the attempt to put science to work on the farm. He paid the penalty of being a prophet a little before his time, but one cannot speak too highly of his ability and service. He belongs with Miles and Roberts and Stockbridge."

E. H. Farrington, Professor Emeritus of Dairying of the University of Wisconsin, was associated with Professor Morrow at the Illinois Experiment

Station in 1890, and esteemed him highly as a gentleman who had "nothing but the highest ideals in his head and in his daily life," and of whom Dean W. A. Henry of the Wisconsin University once said, "Morrow is a 'fine-haired' man." And he was!

Professor W. J. Fraser, of the University of Illinois College of Agriculture was a student under Professor Morrow for four years, and for a year worked with him as assistant agronomist before becoming an instructor in dairying. He considered Professor Morrow "a splendid man who possessed to a high degree that quality of sincerity and genuineness so much needed in the progress of the world today. He wasted no time in playing politics, and always gave his best, and did his best, for the benefit of Illinois farmers. He was very versatile, and took a keen interest in all matters of education and the upbuilding of the University, as well as being a great church worker."

"A Just Man"

The tributes we have cited as to the character and accomplishments of Professor Morrow would have pleased him during his life, although he did not try to curry favor or seek applause. Indeed, he was ever modest in his mien and associations with his co-workers and the public. As the time for his passing approached he said to a friend, "After I'm through with this life I'd rather it be said of me, 'He was a *just* man,' than anything else." That, we are sure, is the estimate of him remaining in the minds of those of his friends who remain, and recorded in the archives of the State he served so well.

"The memory of the just is blessed."

Some Soil Problems

(*From page* 19)

show the symptoms first. The striped leaf effect in the corn plant has long been observed by many farmers who did not know the cause.

Hunger Signs on Velvet Beans

Both magnesium and potash deficiency are noted in velvet beans, the center leaf showing typical green veins with the yellowish-white areas between, with dying of the leaf margins.

Magnesia hunger can be very easily remedied at little cost and thus large annual loss to farmers saved. Briefly here is the remedy suggested by Dr. Cooper and Dr. W. D. Moore of the South Carolina Truck Experiment Station.

Magnesium can be added to the soil in various forms, as in dolomitic limestone and sulphate of potash-magnesia. It would be advisable to have half or more of the potash in truck fertilizer for light gray sandy soils derived from sulphate of potash-magnesia and use a fertilizer which contains dolomitic limestone rather than sand or other inert material as a filler. This will usually correct the magnesium deficiency for a single crop or for one year.

If the soil reaction is around pH 5.00 or below, it is advisable to make a broadcast application of 1,500 to 2,000 pounds of dolomitic limestone per acre. Oyster shell is of little value in controlling magnesium deficiency; it often makes the deficiency more severe.

Basic slag has been found to be one of the most satisfactory materials to stimulate crop production on certain unproductive soils. It is advised that this material be applied at the rate of 400 to 1,500 pounds per acre. Basic slag contains magnesium, manganese,

and iron in addition to the phosphorus. The phosphorus in basic slag is usually sufficiently available for grain crops, but it is not advisable to depend upon basic slag as a supply of phosphorus for delicate-feeding vegetable crops. It would very probably be best for most truck growers to make a broadcast application of basic slag in a similar manner to lime applications, and use the customary fertilizer analyses applied to various crops.

Manganese Deficiency

As with magnesium, so with manganese. Many common farm crops are grown on the gray soils of the lower Coastal Plains with not enough available manganese for normal growth. Oats, corn, peas, beans, and the various commercial truck crops suffer thus. The manganese deficiency symptoms usually appear first on the top and younger leaves, but otherwise the same as in magnesium hunger.

In cabbage, one of the important truck crops of the areas under consideration, the manganese deficiency is apt to show up on soils which have received large amounts of limestone or oyster shells. The cabbage plants on such soils are often dwarfed and yellowish white, the areas near the leaf veins being light to yellowish green. The deficiency is likely to show up also on any strongly acid soil which is poorly drained.

For remedy around 100 pounds of manganese sulphate per acre is found to be most effective. The manganese may be added also in the form of basic slag, but it takes heavy applications to supply sufficient manganese.

Avoid Overliming

South Carolina experience warns against overliming of truck soils, which leaves a condition worse than that of high soil acidity.

Where a soil is overlimed, it requires several years for it to come back to normal production unless it is given a special fertilizer treatment. Manganese and perhaps iron in certain cases are rendered less available by liming and they have to be added to the soil for the production of profitable crops.

Ordinarily it is not advisable to add more than one ton of limestone per acre for most vegetable crops unless the soil reaction is definitely known, the specialists find. Occasionally it is necessary to apply two or three tons of limestone to certain acid soils, but it is desirable to have the soil tested before large amounts of limestone are applied.

Recent Developments in Fertilizing Muck Soils

(*From page* 10)

types is neither so high nor so available, most crops on this type of muck will show a response to nitrogen in the fertilizer mixture, until lime has become well mixed with the soil to considerable depth. On the less acid mucks (Group 2), the response to nitrogen will be governed by the extent of drainage, the cropping age of the muck, by the time of planting and temperature of the soil, and by the type of vegetative growth of the crop. In general the higher the water-level and the older the muck, the greater will be the response to nitrogen. Early crops, grown while the soil is cold, and leafy crops, such as celery and spinach, are also usually benefited by nitrogen in the fertilizer mixture. On the alkaline mucks (Group 3) nitrogen is generally beneficial for early crops and leafy crops.

With the exception of a district in northwestern Minnesota which is benefited by phosphate alone, all mucks require potash and most of them phosphate, especially when intensive farming is being practiced. Although a fair yield of general crops is sometimes secured without fertilization for one to three years after reclamation, the production of special crops generally requires immediate and heavy fertilization for the first crop. This is especially true if several crops of wild hay were removed or the land pastured for several years before the muck was first broken.

Rate of Application

The rate of application of fertilizers required depends on the kind of crop being grown, and the closeness of planting, on the method of application of fertilizer, on the amount of fertilizer applied in preceding years, and on the percentage of plant food in the mixture applied. Thus a celery crop requires from two to three times as much fertilizer as does the spinach crop; and the celery crop will require at least a third more, if the rows are 30 inches, than if they are 48 inches apart. If the land has been heavily fertilized for several years, a considerable reserve in phosphate and some reserve in potash have been built up in the soil, and the rate of application can be somewhat reduced. Yet it is false economy in muck-land fertilization to omit or to greatly reduce the annual fertilizer application. Recommendations for the various crops are given in Table 3.

If the fertilizer is applied broadcast on the surface, it should be thoroughly disced in. It also may be applied with a seven-inch fertilizer disc drill to a depth of three or four inches, or it may be partly or wholly placed in the row. Generally the application with a disc drill gives better results than does the broadcast application disced in. If the row application is used, the rate of application can be somewhat reduced; in fact, a heavy row application is not advisable because of danger of injury to seed or to transplanted plants. The row application is not advisable if the muck is quite sour or if it is at all droughty. If the muck is not more than slightly acid and is well supplied with moisture, a light application of fertilizer, applied in the row not less than two inches from and preferably below the seed and not later than one week before transplanted crops are to be set in, is

Timothy and alsike clover on deep muck. Unfertilized in the foreground and fertilized with 275 pounds per acre of an 0-8-24 mixture beyond the stakes.

TABLE 3—FERTILIZER RECOMMENDATIONS FOR MUCK SOILS[4 5]

Crop (Where two fertilizer analyses are given, the first is generally preferred)	Annual broadcast application Pounds per acre: If only muriate of potash is needed, one-half to two-thirds these amounts should be applied.	TYPE OF MUCK: High-Lime Muck: Deep and Medium Muck, Properly drained, not acid to strongly acid: Mucks requiring both potash and phosphate.	High-Lime Muck: Deep and Medium Muck, Properly drained, not acid to strongly acid: Mucks showing little benefit from phosphate in mixture.	High-Lime Muck: Shallow Muck, "Alkali" Muck, or Poorly drained muck	Low-Lime Muck: Very strongly acid in reaction. Limestone or marl should be applied preceding fertilization.
		3-9-18	3-9-18	3-9-18	3-9-18
Lettuce[1 2] Spinach[1 2] Swiss chard[3]	500-1000 400-800 500-1000	Broadcast and disc in fertilizer before seeding. Side-dressing of available nitrogen fertilizer, at rate of 75-100 pounds, sometimes advisable during growth.			
Beets, Early[3] Celery, Early[1 3]	600-1000 1000-1800	3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18	3-9-18
		Row application advisable for beets—not more than 500 pounds 2 inches below seed. Broadcast remainder and disc in before seeding.			
		If no manure has been applied for celery, side-dressing of available nitrogen fertilizer is often beneficial in cold or wet periods during growth. If manure has also been applied, no nitrogen is needed in the fertilizer mixture.			
Beets, Late[3] Celery, Late[1 3]	600-1000 1200-2000	0-8-24	0-8-32	3-9-18 or 2-8-16	3-9-18
Early		3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18 or 2-8-16
Radishes[1 2]	400-800	Apply with fertilizer drill or broadcast and disc in before seeding.			
Late		0-8-24	0-8-32	0-8-24	0-8-24
Cabbage[2] Cauliflower[2]	500-1000 800-1500	For cabbage and cauliflower, application of 400-500 pounds may be made in row 4 inches deep, if plants are transplanted to field. Broadcast remainder and disc in.			
		3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18	3-9-18
Onions[1 2]	600-1200	Row application of 300-500 pounds 2 inches below seed advisable for onions. Broadcast remainder before seeding and disc in. Seed early if possible. Protect from wind to save crop and fertilizer. For further information see Extension Bulletin 123.			
Mint[2]	250-500	Fertilizer needed to maintain stand of mint, as well as to increase oil content. Apply broadcast fairly early in spring.			

Oats (With or without seeding)	**250-400**	To secure satisfactory results from fertilizers, grow grain varieties adapted to muck land, such as Gopher oats, Peatland barley, and Rosen rye.
Barley (With or without seeding)	**250-400**	
Rye (With or without seeding)	**200-350**	
		0-8-24 or 0-8-32 | **0-8-32 or Muriate of Potash** | **0-8-24 or 0-20-20** | **0-8-24 or 3-9-18**
Field corn	**250-500**	If row application is made for corn, do not use more than 200 pounds, preferably below and 2 inches from seed. Broadcast remainder and disc in.
Sweet corn	**400-800**	
Sunflowers	**250-400**	
Potatoes[1] [2]	**400-800**	Row application sometimes advisable for potatoes but not more than 400 pounds, preferably in furrow 2 inches below seed. If mixed with muck with machine planter, 600 pounds can be safely applied. Plant close to avoid hollow heart and to minimize frost danger.
Timothy and alsike	**200-350**	Seeding hay without nurse crop often advisable. Early seeding necessary to beat weed growth.
Sweet clover	**200-350**	
Reed canary grass	**300-400**	
Hungarian millet	**200-300**	
Permanent pasture	**100-200**	Apply broadcast on pasture in spring. Growth increased and palatability and nutritive value of grass much improved by proper fertilization.
		0-8-32 or 0-8-24 | **Muriate of Potash** | **0-8-24** | **0-8-24 or 3-9-18**
Sugar beets[2] [3]	**400-600**	Row application advisable for sugar beets, not more than 150 pounds with seed, or not more than 300 pounds if 2 inches from seed. If more is to be applied, broadcast it and disc in before planting.
Mangels[3]	**300-500**	For root crops, apply with fertilizer drill, or broadcast and disc in before seeding.
Parsnips	**600-1000**	
Rutabagas and Turnips	**300-500**	
Stock carrots	**300-500**	
Table carrots[2]	**400-800**	
		0-20-20 or 0-8-24 | **0-8-24** | **0-20-20** | **0-20-20**
Beans	**250-500**	These crops easily killed by frost, therefore generally not safe on muck soil. Keep soil compact to help prevent frost injury. See "Prevention of Frost Injury to Muck Crops," in Mich. Quarterly Bul. Vol. XVI No. 2.
Cucumbers and Melons	**400-800**	
Pumpkins and Squash[1]	**300-600**	
Tomatoes[2]	**500-1000**	

[1]These crops likely to show marked response to sulphur when grown on "alkali" muck.
[2]These crops may respond to copper sulphate when grown on acid muck.
[3]If muck has not been heavily fertilized in past, these crops are likely to respond to salt in fertilizer mixture.
[4]From Michigan Cir. Bul. 53 revised, "Fertilizer Recommendations for 1932."
[5]Fertilizer mixtures having the same ratios as those recommended, but of higher or lower analysis, would be equally desirable, a proportionately smaller or larger amount per acre being needed by the crop.
[6]Because of a limitation in the number of fertilizer analyses manufactured, by action of the fertilizer code agreement of the N. R. A., the 0-8-32 mixture has been temporarily withdrawn from sale. As the value of this new higher potash analysis becomes more evident, it is probable that it will again be manufactured. In the meantime, the grower who needs more potash and less phosphate for his particular crop can get the benefit of an 0-8-32 analysis by mixing with or applying separately 160 pounds of 50 per cent muriate of potash with each 1,000 pounds of 0-8-24 used.

incomplete and their life work wasted. Unfortunately some of these arrant mountebanks found comfort in the attitudes of the least discriminating of the commercial clan with goods to sell. The louder they bellowed and megaphoned, the better these thoughtless camp-followers liked it. On the whole, be it said, the prudence of the more solid mercantile agencies supported the conservative element in extension.

SENDING to the jungles for wilder and woolier menageries to use as breath-taking marvels could not stand the ultimate pressure of utility. The commercial agent had his delicately balanced task as well in the face of such conditions.

There is an old adage "be not the first by whom the new is tried nor yet the last to lay the old aside." In getting fertility adopted by farmers, peculiar traits of character need to be recognized. The elements of competition, personal profits, and greater volume of production, not to mention the glory of being ahead of the field, can become dangerous in the extreme sense. With woeful absence of good records, farmers can be reached best in general terms of numbers and tonnages. In other words, *more* has always been a synonym for *good* among farmers. But the more they all got more, the more trouble ensued, measured in excess numbers and tonnages.

It is a pity that greater thought has not invariably been given to quality on the one hand and permanent year-in-year-out soil building on the other. Soil practice that has stressed the long-time effect, the accumulated benefits, the interest-bearing value of fertility rightly applied stands far in the front, while the fellows who counted numbers in the hill in 1930 and had to borrow the price of seed in 1933 belong to the misguided group.

AT the risk of being a bore, let me repeat that Agadjustment is not designed or directed with the intention of supplanting efficiency or making the work of the scientist and the extension man less necessary. This rests upon the fundamental factor which everyone engaged in this stupendous experiment fully recognizes.

This factor is as old as life itself and part of it. It may be stated in very simple terms. Man's activity and ambition never entirely cease under any circumstances short of complete paralyses, while he lives. Similarly, the minute and complex stirrings of life and change and progress in the soil never cease entirely save when some corroding chemical sterilizes it. You may tell a man not to grow this or do that and he will sign up cheerfully to comply; but an outlet must be found for his abundant energy of thought and action, and find that outlet he will regardless of consequences.

IN like degree, you may decide to abandon a piece of land and keep it out of cropping, but behold what nature does while you sleep off the jag! Tares and quack perhaps, but Mother Nature smiles just as broadly at the result and insists that she cannot be barren with such a bursting womb. And birds and bees, foxes and ants, stray animals and sundry crawling things imbibe some nourishment out of that which man insisted must remain unproductive!

Nature thus discounts man's unwitting contracts, but during the process there should be some educational result that brings social values and a greater sense of the unity of agriculture. If this is accomplished while we await a saner tariff policy, or other things you think are more basic than "basic commodities," it will not be a waste of effort to engage in Agadjustment.

So perhaps it is well to broaden out at this point and admit that probably the crux of our mutual problem lies on top and above the soil rather than in it. By this I mean no disregard for the needs of the soil or the virtue

of centralizing efforts upon the better lands rather than upon the lean ones. Rather I inquire, as you do, whether the task is not to understand and manage the affairs of mankind more equitably instead of poking our noses forever into test plots and auger holes looking for profits under the ground that cannot be fairly distributed above ground!

This is just as applicable to farm implement manufacture, housing, farm equipment, or any other line as it is with soils. Not until we join the ranks of the inquiring minds who are not satisfied that we can safely return to things as they were, will we be able to grow into the future.

WE may laugh it off and say that "noble experiments" die aborning, and that the ways of the past are the ways to follow still. They are—below the ground level, but not above it; they are—below the neck, but not above it! If man cannot rise to better ways of overcoming physical things and push upward all together to a better system, then what will the future hold for soil fertility?

Unless we measure our lives by racial and human welfare as we come out of this coma, what assurance have we that men will be able to retain and restore soil fertility—unless all the land comes under the sway of a few despots? And soil fertility has but one prime object, and that object is to provide food in abundance and clothing a-plenty. If there are few to buy the food and few to get the clothes, I see little value left in any soil.

Men pressed for meager necessities on farms postpone the restoration of their acres. "Women and children first" is not a slogan reserved for ships that are sinking! Common sense of the old school teaches us that much. That is no idle dream of Agadjustment theory.

IN the days of feverish settlement and national land expansion, our ancestors who grew restless and weary of cramped local life and opportunity could move onward to places where greater freedom existed to achieve better things. Largely they found the soils waiting them abundant and fruitful, responsive to crude husbandry, and rich in promise. In the zest of high adventure of this golden age of dross, such pioneer endeavor subsisted wantonly of the land's largess, just as it killed the pigeons and the bison by the wholesale. That started the neglect of things both above the ground level and below it. "Why not?" quote the ravagers, "the land area is limitless and we are the conquerors!"

Selfish profit motives ruined both the land and the tiller of land. Right now let us carefully observe the grave error in a common term.

Profit and expediency for the moment were the rule, and continued as the guiding principle even unto the smash! These forerunners of ours thought that individual profit piled away in sly places meant wealth that could be counted as national and permanent. If they had considered the way of the soil in that same sense, maybe the error would not have been committed.

You can take the richest fertilizer

mixture in the laboratory of modern science and apply it to a hill here and there in proper amounts and at proper depth, and then sit back and hope for universal benefit—but it never comes! Dribbling and dabbling in a small area of soil grains does not provide sustenance and chemical action enough to seep through the entire acreage. Everybody knows that, sure enough; but when you apply that thought to doses of selfish profits thrust into small personal ant hills, you get the same barren result for the whole acreage of human welfare.

AND as more accurate knowledge of soil fertility came, men comforted themselves at the size of their manure piles and the handy beds of marl. Out of the wealth torn from the soil they bought some chemical supplement perhaps, and put it into their own ant hills. The rest of them, and a sad majority they were as the lean years came, had no manure and no marl and nothing to salt the earth withal.

But now the age of colonization is over, unless we wish to trust our luck with Byrd on an iceberg. Men have come into their corner. At least in the temperate zones, where the do-ers reside. Man faces the status quo, and has to stand pat where he is whether he is a standpatter or not. He is right on the spot. The soil beneath his restless brogans is all he has left on which to do or die. All animal life comes from the plant, and all plants come from the soil. We are up against the majesty of fundamental laws in an age of social complexity.

WE have two roads to try out. One is a slippery concrete trail paved with the good intentions and taxes of the past, ending in a barricade and a red lantern marked "the end of human and natural resources." The other is a rather uninviting detour, winding and hilly, dusty and tiresome, giving us punctures and blow-outs, but which if persisted in will get us up, over, and beyond!

Better equalization of opportunity embodied in many of the strange new plans that are being evolved today will take shape before long. Wise doctors of men and of soils know the right prescription, or at least can advise the proper regimen to follow. At this juncture we stand in need of sage counsel like the man who has been sick abed, feels a gradual return of vitality, and wants to arise and put on his pants so that he may hustle once more for profits. Or like the lean soil that gets a spurt of animation from a green-manuring crop, not sufficiently balanced in the required mineral elements to last.

Personally I prefer to see us stick in bed awhile and take our medicine, along with a little exercise to try our muscles. The devil is never so tricky as when he is convalescent. It is so easy to rush back onto that inviting concrete road to chaos again. Voluntary discipline is so irksome! Planning together is not so much fun as cheating each other!

Let us hope that while men are resting from their profit orgies and some of the land is resting under Agadjustment a little horse-sense will teach us to say "Nay."

TODAY

Look well to this one day,
For it, and it alone, is life.
In the brief course of this one day
Lie all the verities and realities of your existence,
The joy of growth, the splendor of beauty, the glory of action.
Yesterday is but a dream, and tomorrow is only a vision,
But today well lived, makes every yesterday a dream of happiness.
And each tomorrow a vision of hope.
Look well, therefore, to this one day,
For it, and it alone is life.
Such is the salutation of the dawn.

—Translated from the Sanscrit.

NEITHER DO WE

Math. Prof.: "Now, Mr. Zilchguard, if I lay three eggs here and five eggs here, how many eggs will I have?"

Mr. Zilchguard (with a questioning glance): "I don't believe you can do it, sir."

Criticized for addressing his employer as Mr. 'Arrison, an East-end Londoner remarked: "Well, if a haitch and a hay, two hars, and a hi and a hess, a ho and a hen, don't spell 'Arrison, I don't know what does."—London *Tidbits*.

Florence: "Mama, do pigs have babies?"

Mama: "Why of course, my dear."

Florence: "Someone told me they had little pigs."

"Has George matriculated yet?" was the question put to Mrs. Newly-Rich, with a son at college.

"Oh, no," came the reply, "he's not at all that sort of boy."

LION HEART

"Now, Macpherson, why don't you fight against your longing for drink? When you are tempted, think of your wife at home."

Macpherson (thoughtfully): "When the thirst is upon me, I am absolutely devoid of fear."

Some men never appreciate their children so much as when making out their Income Tax.

INTUITION

Two Jewish businessmen were riding home from their stores, on the streetcar. Side by side they sat, both looking worried and both remaining silent. Finally one heaved a deep sigh. The other studied him for a moment and then said in an annoyed tone: "You're telling me?"

Johnny had an accident—his pants were torn. The teacher had just finished a temporary patch, when Johnny, always polite, murmured, "Thanks, teacher, I hope I can do the same for you sometime."

"Last night I was kissed twenty times in twenty minutes."

"By the same man?"

"No. He was a changed man after the first kiss."

Perplexed Male Shopper: "I want to buy a camisole or a casserole. I'm not sure which is the correct name."

The Clerk: "It all depends, sir, on what kind of a chicken you want to put in it."

ECONOMICS

Two Hill-billy farmers were discussing the P & L of Agriculture at the pig-sty.

"Zeke, that durn sow of yourn would fat up faster if you fed her more," said one.

"I knows it, Airy," Zeke conceded, "but my Gawd, neighbor—what's time to a hawg?"

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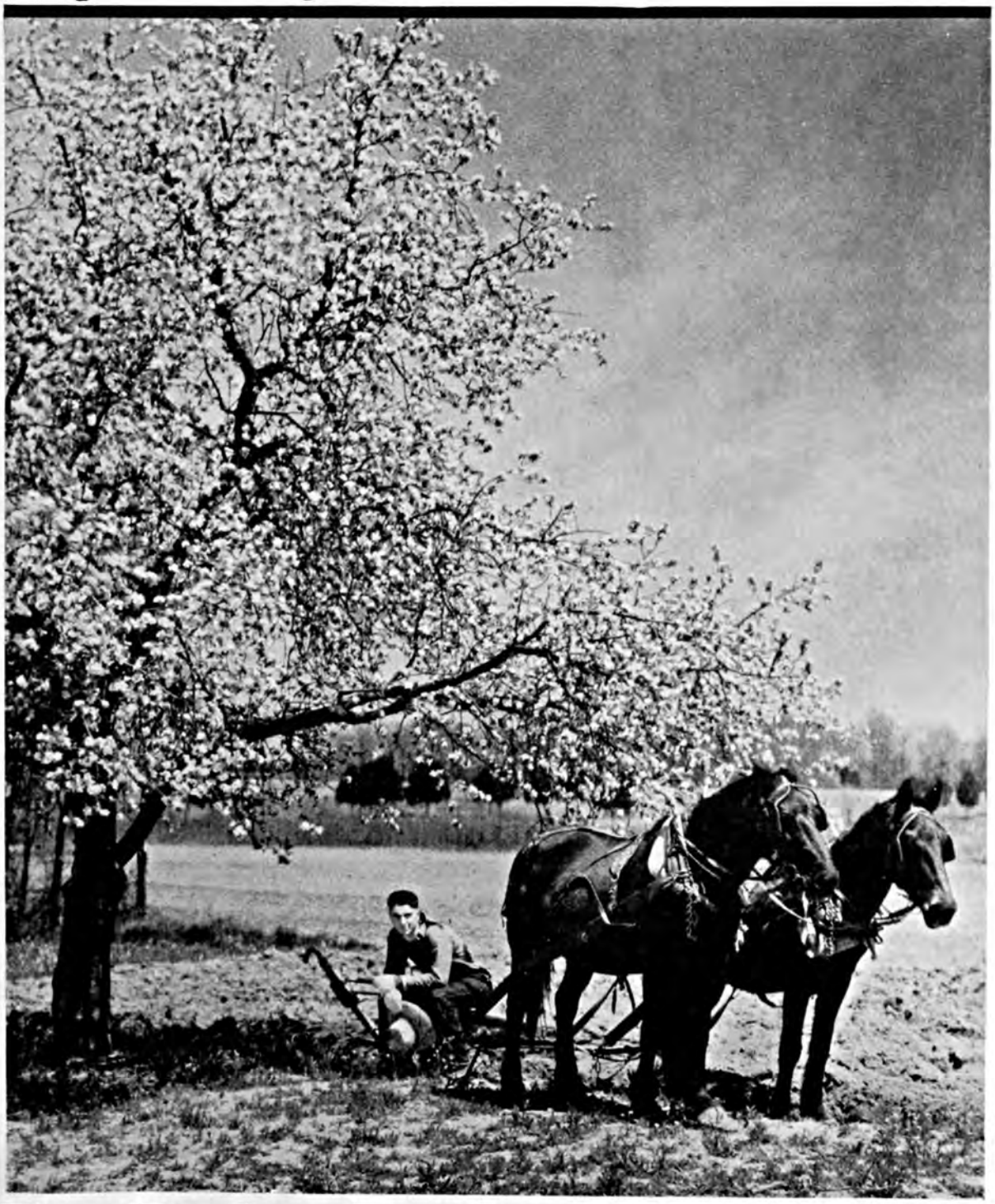

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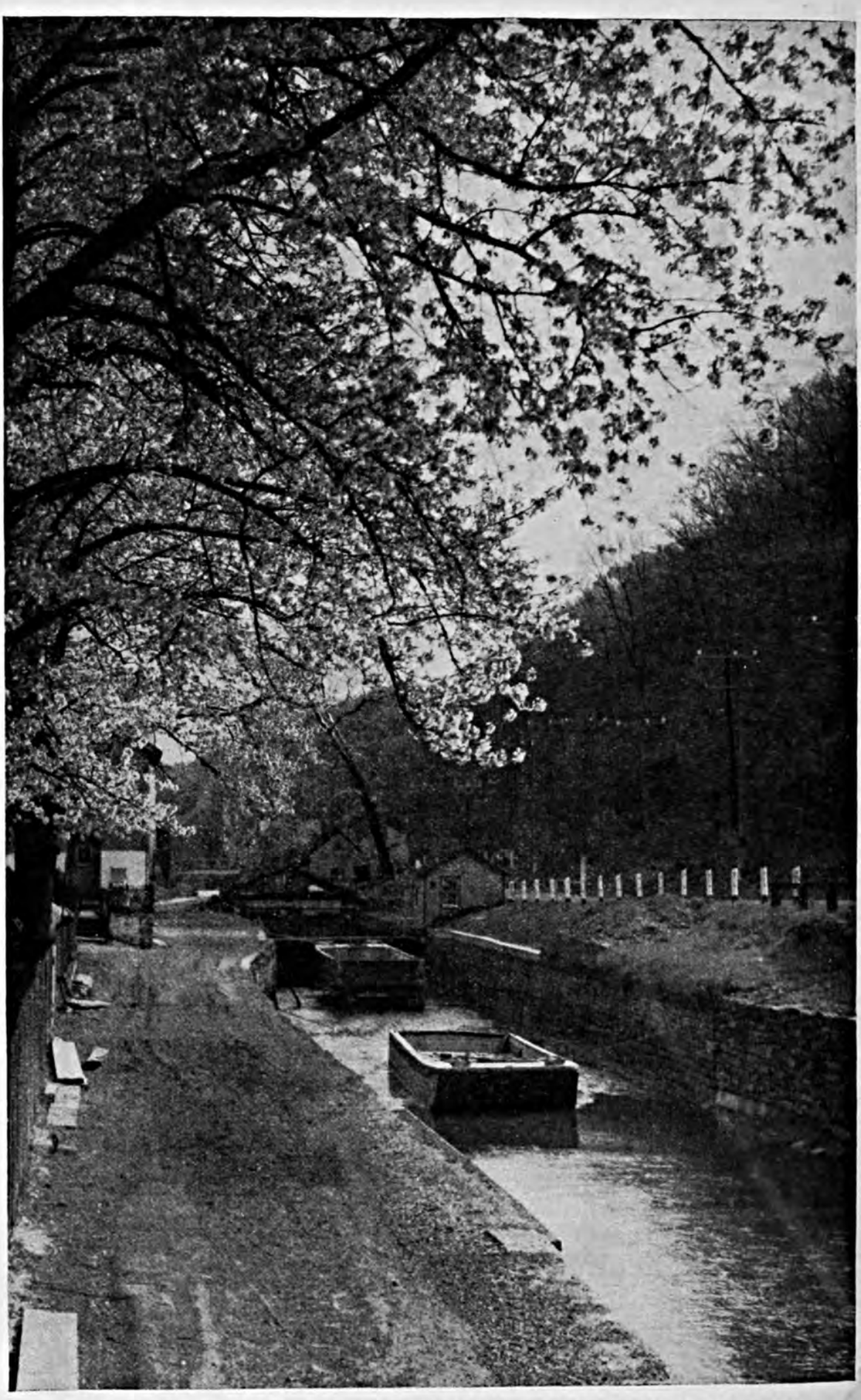

A PICTURESQUE SPOT ON A CANAL NEAR EASTON, PENNSYLVANIA

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Are you, with Jeff,—

Country-Minded?

By Jeff McDermid

TO be country-minded and be chained and riveted to city living when the spring blooms afield is woe indeed! A person thus situated combines the feelings of one who misses a train, commits an error, and loses his best girl.

They say that an expatriate is one who is absent by choice, while an exile is one who is absent by compulsion. City slaves of rural origin belong to both classes. Then there is of course a third class to consider. To this class belong those who never lived in the country and yet who yearn for it constantly when they can find the time for yearning on Sundays and after six o'clock week days. Theirs is either an inherited or an acquired distaste for the smother and grime of brick and mortar, cement and sameness.

Some of these devotees of a life they have never enjoyed or experienced assume a freakish semblance to us who know that country life is not all butterflies and cream, glowing sunsets and dewy mornings. Their temperament for open spaces sometimes suggests a strait-jacket, but withal there is some-

thing divine and mystic about the way in which that germ of rebellion became implanted in their souls. True, it sometimes gets rubbed out when they invest in chicken ranches or try suburban farming on an ambitious but fruitless scale. Even though their imagery leads to a delusion and a snare, we of the country in bone and marrow secretly applaud them for overcoming the thralldom of the city.

THE well-known and much economized example of the "swing to the city" (during the commercial era of profit above planting) caught in its ebb-tide those who went by choice as well as those who went by compulsion. It is sometimes hard to say exactly whether it was the city which attracted or the country which repelled. But we do know that from 1920 to 1929 the compelling force was greater somehow than the free-choice element, and thousands of them went from pastures to pavements and seemed to like being street-car conductors and clerks better than being hired men and town chairmen. Naturally some of them became captains of industry after awhile and then lost their last nickel down a crack in the sidewalk playing craps with some other gambler. They could have sunk it just as well in wonderberries or sure-sex chick investments out on the old farm, but the excitement was greater amid the bright lamps, and the county poor farms were overcrowded anyhow.

Folks were driven from the farms, or lured therefrom during the drab decade and for awhile they appeared happier. Then groceries got scarce and they recalled the cellar at home filled with juicy jams and hams, and the mooley cow begging to be relieved of her lactic flood. The retrograde movement set in and has kept up a steady pace, they tell me in the Agricultural Annex, until dim signs of recovery stirred the star boarders on the farm to hang up their borrowed overalls. We now discern another timid movement once more toward the city, a sort of skirmish as it were, to see how real the recovery may be before forever letting go of the meal ticket back on the farm. This leads us to say on the side that farm relief in the past three years has been much in the nature of succor for the suckers.

To some city-bred folks "country-minded" means being ornery and unwilling to cast thoughts in a definite mold or standard pattern. It means being pernickety or stubborn, unbending to novelties, resistant to modernity, inconsistent and untamed. In illustrating this scrambled idea of theirs they point to cooperative squabbles and the insistent and never-satisfied cry for farm relief and equality, while they say that every township has its own peculiar and unworkable scheme for rural salvation.

THEY dub it being "country-minded" when it is only a very human trait amplified by environment and native habits. The country daisy may be as much a flower as the city orchid and subject to the same conditions of growth or decay.

They forget that the farmer is like the poet's description of youth when he says "the thoughts of a boy are long, long thoughts." Habits of rural life may not be conducive to technical education, but they do induce retrospective thinking and stir visions of broad human equality and freedom. As another poet has said, the farmer is in a position to hear sermons in stones and books in the running brooks. Even as expressed in the Ode to Immortality, the farmer is like a child in his nearness to the vital, the ultimately real, and the purest verities of life. Maybe he never grows up to become as skeptical of immaterial things as city folks are, but you can't fool him on the substance of permanent values.

It has been so often the case that people with plans afoot for wide campaigns would insist on "talking

plain to farmers, using their own language," that we get the impression that folks with country minds are a race apart. What does that signify? Does that mean shying from allegory or sentiment or truth? Does it mean sticking to the dollar sign and class prejudice for a country appeal?

I believe that it means opening the windows of the mind to let in fresh air from the meadows. It means using sound seeds of truth and planting them not too thickly. It means the gentle rain of sincerity and the sun-

shine of understanding. Words of this kind provide messages which cause sprouts to grow in any rural environment.

I have seen as many dismal failures on the part of country-bred exiles who attempted to get messages over to farmers as I have of those who never had the privilege of knowing the "mother tongue" of the soil. What can be more disappointing than the eruption of a learned graduate or doctor who tries to plot cycles or chart curves on the vagaries of untamed nature? Especially a farm-raised collegiate!

What is there about being country-minded that gives such a fraternity of feeling to folks who rejoice openly in their rural origin?

What is it that makes such men come from city offices with a smile when rain follows a dry spell and makes them scan the skies like sailors during hay time?

Memory is the only answer. Even though a man may have the most arid recollections of his boyhood in the back country or of his overworked youth and his jaded mother, the wealth of feeling for the forces of nature in the open country is bound to claim him as their own.

Show us how any similar power exists to pull a city man's interest back to Hogan's alley when he smells a goat or hears a beer wagon rumble by his door. You may move from the country, but you can't shut its images and sense impressions out.

YOU can take any topic under the sun, almost, and test it out under the influence of country-minded memory. The power of that early environment to color the ways you approach a subject is amazing.

Take religion or piety, self-control or decency—whatever you may choose to classify this moral fiber of a fellow's nature—it has deep roots in the memory of country minds.

Perhaps the country has changed in the meantime, so that no longer are the old, brown wooden sheds near the white meeting house, filled with horses and wagons on somnolent summer Sundays. Perhaps the old, grass-grown churchyard with its broken tombstones no longer brings the elegy to mind as slow-footed, bare-legged boys trudge by it on their way to Sabbath school. Maybe the high-power clergyman and the vested choir in the city fifteen minutes and ten seconds away have reduced the old rural collection plate to an empty sham. Even so, I still hear the fiery tones of Elder Brown, the snores of my weary Father, and I see once more that which gave me more religion than I have been able to retain—the soft brown eyes and golden curls of a Daughter of the Parish, whose presence was a benediction and whose departure was a blight.

Take Labor, which the Good Book specifies carries its own just and sure reward! What attitude towards it have the country-minded out of their hazy and oft unconscious memory of things long past?

I think it has seldom bred clock-watchers and time-servers. Perhaps that is why so many have observed that the city is so full of successful folks who originated in the country. Likewise that is why farm life has been willing to remain "underpaid," and has not asked for union hours. That is why we cannot prove cost of production in man hours at every turn of the dial in the country. So much of our work on farm lands is really a tribute to the life itself, to the pulse of nature, dedicated to the task done to a finish rather than to the tune of a paymaster. That is why our memories of the hired man and the hired girl blend so closely with our own family life instead of being some remote tool of profit-making such as city employees become.

BUT this ingrown custom of taking labor as part of life itself and accepting it as inevitable, which has marked country living for ages, may in itself indicate a weakness. I am not sure what the answer may be. It seems extremely difficult to wean country-minded folks, either in rural homes or in cities, from the idea that leisure is laziness. Labor is religion to them. It is not, as some suppose, because of the pecuniary reward alone that comes from such drudgery from dawn to darkness. If that were the only cause of country-minded attitude toward labor the lesson of the past ten years would have erased it long since. There has been so little reward in country labor—aside from the mystical, spiritual, intangible rewards that return with each spring seeding—that I am sure we can prove nothing by following that course.

I maintain that in farm life alone there remains some vestige of man's original "sentence" to labor in the Garden, so that all the power of the prophets and the influence of Government finances cannot completely overcome it. Take one acre away, remove one cow, shorten one hour, lighten one burden, and the farmer and his wife are uneasy until once again their time is fully occupied. The only way we can ever make submarginal lands void of the cultivator is to make them reservations with penalties for doing anything thereon except scatter egg-shells.

Take neighborliness! No single aspect of human affairs belongs so much to the country-minded as that. Perhaps with the radio and the flivver in our midst these days there is not the urge for reunions of families and friends in farming communities that existed before. But where is there a country-minded person stifled inside a city "flat" who has not wondered how people under the same roof could so long remain ignorant of each other, and so "leery" of a little friendly gossip? I could not describe one of my fellow apartment dwellers, but my Mother could spin such delightful and humorous descriptions of the town selectmen and the newcomers from Iowa and all their foibles that they seemed like characters in fiction. Knowing and seeing your neighbors, which is after all worth a great deal in life, seems to be an art of special development in the country-minded. I guess they saw comparatively few people and had lots of time to sort them over in their minds. We see hundreds daily and forget half of them.

HOW about economics? This is a touchy subject with many angles to it and one that might well take a volume to spin out. I often think that country-minded people accept economics as a necessary evil, because they know that hard labor and sentiment rule the open country anyhow, and that statistical sermons bring on the shut-eye. Sons of the soil sometimes forget it, however, and insist on reeling off doses of embalmed conclusions deduced from historical inferences.

It has been said with some truth that the only economics that appeals

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Balanced Fertilizers *as an* Aid *to* Better Keeping Quality *of* Fruit

By M. B. Davis, Dominion Horticulturist

Reprinted from Canadian Horticulture and Home Magazine, April, 1934

INSTEAD of judging the results of our fertilizer treatments entirely by yield and growth records, it seems far more reasonable to also consider the quality of the fruit on the tree and keeping quality of the fruit after it has been picked. A large crop of poor-keeping fruit is of little value to any person.

The proper date of picking and proper storage conditions may be used to influence the keeping quality of apples, but fertilizer and cultural practices during growing have a greater effect. Proper picking dates may, of course, iron out some of the ill results of faulty nutritional treatment, but it is doubtful if all ills due to bad fertilizer practice can be ironed out in this manner.

Whilst there are numerous cases of orchards very high in nitrogen producing good-keeping fruit, and cases of where experiments show that high nitrogen feeding has not interfered with keeping quality, it has been our general experience that high nitrogen feeding and possibly high nitrogen and phosphorus feeding are the two greatest factors in destroying the keeping quality of apples.

We have found that we are able to overcome the ill effects of high nitrogen by the addition of potassium in so far as vegetatation is concerned. I wish now to impress on you that a highly vegetative plant, making excellent growth and possessing good-looking foliage, is not necessarily a plant capable of producing good-keeping fruit. This can best be explained by referring to tomatoes for a moment. We can produce a perfectly marvelous tomato plant, with a perfectly marvelous crop of tomatoes, by forcing it with plenty of nitrogen and plenty of minerals or even just plenty of nitrogen and plenty of potassium, but if we force it too much, all the fruit is diseased with blossom end rot, due entirely to too much nitrogen which no amount of mineral feeding will offset.

The same holds true of orchards under forced feeding of nitrogen. A practical example will make this point clearer.

In one of the orchards we have had

under observation for some time there is a block of Fameuse and McIntosh 16 years old. One section has been mulched and heavily nitrated for several years. The foliage is very luxuriant and the trees are making excellent growth. The other section has been in sod and very rarely receives any fertilizer. The trees here show signs of low nitrogen, but not enough to get excited about, and they are making very moderate growth. The fruit from the sod section keeps perfectly free from premature breakdown or decay, whilst the fruit from the heavily mulched or nitrated section is very subject to premature internal browning and spoilage. I could multiply this example many times until one would be forced to conclude that on the whole a low-nitrogen orchard is capable of producing better keeping quality fruit than one being fed large amounts of that element.

We are perfectly aware of the fact that there are experiments in America to show that nitrate applications do not materially interfere with the keeping quality of apples. This might indicate that under these conditions available nitrogen for the time-being has been very low, while available minerals have been high. The South African workers, in criticising these experiments, claim a balance between nitrogen and phosphorus is essential; that if phosphorus is available in large amounts then heavy nitrogen feeding can, to a certain extent, be given without interfering with the keeping quality of the fruit. If, on the other hand, phosphorus is not present in sufficient quantity, the same amount of nitrogen will result in poor keeping quality.

It is necessary then to consider the nitrogen-phosphorus balance in relation to keeping quality.

We have found that there is a phosphorus-potassium balance in which an excess of phosphorus may interefere with potassium intake and bring about troubles in the form of low vigor, leaf scorch, low yields, and poor quality. There is also some evidence that excess phosphorus can induce poor keeping quality and further evidence that this is due to a relationship between phosphorus and nitrogen and potassium.

Table 1 will indicate this a little more clearly:

TABLE 1.	*Per cent spoilage from internal browning.*
9 nitrate only	32
9 nitrate—6 slag	12
3 nitrate—6 slag	100
9 nitrate—6 slag—3 potash	0

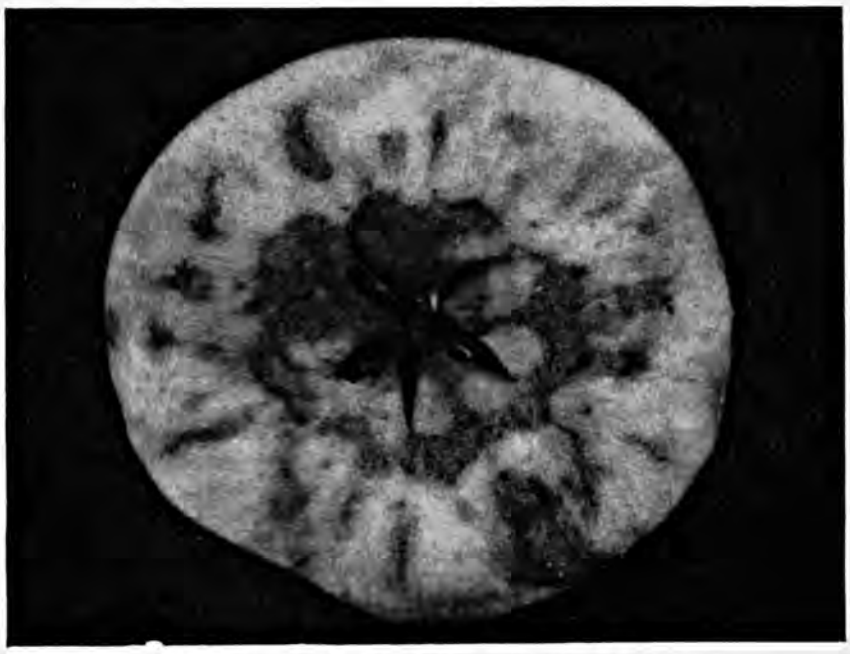

Fig. No. 1—Apple injured by internal cork areas.

You will note that where nitrogen has been fed alone, the spoilage due to core flush has been considerable, *viz.* (32%); but that where nitrogen has been fed in conjunction with a reasonable amount of slag, this has been reduced to 12%; where an excess of slag over nitrogen has been used, it has jumped up to 100%; and that

where a reasonable balanced amount of nitrogen, phosphorus, and potash has been used, it has dropped to 0. This would substantiate the South Africans' theory of the nitrogen-phosphorus relationship and at the same time afford evidence of the value of a balance between potassium and phosphorus and nitrogen.

Evidently this soil is in a rather delicately balanced condition and excess feeding of either phosphorus or nitrogen alone can soon bring about poor-keeping quality of fruit.

The Effect of Potash

The exact effect of potassium on keeping quality is not any too clear at the present time. Very briefly, it seems to depend to a certain extent on storage temperature. Thus Wallace has shown that fruit from low-potash areas goes down very quickly in cold store but keeps fairly well in common store, although, of course, shrinkage is bad in this case. On the other hand, fruit from areas high in potash kept much better at lower temperatures. Doubtless there will be found some temperature between the two extremes used by Wallace which will permit of the use of low temperatures for both sorts. He used 1° C. for cold storage and 40-50° F. for common storage.

Before dealing with our final recommendations, I should like to draw your attention to a certain trouble commonly called "stippen" which occurs in various forms and has been classified under different names. For our purpose we can refer to them as cork troubles. Figure No. 1 illustrates this trouble. The trouble has occurred on Fameuse and McIntosh in Eastern Ontario and Quebec. In the case of Fameuse it takes the form of corky core, internal cork, or blotchy cork; all three forms may be found on the same tree. In the case of McIntosh it is nearly always corky core, and we have not yet seen a case of blotchy cork in McIntosh.

We have done a little work with this for the last three years and, while we are at a loss yet as to the exact cause, I think our findings to that date might be of interest.

Fig. No. 2—Leaf showing effects of potash deficiency. Note scorched leaf edge.

In the first place, the trouble is more frequent on shallow soils than on soils of good depth; but it is also found on soil of the latter type. It is also more frequent on poor sandy soils than on clay loam or clay soils, and it is worse in dry years than in seasons of normal rainfall.

These factors, when examined independently of anything else, might lead one to conclude that it was entirely a question of moisture supply in itself, but our observations and work lead us to think it is more nutritional than that. We have, for instance, always found the trouble on very vigorous orchards. We have not as yet located it on definitely low-nitrogen

trees. In one orchard, where the trouble occurs to a considerable extent, there happens to be a fertilizer test which gave results as follows:

Lime only—cork very bad;
Nitrogen only—cork very bad;
Check rows receiving no fertilizer —very little cork, trees showing low vigor;
Potassium only—no cork;
Complete fertilizer—very small amount of cork;
Phosphorus only—no cork.

It should be added that where nitrogen was fed the trees were more vigorous than where it was not fed, but the complete fertilizer rows showed good vigor and a very small amount of cork.

A survey of the orchards in Hemmingford, Que., revealed that the trouble was generally associated with heavy mulching and heavy amounts of nitrogen. Particularly was it noticeable where heavy amounts of hen manure and pig manure mulch were used.

As examples of the influence of fertilizer treatment in contrast to purely water supply, permit me to recite the case of a few isolated trees in two orchards.

In orchard No. 1, the soil is very shallow and in 1933 was almost near the wilting point for the bulk of the summer. The trees were fed fair amounts of nitrogen until two years ago when the owner stopped and relied for a couple of years on mulch only, using old hay and straw. He was free of cork this year except on a few Fameuse trees which were in an old pig yard and a couple that were in his hen yard.

In orchard No. 2, there is fair depth of a good loam. The trees are vigorous and making good growth in a 9-5-7 fertilizer for the last five years.

Cork was found on a few trees of Joyce to which liberal applications of hen manure had been applied for two years.

One McIntosh in this orchard nine years old, which for the last three years had received six pounds of nitrate per tree plus heavy hen manure, showed cork very badly.

One Stark tree ten years old, growing where night soil had been deposited for years, has shown pit every year but in a gradually lowering amount until 1933 when no pit was present. This was the driest year in the history of the country. No fertilizer treatment has been given this tree since planting, and pit is gradually disappearing.

Another isolated tree is of interest. In this case it is an old Canada Red growing in what was, up until nine years ago, a pig yard. The present owner says that when he took away the pig yard of years ago the tree did not produce a single apple without cork. He has not given any fertilizer since and the amount of cork has been getting less until in 1933 it did not exceed 10% of the apples on the tree.

Other Illustrations

An example from our own orchard at Ottawa is noteworthy; a section of our orchard has been treated for the last five years with tremendous amounts of hen-house litter from the Egg-Laying Contest. The remainder of the orchard is under cover crop or sod and ordinary grass mulch. This year we had considerable trouble from the hen-manure section and were practically free of it in the rest of the orchard.

Patten Greenings, growing under the excessive mulch, were 100% pitted this year, whilst the same variety a hundred yards away under complete fertilizer and cultivation was 100% free of the trouble.

In another orchard where we have been working, we have trenched down five feet and found a good root system and good moisture conditions at that depth. An examination of the roots showed heavy iron accumulation and an ash analysis revealed excessively high iron, as high as over 2% iron compared with a fraction of 1% from

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Good Quality *in* Canning Peas

By F. L. Musbach

Wisconsin Agricultural Experiment Station, Marshfield, Wisconsin

CANNING peas have always been an important cash crop in Wisconsin. Only one other crop, potatoes, exceeds it in value, though occasionally tobacco occupies second place. Approximately 100,000 acres are devoted to the crop producing in round numbers 50 per cent of the total put up in the United States. In 1933 the acreage was reduced to 88,000 acres yielding approximately 40 per cent of the total United States pack.

The crop is grown in rotation following corn or legume hay, and only in a relatively few areas are peas grown on the same ground more than one year out of three or four. Disease losses are much less severe when the crop is grown under a rotative system insuring better yields and quality.

Mistaken Notions

Until recent years fertilizers, aside from manure, have not been used extensively. Good yields were secured, in the system of cropping followed, without supplementing the barnyard product with commercials. On the older cropped land of the State where the bulk of the peas are grown, fertilizers have been found profitable, though the use of complete fertilizer was discouraged by some canners because of the mistaken notion that the quality of the canned product was impaired if the fertilizer mixture included potash. Then, again, it was argued that since the crop is a member of the legume family it may be depended upon to secure its own nitrogen, and that this element was, therefore, needless. Finally it was believed that fertilizer may hasten maturity unduly, thus making it difficult to harvest the crop at the proper stage for quality product.

Quality Is Important

The importance of quality in canned products has been a subject meriting much discussion at every meeting of the National Canners' Association in recent years. The housewife is demanding quality in canned goods, and the canner aims to satisfy the demand. Then, too, doesn't her grocer point out the hamper of "fresh" garden peas just in this morning from beyond the Rio Grande or elsewhere? These faraway shipments, it must be remembered, come to the Northern markets when our canned products should be moving off from the merchant's shelf.

The question of the effect of complete fertilizers, or any particular constituent in fertilizers, on the quality of peas until recent years has remained one about which much has been said but little done. The purpose of the work here reported was to study the quality of canned peas as influenced by fertilizers. Some chemical studies also were undertaken.

On a uniform piece of Miami silt loam various combinations of fertilizers were applied at the rate of 300 pounds per acre, and the field was

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

FOR 41 years Dr. Frank Thomas Shutt has borne the imposing title of Dominion Chemist and filled the position of trust and responsibility it designates, in unique and completely satisfactory manner. Unique, because it was formulated and founded by him; satisfactory, because he has exceeded the most sanguine expectations of his employers in the masterly way in which he has conducted its multifarious functions and duties for the benefit of farmers, the honor of the science of chemistry, and the credit of his country.

Studying the records of Dr. Shutt's life work, one is amazed at the dynamic energy he has brought to the accomplishment of his onerous but congenial task. One wonders whence such energy comes, and how it has been maintained. Apparently he has never wasted a moment of time, and his holidays, if any, have been few and far between. Indeed, his trips away from Ottawa have been taken chiefly, for purposes of study rather than for pleasure, and ever he has had upmost in mind the furtherance of his efficiency for research in the chemistry of agriculture.

Despite the long hours and tedium of his labors in laboratory and library, he has managed to take walks abroad for the study and admiration of the works of the Creator, and well has proved the truth of Wordsworth's assertion that "Nature never did betray the heart that loves her." His walks, where solitude is sweet, appeal to him more than golf. Dogs of all breeds are his friends and companions. His pipe is a source of solace.

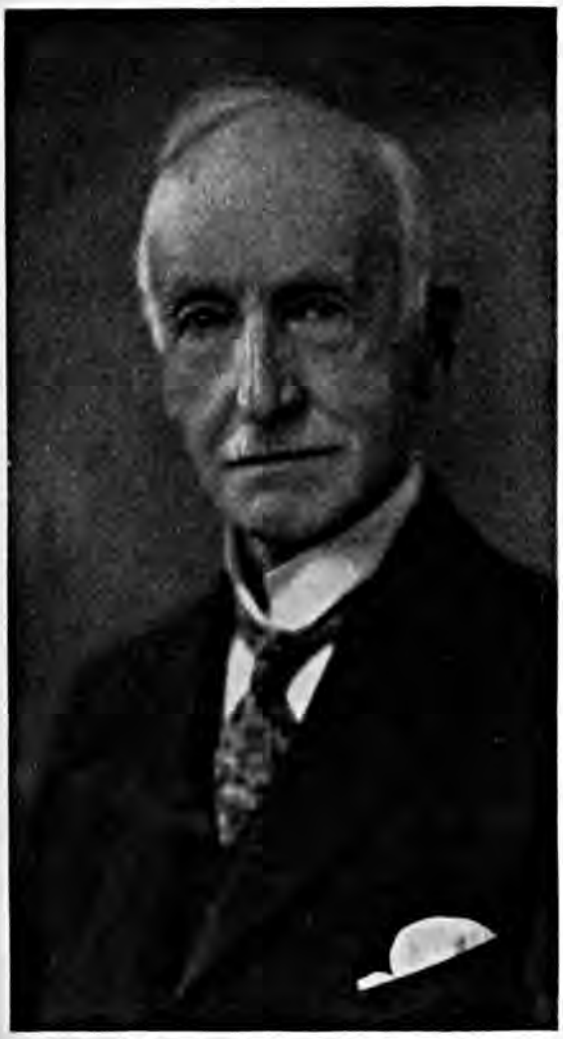
Then, too, his love of Nature has found expression in music, for he is an accomplished musician, and in the many camera pictures he has made and exhibited with success, as an amateur photographer possessed of professional skill. A gallery of over 200 pictures graces the walls of his beautiful home on the banks of Rideau River where also a vast library is housed.

Most Versatile

Seldom does one find a scientist so versatile as he and so thorough and exact in all that he undertakes. Withal, he is of charming personality and is a pleasing and prolific writer of articles, reports, bulletins, and official and scientific documents of surpassing clarity and pureness of diction. He has contributed nearly 40 articles to the Transactions of the Royal Society of Canada, and has prepared many important papers for home and foreign journals. Publications on chemical research regarding a wonderfully wide range of subjects have come annually from his facile pen. Their number is legion, and all of them have been characterized by authenticity, conciseness, and educational value. The extent of his writing, and that of his able staff, may be judged by the

fact that annually some 35,000 letters are mailed from the Central Experimental Farm at Ottawa, in addition to reports, bulletins, and other printed matter. For more than a quarter of a century Dr. Shutt also conducted a column in "The Family Herald and Weekly Star" in which he gave practical and scientific information on all matters pertaining to "Chemistry on the Farm."

But ability as a writer has not been



Dr. Frank Thomas Shutt

his sole means of conveying to the public the results of his experiments and investigations in a useful and informative manner, for he has been a ready and convincing speaker. Being a practical farmer, he also has been as much at home with rural audiences as with congregations of chemists and research men in other branches of science. At all of these meetings he has not only upheld the dignity of the savant, but has been able patiently and clearly to explain matters in doubt or dispute and, possessing a nimble wit and readiness in repartee, ably has acquitted himself in public debates. Always, he has shown the attributes of the gentleman, and so is regarded as a true friend by hosts of admirers.

Dr. Shutt holds that the object of science is to discover facts and then correlate and coordinate them, so that laws and principles may be established. He has found that *chemistry tells the tale of soil impoverishment,* and for more than 40 years has been striving, through his knowledge of that science, to offset the depletion of soil fertility and devise means for the productive improvement of Canadian farms. His work has borne fruit, as evidenced by improved conditions on every hand; but he does not attribute that solely to the research work of himself and his colleagues in the field of agricultural chemistry. He is of the opinion that the marked improvement in farming as an industry, in recent years, has been due largely to the abandonment of haphazard rule-of-thumb methods, as well as the adoption of methods based on the results of carefully and skillfully conducted investigations by chemists, botanists, physiologists, physicists, entomologists, and other scientists. He respects and appreciates the work of his brother scientists in all branches of the art having a bearing on agriculture.

"Rational, profitable farming today," according to Dr. Shutt, "has scientific truths for its foundation." He acknowledges also that the work of himself and his staff in chemistry has been assisted very greatly by help rendered in various ways by those in charge of the chemical investigations at the agricultural experiment stations of the United States.

Despite all that has been accomplished during his long and purposeful tenure of the position of Dominion Chemist, and all that has been done by others in like posts elsewhere, he modestly confesses that so much re-

mains to be undertaken that he feels at times as if a beginning had not yet been made. Nevertheless, in looking back, he does not find it difficult to see where chemical research has played its part in the development of Canadian agriculture.

An Important Trio

He believes that the three sciences —chemistry, physics, and biology— must all contribute their share of work toward complete and correct soil diagnosis, and as his contribution, he has been trying to construct a plan or system of farming that will materially lessen the deterioration consequent to exclusive grain farming. As among the factors that conduce to profitable farming a productive soil is perhaps the one of greatest importance, it is natural that from the outset he has made the matter of economic maintenance and increase of soil fertility his special study. The requirements of crops and animals, the constitution and needs of soils, the most economical means of maintaining soil fertility, the nature and amounts of fertilizing ingredients in manure, the relative value of forage crops and cattle feeds, the composition of dairy products, the constituents and preparation of fungicides and insecticides—all these and many more have been the subjects of Dr. Shutt's chemical research and analysis. He considers the relationship that exists between modern and progressive agriculture and chemistry so important and intimate that, truthfully, it may be asserted that up-to-date farming is putting into practice the teaching of himself and other leading agricultural chemists.

The variety of materials analyzed in Dr. Shutt's laboratories since 1890, in addition to ordinary farm soils, feeds, fertilizers, and insecticides, is astonishing. The list includes hundreds of analyses of marsh, river and mussell muds, mucks, leaf molds, bracken, peats, mosses, seaweed, eelgrass, spent sewage, cotton-factory waste, flue ashes, dog-fish scrap, tobacco refuse, whale scrap, grape refuse, elevator dust, boiler scale, spent bone and, many other unusual commodities. His analyses of drinking water have materially ministered to the health of the farming communities of Canada.

Frank Thomas Shutt was born in Stoke Newington, London, England, September 15, 1859, the son of William Denis Shutt, C. E., and Charlotte Cawhorn Shutt, a native of Leeds, Yorkshire. Expert as a civil engineer, his father supervised the work of the Thames River Embankment and the Abbey Mills Pumping Station of the London sewage system. Young Frank, being somewhat delicate, was educated at home by tutors instead of attending the public schools.

After arriving in Canada, he was a pupil of Dr. William Hodgson Ellis, Principal of the School of Technology, Toronto. Subsequently he became private assistant in analytical work and teaching to Dr. Ellis. On removal of the college to the School of Practical Science, Queen's Park, affiliated with the University of Toronto, Dr. Ellis became Professor of Applied Chemistry and acted as Public Analyst. As his assistant, young Shutt served for five years and obtained valuable experience in the analyzing of foods, and in teaching and lecturing work.

Accorded Many Honors

In 1883 he matriculated at Toronto University with first class honors in the science course, and in 1885, graduated B.A. with first class honors and medal in chemistry and biology. In 1886 he received the degree of M.A., and in 1894, that of Doctor of Science. In 1928 he was awarded the sum of $1,250 by the American Society of Agronomy in recognition of his research work on the nitrogen problems of North American agriculture. On graduation in 1885, he was appointed Fellow in Chemistry and held that appointment until selected as

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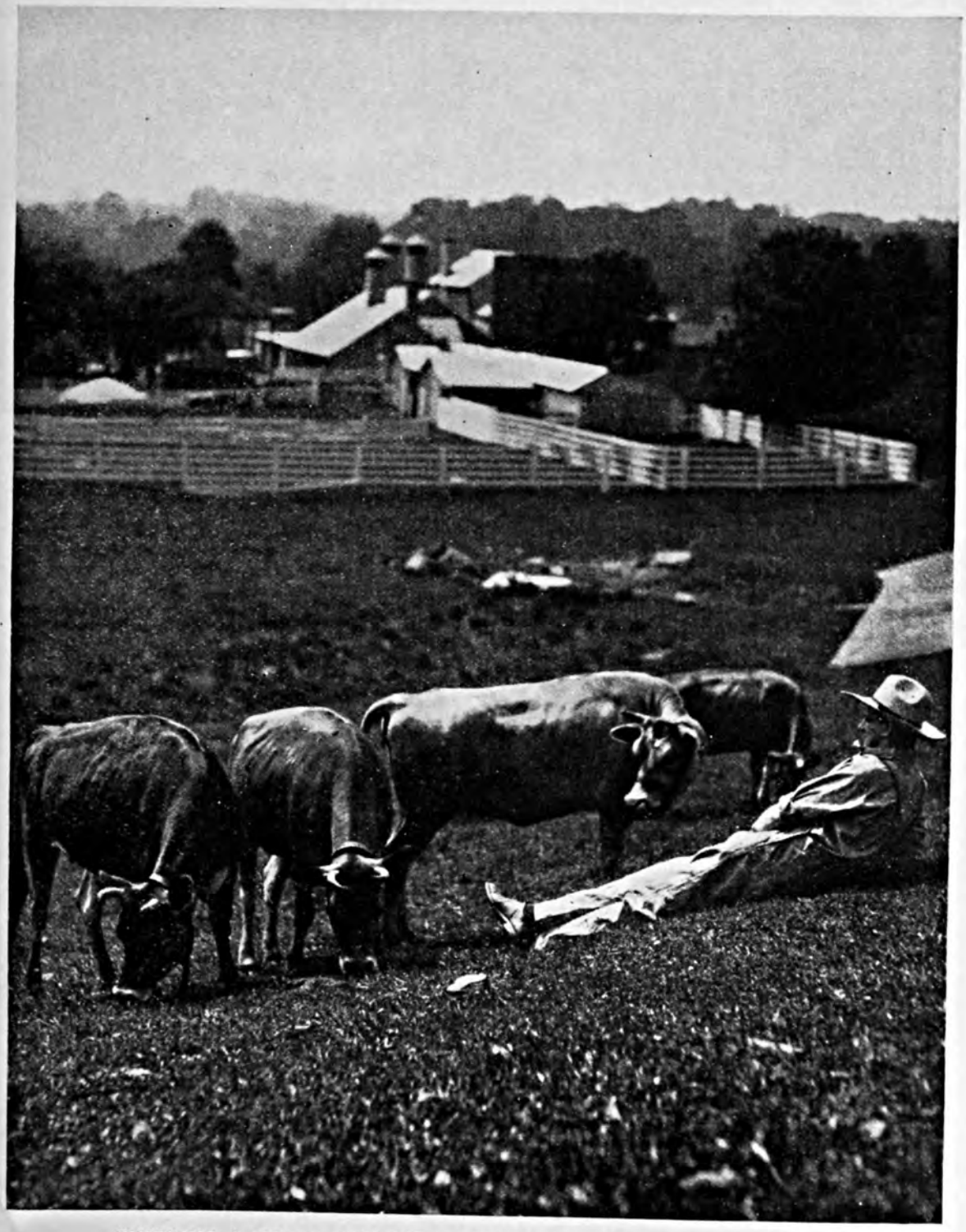
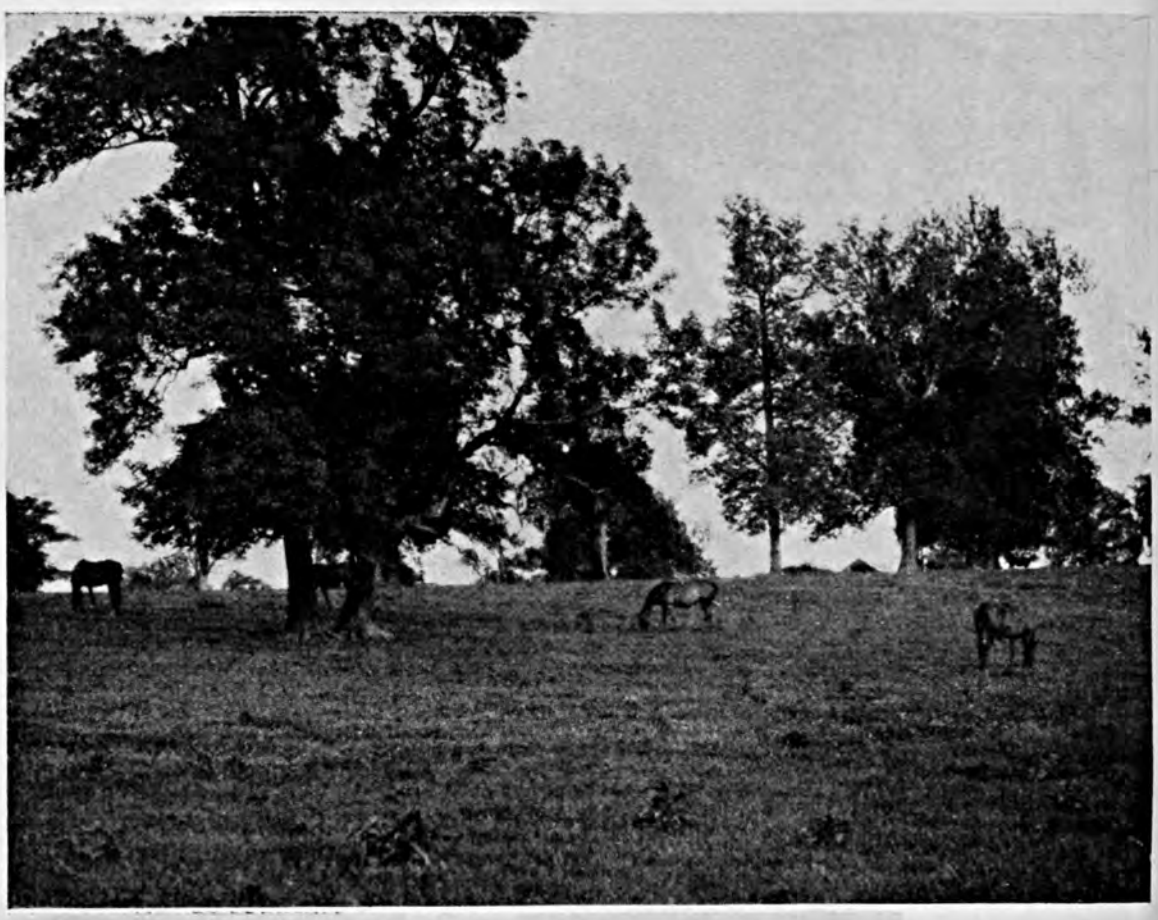
Pictorial



ENJOYING A SPRING TWILIGHT, AFTER THE DAY'S WORK IS DONE.

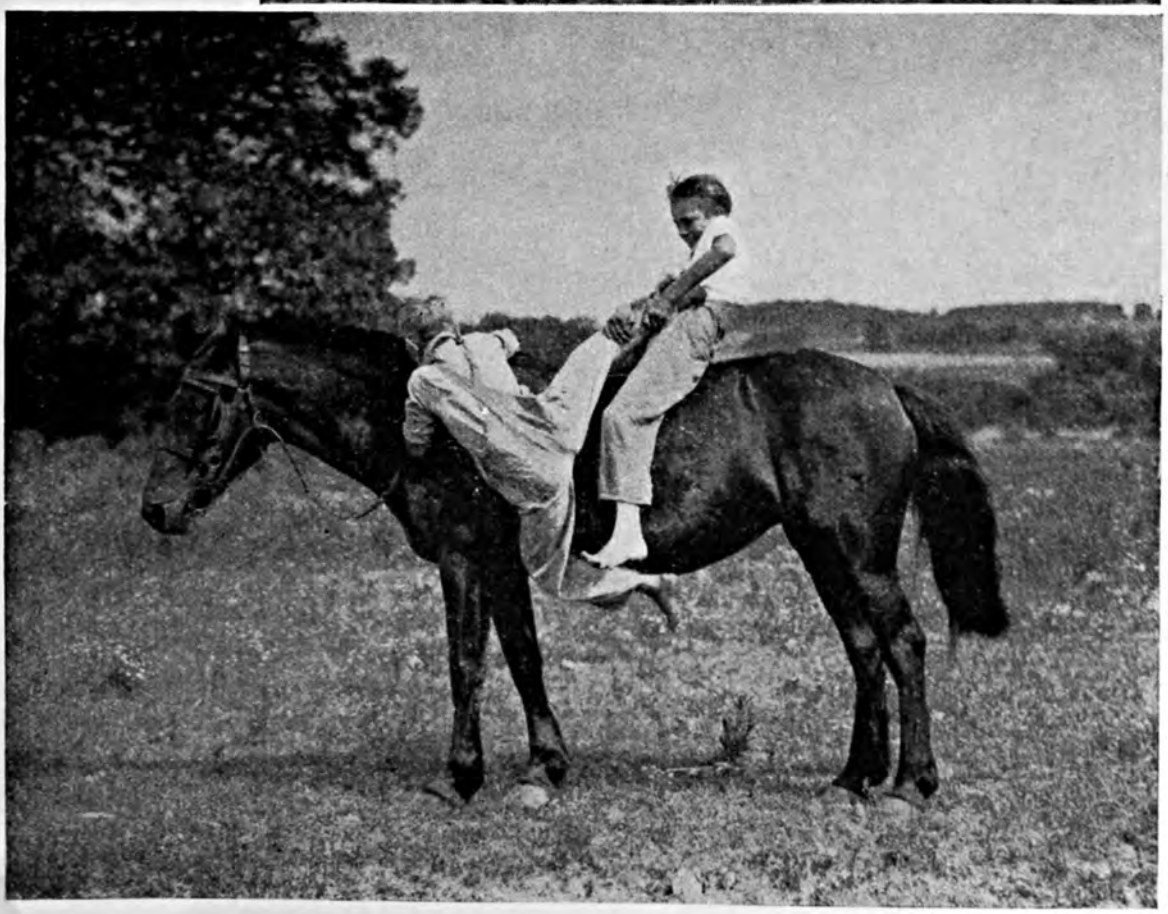


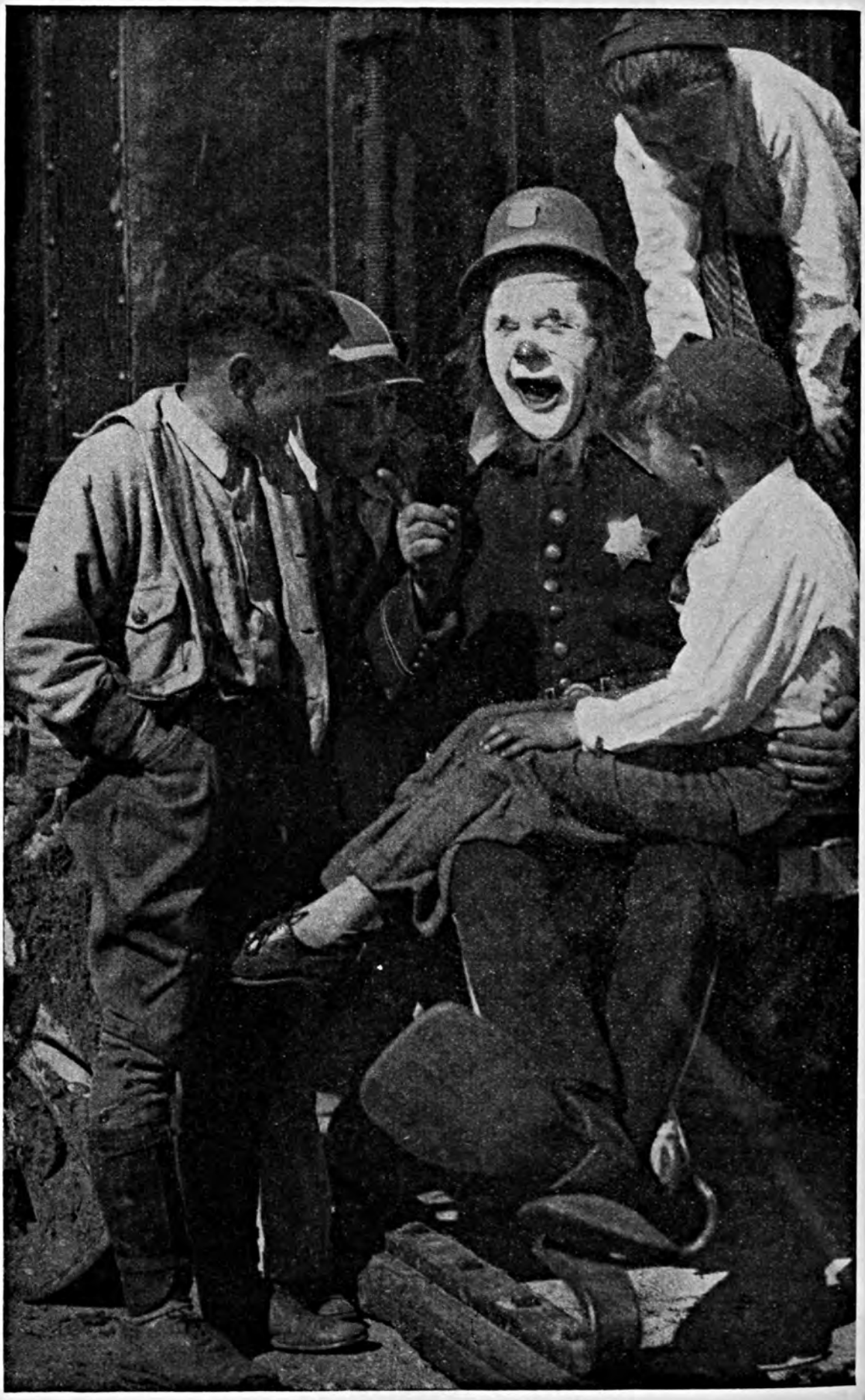
Above: In Kentucky, home of the famous bluegrass pastures.

Left: Some future potato pickers of Florida.

Right: The contentment of this little piggy is evident.

Below: Where there's a will, there's a way.





THE THRILL OF A LIFETIME.

The Editors Talk

Tung Oil

A relatively new interest in American agriculture is the production of tung oil. There is a growing need for reliable information on the best fertilizers to use in the production of tung trees. According to a report by the U. S. Department of Commerce, entitled "Tung Oil," this oil has become "particularly well-known as an essential raw material in the manufacture of varnishes, also for the waterproofing of wood and many other substances." It is also pointed out that domestic requirements are at present derived almost exclusively from China, and the imports for the years 1926-1930 have expanded steadily from 83,000,000 pounds in 1926 to over 126,000,000 pounds in 1930.

The tung oil of commerce is expressed from the seeds of two species of Aleurites, belonging to the spurge family, which differ considerably in appearance and characteristics. It has been found that tung trees can be grown satisfactorily in the Gulf States. Work on the fertilization of tung trees is in progress. In Mississippi fertilizer experiments are under way. Florida also has made recommendations with reference to the nutrient requirements of tung trees. One of the difficulties to be overcome apparently is that the trees are apt to grow too quickly and have not a sufficiently close grain for strong, firm trees. Under certain conditions of growth, die-back is also prevalent.

From the point of view of the chemical content of the dry matter in the fruit, shells and almonds, interesting data is provided in the following table:

(l'Agronomie Coloniale, Octobre 1933) P. Ammann
"Huile d'Aleurites Fordii de Madagascar"
(Tung Oil of Madagascar)
p. % Dry Matter:

	Envelope of fruits	Shells	Almonds
Ashes	4.25	7.14	2.92
P_2O5	.247	.227	.973
CaO	.55	.586	.437
MgO	.249	.182	.02
K2O	2.937	1.276	.683
N	.93	.927	3.051
Moisture when analyzed	11.97	14.60	4.71

Apparently there are few places in the world where adequate nutritional experiments have been conducted. In view of the growing need for tung oil in America, and the fact that trees can be grown in this country, there would seem to be a particular field for the contribution of agricultural workers to our knowledge of the nutritional requirements of tung trees for the production of maximum quantities of tung oil from trees free of disease.

Reforesting the South

In connection with the work of the National Forest Reservation Commission and the program for which President Roosevelt last June allotted $20,000,000 of Emergency Conservation Work funds, it is very interesting to note some of the outstanding advantages of Southern States as a field for forestry development. E. L. Demmon, Director of the Southern Forest Experiment Station at New Orleans, believes that with approximately 200,000,000 acres either in forest or cut-over land, the volume of annual wood production possible under adequate forest protection and management will be a most important factor in the economic and social progress of the South.

Among the South's advantages in forestry, Mr. Demmon lists its great number of valuable fast-growing native timber species, its long growing season, its abundant rainfall, the comparatively easy conditions for logging, the relative ease and low cost at which forest crops can be produced, and proximity to great timber markets.

"The South has long been an outstanding source of lumber and other forest products," he says. "One reason for this is that it leads all other sections of the United States in area of commercial forest land, with 39 per cent of the total for the country. Within its borders, 73 per cent of all land is either in forest or has been cut over and now lies idle; 64 per cent of its gross area is commercial forest land. Although the South has only 12 per cent of the volume of merchantable saw-timber of the Nation, it exceeds in this respect all other regions except the Pacific Coast. As an industry, the forests of the South rank second only to agriculture in importance. Forest products cut and sold on farms rank fourth among all farm crops in the South, with a total annual income to farmers of more than 82 millions of dollars, being exceeded only by cotton, tobacco, and potatoes."

Rothamsted's Appeal

Everyone who has visited the Rothamsted Experimental Station at Harpenden, England, and everyone who has studied its valued records to agriculture will be interested in knowing that an appeal for donations to purchase the holdings has been launched. The Journal of the Ministry of Agriculture for April, 1934, contains some notes on this subject. It says: "The menace of encroaching building development has made it necessary for the Committee of the Rothamsted Experimental Station to launch a public appeal for a fund of 30,000 pounds to purchase their holdings."

Before the death of John Bennet Lawes, he established a Trust to continue the work begun by himself in association with Joseph Henry Gilbert. He gave to the Trust for a term of years the use of the land on which the field experiments had been carried out. But, "the old leases and agreements," the Journal reports, "no longer afford a prospect of the peaceful continuity essential for agricultural experiments. It has become necessary to purchase, and the Trustees of the Lawes Estate have agreed to sell the necessary land to the Rothamsted Committee for the sum stated."

In view of the great value of the long-continued experiments to world agriculture, it is hoped that this public appeal will be successful and that the classic work started long years ago by Lawes and Gilbert will be continued.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

An interesting and highly significant compilation of fertilizer and plant-food consumption data has been prepared by the Department of Agronomy of the Ohio State University under the title of "Spring and Fall Fertilizer Sales in Ohio in 1933." Actual tonnage of fertilizer materials and of the various mixed fertilizer analyses for a number of years are given. The highest total fertilizer sales were made in 1929 and the lowest in recent years in 1932. A 23 per cent increase in sales in 1933 was a pleasing indication of an improvement in the agricultural situation, but sales were still very low. Plant-food consumption data from 1924 to date show significant changes in fertilizer usage in Ohio during this period. Nitrogen and potash consumption have increased, the former more than the latter, while phosphoric acid has decreased.

Similar data for 1932 and 1933 in Massachusetts are contained in Control Series Bulletin No. 69 of the Massachusetts Agricultural Experiment Station, "Inspection of Commercial Fertilizers," by H. D. Haskins. The effects of the poor agricultural situation are shown in the falling off in total tons of fertilizer sold and in a lower consumption of all plant foods in these years.

Bulletins of this type, giving such complete records of fertilizer sales and of plant-food consumption, are highly commendable. The number of States compiling such data is increasing and those interested in fertilizer usage hope that all States soon will be publishing complete records of plant-food consumption. Such data are essential for the intelligent interpretation of trends in fertilizer usage and aid in gauging the efficiency of fertilizer practice.

"Quarterly Bulletin," State Board of Agr., Dover, Del., Vol. 23, No. 4, Fertilizer Report-Seed Report, July-December, 1933, Feeds and Miscellaneous, January-December, 1933, for Quarter Ending Dec. 31, 1933, H. H. Hanson.

"Annual Report of the State Chemist of Florida for the Year Ending December 31, 1933," Dept. of Agr., Tallahassee, Fla., Quar. Bul. Vol. 43, No. 1, Jan. 1, 1934, J. J. Taylor.

"Commercial Fertilizers, 1933," Agr. Exp. Sta., Orono, Me., Official Inspections 149, James M. Bartlett.

"Commercial Fertilizers, Commercial Feeds and Agricultural Liming Materials." Univ. of Md., College Park, Md., Control Series, No. 150, Jan., 1934.

"Inspection of Agricultural Lime Products," Agr. Exp. Sta., Amherst, Mass., Control Series, Bul. 71, Dec., 1933, H. D. Haskins.

"Fertilizer Tests on an Important Pasture Soil Type," Agr. Exp. Sta., Amherst, Mass., Bul. 306, Jan., 1934, A. B. Beaumont.

"Buying Fertilizers," Agr. Exp. Sta., East Lansing, Mich., Ext. Bul. 47, (Rev.) May, 1933, E. C. Sackrider.

"Investigations in the Use of Nitrate of Soda for Field Crops," Agr. Exp. Sta., Columbia, Mo., Bul. 327, July, 1933, M. F. Miller and R. L. Lovvorn.

"Fertilizer Experiments on Strawberries with a Presentation of Statistical Methods for Calculating the Significance of Plot Yields," Agr. Exp. Sta., Durham, N. H., Tech. Bul. 55, June, 1933, L. P. Latimer and S. W. Wentworth.

"Fertilizer and Tillage for Blueberries," Agr. Exp. Sta., New Brunswick, N. J., Bul. 558, Nov., 1933, Charles S. Beckwith and Charles A. Doehlert.

"Fourth Annual Fertilizer Report of New

Mexico Feed & Fertilizer Control Office, State College, New Mexico, March 1, 1934," F. E. Oakes.

"A Test of Floats as Fertilizer and a Study of the Influence of Farm Manure on Their Effectiveness," Agr. Exp. Sta., Ithaca, N. Y., Bul. 574, June, 1933, T. L. Lyon.

"Manganese an Essential Element for Green Plants," Agr. Exp. Sta., Ithaca, N. Y., Mem. 151, Jan., 1934, Edwin Fraser Hopkins.

"Report of Analyses of Commercial Fertilizers Sold in New York State July 1, 1932 to June 30, 1933," Dept. of Agr. and Mkts., Albany, N. Y., Agr. Bul. 280, Nov., 1933, Charles H. Baldwin.

"Fertilizer Analyses for Different North Carolina Crops Including the Best Percentages of Water-Insoluble Nitrogen of Totals in Fertilizer Mixtures Recommended," Agr. Exp. Sta., State College Station, Raleigh, N. C., Agron. Infor. Cir. 85, Jan., 1934, R. Y. Winters.

"Inspection of Fertilizers," Agr. Exp. Sta., Kingston, R. I., Ann. Fert. Cir., Sep., 1933, W. L. Adams and A. S. Knowles, Jr.

"Farm Manures," Agr. Exp. Sta., Clemson College, S. C., Ext. Bul. 92, Sep., 1932, R. W. Hamilton.

Soils

In line with increasing the efficiency of agriculture, more and more attention has been paid in recent years to land utilization. This is reflected in numerous publications of Agricultural Experiment Stations dealing with various phases of land utilization, especially as affecting the production of farm crops. "Crop Response to Lime and Fertilizer on Muck Soil" by C. B. Williams, H. B. Mann, and J. L. Rea, Jr., of the North Carolina Agricultural Experiment Station (Bulletin 292) shows how the disappointing crop yields on cut-over swamp land in that State were due mainly to improper fertilization. From the results of work on these soils it would appear as if the key to improved yields is the use of lime and complete fertilizer.

A classification of the soils of Maryland on the basis of their adaptability to produce certain crops has been prepared by O. C. Bruce and J. E. Metzger in Maryland Agricultural Experiment Station Bulletin 351, "The Soils of Maryland." This should serve as a useful guide in determining the best crops to grow on the various soils of the State and thus aid in the better utilization of these soils.

P. T. Gish and T. B. Hutcheson have made an intensive study of an important soil type in Virginia. They experimented on lime and fertilizer treatments and types of crops and varieties that are likely to give best results. This work will be of great value to farmers on this and similar types of soil. The methods used, data, and conclusions reached are contained in Virginia Agricultural Experiment Station Bulletin 292, "Field Crops on Berks Shale Soil Respond to Lime and Fertilizers."

The Illinois Agricultural Experiment Station has maintained 26 permanent experimental fields in various parts of the State covering the most important agricultural soils on which types of farming and soil fertilization are studied. Crop yields and the interpretation of the results for 1932 are given by F. C. Bauer in Illinois Agricultural Experiment Station Bulletin 398 entitled, "Crop Yields from Illinois Soil Experiment Fields in 1932." These experiments bring out very forcefully the variation in soil types and the necessity of adapting the type of farming and, more particularly, the fertilization of the crop to the soil. It is emphasized also that the longer the soils are intensively farmed, the greater is the attention that must be paid to proper fertilization, if farmers "are to make the most economic use of their land."

"The Relation of Certain Soil Characteristics to Forest Growth and Composition in the Northern Hardwood Forest of Northern Michigan," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 135, Sep., 1933, R. H. Westveld.

"The Occurrence of Azotobacter in Peat Soils in New York," Agr. Exp. Sta., Ithaca, N. Y., Mem. 148, June, 1933, J. K. Wilson and B. D. Wilson.

"The Character of the Peat Deposits of New York," Agr. Exp. Sta., Ithaca, N. Y., Mem. 149, June, 1933, B. D. Wilson and E. V. Staker.

"Lysimeter Investigations—III. Mineral and Water Relations and Final Nitrogen Balance in Legume and Non-legume Crop Rotations for a Period of 16 Years," Agr. Exp. Sta.,

Geneva, N. Y., Tech. Bul. 212, Aug., 1933, R. C. Collison, H. G. Beattie, and J. D. Harlan.

"Moisture and Fertility Relations of Subsoil Variations in Heavy Silt Loam Soil at Goodwell, Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Bul. 214, Nov., 1933, H. H. Finnell.

"The Economy of Soil Nitrogen under Semi-arid Conditions," Agr. Exp. Sta., Stillwater, Okla., Bul. 215, Dec., 1933, H. H. Finnell.

"Raw Organic Matter Accumulations Under Various Systems of Culture," Agr. Exp. Sta., Stillwater, Okla., Bul. 216, Dec., 1933, H. H. Finnell.

"The Results of Twenty Years Complete Soil Fertility Tests, Brookings, S. D.," Agr. Exp. Sta., Brookings, S. D., Bul. 280, Apr., 1933, Joseph Gladden Hutton.

"Soil Profile and Root Penetration as Indicators of Apple Production in the Lake Shore District of Western New York," U. S. D. A., Washington, D. C., Cir. 303, Dec., 1933, A. T. Sweet.

"A Study of Claypan Soils," U. S. D. A., Washington, D. C., Tech. Bul. 399, Dec., 1933, Irvin C. Brown, T. D. Rice, and Horace G. Byers.

"Soil Survey of Coosa County, Alabama," U. S. D. A., Washington, D. C., Series 1929, No. 18, Arthur E. Taylor and J. F. Stroud.

"Soil Survey of the Yuma-Wellton Area, Arizona-California," U. S. D. A., Washington, D. C., Series 1929, No. 20, F. O. Youngs, W. G. Harper, James Thorp, and M. R. Isaacson.

"Soil Survey of The Capistrano Area, California," U. S. D. A., Washington, D. C., Series 1929, 19, E. J. Carpenter and R. Earl Storie.

"Soil Survey of The Paso Robles Area, California," U. S. D. A., Washington, D. C., Series 1928, No. 34, E. J. Carpenter and R. Earl Storie.

"Soil Survey of Blackford County, Indiana —Part 1, The Management of Blackford County Soils—Part 2," U. S. D. A., Washington, Series 1928, No. 32, D. C., W. E. Tharp, S. R. Bacon, A. T. Wiancko, and S. D. Conner.

"Soil Survey of Colfax County, Nebraska," U. S. D. A., Washington, D. C., Series 1930, No. 11, A. W. Goke, W. J. Moran, F. A. Hayes, E. A. Nieschmidt.

Crops

The spring season has brought forth an interesting lot of practical information on the profitable production of various crops. In addition are several annual reports from experiment stations summarizing work done in the interests of the farmers. A great many of these publications will prove valuable additions to farm-home, county-agent, and school libraries.

"Irish Potato Culture in the Coastal Plain of Georgia," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Bul. 20, Jan., 1933, Otis Woodard.

"A Year's Progress in Solving Farm Problems of Illinois," Agr. Exp. Sta., Urbana, Ill., 46th Ann. Rept. for Year Ended June 30, 1933. H. W. Mumford.

"Report on Agricultural Research for the Year Ending June 30, 1933," Agr. Exp. Sta., Ames, Iowa, R. M. Hughes.

"Growing Tomatoes in Kansas," Agr. Exp. Sta., Manhattan, Kan., Cir. 172, Nov., 1933, Walter B. Balch.

"Sorghum Production in Kansas," Agr. Exp. Sta., Manhattan, Kan., Bul. 265, July, 1933, H. H. Laude and A. F. Swanson.

"Forty-Fourth Annual Report of the Agricultural Experiment Station of the University of Kentucky for the Year 1931—Part II," Agr. Exp. Sta., Lexington, Ky., Buls. 314-325.

"Bean Investigations," Agr. Exp. Sta., Baton Rouge, La., Bul. 245, Dec., 1933, Julian C. Miller and W. D. Kimbrough.

"A Study of the Factors Influencing Red Color on Apples," Agr. Exp. Sta., College Park, Md., Bul. 353, July, 1933, L. A. Fletcher.

"Culture and Use of Popcorn," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 148, Jan., 1934, J. R. Duncan.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 16, No. 3, Feb., 1934.

"Work of the Agricultural Experiment Station—The Report of the Director for the Year Ending June 30, 1932," Agr. Exp. Sta., Columbia, Mo., Bul. 328, July, 1933, F. B. Mumford and S. B. Shirky.

"The Best Practices in Oats Production," Agr. Exp. Sta., Columbia, Mo., Cir. 171, Jan., 1934, C. A. Helm.

"The Nature of Shedding of Immature Apples," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 201, Aug., 1933, A. E. Murneek.

"Lespedeza Serica," Agr. Exp. Sta., Columbia, Mo., Bul. 331, Dec., 1933, C. A. Helm and W. C. Etheridge.

"Forty-Sixth Annual Report 1933," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Carl E. Ladd.

"Fifty-Second Annual Report for the Fiscal Year Ended June 30, 1933," Agr. Exp. Sta., Geneva, N. Y., U. P. Hedrick.

"Orchard Management," Agr. Exp. Sta., Geneva, N. Y., Cir. 121 (Rev.), Jan. 1, 1934.

"Studies in Plant Propagation—The Influence of Chemicals, of the Medium, and of the Position of the Basal Cut, on the Rooting of Evergreen and Deciduous Cuttings," Agr. Exp. Sta., Ithaca, N. Y., Bul. 571, June, 1933, L. C. Chadwick.

"Nut Growing in New York State," Agr. Exp. Sta., Ithaca, N. Y., Bul. 573, June, 1933, L. H. MacDaniels.

"The Rate of Photosynthesis of Apple Leaves Under Natural Conditions. Part I,"

Agr. Exp. Sta., Ithaca, N. Y., Bul. 577, Nov., 1933, A. J. Heinicke and M. B. Hoffman.

"Varieties of Alfalfa in Pennsylvania," Agr. Exp. Sta., State College, Pa., Bul. 295, Sep., 1933, H. B. Musser and C. J. Irvin.

"Influence of the Cion and of an Intermediate Stem-Piece upon the Character and Development of Roots of Young Apple Trees," Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 218, Nov., 1933, H. B. Tukey and Karl D. Brase.

"Planning the Home Garden in Eastern North Carolina," Agr. Exp. Sta., State College Station, Raleigh, N. C., Ext. Cir. 198, Mar., 1934, E. B. Morrow.

"Current Investigations of the North Carolina Agricultural Experiment Station 1933-34," Agr. Exp. Sta., State College Station, Raleigh, N. C., Bul. 294, Feb., 1934, R. Y. Winters.

"Relation of the Quality of Cotton Planting Seed to Length of Staple," Agr. Exp. Sta., State College Station, Raleigh, N. C., Bul. 296, Feb., 1934, J. H. Moore.

"Annual Report of the Director for the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., Brookings, S. D., James W. Wilson.

"Growing Sweet Corn in Texas," Agr. Exp. Sta., College Station, Tex., Cir. 69, Feb., 1934, P. C. Mangelsdorf.

"The Home Garden and Orchard in the Wichita Valley," Agr. Exp. Sta., College Station, Tex., Cir. 70, Jan., 1934, L. E. Brooks and C. H. McDowell.

"Rate of Water Evaporation in Texas," Agr. Exp. Sta., College Station, Tex., Bul. 484, Nov., 1933, R. E. Karper.

"Growing Cherries East of the Rocky Mountains," U. S. D. A., Washington, D. C., Farmers' Bul. 776 (Rev.) June, 1933, H. P. Gould.

"Strawberry Culture—Eastern United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1028 (Rev.) July, 1933, George M. Darrow.

"Corn Culture," U. S. D. A., Washington, D. C., Farmers' Bul. 1714, Nov., 1933, Frederick D. Richey.

"List of Bulletins of the Agricultural Experiment Stations for the Calendar Years 1931 and 1932," U. S. D. A., Washington, D. C., Misc. Pub. 181, Mar., 1934, Catherine E. Pennington.

"Forty-Third Annual Report for the Fiscal Year Ended June 30, 1933," Agr. Exp. Sta., Pullman, Wash., Bul. 291, Jan., 1934, Edw. C. Johnson.

"Forty-Third Annual Report of the University of Wyoming Agricultural Experiment Station, 1932-1933," Agr. Exp. Sta., Laramie, Wyo., J. A. Hill.

Economics

If the depression has done nothing else for the welfare of the country, it has put a premium upon good management. There will be found among the publications listed below several studies on farm management, from which can be gleaned much information on practices which will go a long way toward beating hard times.

"Types of Farming in the Eastern Connecticut Highland," Agr. Exp. Sta., Storrs, Conn., Bul. 191, Aug., 1933, I. G. Davis.

"Profitable Systems of Farming for the Idaho Falls Area," Agr. Exp. Sta., Moscow, Idaho, Bul. 198, June, 1933, Paul A. Eke and Neil W. Johnson.

"Agricultural Outlook for Illinois 1934," Agr. Exp. Sta., Urbana, Ill., Cir. 417, Jan. 31, 1934, H. W. Mumford.

"Corporate-Owned Land in Iowa," Agr. Exp. Sta., Ames, Iowa, Bul. 307, Sep., 1933, William G. Murray and Ronald C. Bentley.

"Prospects for Agricultural Recovery—I. The Economic Situation in 1933," Agr. Exp. Sta., Ames, Iowa, Bul. 310, Dec., 1933, Geoffrey Shepherd.

"Prospects for Agricultural Recovery—III. Estimating Advantages of the Corn-Hog Plan to the Individual Farm," Agr. Exp. Sta., Ames, Iowa, Bul. 312, Jan., 1934, John A. Hopkins, Jr.

"Prospects for Agricultural Recovery—IV. National Economic Planning," Agr. Exp. Sta., Ames, Iowa, Bul. 313, Jan., 1934, Geoffrey Shepherd.

"A Farm Management Study of 70 Dairy Farms in Montgomery County, Maryland," Agr. Exp. Sta., College Park, Md., Bul. 356, Sep., 1933, Donald E. Watkins.

"A Farm Management Study of Crop Production Practices," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 241, Sep., 1933, P. G. Minneman and E. B. Hill.

"Grape Production Costs and Returns in Southwestern Michigan," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 242, Sep., 1933, N. L. Partridge.

"Local Prices of Farm Products in Nebraska, 1895-1932," Agr. Exp. Sta., Lincoln, Neb., Bul. 284, July, 1933, H. C. Filley and Arthur M. Hauke.

"Economic Studies of Dairy Farming in New York—XI. Success in Management of Dairy Farms as Affected by the Proportion of the Factors of Production," Agr. Exp. Sta., Ithaca, N. Y., Bul. 562, June, 1933, P. H. Stephens.

"Costs and Returns in Producing Apples in the Newfane-Olcott Area, Niagara County, New York, 1926 to 1928," Agr. Exp. Sta., Ithaca, N. Y., Bul. 565, June, 1933, T. E. LaMont.

"Costs and Returns in Producing Potatoes in New York in 1929," Agr. Exp. Sta., Ithaca, N. Y., Bul. 568, June, 1933, F. L. Underwood.

"Wisconsin Farm Prices 1841 to 1933," Agr. Exp. Sta., Madison, Wis., Res. Bul. 119, Nov., 1933, W. P. Mortenson, H. H. Erdman, and J. H. Draxler.

The Inquiring Mind

(*From page* 14)

Chemist to the Dominion Government Experimental Farms System, in 1887, with headquarters at Ottawa. The act establishing the Experimental Farms System was passed by the Federal Parliament in 1886.

Dr. Shutt is a member of the Royal Chemical Society of England, and of the American Association for the Advancement of Science, and a Fellow of the Royal Society of Canada, the Canadian Institute of Chemistry, the London, England, Chemical Society, and the Institute of Chemists of Great Britain. In 1931 he took part in the ceremonies commemorating the Jubilee of the Pennsylvania State Agricultural Experiment Station. We understand, too, that he has been asked to accept the Presidency of the Agricultural Section of the British Association for the Advancement of Science at the 1934 convention to be held in Aberdeen, Scotland. He is an Episcopalian and 20 years ago served as organist in St. Matthew's Church, Ottawa.

A Practical Farmer

As already has been stated, Dr. Shutt is a practical farmer. He owns a farm of about 160 acres called "The Maples" at Kemptville, Ontario, 35 miles west of Ottawa, and fronting on the Rideau River. It was purchased 10 years ago. There he maintains a fine herd of Holstein cows whose milk goes to a local butter factory, while the skimmilk is fed to a large number of pigs which have returned a profit. The farm is well managed by his nephew, Archie Homes, and is a source of recreation as well as practice and profit to Dr. Shutt. There, despite the extreme frigidity of the Canadian winter, this hardy old bachelor sometimes may be seen enjoying the strenuous work of cutting and hauling wood from the "bush."

He has, throughout life, been lovingly devoted to his mother, who lived with him and was alert in mind and body until a month before her decease in 1920, at the great age of 93 years. A beautiful home was built by him on the banks of the Ottawa River in the fine suburb of Rockcliffe, in addition to his house at Warrington Drive on the Rideau River.

When Dr. Shutt assumed the position of Dominion Chemist in 1887 at the Central Experimental Farm, there was but one small room equipped as a laboratory. Since then the division of Chemistry, under his direction, has grown in a wonderful way. The Chemistry Building erected there in 1896, and since then twice enlarged, contains 14 well-equipped laboratories, with a technical staff of 12 to 15 experts. In connection with the Central Experimental Farm at Ottawa, which is headquarters of the chief administrative officers and scientific staff, there are fully equipped laboratories for the chemical, botanical, entomological, and other departments, with a force of trained men necessary to cope with the many problems requiring scientific investigation.

Many Branch Stations

The Central Experimental Farm on the confines of the City of Ottawa comprises 465 acres, including an arboretum and botanical garden of about 60 acres. Many branch experiment stations also have been established. The four original ones were located at Nappan, Nova Scotia; Brandon, Manitoba; Indian Head, Saskatchewan; and Agassiz, British Columbia. From 1906 to 1912, branch stations were established at Lethbridge, for South Alberta; Lacombe, for Alberta; Rosthern, for Central Saskatchewan; Scott, for Northern Saskatchewan; Charlottetown, for Prince Edward Island; Cap

Rouge, near Quebec, for the Province of Quebec; and another at Ste. Anne de la Pocatière, for Eastern Quebec. In 1912 four more stations were established: Two in the east, one at Kentville, Nova Scotia, and the other at Fredericton, New Brunswick; and two in the west, one at Sidney, on Vancouver Island, and the other at Invermore, on the Columbia River, British Columbia.

In addition to work being conducted at the stations mentioned, there was, up to 1913, experimental work being carried on at Fort Vermilion, on Peace River; at Kamloops and Salmon Arm, British Columbia; and at Forts Smith, Resolution, and Providence, in the far north. Other stations have since been established in different sections of the Dominion.

A Wide Scope

The scope of the research work in the various branches of agriculture still facing all departments of the Central Farm Institution, for the benefit of the farmers of new districts, may be imagined when it is remembered that the three western provinces of Canada are estimated to contain 180,000,000 acres of land suitable for cultivation, chiefly wheat growing, of which, in 1910, but six per cent was under cultivation. Furthermore, there is in the territory north of Alberta and Saskatchewan, within the boundaries of Mackenzie, Keewatin, and Yukon, an area of more than 900,000,000 acres, in several districts of which wheat has been successfully grown.

B. Leslie Smith, C.D.A., F.C.S., the eminent soil fertilizer specialist, of Montreal, writing in "The Farmer's Advocate," stated that Dr. Shutt visited Rothamsted, "mother of experiment stations," England, in 1888, and other agricultural experiment stations, including that of Bernburg, Germany, where Hellriegel and Wilfarth discovered that legumes possess the power of fixing and using atmospheric nitrogen. At Rothamsted he became acquainted with Sir John Bennet Lawes and Sir Joseph Henry Gilbert, who worked there for 57 years and made a record of monumental deeds rather than years. He is also a friend of Sir Daniel Hall and Sir John Russell, successors of Lawes and Gilbert, who gave addresses at the World's Grain Conference at Regina, Canada, in July 1933, where Dr. Shutt made his last public appearance as Dominion Chemist. His successor has not been appointed, as yet, and the senior assistant, C. H. Robinson, is Acting Dominion Chemist for the present.

Lasting Inspirations

Dr. Shutt received lasting inspiration from his contact with the noted chemists mentioned, and became especially interested in the value of legumes as fertilizing agents. He was, indeed, the first to establish the manurial value of clover and legumes in general for soil improvement on a firm, scientific foundation in Canada and to inform her farmers on the subject. He has insisted that the fertilizing value of legumes does not lie simply and solely in the nitrogen they contain, though therein is their chief merit. The large quantity of humus-forming material they furnish and the potash, phosphoric acid, and lime set free in their decomposition are features the significance of which should be more widely recognized. He thinks, too, that a matter closely connected with nitrification is this liberation of mineral plant food, in available form, and considers it more than probable that the two processes are coexistent and interdependent—possibly identical. His studies relative to the use of legumes as manurial agents have extended over a period of 25 years and have proved legumes to be nutritive fodders of the highest rank. His analyses have shown that from 75 to 150 lbs. of nitrogen per acre may be stored up in a season by the more common legumes, and largely due to his influence the plan of sowing clover with the cereal crops has become general in the older parts of the Do-

minion and is proving a very valuable one in the enrichment of Canadian soils.

Through the courtesy of the officers of the Central Experimental Station, Mr. B. Leslie Emslie, of Canadian Industries, Ltd., Montreal, and Mr. H. L. Trueman, general secretary of the Canadian Society of Technical Agriculturists and managing editor of "Scientific Agriculture," Ottawa, we have been privileged to examine many of Dr. Shutt's bulletins reporting on his research work. Several fine biographical sketches of that scientist, from the pen of Mr. Emslie, have also been read with pleasure and profit, and we should like to publish many items from these interesting papers did space permit. Bulletins No. 8 by Dr. Shutt and Mr. Emslie, and No. 145 by Dr. Shutt and L. E. Wright, B.Sc., Chemist, are particularly valuable. They contain a wealth of excellent material regarding plant food and fertility, farm manures, green manuring, artificial manures, commercial manures, fertilizer formulae, home-mixing, and the fertilizer needs of various crops. Silage is also fully considered in Bulletin No. 50, and soil fertility in Bulletin No. 27, second series.

Work Has Proved Great Aid

Dr. Shutt's experiments, in general, have gone far towards establishing that a judicious and rational use of fertilizers may be depended upon to yield a profit, that the exclusive use of fertilizers will neither keep up the fertility of the soil nor yield profitable returns, that it is on soils of medium rather than poor quality that a lucrative response from their employment is to be expected, and lastly, that it is on "money" crops that their application will be found most successful.

We also have been interested in Dr. Shutt's experiments relative to the causes and prevention of softness in pork, that subject likewise having engaged the attention of American chemists and animal husbandmen since the introduction and use of the soybean for hog feeding. He has reported that a tendency to softness or flabbiness is quite sufficient to rate the bacon, in the English markets, at second class prices; and if the softness is at all pronounced, the bacon is altogether unsalable at a profit. He has found that lack of thrift, from whatever cause, and immaturity are probably the two chief causes of softness, and that character of food is also an important factor. A ration composed of oats, peas, and barley, in equal parts, gives a firm pork of excellent quality. Free feeding of skim-milk tends to offset the softening influence of corn in the grain ration for pigs. Corn tends to induce softness by increasing the percentage of olein in the fat.

"A True Scientist"

Dr. Shutt's investigations of the qualities of Canadian-grown wheat have been extensive, and had much to do with the permanent establishment of Marquis wheat. He determined that, relative to the influence of environment on the protein content of wheat, the character of the season is a more important factor than the nature of the soil. The responsibility of examining flour for export, and the granting of certificates of purity, in conformity with the pure-food laws of importing countries, also have devolved upon Dr. Shutt.

For nearly 25 years he also carried on tests of sugar beets and indicated suitable areas for their successful and profitable production. His studies of the nutritive qualities of grasses at different stages of growth have been notable and have led him persistently to advise the early cutting of grass for hay to insure a high protein and low fiber content.

Mr. Emslie, who served under Dr. Shutt for seven years, said in one of his articles, "Canada possesses in Dr. Shutt a true scientist who, without fear and without reproach, has followed the truth unswervingly and

lighted the path for others. His researches comprehend all agriculture and his fame extends beyond the bounds of the Empire. He has done only what he conceived to be his duty, but he has done more than his duty, having toiled throughout his long term of office with scarce a holiday, in order that the progress of his work might be uninterrupted."

Little wonder, therefore, that he is highly esteemed, respected, and valued by his countrymen. Growing on the grounds of the Central Experimental Farm, there is a memorial oak tree, planted by Dr. Shutt, which fittingly typifies his rugged character and enduring qualities. We sincerely hope that for centuries to come it will flourish and keep green the memory of this gracious gentleman and chemist of renown.

Quality in Canning Peas

(*From page* 11)

planted to Advancer peas. The mixtures included phosphate alone, phosphate and potash, and complete goods with varying amounts of potash. Each differently fertilized plot was harvested separately and passed through the various steps of vining, processing, and cooking under standard commercial methods. The canned product in each case was stamped for identification and set aside until the grading by competent judges might be done. The fertilizer treatments and the result of the grades scored are summarized in the table:

Score-card Grades of Canning Peas

Treatment	2's	3's	4's	5's	Average
Unfertilized	76	81	81	76	78.5
0-16-0 ...	86	90	86	86	87.0
0-16-8 ...	86	86	86	76	83.5
2-16-4 ...	90	95	95	90	92.5
2-16-8 ...	90	95	90	90	91.2
2-16-12 ..	86	90	90	86	88.0
2-16-16 ..	95	95	95	90	93.7

The average of the total scores for the various sizes, 2's to 5's inclusive is shown in the column on the right. Peas from completely fertilized plots averaged above 90 with one exception, that is the 2-16-12. Stepping up the potash in increments of 4% from 4-16% did not result in any deleterious effect on the canned product notwithstanding the claims of some that potash in any amount in the fertilizer mixture would result in tough peas. On the contrary the evidence here reported, also confirmed by other investigators, indicates the need of potash in fertilizers in order to secure good quality.

Tenderness and flavor are the most important factors involved in grade designations. Judges were unanimous in marking tenderness "good" in the three commercially important sizes, 2's, 3's, and 4's for the 2-16-4, 2-16-8, 2-16-12, and 2-16-16 treatments. Except for size 3's, in the 0-16-0 and 0-16-8 treatment, also marked "good," the balance of the various siftings from different treatments were marked "fair" in tenderness.

It is not to be understood, however, that fertilizers recommended for peas should run as high as 12% to 16% of potash except possibly in special cases of potash-deficient soils. Just what constitutes a well-balanced fertilizer for the pea crop will depend largely on soil conditions. Fertilizers similar to a 2-16-8 or 3-18-9 are well adapted for Wisconsin growers.

Tough peas make an inferior product. It is difficult to differentiate between toughness due to the composition of the seed coat and that due to the physical structure of the cotyledons. Puncture testers have been used in order to test toughness. This instrument measures the pressure re-

quired to drive a small pin through the seed coat. Since the pressure exerted in puncturing the seed coat is influenced to a considerable extent by the firmness of the pea, this device has only limited value.

In connection with the general question of quality it was thought that a correlation existed between toughness of peas and the calcium content of the seed coat. Potash was reported responsible for the concentration of calcium in the skins. In order to determine whether the addition of potash influences such concentration under Wisconsin conditions, analyses were made of pea skins in which potash was a variable factor. The results are summarized in the following table:

Per cent Calcium in Dry Matter of Pea Skins

Sizes—	2's	3's	4's
Unfertilized	.151%	.178%	.208%
0-16-0 ...	.147	.167	.190
0-16-8 ...	..	.155	.176
2-16-8 ...	.145	.173	.217
2-16-16 ..	.165	.170	.200

In the table it will be noted that no consistent relation exists in the calcium of the pea skins between an 0-16-0 and a complete fertilizer with varying amounts of potash. In the 0-16-8 plot less calcium was found in the 3's and 4's than where the straight phosphate was used. In the 3's the highest calcium is found in the unfertilized, and in the 4's this occurs in the 2-16-8 plot. There is, however, a progressive increase in the calcium content of pea skins with increase in sizes. This holds true in all cases whether fertilized or not. In general there appears to be no relationship between potash in the fertilizer mixture and the concentration of calcium in the seed coats.

The condition known as tough peas is unquestionably linked up with many factors. The stage of maturity when the crop is harvested, the time elapsing between vining and canning, temperature conditions at harvesting time, and perhaps other factors are involved. That any fertilizer constituent is responsible for inferior quality may be dismissed from consideration. Well-balanced mixtures may be depended upon to improve rather than to reduce quality.

Balanced Fertilizers for Fruit

(*From page* 10)

disease-free trees. Diseased trees also showed much less potassium in the roots than in those of disease-free trees, and a much greater accumulation of starch was found in the roots of the diseased trees than in those trees not showing the disease. We can not, therefore, concede at present that this trouble is due solely to a soil-moisture condition or a soil condition over which man has no control.

In further support of this, let me finally present data from some trees grown in sand cultures in pots under constant moisture conditions.

The variety is Melba; the treatment consists of feeding nitrogen for varying periods throughout the growing season. Where late or prolonged feeding of nitrogen was given, cork mounted to as high as 100%; thus, when nitrogen was fed only until the trees were in full bloom, the amount of cork was 6%; when fed until after the calyx spray it rose to 15%; when fed until September 1 it rose to 100%.

The question of excess or lack of moisture did not enter here, so we are obliged to seriously consider the question of unbalanced nutrition as one of

the more important causes of these disorders.

With reference to the question of endeavoring to raise production to excessive heights by the use of nitrogenous fertilizers, Wallace says that in addition to the tree being driven into excessive growth, fruiting may be reduced, fruit size decreased, and the tree may become affected with nutritional disorders such as leaf scorch or diseases such as scab, canker, and die-back.

We have repeatedly observed that spray injury is more abundant on high-nitrogen trees than on low, and die-back is becoming quite prevalent in the eastern fruit sections of this continent.

The statement of many people that potash deficiency does not exist in Canada is far from the fact. There are numerous examples of orchards that are on the verge of it and the worst case of potash deficiency I have ever seen in my life exists in the Niagara peninsula of Ontario. This area has been planted twice to peaches and ripped out because the trees made very poor growth and produced little fruit and what they did produce was of extremely poor quality and ripened prematurely and unevenly. A portion was recently planted to apples and Figure No. 2 will show you the foliage condition in this young apple orchard. By paring away the soil in the spring of 1933 and applying potash, response was obtained in one season as indicated by commencement of growth and return of normal foliage. For some years this condition was baffling, and the continued use of nitrogenous fertilizers did but aggravate the situation.

Telltale Signs

I now come to our final recommendations, which largely consist of using the symptoms of the tree as an index to its requirements. In the case just cited the leaf-scorch symptoms indicated the soil requirements, and when attention was paid to the distress signals, results were obtained.

Potash deficiency is first noticed by a very dark leaf, generally lacking lustre. This condition may be overlooked but is soon followed either by a faint chlorosis around the margin or at the tip or sometimes by a slight scorching or burning of the tip of the leaf. In bad cases the scorching is around the entire margin, and when it reaches that stage, can not be mistaken.

In operating an orchard it is better to have your leaves on the slightly pale green side than on the extremely dark green side. The latter condition indicates excessive nitrogen and it indicates you are close to the border line of excess nitrogen over potassium unless you have an abnormally high potassium content in your soil.

Fertilize Accordingly

In our opinion, it is unwise to ignore the application of potassic fertilizers, especially where nitrogen is in use, and we would recommend growers to watch their foliage, color, and twig growth and regulate their fertilizer needs by varying their nitrogen applications while applying yearly amounts of about 200 pounds per acre of potassium fertilizer.

Phosphorus deficiency is readily recognized by the bronzing of the foliage. This bronzing may be accompanied by a certain amount of purpling, but the bronzing is always present if phosphorus is really deficient.

Calcium and magnesium deficiency, if present, are recognized by the edge, or sometimes the center, blotching, consisting of brown areas on the margin or in the center of the leaves. The two produce similar symptoms and are very difficult, if not impossible, to distinguish from each other. It is not probable that you have either of these deficiencies in your orchards, although excess feeding of potassium might induce a low-magnesium condition and, if aggravated enough, a low-calcium condition. Low magnesium, due to excess potassium, is more likely than

low calcium, but we can not say we have seen such a case under practical conditions.

By carefully watching foliage and tree characters, the grower can do much to adjust his fertilizer practice to his needs. Trees carrying large-size, dark green leaves and making good growth while bearing a crop are on the high-nitrogen side; cut down on your nitrogen applications. When foliage starts to become pale or light green, it is time enough to start worrying about your nitrogen supply.

No good rule-of-thumb method for year in and year out fertilizer treatment can be given, but where a grower feels that he must use such a rule, our advice is to continue with a complete fertilizer of the 9-5-7 type rather than to adhere to nitrogen alone.

Country-Minded ?

(*From page 6*)

to farm folks is the kind that is paid in cash. That is a trifle unjust. If that were the case why do we not find more expert bookkeepers and checkers totaling up the assets and liabilities on farms? Why do we not find more rural Shylocks who have grown rich on seven or eight per cent, or even loan-shark rates? The real reason why the chief answer in economic discussions in the country is to pay up and shut up is that they want you to *shut up*. It is not that they are more mercenary than other people. Their mental brushes paint larger pictures. Details irk them. Tables that do not groan with food or drink are useless to them. That's all.

I REALIZE that if they had had more schooling in sound economics they would be the rulers of the universe instead of the takers of dole. But as long as we have no united economic platform and the doctors can't agree among themselves, why pick on the farmers?

I believe that the majority of farmers do not wish to follow unsound theories or the hobbies of seekers after glory. If and when the leaders emerge with a plan that they agree upon and which has in it the elements of justice, the economic weakness of the farmer will fade. Does that take more courage than political pressure can provide? Time will tell.

One might carry this discussion through other things such as the taste for art and beauty and the love of humanity, but it is unfair to present one side of the picture only. For one can be country-minded and get wrong notions which take root as vigorously as quack-grass.

One of the bad habits of country-minded folks is often called inferiority complex. Some of my own people had extreme cases of it, and occasionally I catch myself up short indulging in it a little. This is a queer blend of conceit and a desire to show off, mixed with a native shrinking, a painful fear that somebody is looking down on your efforts and discounting you.

How natural it is for rural workers to acquire this blight! They become skilled in various tasks, confident of their ability in the shelter of the farmstead to perform as well as any other person. Yet in the presence of some sophisticated group, or thrust into a prominent position of public responsibility, a strange quaking and panic forces them to submerge themselves and allow people of less training or equipment to run the show.

And again this same complex works the other way. It banishes a man's real judgment of values and the fit-

ness of things. He goes into a trance and overdoes the job horribly, making a farce and a nervous outburst out of what should have been done calmly and well. Of such stuff are made many of the radical spokesmen who often injure the cause of agriculture and label it with wild-eyed terrorism.

Another fault in country-mindedness comes as a relic of the copybook days. It is using sentiment when hard sense would fill the bill to better advantage. Take the case of consumers versus producers. We see some farm folks lined up on one side and some on another, all slopping sentiment into the discussion where it does not belong. My uncle would get tearful over the dear old farm and its God-given heritage as the foundation of world happiness and security, and argue that all non-farmers were parasites. On the other hand, a weepy rural aunt of mine of late has lamented about the slaughter of the little pigs and the talk of curtailing the milk supply when so many babies were going hungry. Wasting time lamenting such things when consumers are producers and producers are consumers, separated by a widening gap of speculative and service-catering agencies, is like trying to put out a prairie fire with dew.

IN summary, it seems to me that by and large one unfailing trait that makes country-minded folks stand out is a reserve power of patience and a willingness to bide awhile before the millennium comes. It is sheer conservatism rising from conditions that in many places in cities breeds revolution.

The age-long struggle against bugs, blight, frost and flood, hail, and marauding animals rather makes for a stoic sort of inward philosophy. I often wonder how much this has contributed in this country to the relative calmness of our people during the depression, even in the cities. Our cities trace the largest share of their population, at one time or another, to the soil. Some remnant of the spirit which accepts things as inevitable and gives folks endurance to meet tribulations no doubt has its origin in country life.

Coming out of that same trait in the country mind is the saving grace of humor. There is more broad, rail-splitting, man's-sized appreciation of the ridiculous and the laughable amid our country communities than anywhere else. Maybe it is that homeopathic mental method of treating our ills with a dose of risibility which enables me to accept the crowded streetcar, the fly-specked lunch counter, the traffic policeman waving six ways at once, and the mistakes of the janitor with such ease.

After all, history usually teaches us that more things are a joke than ever we thought were while they were happening. We grin at the styles in autos and human dress as they flash at us from some relic of the early days of motion pictures, and we find the policies and platforms of past campaigns and the speeches of former industrial barons extremely funny now. But those are mostly city scenes and city programs, and if you try to check back on the life of country communities a couple of decades ago, no such startling changes of patterns are evident. The farmer laughs it off, goes his way undisturbed to any great extent by innovations, and adheres to the fundamental principles of thinking and acting which always have been his custom.

SO maybe the country mind is one that has been ventilated and insulated, and escapes some of the contagion and the false attitudes of the moment. At least we who think we have it yearn to mingle with those who possess it, and we long to live once more under the sky and the stars, clasping the plow handles, feeding the livestock, braving the elements—with the mortgage and the tax bill as the only reminders of Adam's original sin.

LOSS OF INTEREST

A Negro, applying for work, had a face so battered that one might have been pardoned for assuming that its owner had been run over by a steam roller.

"Good heaven!" cried the foreman: "what have you been doing to yourself?"

"Me? I ain't been doin' nothin' to myself," explained the Negro. "It's lak dis. Yistiddy I got into a kind of ahgyment wid anothah cullud man, an' one word led to anothah.

"Purty soon I up an' hit at him wid my fist. Well, seemed lak dat irritated him. So he split my lip, an' he blacked dis eye of mine, an' den, to cap all, he knocked me down and stomped up an' down on my stomach wid his feet. . . . Honest, I never did git so sick of a man in all my life!"

The bride of three months timidly asked her husband:

"Dearest, will you please give me some money for a new dress?"

"Sure," said he generously. "Here's five dollars, get a hat, too."

Advertisement: "Wanted — Small apartment by couple with no children until May 1."

TIME OUT

Parson: "Do you take this woman to be your lawful wedded wife till death do you part?"

Bridegroom: "Don't I get any time off for good behavior?"

CONFUSING

"Now, sir," said the counsel to the witness, "did you, or did you not, on the date in question, or at any time, previously or subsequently, say or even intimate to the defendant or anyone else, whether friend or mere acquaintance, or in fact, a stranger, that the statement imputed to you, whether just or unjust, and denied by the plaintiff, was a matter of no moment or otherwise? Answer—did you or did you not?"

"Did I or did I not what?" asked the witness weakly.

SIN TAX

Prof.: "What do you know of Latin Syntax?"

Frosh: "Did they have to pay for their fun, too?"

Sam (to wife at show): "Mandy, tell dat Niggah to take his ahm away from 'round yo' waist."

Mandy: "Tell him you'self. He's a puffect stranger to me."

She: "Oh, Henry, there's a bug down my back."

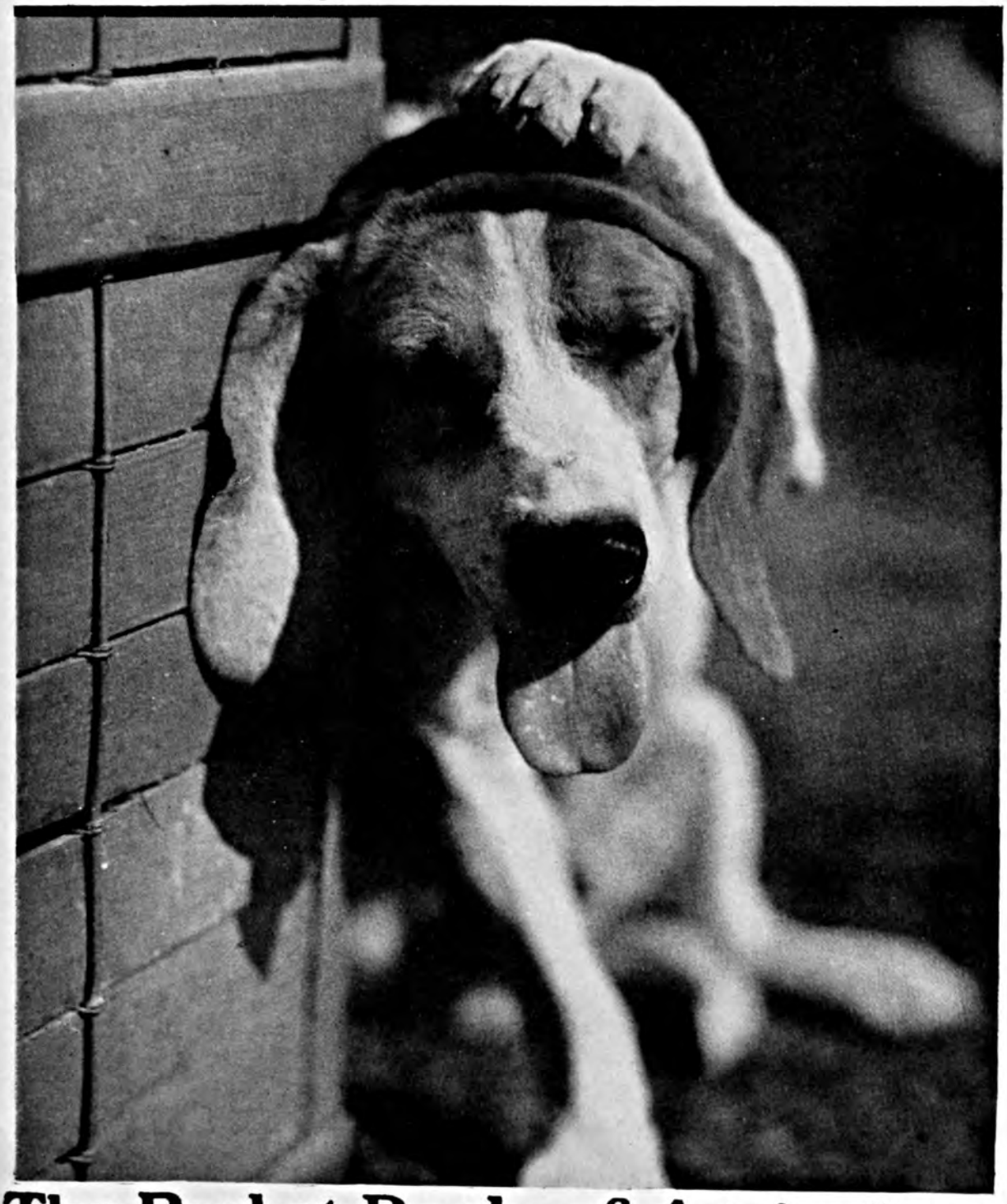
He: "Aw, cut it out. Those jokes were all right before we were married."

A man may be truthful in everything else, but he always played a better game of golf several years ago than he does now.

Printed in U. S. A.

Better Crops with PLANT FOOD

June-July 1934 10 Cents



The Pocket Book of Agriculture

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

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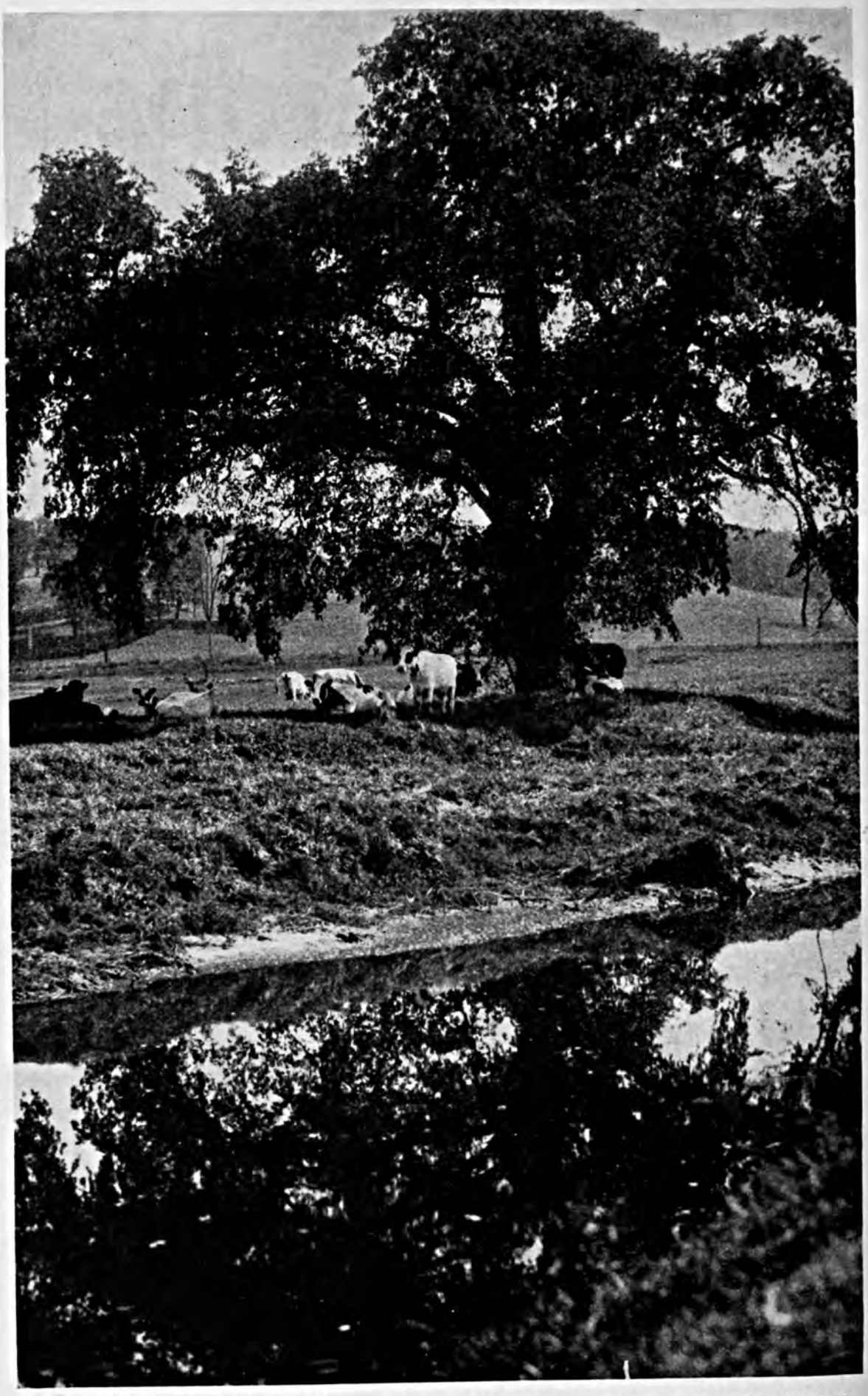

A BOVINE'S SUMMER PARADISE—GOOD PASTURE, GOOD WATER, AND SHADE.

Better Crops with PLANT FOOD

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More About Less Milk

By Jeff McDermid

THE title for this discussion bothers me. I might have used Dam(n) the Lactic Flood or Less about More Milk, but perhaps one shot is as good as another on such a moot question. It concerns a basic agricultural commodity which refused to be budged. Our personal experiences in that recent campaign indicate that the milky way, as science avers, consists of something pretty nebulous.

If the recent plebiscite among our dairymen could have agreed on some reduction program which they could adopt free for nothing, America could have supplied enough bologna sausage and cow-hide boots to equip a huge army, and there would have been little left on the Swiss cheese counter but holes and a smell.

To begin with, like the economists do, the dairy business is different, difficult, and diffident. For one thing, the surplus is like a horse-fly or a mosquito—you hear the blamed thing buzzing around all the time, and it squats down and stings you impu-

dently; yet you are always too slow to swat it.

The milk surplus is always the fault of the "udder" fellow! Dairying is peculiar that way. A surplus is regarded with as much self-righteous horror as bad breath or dandruff, but the other producer is the one who spreads the contagion—never yourself. It's illegal to smash his stanchions or put arsenic in his bran mash, except perhaps during a "yeoman holiday" while the Governor is on a vacation in his storm cellar. And it is no good to use missionary tactics when the extension service has worked 27 years to get only three per cent of the confounded cows weeded out on a board bill complaint. At this writing no relief is in sight to cure the milk surplus by removing the pumps and windmills either.

THE dairy industry is so complicated with milkmen and middlemen, spokesmen and hoaxmen, sentiment and sediment, silage and verbage, that no man knoweth where fact leaves off and conjecture starts.

When anybody suggests a hand-out bonus at no obligation, there are 15 million dairymen with 8½ gallon cans ready to catch the strippings. This number includes several hundred thousand western lariat swingers who ordinarily milk their cows for money in strict and shameful secrecy, as well as the hill tribesmen who herd goats. But when somebody just drops a hint that there may be a general levy to sweeten the kitty, dairymen are as scarce as Dillinger.

The dairymen are considerate of the wheat and cotton farmers who are now under obligation by contract as to disposition of acreage. The dairymen have not hesitated to point out that the Government should not permit wheat and cotton farmers to "go to seed" or "go to grass." Next to avoiding a contract yourself, it is a good idea to keep an eye on the ones which the other man signs.

Those of us who found time to attend any of the regional meetings called to discuss the milk muddle came away convinced that those who sigh for the good old days of revival meetings garnished with brimstone, or the political rallies spattered with insulting allegory, need not mourn a minute for the decadence of spontaneous Americanism.

The gospel according to the Bureau of Agricultural Economics and the testimony grounded on the Year Book, reinforced with the apostles' creed of the Market News service, had to stand agnostical assaults and all manner of inferences from infidels.

The debates of such erstwhile successful public entertainers as Webster and Hayne, Bryan and Darrow, or Corbett and Fitzsimmons, were no more thoroughly prepared or more jubilantly applauded. The "professors" labored under the severe handicaps of official decorum, impartial analysis, statistical clutter, and some charts that the fellows on the back seats didn't want to see if they could have done so.

The opposing non-believers, nonconformists and standpatters were able, in their turn, to throw off their vests, snap their galluses, brandish their dry-year milk sheets, and sweat lactic acid in defense of the brindle cow, Vitamin D, and the thirteen original colonies.

BY the same token, the conflabs were much like Paddy McGuire's wake, with the "poor ould corpse" representing the real dirt dairyman, all silent and serene. The story goes that Paddy, poor b'ye, was deceased from a lingering disease, and the funeral orators got to wrangling over whether too much whisky or not enough whisky was the cause of it. " 'Twas too much poteen taken inwardly too frequently," shouted the dry orator. "Ye're a talented prevaricator, my frind," replied the wet waker, tipping up the pint for the last gurgle, "He died because

of a constant lack of Donegal dew!" After railing at each other thus for twenty minutes, the wakers were astonished to see Paddy (Himself) McGuire rise up in his coffin and grab for the bottle, exclaiming: "You're both right! I've nivver had too much and I've nivver had enough. Give me one more swig and spit on the shovels!"

And so it was with the quiet dairyman standing on the sidelines during the pow-wows of April. He was short

of shorts, and also of bran, distillers' grains, hominy, molasses feed, rain, and money; in short, short of everything except cows; and long on mortgages, chattels, rats, organizations, kids, and advice. When they told him he was mighty important because his income represented a quarter of the farm total, he could not drum up much admiration for the other three-quarters. Others said he should be left alone because he could starve himself out of it in no time.

Can we hold back our cows as well as make them give down? This was another major problem. One could feed hydrolyzed sawdust, as once attempted at the Wisconsin University by the experiment staff, but that would be far more suitable for adoption by the canny wooden nutmeg dairymen of New England. One might play selections from Gershwin or the Flying Trapeze to an audience of bovines, beating time meanwhile on their thin ribs with hay forks. Reduction might also be accomplished by hiring Scotch herdsmen or removing the muzzles from self-sucking cows. Sarcastic ones thought that it could all be solved by letting the county agents and home economics girls balance the cattle rations. Resort to bimetalism or the rubber dollar was also advocated in some circles.

If we can't hold them back, may we not get good and rid of them? This was even worse to ponder upon. The stockyards were full already with mavericks from no man's land, and the stomachs of the unemployed had begun to distend because they were expected to become garbage cans for every industry forced on a domestic basis. Killing some folks with kindness in order to make other folks pay double for butter seemed lopsided. One scheme involved loading unwanted foster mothers of the h. r. onto trucks and taking them elsewhere. Still another plan in lieu of the cow transfer idea was to move all the good dairymen south and give them the hookworm, and let the southern amateurs occupy the northern farms and milk without mittens.

The fellows who used to whisper cautiously about the relation between contagious abortion and undulant fever came right out loud and voted to create a national fund to remove aborters on the one hand and tell the public at the same time how much better the milk ought to be for mothers and others. The slogan "more and better cows" was changed by deleting "and."

Every industry, dairying no exception, must have its saints and its dragons, to be decked out in all the panoply of mythological regalia and trotted out on the stage for alternate admiration and abhorrence. The gallery gods demand it.

Weeks before the dairy jousts,

giants of the churn and vat conducted sundry rehearsals in the grand lodge rooms so that there might be no bungling of the ancient ritual. Indeed, wherever any milk conventions assemble, be it in meadow, opry house, or village green, the climax of the program rests with the Punch and Judy show of dairydom.

The hero of the piece is always "Ad" whose powerful voice, majestic appeal, and wide acquaintance in all walks of life are the imagined hope of the dairymen to save them from disaster and gain them new trade. In the mimicry of the spotlight Ad languishes, to be sure, and is rather scrawny and underfed, but whenever he appears the palates of the people taste ripe limburger in fond anticipation, and the hypnotized producer digs deep for another nickel.

"IF every inhabitant of the country each day ate one ounce of smear-case, drank two pints of bulgaricus, used butter for face cream and skim-milk powder for foot ease, the nation would never have another depression and we could forget such troubles as Huey Long and the war debts."

On the q. t. they really don't believe just that—it's only part of the pageant to keep the cows contented. While tiny Ad, the milker's marionette, plays his dumb show in the shadow box, the *real* Ad, supported well by the limousine lads, holds his fat sides with risibility. "To think I ever looked like that," says he to his bosses, between guffaws, and the big butter-and-egg men who have dropped in to enjoy the milk route mummery also snicker and relax. The farmer as an advertiser is too cute for words.

Ods bodkins! Couch your lances! Drop the drawbridge! Prepare the guillotine! For behold the show is never complete without the villain in his vileness.

He cometh, decked in greasy paraffin and the duds of deceit. Behold Ole, malignant enemy of the orphan calf, thief of the quick lunch counter, destroyer of the bull's pedigree, and the principal obstacle to 60-cent butter, good roads, a balanced budget, industrious hired men, and universal longevity.

YET somehow, the cottonseed boys and the beef feeders don't get as much kick out of this act as the teat yankers, although everybody would really be disappointed were Ole accidentally killed for good. You know how it was when you were a kid—a good scrap developed the stamina and a bunch of sissies without competition are headed for the seminary.

When the show is over and the lights go out, little Ad, the Don Quixote of the comedy, and flabby Ole the bandit, are both shoved down into the old bag of tricks and headed for the next one-night stand. The rank and file return to their chores well satisfied that justice will prevail, and the barons of the butter tubs continue to separate and skim.

Optimism run amuck and pessimism gone crazy! Which is simply another reminder that in the milk muddle we see the counterpart of bewildered America in all her delightful inconsistency.

Getting back to the surplus, who is there more entitled to sing a parody on the "purple cow" than the owner of the herd:

I never saw a surplus,
I never hope to see one;
But lest you make an awful fuss,
I'd rather see than be one.

The surplus in dairying is either taken *from* the book of nature by rains or put *into* the producer's book by distributors. It comes and goes amazingly. In one western city in a period of 15 days a 40 per cent surplus formerly charged to the farmers disappeared by a little "legerdemain." It came from more accurate bookkeeping installed by Uncle Samuel.

The most expensive surplus we have doesn't appear as such. It shows up

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How They Become Corn Champions

By M. O. Pence

Purdue Agricultural Extension Department

SO many Indiana corn growers have produced official yields of 100 or more bushels of corn per acre that it seems almost commonplace to review their achievements. This fact is born out by the records of the Five-Acre Corn Contest started on a State-wide basis in 1914 by the Indiana Corn Growers' Association in cooperation with the Purdue University Agricultural Extension Department.

During the 20 years just finished, 10,859 corn growers, an average of more than 500 each year, have finished the project and had their yields checked by the official judges. The records show that during this time 921 have produced yields of 100 bushels or more corn per acre, for which achievement the Association awards a gold medal.

A. C. Brown, Indiana's 1933 Corn King

Since 1917 when silver medals have been awarded for yields of 85 to 100 bushels per acre, 2,208 corn growers have qualified; and since 1918 when bronze medals have been awarded for yields of 75 to 85 bushels, 2,296 have finished in this group. The past year was considered an unfavorable year for corn throughout most of the State, and yet 68 per cent of the contestants produced yields of 75 bushels or more per acre.

That farmers are profiting by their experience as well as by the experience

of others in this contest is shown by comparing the number who were able to produce 100 bushels of corn per acre during the first five years as compared to the last five years. In making this comparison I am sure the weather records and the average yield of the State will show that at least three of the past five years were far below the average in corn production.

During the first five-year period, out of 1,631 completing, only one corn grower in fifty produced 100 bushels per acre, while during the past five years out of 2,952 completing, one corn grower in nine produced a 100-bushel yield. These results may be considered as evidence of the mass effect of the experiences and demonstrations of the better growers on other good corn growers. The effects of this contest are bound to be wide spread as corn growers from 50 to 70 of the 92 counties take part each year.

Unusual Records

Each year brings forth some unusual achievement or record. Herman Pankop of DeKalb county made an all-time State record as well as a national record for 1932 by producing 165.6 bushels of corn per acre. Last year 1933, another unusual record was made by A. C. Brown of Ripley county who produced 141.3 bushels of corn per acre. Although this is not a national record, I feel quite sure it has never been exceeded on a soil type such as Mr. Brown operates. His soil is Clermont silt loam, locally known as "crawfish" or "slash" land.

Thousands of acres of this type of soil are abandoned in the territory surrounding Brown's farm, because the yields are too low and the management of this soil type is too difficult. This land lies very flat and because of its high silt content has very poor natural drainage. The soil is cold and wet, and without underdrainage cannot be plowed until late in the spring, often too late to plant corn. In addition to these handicaps it is quite acid as well as deficient in all three essential plant foods. Could any soil condition offer more discouragement to a corn grower?

For many years Mr. Brown was a rural mail carrier. As he traveled his route from farm to farm, he was a close observer of the best farm practices of his patrons. From them he learned many practical points about handling his soil. About the time he left the mail service to give full attention to his farm, a soil experiment field was established on this soil type, by Purdue University in Jennings, an adjoining county. In his visits to this field at the semi-annual field meetings, he learned about the plant-food deficiencies of this particular soil.

Begins With Soil Fertility

He noted first of all, that it must be limed in order to grow the clovers. He proceeded to lime his farm, and on the field where his record was made he has applied seven tons of ground limestone per acre. He has grown several excellent clover crops on this land. He learned, too, that this land responded to underdrainage, but this investment he could not afford. Consequently he proceeded to lay out the next best thing, small lands with dead furrows in between to carry off the excess surface moisture. He noted the great response that this soil made to the three plant foods, once it was limed and drained. Through his clover crops he added most of the nitrogen and humus needed and through the purchase of phosphate and potash he took care of the other plant foods. It should be added, of course, that he has used all crop residues either as bedding or for direct return to the soil, and has saved and applied all manure produced on the farm.

On his record corn crop Mr. Brown applied 100 pounds of 0-20-20 drilled in the row, and before planting 225 pounds of the same fertilizer were applied broadcast and worked in. Since he does not have much invested in this land, he can afford to invest fair sums

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Old Soils *Need* Potash

By R. E. Stephenson

Professor of Soils, Oregon State Agricultural College

LOSS of humus is a noticeable change that occurs when fertile virgin soils are placed under cultivation. The extent of the loss depends upon the system of farming, but usually amounts to 25 or 30 per cent in as many years. Crop yields drop in like proportion. The reduction in humus and crop yields continues under poor farming for perhaps half a century, until equilibrium between losses and gains is established at a new base level so low that crop production is no longer profitable.

Along with the disappearance of humus occurs a loss of bases, particularly calcium and potassium. The soil becomes acid. Data from Missouri show that one-third the readily available bases disappeared in the same period that reduced the humus level by 38 per cent. Production dropped 40 per cent as a result.

The Use of Lime

Such soils are described as "worn out." A frequent practice for renewing worn soils includes the use of lime to correct acidity, superphosphate, rotation, and the growing of legumes. The importance of potassium renewal sometimes has been overlooked. Perhaps stable manure is depended upon for potash. Manure carries considerable potash, but lack of manure renders this source ineffective. The more exhausted soils are least likely to receive a sufficient quantity of manure. Many old fields never receive any. The manure program has been delayed too long when the soil is already exhausted.

The importance of potassium on worn soils has been demonstrated in fertilizer trials in old pasture fields. Applications of potash and phosphate renew "run-out" pastures effectively. Legumes come more and more abundantly following these treatments. Lime in small amounts with the fertilizer usually proves helpful.

Plants Show Needs for Potash

That liming sometimes receives attention to the exclusion of potash renewal is due in part to the fact that high acidity results in low availability of nutrients in general. Phosphates become almost entirely unavailable in very acid soils. High acidity brings in soluble aluminum and other toxins very injurious to some crops. The use of lime corrects this condition, but does not restore the lost potash.

As the supply of available calcium is reduced by increased acidity, crops have greater need for potash. Reduced absorption of calcium causes increased absorption of potassium by crops. In old acid soils readily available potash becomes practically nonexistent. This may be indicated by various signs of malnutrition such as "die back," "leaf scorch," and "little leaf" in fruit trees. Farm crops, besides producing disappointing yields, become more susceptible to such in-

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

WISCONSIN reveres the memory of William Arnon Henry, founder of her Agricultural College and Experiment Station. A genial gentleman, loving with every animate fiber of his being the State and its farmers, he strenuously devoted 27 years of his life to their service and unselfishly sacrificed himself for their interests and welfare.

Visit the peerless campus of the University of Wisconsin and you will see on every hand lasting monuments to Dean Henry's vision, inspiration, and industry. There stands the great Agricultural Hall he longed for and at length was granted. Near-by is Hiram Smith Hall where, under his guidance, dairying was placed upon a scientific basis and fostered as an industry until it grew magnificent in proportions and importance. Past the noble portals of the central agricultural building runs beautiful Linden Drive, set out by the Dean, and branching at its eastern end into a shady avenue of evergreens.

On the north slope of Observatory Hill, stretching toward the blue waters of lovely Lake Mendota, you may see today a trial orchard planted by the late Professor E. S. Goff, the eminent horticulturist, at the behest of Henry; and on the lawn, near the Dairy Building, are flourishing the two memorial red oak trees planted one fine Arbor Day by Dean Henry and the late Dr. Stephen Moulton Babcock. Then, at the entrance to the roadways and parkways between Linden Drive and University Avenue, leading up to Agricultural Hall, imposingly rests a great banded gneiss bowlder bearing a tablet of bronze on which is inscribed: "The HENRY QUADRANGLE. In recognition of the pioneer services of Dean William Arnon Henry to the State and the Nation, from 1880 to 1907, this approach to the College of Agriculture has been designated by the Regents, The Henry Quadrangle."

Worked for Pavilion

Walking west on Linden Drive to the University Farm, one comes to the immense Live Stock Pavilion, for the erection of which Dean Henry talked and worked for many years, deeming it of prime importance in rounding out the equipment of the College and Experiment Station. Many critics prophesied that the building would be a "white elephant," on account of its size and cost; but Dean Henry had planned wisely and well. The spacious arena of the Pavilion has proved not only necessary and perfectly adapted for livestock teaching and demonstration work, but has served on many notable occasions for the holding of commencement exercises, great conventions, important exhibitions, and even concerts by celebrated artists. It is but one of the great monuments to the memory of

the Dean, for many other fine buildings of the agricultural group were erected during his regime and the experimental farm and grounds also were developed and beautified under his competent direction.

Close to the Live Stock Pavilion still stands the modest frame structure in which the Dean began the work of the Agricultural Department, in 1880. This little building was the original farm house. Three rooms in it in 1881 were occupied by the Dean and his wife. The other rooms were used by the farm workmen. The "foundation

William Arnon Henry

equipment" of the Department consisted of a small walnut desk-table placed in the front room of the second story of the house along with two chairs, an inkstand, a little stationery and some record books. Later, four rooms used as student living quarters on the third floor of the south half of old South Hall, on University Hill, were vacated and utilized for the offices, library, and chemical laboratory of the Agricultural Department. In time, all of South Hall was granted for agricultural teaching and research purposes.

You may, today, see that old walnut table as a prized treasure in the great Agricultural Library which Dean Henry did so much to plan and equip. It served both as an office and classroom desk. Under a glass plate on its top there is a faded letter, written by Dean Henry which states: "The Agricultural Department of the University of Wisconsin, under my direction, was first housed in the University Farm House in 1880. I started the form of an office by purchasing the table for $2.50 and placing it in the front room, second story, of the farm house. This table may be regarded as the first and oldest piece of furniture belonging to the College of Agriculture."

Championed Book Learning

Gradually, interest was aroused in the new project of agricultural education. At that early day, "book learning" was at a discount and farmers believed that practices considered proper by their fathers were good enough for them. The attempt to introduce better methods, based upon a scientific knowledge of agriculture, therefore met with opposition at first, and Dean Henry had to work at a disadvantage. Often he was misunderstood, often criticised, and sometimes disappointed; but ever he fought bravely on and in time came to see his work approved, himself applauded, and his teachings applied to practice.

In 1881 the State Legislature appropriated $4,000 for his use in experiments in the manufacture of sugar from amber cane, and the ensiling of fodder corn. That small fund gave him a start, and year by year more liberal allowances became available, and the work progressed. That with silage, or ensilage as it was called at first, was of greatest importance. Henry was a pioneer in experimental work on that subject. He built a

rather crude stone silo and filled it with immature green corn fodder. The silage made was somewhat acid, but cows consumed it with relish, and the fear expressed by critics that the fermented stuff would burn down the building, or poison the cattle if they ate it, was dispelled by the results obtained. Today, thousands of silos in Wisconsin and other States bear witness to the value of Dean Henry's initial efforts, and the silage produced from better ripened, cut, and stored corn fodder has become a staple and valuable feed for cattle, that nourishes instead of poisoning and does not loosen the cow's teeth, which opponents predicted would result from its use.

Made Himself a Leader

Dr. E. A. Birge, President Emeritus of the University of Wisconsin, once said of Dean Henry's work: "He undertook the guidance of agriculture in Wisconsin at a critical time, both for the State and for science. The State had to abandon pioneer, exploitative farming, but could not see any new policy. The science of agriculture was not yet born; its powers were still latent. Not only must a new science be developed, but the farmers, a most conservative group, must adopt its findings as the means of their livelihood. Both theory and practice found their man in Dean Henry, and the man embodied the full measure of a great opportunity. He made himself a master and a leader in his own field of that science. From the beginning he sought out, for the department and college, men who would become leaders in the discovery and establishment of the basic principles of agriculture. Thus both he and the faculty built up their science."

William Arnon Henry was born in Norwalk, Ohio, June 16, 1850, the son of William and Martha Haines Condict Henry. He was reared on a farm and obtained his preliminary education in the district schools. Then he took a preparatory classical course in the Wesleyan University of Ohio. From 1871 to 1873, he was principal of the public schools of New Haven, Indiana, and from 1873 to 1876 principal of the public schools of Boulder, Colorado. In 1880 he obtained the B.S. degree in agriculture from Cornell University, New York, and on September 9, 1880, went to Wisconsin University as Professor of Botany and Agriculture. From 1883 to 1887 his title was Professor of Agriculture, and in 1887, he was made Director of the Experiment Station and served in that capacity and as Dean of the College of Agriculture until 1907, when he resigned on account of failing health and was made Emeritus Professor by the Regents.

In 1904, the honorary degree of Doctor of Agriculture was conferred upon him by the University of Illinois, and Doctor of Science by the University of Vermont. In 1907 the University of Michigan also honored him with the degree of Doctor of Science. During the summer of 1879, he was connected with Professor Riley on the U. S. Entomological Commission at Washington, D. C., and in the spring of 1880 was Instructor in Botany at Cornell University. In 1900 he was an agricultural delegate to the Paris, France, Exposition.

Retirement in California

In July 1881, he was married to Clara Roxann Taylor, and they had one son, Arnon Taylor Henry, who graduated in agriculture at the University of Wisconsin, married Miss Jessie Stephens of Madison, and moved to Wallingford, Connecticut, where he now lives on a fine fruit farm with his family. After resigning from the University of Wisconsin, Dean Henry lived for a time in Connecticut, then bought property at Sarasota, Florida, and after a few years moved to San Diego, California, where he lived with his sister, found consolation in the Church, and passed away November 25, 1932, at the age of 82 years. Mrs.

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Reaping of the first rye in the Wieringermeer. *(Photo copyright: K. Maaskant, Wieringen.)*

A Sea Bottom Produces

DIGGING drainage ditches equal to a total length of about 25,000 miles is a big job anywhere. Yet it is what the people of the Netherlands have undertaken as one of the things necessary in enabling some 300,000 people to ultimately find the means to a good livelihood in farming the land that was once the bottom of the Zuider Zee. By enclosing and partially reclaiming the Zuider Zee, the area of habitable Holland will be increased by 550,000 acres, or an increase of 10 per cent in the cultivated area of the country.

As pointed out by Edgar Brown in a very interesting and illustrated pamphlet:* "Holland is largely overpopulated and since industrialization is evidently not the remedy in a land where nearly all the raw materials must be imported and emigration is, at any rate for the present, of small avail, most good may be looked for in the increase of agricultural production, chiefly by extending the cultivated area."

While the reclamation of the Zuider Zee as agricultural land, estimated to cost over $225,000,000, is modern in all its vast engineering and agricultural phases, the idea has been considered for centuries, for it was not a question of taking back what the sea has always held. The origin of the Zuider Zee was twofold. In Roman times great lakes existed. By 1500 the land between the lakes had been covered by salt water. Thus was formed the Zuider Zee.

Many years were given to thinking out definite plans for its reclamation before it was decided to make the large expenditures involved. In 1918 a bill was passed to enclose and in part reclaim the area. In 1920 a sill in the channels of the Amsteldiep, lying between the coast of North Holland and the Island of Wieringen, was the basis of the first operations. In five years an enclosing dam across the whole Amsteldiep had been completed

and the reclamation of the first area was in sight.

Wieringen ceased to be an island in 1925 when the dam 1½ miles long between it and the Peninsula of North Holland was completed. But some 24½ miles of open sea remained. From Wieringen the dam was continued to the Friesland coast, in all a distance of about 26 miles from Van Ewijeksluis on the coast of North Holland to Wieringen, and from there terminating near the village of Zurig.

In constructing the dam the engineering work proceeded from several centres until on May 28, 1932 the first of the three important channels was closed. One of the special difficulties in building the dam was the possibility of scouring the sea bottom by the increased velocity of the outflowing water as the dam was built and the openings narrowed. In fact, at one time scouring occurred to a depth of 90 feet, but by the aid of a veritable armada of material the dam was constructed and the closing of the last opening finally effected. The occasion was one of much rejoicing. Ships hooted their congratulations; speeches were made in the presence of high authorities; and well-deserved thanks were recorded to those who had directed and carried out this immense work of building the dam.

When the project is completed, the area enclosed by this great dam will consist of four immense polders and a fresh-water lake, the Usel Lake. The lake lies between the four polders, adjacent to each. Thus the water from each of the four drained polders can be pumped into the lake. By means of steel sluice gates in the dam, which move up and down, the water from Lake Usel is then enabled to flow out to sea at low tide.

Besides providing a means of drainage, other advantages of the fresh-water Lake Usel are that it will provide good drinking water for cattle at all times and the dikes can be maintained at a smaller cost, since fresh-water dikes are less costly and troublesome than sea dikes. Finally the great dam between the lake and the sea will provide an excellent means of connecting North Holland and Friesland by a railway and roads. The value of Lake Usel as a fresh-water reservoir is put at well over $75,000,000.

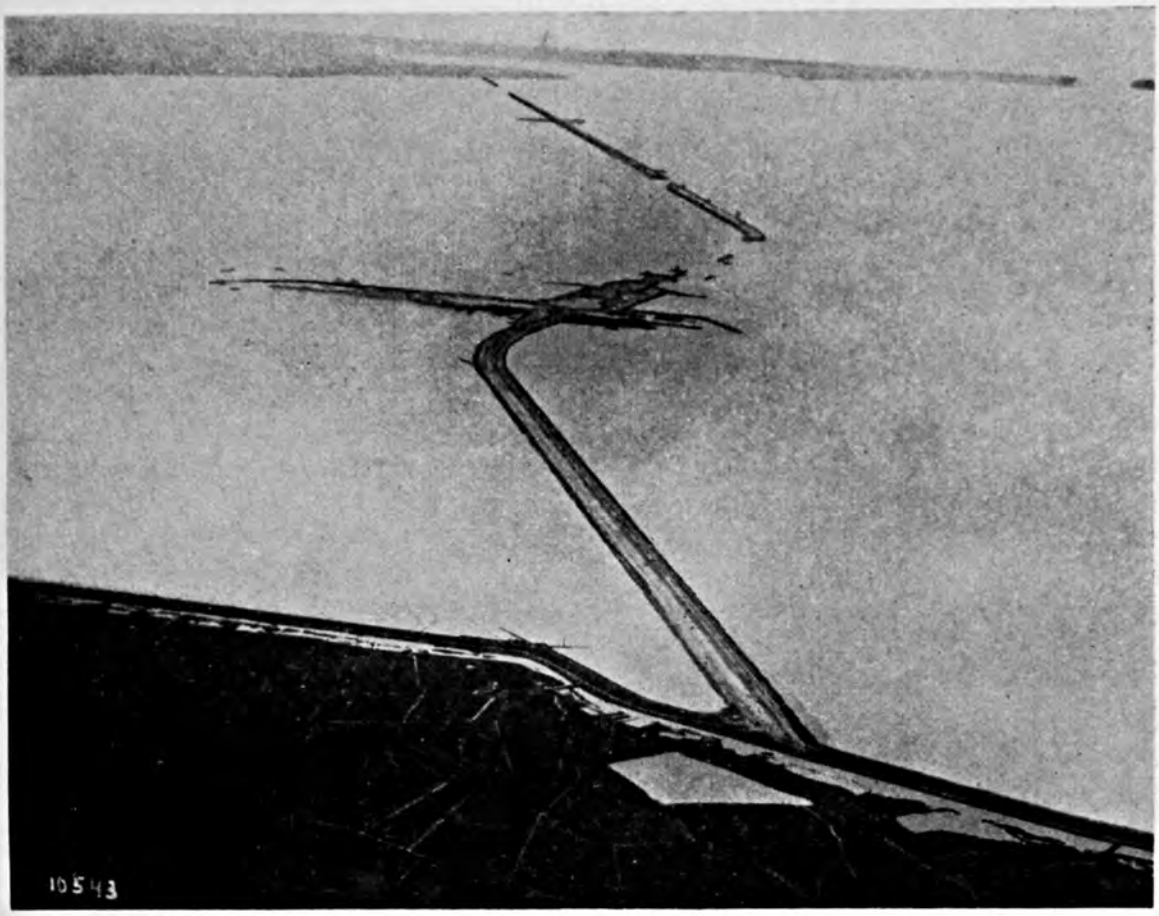
Having closed this area, there arose the problem of how to remove the salt from the soil in the new polders and make the land, for so long under the sea, fit for agricultural operations. For this purpose a small experimental polder of about 100 acres was made near the village of Andijk on the North Holland coast. The drainage and extraction of the salt was successful and crops were grown in 1930.

In the same year, the northwestern portion of the land (The Wieringermeerpolder) had been reclaimed and dried out and in that year was being plowed, cultivated, and reaped. This polder is 48,000 acres in extent and though the largest in the world, will be the smallest of the four polders.

In bringing the land into cultivation, it has been necessary to make detailed soil surveys. Various systems of drainage are being compared and salinity tests of the water are being made. Experiments with various kinds of fertilizers for the newly reclaimed land are also in progress. It is noted in the 1933 report that the experimental fields show satisfactory development and it was possible to record gratifying results of the various fertilizer treatments to clover for grass sowings.

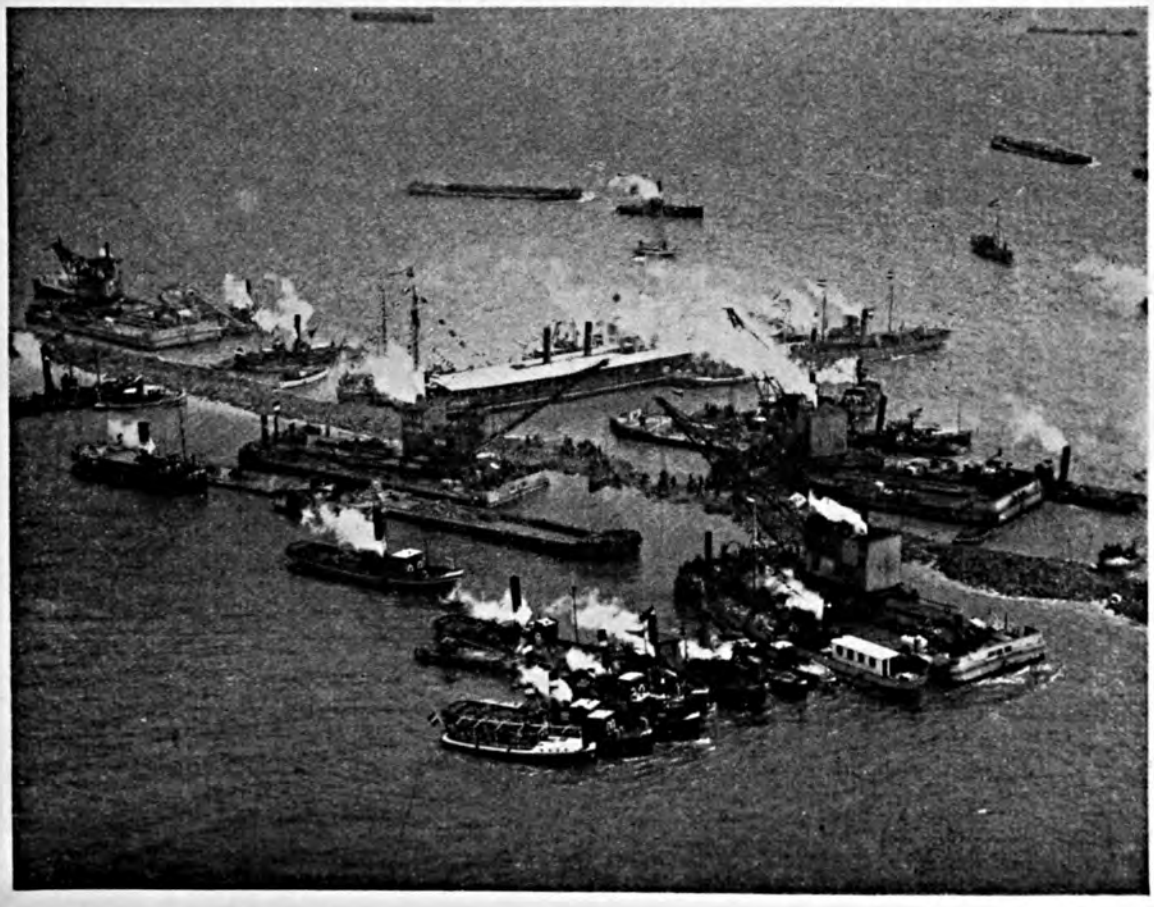
The reclamation of the Zuider Zee is a captivating story. It reveals the sturdy qualities of the people of the Netherlands and its engineers responsible for the gigantic project and marks the successful termination of another episode in the age-long battle between Man and the sea.

* "The Story of the Zuider Zee Works"; "Fresh Fields and Polders New"; written by the Association "The Netherlands Abroad", published in cooperation with the official Tourist Information Office at Hague; and "The Enclosure and Partial Reclamation of the Zuider Zee", reports written in collaboration with the Ministry of the Waterstaat, editions 1930, 1931, 1932, and 1933. We are indebted to the above publications for the information contained in this article.



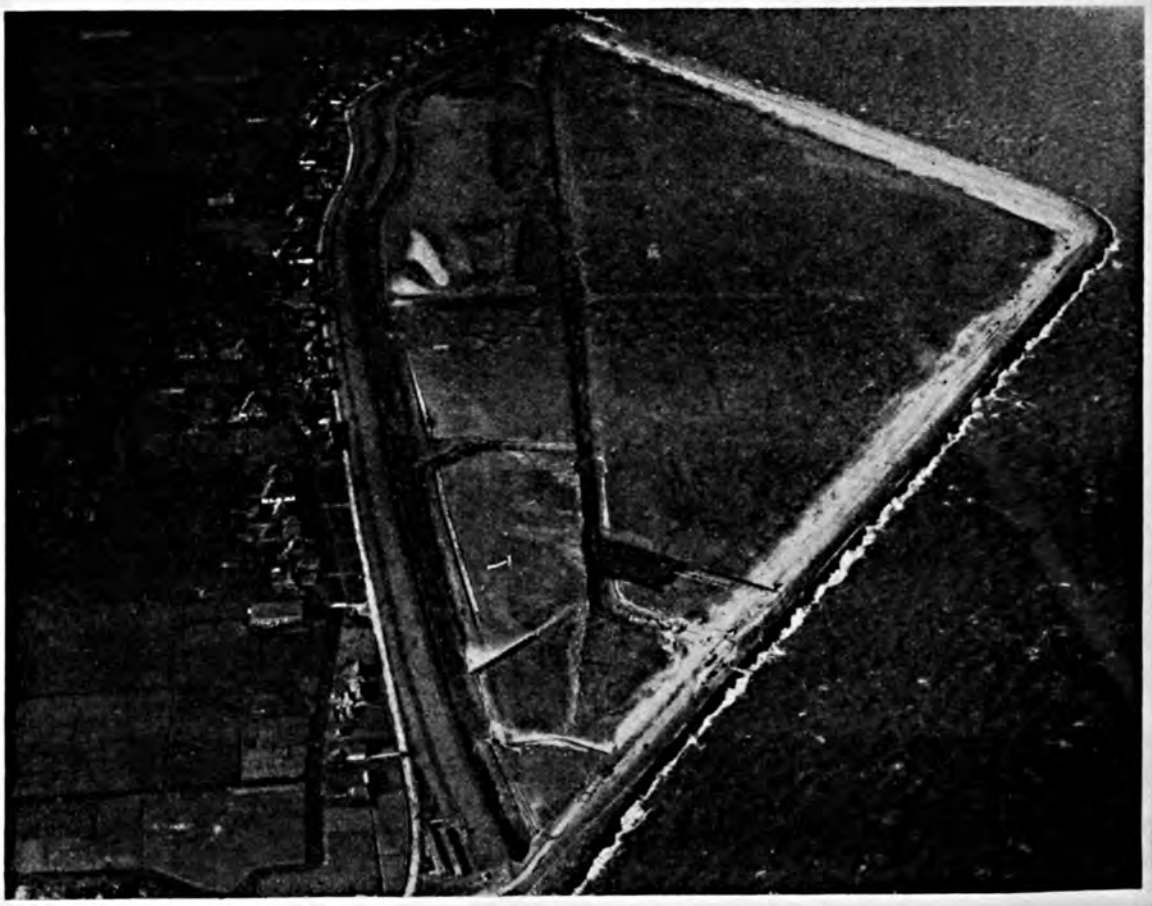
Above—A bird's-eye view of the dam from Friesland to North Holland. The Northsea, 37 miles away, can be seen in the far distance. ***(Photo by K. L. M. Royal Dutch Airlines.)***

Below—The Vlieter gap on the day of closing. ***(Photo by the Military Air Service "De Kooy.")***



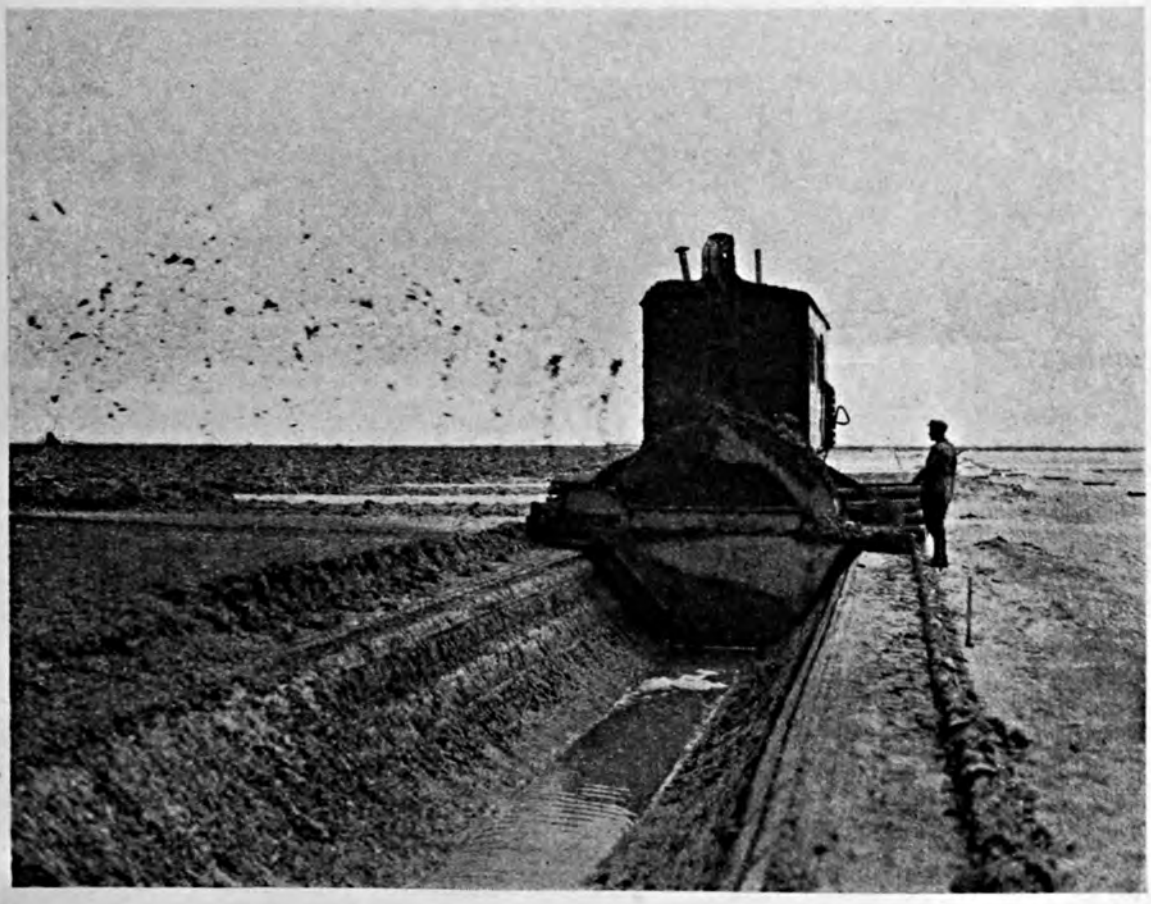
Above—Discharging sluices at Kornwerderzand, seen from the northwest. In the rear the outport of the locks. (November 20, 1931.) *(Photo by K. L. M. Royal Dutch Airlines.)*

Below—The Experimental Polder near Andijk, shortly after reclamation. *(Photo by K. L. M. Royal Dutch Airlines.)*



Above—The top of a dyke, ready for roads and rails. *(Photo copyright: K. Maaskant, Wieringen.)*

Below—Mechanical ditching, showing the excavated earth equally overspread. *(Photo copyright: K. Maaskant, Wieringen.)*



Above—Clay grubbing machine, lifting clay from the sub-soil of sandbank to the surface, for stemming drifting of the soil. *(Photo copyright: K. Maaskant, Wieringen.)*

Below—The Andijk Polder in 1931, showing sheaves of rye on the sky-line. *(Photo copyright: K. Maaskant, Wieringen.)*

The Editors Talk

The Industry Mind

Agriculture is facing the problem of becoming industry-minded instead of being individually minded. More and more is it necessary for the farmer to act as much in accordance with the wishes of his neighbors as in accordance with his own wishes. Especially is this so in the problems of the sale and distribution of his products. Would he obtain a better price for his potatoes, he must think of his neighbor as well as himself. Hence the farmer is finding it necessary to shift to a basis of being industry-minded.

Industries and services dealing with the farmer are facing the same problem—the necessity of shifting from being company-minded to being industry-minded.

The kinds and types of problems facing the farmer in different agricultural sections, as the cotton, potato, dairy, and wheat sections, are different. The kinds of problems facing industries serving agriculture are again different. But the principle is the same, i.e., individuals and groups are finding it necessary to see their own problems in relation to the larger industry problem and to adjust their thinking and doing in accordance with the larger sphere of activity.

Naturally many find it hard to make this shift. Long-established privileges and practices, sacred to the heart of the individual or the group, die hard. New confidences have to be nursed and new and larger view-points developed. Leaders in the agricultural field today are working as never before to reconcile conflicting and possibly stubborn views for the good of industry as a whole. Discouragement and failure exist alongside success and satisfaction.

In many minds the question looms—when does cooperation for the good of the industry leave off and regimentation and loss of individual liberty begin?

But whatever the right or wrong of extreme developments in industrial and agricultural unity, economic and social forces pressing hard in the world today indicate that a definite degree of industry-mindedness is necessary to the individual or group that would survive with any measure of success or contribute anything to the social welfare of this generation.

Using the Short Cut

The use of short chemical methods for determining available nutrients is arousing increasing interest, since this offers an important means of improving the efficiency and economy of crop production. The chemical side of the testing methods has been developed more or less satisfactorily, but much work is needed on the correlation of the results with field trials and the interpretation of the tests in terms of fertilizer recommendations.

A valuable contribution to this phase of the work has been made by A. L. Prince and A. W. Blair of the New Jersey Agricultural Experiment Station

(Circular 292, "The Bray Method for Available Potassium Applied to Soils of Known Potassium Treatment"). The authors have utilized some of their soils which had been treated over a period of years with varying amounts of potash fertilizers. These soils were tested for their available potash content by the Bray method, and the results were compared with yield and growth records.

From these data it is concluded that the Bray method gives an indication of the readily available potash present in the soils tested. However, the authors point out that experience is needed in interpreting the results. This publication will aid in arriving at a practical estimation of the fertilizer needs of soils on the basis of short chemical tests.

Canadian Birthdays

The year 1934 is one of several notable anniversaries in Canada. It is the 400th anniversary of the landing in Canada of Jacques Cartier, who landed at Gaspe in July 1534 and took possession of the country for France. The city of Three Rivers, Quebec, is celebrating the 300th anniversary of its founding by Sieur de Laviolette. The 150th anniversary of the founding of New Brunswick as a separate province also is to be celebrated.

Another 150th anniversary which is to be appropriately commemorated is that of the settling in sections of what are now the Provinces of Quebec and Ontario of the United Empire Loyalists. A notable anniversary is the centennial of the city of Toronto, the second largest city in Canada, popularly known as the "Queen City." This celebration began on May 24 and will extend until the close of the Royal Winter Fair in November.

We extend our most cordial good wishes to everyone participating in these historic events.

Teaching by Doing

Out of an emergency in Texas 30 years ago, grew the cooperative extension forces that now cover approximately 2,750 of the 2,900 agricultural counties of the United States. These agents form a coordinated system for carrying the results—teaching by doing—of research work into the farm home and for modifying farm practices.

As stated recently by former Congressman A. F. Lever, co-author of the Smith-Lever Act, in summarizing two decades of the work of County Extension Agents, "They have been the spearhead of any difficult rural situation during these 20 years."

C. W. Warburton, Director of Extension Work, in reviewing the activities of the extension forces, said in part, "The farm problems presented by droughts, floods, hurricanes, insect invasions, and falling commodity prices have engaged the attention of the extension workers. When an occasion arises the extension forces adjust their programs to meet the emergency."

Especially gratifying is one outstanding result of extension work, i.e., the enrolled membership of nearly a million boys and girls in organization for the betterment of rural youth.

BETTER CROPS WITH PLANT FOOD is glad to be of service to the extension forces and wishes them success in the future as in the past.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Tobacco growers will be interested in the results of "Fertilizer Tests with Tobacco," by J. E. McMurtrey, Jr., W. M. Lunn, and D. E. Brown (Maryland Agricultural Experiment Station Bulletin 358). The authors report and discuss a comprehensive series of experiments with numerous nitrogen and potash fertilizers in varying amounts. Consideration also is given to the role played by sulphates, chlorides, calcium, and magnesium in tobacco fertilization. A number of mineral nitrogen carriers were compared in their influence on yield and quality of tobacco, and material differences were found. The authors do not make specific recommendations as to which nitrogen carriers should be used, but the data indicate that a combination of carriers might be safest under most conditions. The amount of actual nitrogen which gave best results in this work was 30 to 40 pounds per acre. Insufficient nitrogen reduced yields, while excess nitrogen lowered the quality and increased susceptibility to disease.

The statement is made that "potash appears to be in some respects the most important component of the fertilizer mixtures as regards the quality of the leaf produced." Varying the amount of potash did not influence yield so much as quality. The best quality over a period of years was produced by 120 pounds per acre of actual potash or 240 pounds per acre of sulphate of potash. There was a noticeable shift in the amount of potash required to produce the highest total value per acre (yield and quality combined) as the experiment progressed. In the earlier years 120 pounds actual potash were sufficient to produce greatest value, but in the last several years 168 pounds per acre of actual potash gave best results. When the sulphate and muriate forms of potash were compared, the results on a quality and total value-per-acre basis greatly favored the sulphate form. The muriate form produced higher yields but lowered the quality so much as to reduce the acre value of the tobacco much below the acre value of tobacco produced by sulphate of potash.

The poorer results when using muriate of potash were due, of course, to the chlorides in this form of potash. The sulphates present in potash or nitrogen compounds did not have this adverse influence. In addition, it is stated that sulphates apparently tended to start plants growing earlier in the spring after transplanting.

Tests with calcium and magnesium indicate that the beneficial effects of these elements were due to their action as such, rather than to their influence on soil reaction.

The influence of several fertilizer materials on fire-holding capacity of the leaf was investigated. Chlorides either in nitrogen or potash compounds greatly decreased fire-holding capacity, while sulphates increased it.

A proper balance of nitrogen and

potash was found helpful in reducing leaf-spot diseases on tobacco. An excess of nitrogen with insufficient potash favored the development of these diseases. A proper balance of these nutrients also aided the plant in withstanding unfavorable weather conditions. The statement is made that . . . "a liberal potash application is the best type of storm insurance."

Summarizing their work, the authors make the following recommendation: "It seems that under the conditions of these tests a fertilizer mixture made up from the materials which have been shown to be satisfactory and used at 750 to 1,000 pounds per acre should contain 4 per cent nitrogen, 8 per cent phosphoric acid, and 12 per cent potash."

The bulletin contains good descriptions of deficiency symptoms of potash and magnesium and carefully differentiates between them. These are supplemented by numerous excellent photographic illustrations. This publication must be considered as a valuable addition to the literature of tobacco production.

"Nitric Nitrogen in the Soils of the Arkansas Valley," Agr. Exp. Sta., Fort Collins, Colo., Tech. Bul. 6, Feb., 1934, Robert Gardner, Alvin Kezer, and J. C. Ward.

"Registration, Labeling, and Inspection of Commercial Fertilizers; 1933," Agr. Exp. Sta., Columbia, Mo., Bul. 333, Mar., 1934, W. S. Ritchie, L. D. Haigh, and E. W. Cowan.

"Analyses of Commercial Fertilizers and Ground Bone; Analyses of Agricultural Lime, 1933," Agr. Exp. Sta., New Brunswick, N. J., Bul. 561, Jan., 1934, Charles S. Cathcart.

"The Effect of Nitrogenous Fertilization on the Protein Content of Corn When Harvested for Silage," Agr. Exp. Sta., New Brunswick, N. J., Bul. 563, Feb., 1934, C. B. Bender and A. L. Prince.

"Fertilizer Recommendations for New York," Agr. Exp. Sta., Ithaca, N. Y., Cornell Ext. Bul. 281, Apr., 1934.

"Four Years of Commercial Fertilizers on Currants in the Hudson River Valley," Agr. Exp. Sta., Geneva, N. Y., Bul. 641, Jan., 1934, L. C. Anderson.

"Official Report on Feed Stuffs, Commercial Fertilizers and Agricultural Lime and Limestones for the Year 1933," Dept. of Agr., Columbus, Ohio.

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Clemson College, S. C., Bul. 291, Aug., 1933, R. N. Brackett and J. H. Woodward.

"Tabulated Analyses of Commercial Fertilizers," Dept. of Agr., Nashville, Tenn., Oct. 1, 1933, J. W. Sample.

"The Effect of Time and Rate of Application of Nitrate of Soda on the Yield of Cotton," Agr. Exp. Sta., College Station, Tex., Bul. 490, Mar., 1934, E. B. Reynolds, P. R. Johnson, and B. C. Langley.

"How Much Nitrogen Do Apple Trees Need?" Agr. Exp. Sta., Madison, Wis., Bul. 427, Mar., 1934, R. H. Roberts.

Soils

Two recent additions to the field of soil utilization are Bulletin 293 of the North Carolina Agricultural Experiment Station and Special Circular 44 of the Ohio Agricultural Experiment Station. The North Carolina Bulletin entitled, "Agricultural Classification and Evaluation of North Carolina Soils," by C. B. Williams, W. B. Cobb, and H. B. Mann, contains a full discussion of the soils of the State. The characteristics, crop adaptation, and the general fertilizer needs of the individual types of soils are given in tables and charts, making a handy and valuable reference book. "A Key to the Soils of Ohio," by G. W. Conrey and A. H. Paschall, in addition to covering the subject indicated by the title, gives tables on the adaptability of the various soil types to the important crops in Ohio.

An excellent publication on liming by A. R. Whitson and C. J. Chapman has just been issued by the Wisconsin Agricultural Experiment Station as Circular 266, "Liming Wisconsin Soils." Information on forms of liming materials, time and manner of application, and reasons for using lime are covered in this publication. The authors have wisely drawn attention to the fact that liming, while highly important in many farming systems, is not a cure-all for unproductivity of soils. Fertilizers and organic matter are equally important. This bulletin is written from a viewpoint broad enough to make it helpful to all interested in the problems of liming.

"Experiments in the Use of Old Soil in Growing Carnations and Roses," Agr. Exp. Sta., Urbana, Ill., Bul. 400, Mar., 1934, F. F. Weinard and S. W. Decker.

"Optimum Soil-Nitrate Levels for Table Beets: Their Effect on Certain Nitrogen-Fractions in Juice Expressed from the Leaves," Agr. Exp. Sta., Kingston, R. I., Bul. 242, Jan., 1934, John B. Smith and Frank S Schlenker.

"The Effects of Mulched and Turned Rye in the Green and Mature Stages on the Liberation of Plant Nutrients from a Silt Loam Soil," Agr. Exp. Sta., Blacksburg, Va., Tech. Bul. 53, Feb., 1934, H. H. Hill.

"Soil Survey (Reconnaissance) of The Northern Plains of Montana," U. S. D. A., Washington, D. C., Series 1929, No. 21, L. F. Gieseker, E. R. Morris, A. T. Straborn, and C. B. Manifold.

"Soil Survey of The Lower Flathead Valley Area Montana," U. S. D. A., Washington, D. C., Series 1929, No. 22, William DeYoung and R. C. Roberts.

"Soil Survey of Montgomery County, North Carolina," U. S. D. A., Washington, D. C., Series 1930, No. 13, R. C. Jurney, and W. A. Davis.

"Soil Survey of Harlan County, Nebraska," U. S. D. A., Washington, D. C., Series 1930, No. 12, W. J. Moran, R. Covell, and B. J. Abashkin.

"Soil Survey of Delaware County, New York," U. S. D. A., Washington, D. C., Series 1930, No. 7, Clarence Lounsbury, P. D. Beers, F. B. Howe, E. E. Waite, C. S. Pearson, and C. H. Diebold.

"Soil Survey of Macon County, North Carolina," U. S. D. A., Washington, D. C., Series 1929, No. 16, R. E. Devereux, E. F. Goldston, and W. A. Davis.

"Soil Survey of Van Zandt County, Texas," U. S. D. A., Washington, D. C., Series 1928, No. 33, A. W. Goke, W. I. Watkins, E. N. Poulson, Z. C. Foster, E. G. Fitzpatrick, and W. J. Moran.

"Soil Survey of Brown County, Wisconsin," U. S. D. A., Washington, D. C., Series 1929, No. 17, A. C. Anderson, W. J. Geib, M. J. Edwards, M. B. Whitson, C. E. Born, and Harold Bandoli.

"Soil Survey of Hancock County, Iowa," U. S. D. A., Washington, D. C., Series 1930, No. 9, F. R. Lesh, T. H. Benton, and G. B. Killinger.

"Soil Survey of Guthrie County, Iowa," U. S. D. A., Washington, D. C., Series 1929, No. 15, C. L. Orrben, A. M. O'Neal, A. H. Hasty, and W. C. Boatright.

"Soil Survey of Eaton County, Michigan," U. S. D. A., Washington, D. C., Series 1930, No. 10, J. W. Moon, J. O. Veatch, C. H. Wonser, and R. E. Pasco.

"Soil Survey of Hitchcock County, Nebraska," U. S. D. A., Washington, D. C., Series 1930, No. 8, F. A. Hayes, W. J. Moran, S. R. Bacon, R. L. Gemmell, H. Otte, B. J. Abashkin, and E. A. Nieschmidt.

Crops

The extended drought throughout the Midwest undoubtedly has raised the question of the practicability of irrigation in many sections and for many crops where it has not been considered before. Iowa's new Bulletin No. 308, "Irrigation for Vegetable Crops in Iowa," by A. T. Erwin and E. S. Haber, will throw some light on the subject. Interested growers will find the publication of value in determining whether there is profit in controlling the moisture supply of their crops.

"Report of the Director for the Year Ending October 31, 1933," Agr. Exp. Sta., New Haven, Conn., Bul. 357, Jan., 1934, W. L. Slate.

"Celery Production in Colorado," Agr. Exp. Sta., Fort Collins, Colo., Bul. 407, Feb., 1934, A. M. Binkley.

"Flower Gardens for Colorado," Agr. Exp. Sta., Fort Collins, Colo., Bul. 408, Mar., 1934, George A. Beach.

"A Preliminary Study of the Fruiting Habit of the Black Raspberry," Agr. Exp. Sta., Fort Collins, Colo., Tech. Bul. 8, Mar., 1934, George A. Beach.

"Bright Tobacco Culture in the Coastal Plain of Georgia," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Bul. 22, Nov., 1933, J. M. Carr.

"Report of the Director for the Year Ending June 30, 1933," Agr. Exp. Sta., Lafayette, Ind., J. H. Skinner and H. J. Reed.

"Alfalfa for Indiana Farms," Agr. Exp. Sta., Lafayette, Ind., Ext. Leaf, No. 158 (Rep.), Apr., 1934.

"Soybeans in Iowa Farming," Agr. Exp. Sta., Ames, Iowa, Bul. 309, Apr., 1934, Albert Mighell, H. D. Hughes, and F. S. Wilkins.

"Flax Production in Kansas," Agr. Exp. Sta., Manhattan, Kan., Cir. 173, Jan., 1934, I. K. Landon.

"Corn Culture," Agr. Exp. Sta., Baton Rouge, La., Cir. 8, Mar., 1934, H. B. Brown.

"Summary Report of Progress, 1933," Agr. Exp. Sta., Orono, Me., Bul. 369, Dec., 1933.

"Isolated Tuber-unit Seed Plots for the Control of Potato Virus Diseases and Blackleg in Northern Maine," Agr. Exp. Sta., Orono, Me., Bul. 370, Jan., 1934, E. S. Schultz, Reiner Bonde, and W. P. Raleigh.

"Annual Report for the Fiscal Year Ending November 30, 1933," Agr. Exp. Sta., Amherst, Mass., Bul. 305, Mar., 1934, F. J. Sievers.

"Massachusetts Pastures," Agr. Exp. Sta., Amherst, Mass., Ext. Leaf. 150, Nov., 1933, Ralph W. Donaldson.

"Seed Inspection," Agr. Exp. Sta., Amherst, Mass., Bul. 72, Control Series, Feb., 1934, F. A. McLaughlin and Margaret E. Nagle.

"Gladiolus Culture, Insects, and Diseases," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 149, Jan., 1934, P. R. Krone, E. I. McDaniel, and Ray Nelson.

"Orchard Grass in Missouri," Agr. Exp. Sta., Columbia, Mo., Cir. 173, Feb., 1934, C. A. Helm.

"Tomato Culture in Missouri," Agr. Exp. Sta., Columbus, Mo., Cir. 173, Feb., 1934, E. J. Allen and T. J. Talbert.

"The Soybean Crop in Missouri," Agr. Exp. Sta., Columbia, Mo., Cir. 174, Mar., 1934, B. M. King.

"Management of Bluegrass Pastures in Missouri," Agr. Exp. Sta., Columbia, Mo., Cir. 175, Mar., 1934, E. Marion Brown and James E. Comfort.

"Strawberry Growing in Missouri," Agr. Exp. Sta., Columbia, Mo., Cir. 176, Apr., 1934, T. J. Talbert.

"Flax, A New Cash Grain Crop for New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 295, Mar., 1934, Howard B. Sprague.

"Growing Flax in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 305, Mar., 1934, Howard B. Sprague.

"Leaf Scorch of Shade Trees," Agr. Exp. Sta., New Brunswick, N. J., Cir. 310, Apr., 1934.

"Forty-Fourth Annual Report, 1932-1933," Agr. Exp. Sta., State College, N. M., Fabian Garcia.

"Strawberries," Agr. Exp. Sta., Geneva, N. Y., Cir. 31 (Rep.), Aug. 1, 1933, George L. Slate.

"Longevity of Rhizobium Japonicum in Relation to Its Symbiont on the Soil," Agr. Exp. Sta., Ithaca, N. Y., Mem. 162, Apr., 1934, J. K. Wilson.

"Spinning Quality of Cotton in Relation to Seed Purity and Care of Seed-Stocks," Agr. Exp. Sta., State College Station, Raleigh, N. C., Tech. Bul. 45, Mar., 1934, J. H. Moore and R. T. Stutts.

"Fifty-Second Annual Report, 1932-1933," Agr. Exp. Sta., Wooster, Ohio, Bul. 532, Feb., 1934, C. G. Williams.

"Potato Gowing in Ohio," Agr. Exp. Sta., Columbus, Ohio, Ext. Bul. 86 (Rev.), Feb., 1934, E. B. Tussing.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIX, No. 167, Mar.,-Apr., 1934.

"Virginia Pine in Pennsylvania," Agr. Exp. Sta., State College, Pa., Bul. 300, Nov., 1933, A. C. McIntyre.

"Forty-Sixth Annual Report, 1934," Agr. Exp. Sta., Kingston, R. I., Contribution 449, Apr., 1934, B. E. Gilbert.

"The Influence of Crop Plants on Those Which Follow. IV," Agr. Exp. Sta., Kingston, R. I., Bul. 243, Jan., 1934, T. E. Odland, John B. Smith, and S. C. Damon.

"Improved Methods of Utilizing the Magnolia Fig," Agr. Exp. Sta., College Station, Tex., Bul. 483, Dec., 1933, H. M. Reed.

"Department of Agriculture Immigration of Virginia," Richmond, Va., Buls. 312, 313, 314, and 315, Feb., Mar., Apr., and May, 1934.

"Olive Growing in the Southwestern United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1249 (Rev.), Aug., 1933, C. F. Kinman.

"Important Sugar-Beet By-Products and Their Utilization," U. S. D. A., Washington, D. C., Farmers' Bul. 1718, Jan., 1934, A. W. Skuderna and E. W. Sheets.

"Feeding and Management Investigations at the United States Dairy Experiment Station at Beltsville, Md.; 1932 Report," U. S. D. A., Washington, D. C., Misc. Pub. 179, Dec., 1933, T. E. Woodward, J. B. Shepherd, and R. R. Graves.

"Alfalfa in Western Washington," Agr. Exp. Sta., Pullman, Wash., Ext. Cir. 18 (Rep.), Mar., 1934, Leonard Hegnauer.

"Commercial Potato Production in West Virginia," Agr. Exp. Sta., Morgantown, W. Va., Cir. 63, May, 1933, K. C. Westover.

"Strawberries for West Virginia Farms," Agr. Exp. Sta., Morgantown, W. Va., Cir. 64, May, 1933, W. H. Childs.

"Factors Influencing the Palatability of Hay," Agr. Exp. Sta., Laramie, Wyo., Bul. 199, Nov., 1933, H. S. Willard.

Economics

"Production Costs and Returns from Major Salt River Valley Field Crops, 1928-1930," Agr. Exp. Sta., Tucson, Ariz., Bul. 146, Mar., 1934, R. L. Matlock and S. P. Clark.

"Prospects for Agricultural Recovery—VI. Farm Mortgage Policy," Agr. Exp. Sta., Ames, Iowa, Bul. 315, Apr., 1934, William G. Murray.

"Farm Organization Practices and Costs of Producing Crops in the Middle Rio Grande Conservancy District of New Mexico," Agr. Exp. Sta., State College, N. M., Bul. 215, June, 1933, A. L. Walker and P. W. Cockerill.

"An Economic Study of the Marketing of Certain Perishable Farm Products in Albany, New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 585, Feb., 1934, Wilbert C. Hopper.

"The Cost of Producing Milk in Rhode Island," Agr. Exp. Sta., Kingston, R. I., Bul. 241, Jan., 1934, J. L. Tennant.

A NEW BOOK ON FERTILIZERS

Considering the importance of fertilizers in a large portion of the agriculture of the United States, there are comparatively few books covering the subject in a satisfactory manner. Thus,

"Commercial Fertilizers" by Gilbeart H. Collings (*P. Blakiston's Son and Company, Inc., Philadelphia,* 1934, $3.25) is a welcome addition to this uncrowded field.

After a general introductory chapter, the book can be divided into two large sub-divisions. The first division describes the materials used as fertilizer, while the second division gives principles on the use of fertilizers. Separate chapters are devoted to nitrate of soda; sulphate of ammonia; synthetic nitrogenous fertilizers; organic nitrogenous fertilizers; rock phosphate; superphosphate; other phosphates, such as bone and basic slag; European potash salts; other potash salts; and the so-called minor elements. When discussing each fertilizer material, the source, processing or manufacturing, properties and use of the material are included. This arrangement is of great help when using the book for reference purposes. The new fertilizer materials are well covered.

The remainder of the book is devoted to consideration of the purchase, use, and application of fertilizers. The author, from his long experience with fertilizers, has wisely given principles on their use, rather than a number of specific recommendations or rules of thumb. For this reason the information given is not limited in its applicability to any locality, but is adapted to the highly diversified conditions of the fertilizer-using sections. Worthy of mention is a good bibliography, an aid to those wishing further details on some particular subject than can be included in a book of this nature.

The author states he wrote the book as a textbook on commercial fertilizers for agricultural colleges, and it should serve this purpose admirably. However, it also will serve as a handy reference book for county agents, fertilizer manufacturers, and others concerned with fertilizer problems.

Old Soils Need Potash

(*From page 9*)

fections as wilt and rust diseases.

Available potash sometimes is reduced so low that a deficiency fixation by the soil occurs when potash fertilizer is used. Some of the potash so absorbed or fixed may fail to become readily available to crops. The availability of potash fertilizer in poor soils may be safeguarded by concentrating the application in a small area near the plants. On good soils that have been properly maintained, potash unused by the crop and fixed by the soil remains in a form available to succeeding crops. Soil exhaustion should not be permitted to reach so advanced a stage that available nutrients nearly disappear.

Changes which occur in the supply of available potash are pretty well indicated by what occurs within the plant. As long as available potash is abundant, large quantities are absorbed by the growing plant. In fertile virgin soils "luxury" consumption occurs. Crop removal exhausts the supply the more rapidly because of excessive absorption. As the available supply is reduced, "luxury" consumption disappears, and finally there is no longer sufficient to meet the needs for growth. The diminished supply is indicated by the low analysis in the plant sap.

When available potash is sufficiently reduced, abnormalities of plant development may appear. Every actively growing point must have potash. The plant partially accommodates itself to a reduced supply, by re-

ducing the number of growing points. Roots are less profusely branched. The few roots that develop are long and slender and incapable of rendering the crop drouth-resistant. Sweet potatoes develop strings instead of thick, fleshy potatoes. Irish potatoes are poorly shaped, and less marketable. The leaves are reduced in size and number, and photosynthetic activity slows appreciably. Even when disease does not appear, yields and quality are disappointing.

Becoming Potash-Minded

Appreciation of the danger of potash deficiency is apparently increasing. This is indicated in the extended use of potash fertilizers. Orchardists and small-fruit growers have found potash helpful in controlling certain diseases and disturbances of malnutrition. Nearly all vegetable growers use complete fertilizers carrying appreciable quantities of potash. Many general farmers include the use of complete fertilizer as a part of their system of soil improvement. The use of potash and phosphate has proven especially helpful in restoring old pastures. In the South and East where soils have been farmed longest and most severely exhausted, potash has become increasingly important. Results from the renowned Rothamsted experiments in England indicate that the use of 200 pounds of potassium sulfate per acre with nitrogen and phosphorus has added eight bushels to the yield of wheat (an increase of 42 per cent) over a period of 90 years.

As the "per acre" expenditure for fertilizer increases, the inclusion of potash becomes more urgent. Additional expenditures for phosphorus, nitrogen, or lime are of little help when potash is deficient. Likewise the use of potash shows little return so long as phosphorus or some other important nutrient is seriously deficient. The heaviest users of fertilizer include potash, both perhaps to provide an important nutrient, and to guard against a gradual but nevertheless certain exhaustion of the soil supply.

The crop-producing power of two soils of similar physicial constitution have been compared. One was an old, badly leached soil, acid in reaction. The other was nearly neutral and unleached. The old, leached soil showed only 27 per cent as high productive capacity as the latter. The leached soil contained 20 per cent as much available calcium and 42 per cent as much available potash as the good soil. The availability of other nutrients was reduced to a low level. There is ample reason for the low production of the poor soil. Old soils need complete fertilization to bring them back to high production.

Maintains Fertility

With good methods of farming, soil exhaustion can be avoided. Experienced gardeners and truck farmers do not exhaust the soil, even with the removal of two and three crops per season. They fertilize liberally and completely. The general farmer cannot afford nor does he need as much fertilizer as the truck grower. He can, however, conserve fertility by starting a fertilizer program before the soil is exhausted. The oldest experiment fields in the world indicate that the use of mineral fertilizers and crop rotation will maintain fertility indefinitely. Good farmers find the same method effective and better economy than restoring "run-down" soils.

Soil exhaustion is slow and insidious. Soil building must likewise come gradually. An effective method of restoring old soils is the growing of legume crops. Lime, phosphate, potash, and sometimes nitrogen or manure may be needed to grow a luxuriant legume on run-down land. Expensive yes, but the end justifies the means. Either the land must be made productive, or taken out of cultivation.

Fortunate is the farmer who can introduce a specialized crop of high acre-value into his rotation. For crops

of high value the farmer is willing to prepare his land well. The grower cannot afford to fertilize high-value crops other than liberally and completely. There is profit in the crop. Other crops of the rotation less able to stand the expenditure then give larger returns, because the soil has been made rich.

In soil management as in other things prevention rather than cure is desirable. Rotation with soil-building sods, the return of manure, the frequent renewal of lost bases, both calcium and potassium on old soils, and the use of phosphorus and nitrogen help prevent soil depletion and low production. Soils that are kept productive do not require as heavy expenditures in labor, management, and fertilizers for similar returns. There is profit in farming good soil, whereas poor soils contribute to overproduction, with profit to nobody.

The Inquiring Mind

(*From page* 12)

Henry died on July 4, 1904.

Botany was Dean Henry's specialty, and in his declining years again received his attention. His favorite subject, however, had to be relegated to other scientists when the great task of establishing the agricultural college and experiment station more than occupied his time and talents. Almost every branch of agriculture had to be studied, and, indeed, mastered. That Dean Henry did with remarkable success, and soon initiated research work in the various departments of agricultural science. William Trelease, B.S., who was later Director of the Botanic Gardens at St. Louis, Missouri, was appointed Professor of Botany, and Henry P. Armsby, Ph.D., who afterward became Director of the Pennsylvania Agricultural Experiment Station, was made Professor of Agricultural Chemistry. These appointments, and the enlargement of the scope of the Agricultural College, were made possible by the increased revenue voted by the State Legislature of 1883.

From the first, Dean Henry associated with himself men who became leaders in their respective fields. Of these may be mentioned W. W. Daniells, S. M. Babcock, and F. W. Woll, in agricultural chemistry; E. S. Goff, in horticulture; F. H. King, in soils and physics; Harry L. Russell, in agricultural bacteriology; E. H. Farrington, in dairying; Ransom A. Moore, in agronomy; John A. Craig and W. L. Carlyle, in animal husbandry; A. R. Whitson, in soils; and, later, many other notable teachers and research workers who brought fame to the institution.

The most notable achievement of the Experiment Station during the regime of Dean Henry was the perfecting of the milk test by Dr. S. M. Babcock. Its discovery was announced in Bulletin No. 24, issued by the Station in July 1890. The test consisted of an accurate method of measuring the fat content of milk by a simple process which readily could be practiced by expert dairymen. It followed the development of the practical method of separating the cream from bulk raw milk, by the application of centrifugal force, perfected by Dr. De Laval of Sweden. These two discoveries practically revolutionized commerical dairying and buttermaking. The Babcock test also greatly benefited the cheesemaking industry. Dean Henry reported that over 60,000 copies of the bulletin

and reports describing the Babcock test were issued by the Station. Dr. Babcock refused to patent his method, although profits from it might have made him a multimillionaire. In 1899, the State Legislature voted him a large bronze commemorative medal, made in London, England, as an expression of appreciation, and it was formally presented in 1901.

Other Achievements

Another great achievement occurring during the Henry administration, was the introduction of tuberculin testing for bovine tuberculosis, and the inauguration of a campaign against the disease which was destined eventually to rid the State of Wisconsin of that malady and incite other States to strive in like manner for its eradication. The credit of this great achievement belongs to Dr. Harry Luman Russell, bacteriologist, who succeeded Dean Henry as Dean and Director of the Wisconsin College of Agriculture and Experiment Station in 1907. He had done post-graduate work under Robert Koch, the famous German bacteriologist, and had brought to Wisconsin some tuberculin from the laboratory of that scientist. With it he tested the Wisconsin Experiment Station dairy herd and found 20 of its 30 animals tuberculous. Then he began active propaganda work against the disease, demonstrated the test in many centers, educated testers, wrote and lectured on the subject, and in the face of opposition, won the battle, established the test as a standard and reliable method of detecting the disease, saw the malady banished from many a herd and district and eventually practically eradicated in his home State, Wisconsin.

When Dean Henry started the Short Course in Agriculture in 1885, with an enrollment of 18 regular and 4 special students, the venture was considered by many as a radical and impracticable experiment; but it grew to be one of the most important educational factors in agriculture. It was given impetus and brought to its full measure of efficiency and power by Professor Ransom A. Moore, who was appointed assistant to Dean Henry in 1895 and became famous as an agronomist and also as the originator of the great Agricultural Experiment Association of Wisconsin for the propagation and dissemination of purebred seeds. The Short Course gradually grew in popularity until more than 6,500 young men from Wisconsin farms and elsewhere had benefited by its tuition. The influence of the Course upon the agriculture of the State is inestimable, and other States have had like results from similar courses suggested by that of Wisconsin. Dean Henry also started the Short Course in Dairying, in 1890, soon after the perfection of the Babcock test for butterfat, and it has attracted and trained a host of students in practical and scientific dairy methods, not only from Wisconsin, but from many other States and from some foreign countries.

In 1885, the Legislature, at the request of Dean Henry and other progressive agriculturists, including Hiram Smith, W. D. Hoard, and W. H. Morrison, enacted a law establishing the Farmers Institutes which, in Wisconsin and other States, soon became a power for good in bringing to farmers the valuable facts disclosed by the experiments conducted at the Experiment Station.

Dean Henry was also most influential in securing the establishment of the parcel post. Toward that end he organized a successful publicity campaign for Parcel Post Day, which he named as March 18, 1912, and through letters and personal contact secured the active cooperation of the agricultural press in behalf of the project.

"Feeds and Feeding"

It was in 1898, that Dean Henry published "Feeds and Feeding," a Handbook for the "Student and Stockman," a volume of 670 pages which was destined to revolutionize the feed-

ing of domesticated animals and become the most widely used text-book on the subject in the agricultural schools and veterinary colleges of America and several foreign countries. The many later editions of the book were prepared and brought up to date with Professor F. B. Morrison as joint author. The preparation of the material for the initial edition was a heroic task to which the author brought his most earnest attention. Every sentence composing it had to be as perfect as possible, and its diction would serve today as a model for students in English composition. He was also a valued contributor to the agricultural press and a popular and instructive lecturer upon agricultural subjects, at farmers' institutes, and at conventions of both scientists and practical farmers.

"Dean of Deans"

Recognized as a great administrator, Dean Henry became generally known as the "dean of deans." Better yet, by those who knew him well, he still is affectionately referred to as "Dear Dean Henry," and is spoken of with respect on the 180,000 farms of Wisconsin.

Looking back, we remember that Dean Henry achieved his first triumph and widest fame by the publication of the results of his many and carefully conducted experiments in the feeding of swine. He began and waged an active campaign, in the early eighties, against the prevailing practice of stuffing pigs on corn until the animals became veritable "lard hogs" and almost devoid of the Irishman's "streak of fat and streak of lean." His illustrated bulletins, some with colored plates, showed sections of carcasses of corn-fed hogs, and those matured on a ration containing adequate quantities of protein and bone-building elements. His tests of the strength of the thigh bones of hogs so fed were a revelation to breeders.

In the first Wisconsin trial, as a table in his bulletin showed, the bones of corn-fed pigs broke at an average pressure of 380 lbs. for each 100 lbs. of carcass, while those of pigs fed dried milk, dried blood, and middlings broke at about 500 lbs., a difference of about 32 per cent in favor of the pigs getting the ration rich in crude protein. Analyses of the organs and parts of the pigs used in the second Wisconsin trial showed, further, that the corn-fed pigs had proportionately less dry matter in their blood and kidneys and a smaller amount of dry, lean meat tissue than those on the narrow ration. The results of these and further experiments conducted by Dean Henry, when published and illustrated in the live stock and farm press of the country, had, we think, a greater influence in bettering the feeding methods of swine breeders throughout the country, improving the quality of pork products, strengthening hogs constitutionally, and lessening losses from rickets and paralysis, than anything of the sort that had been accomplished by any other scientist in those early days.

Believed in Future

"Dean Henry was a great believer in the future of agriculture," once said the editor of Hoard's Dairyman, and added, "He was one of the earliest speakers for cooperation, often citing the farmers of Denmark as an example for American farmers to follow. His vision was country and world-wide, and he saw the importance of having a satisfied, happy farm population. His plea was ever for a 'strong, virile, agricultural people, as a rock foundation of the nation,' for, as he said, the one priceless thing in any truly great nation is the character of its people." Another notable saying of Dean Henry was: 'The farmer who simply goes out to plow and work is not going to get any fun out of it, but there is a good chance for fun in farm life. Get enthusiastic over your work and you will begin to see farm life in a new and brighter light'."

Always he preached integrity, hon-

esty, industry, and thrift to his students and farm audiences. On a wall of a room in the Agricultural College he placed a huge sheet of brown paper on which he had printed words to this effect: "The nickel you needlessly spend on a street car ride or cigar would buy a tract of good farm land in Northern Wisconsin as large as this sheet or more. Save your nickels and buy land!"

Often farm boys might be seen contemplatively studying that poster and seriously discussing its moral. No doubt such lessons by Dean Henry set many a young man to thinking right and acting wisely. He was a sound thinker and wise counsellor. Professor R. A. Moore, who worked intimately with him for many years, once said, "None of us are ever 100 per cent perfect, but I don't think there ever was a man in the State of Wisconsin who was right as many times out of a hundred as he would be."

He was a man of wonderful executive ability, and could quickly and correctly "size up" a puzzling situation. Men who did things in a conservative way earned his esteem. Undemonstrative himself, his love for farm boys was far greater and deeper than they knew or suspected. One of his admirable traits was his remarkable ability to work well and successfully with the State Legislature. Its members came to understand him well and to recognize the unselfishness and saneness of his requests; therefore they appropriated the building funds he asked of them. He was strictly honest in all of his dealings and a great admirer of men who were truthful and honest like himself. Although thrifty by nature and practice, he was always ready and willing to spend money when he saw that it would be of great benefit to the farmers.

Of intensely nervous temperament, his work took heavy toll of his strength and at length broke down his health, so that he had to retire at the early age of 57 years. But he had accomplished wonders during his 27 years of service and richly deserved the rest which restored in some measure his waning strength. In his declining days, spent in San Diego, California, botany, his first love, became again his entrancing study and never-failing job. Daily, among the beautiful trees, shrubs, and flowers of Balboa Park, he passed many pleasant hours, and there and in the museum, delighted visitors by his instructive talks and demonstrations. A charming conversationist, always he had held his audiences spellbound. His great spirit passed to the Beyond in the environment he loved.

Now he rests from his labors where "The Tree of Life" has given him a new and better embodiment in the "Home over There."

How They Become Corn Champions

(*From page* 8)

in soil improvement, as they pay especially well.

Since his farm is small, large yields of corn have been a necessity in order to meet his feed requirements. He follows the practice of a good crop rotation, corn, wheat, and clover. Not more acres in corn, but more corn per acre is his motto.

Although he gave his first attention to his soil improvement program, he has been equally active in the adoption of other good corn-growing practices. He used field-selected Johnson County White seed corn, which he has grown and selected on his farm for a

number of years. This variety is highly productive, although too late for Central Indiana and too large for his section unless the soil has been made very productive.

He stores his field-selected seed as soon as it is gathered and dries it out thoroughly before freezing weather sets in. In the spring it is rag-doll tested. These steps he considers vital to securing a good stand of vigorous growing plants.

The land was plowed from May 10 to 20, double-disced and harrowed, and planted on May 29-30. The corn was drilled thickly in rows 38 inches apart. The corn was cultivated five times, shallow. On account of the dry weather a drag was run between the rows after the corn was too large to cultivate. He is quite sure his yield was cut several bushels per acre by the drouth. His yield was based on actual moisture content calculated to 17.5 per cent moisture, the grade for Number 3 corn.

Following this program has made it possible for A. C. Brown to produce yields of more than 100 bushels per acre four times in the last seven years. His average yield for the seven-year period on the basis of his five-acre plot has averaged well over 100 bushels.

Mr. Brown has attended the Agricultural Conference at Purdue for the past three years and from the work in the corn-judging school has become interested in exhibiting corn. He has shown at and attended the International Grain and Hay Show as well as the State Show. Through his contacts at these shows and at farmers' meetings, he has added to his store of knowledge in growing corn.

At the last Agricultural Conference, he was crowned as the Five-Acre Corn King of the State of Indiana and given a certificate of this award by President E. C. Elliott of Purdue University. We believe his achievement as a corn grower, operating under severe soil handicaps and discouraging agricultural prices, should offer encouragement to corn growers everywhere.

More About Less Milk

(*From page* 6)

in butter patties at too many restaurants. The taste tells—on the lining of your mouth. You reach for a chloride of lime chaser after each swallow. Another expensive surplus is in the form of oily, shoe-leather cheese and inflated ice cream that won't melt in the sun. But just try to eliminate that kind of surplus and you'll hear from the personal rights contingents.

In any other market where perishables are sold for eating purposes, a chap who tries to unload super-aged and loud-smelling vegetable offal on the suffering public gets a smack in the lower posterior. His stuff is sorted and all the unfit rubbish is dumped, or else he takes it home to feed the controlled hogs. The rejected leftovers are not called "surplus." But in too many of our milk markets any kind of white liquid is accepted and chucked into the same kettle with the bona fide fruit of the mammary glands of self-respecting cows.

Which means that if we could install honest, supervised bookkeeping records on the real milk which some dealers report as surplus, and then forever abolish the putrid article from interstate commerce, we would be half way on the glory road.

Furthermore, it is the surplus men

behind the cows as much as surplus cows or surplus milk that make the going rough. The inalienable right of dumb bunnies and microbe breeders to pick dairy cow management as a profession is not properly a constitutional guarantee along with free speech and cheap liquor. Anybody who fetches me a nifty code which removes such surplus producers from the milk stools of America will get a blowhard article written up for him, and maybe after that a "nick" in the stall of fame.

Another thing we need to do is to have a bigger national viewpoint on the cow-pailing trade than we have had before. The only notable success in that line so far has been the much-mentioned holding company game. The fellows who fork the silage and sprinkle incense on the mangers are widely disunited.

THIS fact is proven by the complimentary things they say about Wisconsin cream Way Down East and the flattering references to Yankee Notions made by the Cornhuskers. This has gone too far to stop by one or two tut-tuts or even an embargo. Who cares a hoopenholler what region has a deficit. I thought we all had it. Why blame each other for aiming at the high dollar on the wing over the broken back of a willing but misguided cow? The outlook for more favorable tariff treaties with other nations is far better at this writing than to obtain a tariff truce right at home between dairymen—and others. If somebody will shuffle up with a national idea for a dairy union that works even 33 per cent half of the time, the services of a noted scribe are his for promotion purposes. Dairymen will brag about the growth of extensive interstate cattle transfers and then proceed to put regulations into effect to stop the free flow of milk from the cows they just sold.

Everybody says milk is indispensable. Hence like sunshine, air, and water, also indispensable, it should be pretty nearly free, according to the usual logic. The dairyman is sentimental that way too. He has a complex. It tells him that he is under moral obligation to provide this indispensable food as close to nothing as he can under a light mortgage. To do this job pluperfect and beyond criticism by social experts, the perplexed dairyman, sunk in his sentimental reveries, refrains from adding to his overhead labor costs by working the dickens out of his wife and kids. If it were not for the selfish middlemen, the dairyman could supply fresh milk "100 per cent rat power" (vitamin jargon) six quarts for a nickel, with rain checks thrown in. When the dairyman is good and groggy with this brand of sentiment, the ladies' survey society and the milk dealers' amalgamation push his price down another notch and he thinks production control is beeswax. Why control production when the "peepul" are clamoring for custard? Set the alarm clock ahead two hours, put a chattel on the cows, buy the wife a new pair of overalls, and give the tenements a treat! It's better to lose the farm than to fail in a social duty.

So in approaching a conclusion:
Lives of dairymen remind us
We can make our lives sublime
Feeding N. R. A. cost rations,
Milk a gallon for a dime.

Tell me not in mournful numbers
Life is but an empty scream,
And the base milk of our slumbers
Turns to butter and ice cream.

Rather let's be up and doing,
Use a quota or a code,
Or make cows a public service—
Any plan, so we unload!

This department is now open for further consultation with members of the industry who may still desire to submit a comprehensive and practical way to dehorn the dairy dilemma without injury to consumers or to the milk-wagon drivers' union.

HONEYMOON

There has been a big family row; the police had been called; Mr. Blank was hauled into police court for beating his wife. The magistrate rebuked him severely.

"You ought to be ashamed of yourself," his honor began, "assaulting your wife like that. I never saw a nastier black eye. Do you know of any reason why I should not send you to prison?"

"If you do," answered the defendant, "it will break up our honeymoon."

Sandy: "What's the trouble, Jock? You seem so sad."

Jock: " 'Tis enough to make one sad. I'm on my honeymoon and could-no-ford to bring my wife."

A bachelor is a man who never makes the same mistake once.

DeWitt Wing tells about the young woman who had two beaux and couldn't make up her mind which one to marry. When questioned, she answered: "Sometimes I like one as much as the other and more, and sometimes I'd as lief marry one as the other and rather."

"Why was Adam like a radio?"

"Because they took part of him and made a loud-speaker."

TAKE YOUR CHOICE

He: "Will you marry me, honeybunch?"

She: "Certainly. Trial, companionate, or fight-to-a-finish?"

"Gal," pleaded a colored suitor at the conclusion of an impassioned proposal, "ef you' don' marry me Ah'll go crazy!"

"Humph!" sniffed the unmoved belle. "An' who's gwine fin' it out?"

She—"Henry, dear, we have been going together now for more than ten years. Don't you think we ought to get married?"

He—"Yes, you're right—but who'll have us?"

Mrs. Nagger—"I suppose if I were to die tomorrow, you'd marry some other woman immediately."

Mr. Nagger—"Not right away. I'd take a little rest first."

"I just read where a flapper presented her 85-year-old hubby with a baby boy. What do you think of that?"

"The same as you do."

SNAPPY COMEBACK

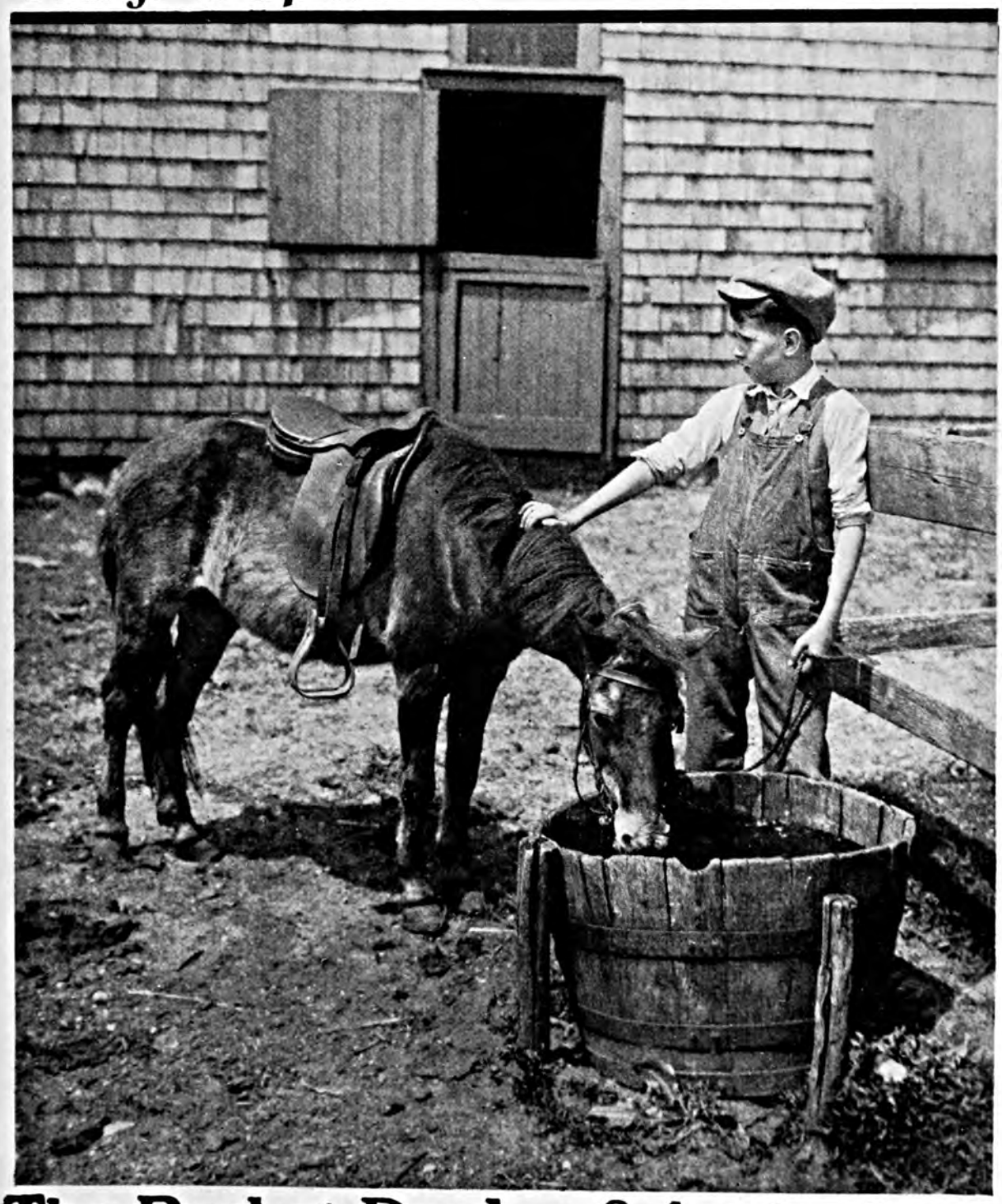
Notice: From this date, I will not be responsible for any debts or obligations made by my wife.—*G.A.F.*

Notice: I have not purchased anything for cash or for credit since I became Mrs. G.A.F.—*Mrs. G.A.F.*

Printed in U. S. A.

Better Crops with Plant Food

Aug.-Sept. 1934 10 Cents



The Pocket Book of Agriculture

POTASH *Starvation Symptoms*

No. 1
of a series

SOYBEANS, like other legumes, can get nitrogen from the air but they draw heavily on the soil for phosphorus and potash, particularly potash. Each ton of hay removes about 47 pounds of actual potash, equal to 94 pounds of muriate of potash.

When soybeans are starved for potash they often suffer from an early, false ripening period, commonly called chlorosis. At about blossom time the edges of the leaves turn yellow and then the yellowing advances toward the veins. This means less hay, poor quality seed and less organic matter for the soil.

SOYBEAN LEAVES SHOWING POTASH STARVATION

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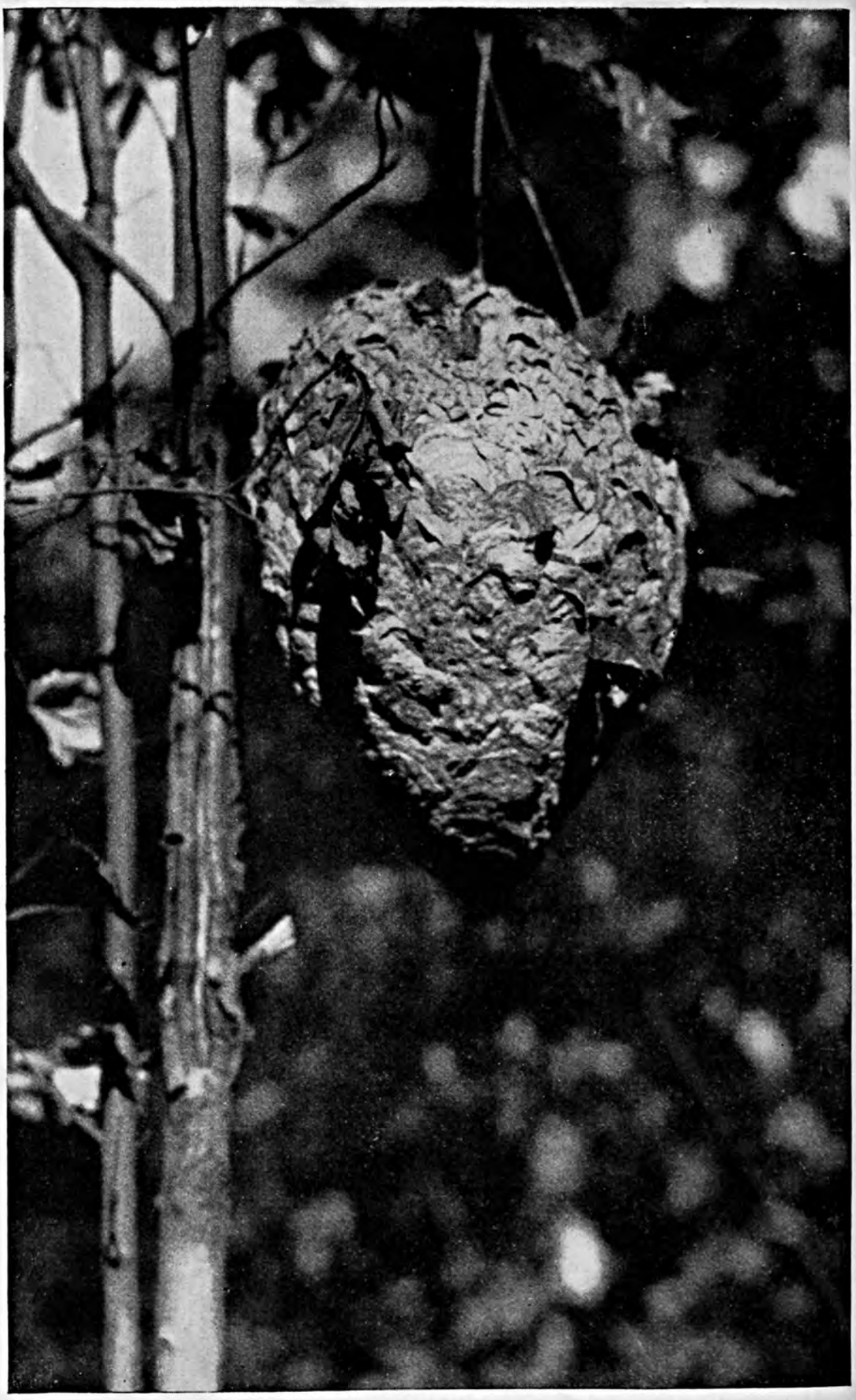

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Consider the workings of—

Nature & Co.

By Jeff McDermid

LET'S face the dwindled harvest without any shattered ideals but with a few new ideas on frustrated planning. Burns made a mousey poem about programs that sometimes went awry. Instead of dismissing that as inevitable, it seems to be wiser for us to see if future troubles coming from past errors cannot be fixed in the future. (Don't be perturbed. No recipes to follow.)

Nature & Company are responsible for running the works on this panicky planet. Nature is the chief stockholder and silent partner, while Co. stands for comrades, communities, or common folks. Nature may be human, animal, or vegetable, or else the neuter elements of drought, storm, and flood. What man proposes God disposes is just a shorter way of saying that nothing is finished until the Senior Partner is considered or perhaps coerced into cooperation. Nature as the Senior Partner has a hand in everything.

If there is an unreasonable, erratic, or temperamental Boss of the Firm, what does the Company do if it can't

buy out his interest and fire him? In that case the only way out is to order the procedure in such a way that the Boss is dodged in his worst moods and then gradually led to see that unless the Company is consulted a little, there won't be any firm left to lord it over. The dodging process goes with elemental Nature and the coercive method will be necessary with human Nature. So We, Us and Co. have a little diplomacy cut out for the next few decades.

Prior to this we have been contented to act like "teacher's pets" with Nature, both elemental and human; keeping up a soft-soaping or a boot-licking attitude just to be certain that we are playing safe. We said that the kids and their offspring could take care of themselves in the future just as we had—if we gave them a little coaching in a course of artful dodging, temporizing, and time-serving. But teacher hasn't been keeping any pets lately, and so those old easy ways to exist in blind blandness are out the window.

After removing my coat to get a better purchase on the problem, I'll tackle one of our worst maladjustments. It arose from a combination of human cussedness and natural barrenness, to wit, the great American land-go-mania. If ever there was a worse era of misguided expansion a la Colonel Sellers, P. T. Barnum, and Baron Munchausen, we failed to meet it. The promoters were able to use letterheads and calling cards bearing the endorsement of eminent statesmen, and the part played by Uncle Samuel and the State colleges is nothing to which we can pridefully point.

YOURS truly also was guilty. Along in yonder years we were among a lonely party of prairie dogs who braved the dry-land mosquitoes, the chinook winds, and the loco fever to stake a claim amid the Dakota cattle ranchers in the Trans-Missouri country. Oh, yes, it was a grand, full, and free experience—on the cloud-shadowed upland plateaus, with a smelly pipe, a tar-paper shack and a pinto pony—15 acres of land and a back, both broken getting ready to swear we were dirt-plow farmers at the one-horse land office on the Cheyenne. Bad lands glittering in waving mirages to the southeast, bunch grass and rattlesnakes, coyotes and owls, the horned lark for company, and the mouth organ for amusement. A trifle later, a final payment of one dollar and a quarter an acre, followed by transfer to a bona fide squatter who stayed squat, for twelve dollars. Consideration, cash for a portion and vague promissory pledges for the rest. Ten years later a return visit to the optimistic purchaser indicated an increase in children, sunburn, and financial obligations after sticking out seven lean years on the half section in hopes and sacrifice. I should like to know at this writing whether Bob Fuller is living after several more years of similar grubbing on the buffalo sod, and I am willing to bet that he is one of the thousands now on enforced relief rolls because of drought.

NOW Bob came there because he was young, iron-muscled, and farm-bred back in Ioway. He had grown restive under the big-acre-price talk of the cronies at home, hanging onto their ancestral corn lands like hogs to a milk trough. He was a sort of "teat pig" among the drove around the agricultural larder and so he, like countless other brave young lads, grabbed the bulky Missus and the other lares and penates and sought a place where he could reach out his arms like Max Baer and claim he was the champion —or something. I remember how cordial he was to the skeptical cow men and ornery sheep herders of the Dakotas. He uncoiled his barb wire and drove his stakes cut in the cottonwood draws, and built his shack on the top of a windy hill with the help of his wife and girls. Always grinning and level-headed and square as a die.

Under any of God's decent farm conditions Bob Fuller would have made

the old sod sing in seed time and harvest, and his bullocks would have pleased the best of judges from anybody's International. He lifted a brawny arm right manfully to repair the schoolhouse and erect a new flag pole, declaring that Francis Scott Key was not the only chap who was in distress while the banner waved in the breeze. He had all the attributes of empire making and home founding and ancestor worship, but the trouble was

that he was only part of the Company, and Nature was the Boss of the Firm.

Poor old Bob, I suppose his hair is gray as a coyote's flanks now, and some of that vim has been plowed deep into the dusty hard-pan of the country that God forgot. I am not crowing because I escaped the same fate, but I am hot as blazes over the era that led Bobs like him to put their manhood into a dead-sure misfire. It took a lot of punishment for the country as a whole to wake up and blink their goggle-eyes at such conditions. But thank my stars they are on the right trail now, and the pack train is loaded with enough grub and ammunition to see us through—unless some blank-headed Congressman or Senator chooses to sell his country's honor and future security for a mess of political pottage.

And that wasn't all my close relations with land boomers either. The medicine men of the grab-and-go tribe mixed up plenty of dirt for the folks back in the older settlements too. The eloquent Chambers of Commerce and the Handshakers' local dining contingents lent a shove to the movement landward and stumpward in the burned-off, second-growth, joy-forsaken mesas where the lumber barons had skimmed off the wealth put there by sunshine, rain, and protoplasm. Theirs was a combination of beckonings to the young landless farmers in the Midwest and the immigrants who "ought to settle in the region where climate and congenial nationalists abound, to feed the soul and replenish the earth."

The North Central cut-over regions were painted as reaching out tempting prizes to Germans, Swiss, Norwegians, and "what have you" from Europe's temperate zone. Some of our staid professors got het up over it all and lent their magic and scientific standing to the drainage and the root-yanking process designed to fit the pulsating land to the approach of the husbandman. "Why waste time fertilizing old farms," they said, "get out in the clover-green natural areas where an axe and a bonfire will provide entrance to the greatest among the lands yet untouched by man." Ergo, if one-thousandth of the money thus tossed into stump fires could have been invested in balanced fertilizer on the farm lands which would have amply supplied us, the long, sad story would not be told.

Not all voices were raised in a chorus for transplanting the land-hungry and teaching them how to blast their way into perpetual debt by dynamite in snag clearing. I recall at least one thoughtful immigration officer who tramped many miles talking with prospective settlers and investigating the actual worth of the soil with spade and auger. But he fought against stiff odds and had a big territory to cover.

Incident to the mania for stump dentistry, we had in the Lake States a

well-organized traffic in sand barrens and peat marshes. Folks whom Uncle Sam could not use on irrigation projects were easy marks for the "realtors" who ran midwinter excursions during deep snow spells to show off their bonanzas to factory-sick heads of families. I recall also a colony of solemn Chinamen who brought their wash tubs along and tried to raise goobers and ginseng on sandbur plantations fringed with jackpines and general desolation. Weird farm hands they were, too, for stories were rife of how they stuck certified Cobblers, eye-up, three feet deep in the drifting sand and muck, being told to beware of frost. Perhaps it was a conspiracy, their idea being to sprout the tubers and harvest the crop in China. In a year or so the only remnants left were a few hard-headed native cranberry growers located on their reservoir projects, reinforced by a shrewd and capable sales company shoving a scarce article. But mind you, these fairly successful specialists came into this area in the early nineties, and the recent ballyhoo meant nothing to them but scorn.

THIS much must be said in justice to the State wherein much of this unwise expansion took place. Their leaders have since sorted over the acres with economic eyes, issued careful analyses of the specific use to which various areas are suited, and actually moved some of the isolated victims of the "occupation orgy" down to more civilized and well-knit communities. Indeed, the great national land-planning project now taking shape to prevent all such crazy conquests finds excellent examples of its benefits right in the midst of the worst field of free-for-all land abuse and man-killing. But there's no place like a hospital for a clinic anyhow.

Land is not sub-marginal until somebody tries to farm it under difficulties, whether of soil, climate, or economics. But in that case the operator also becomes sub-marginal. But land which has two of the adverse conditions against it, soil and climate, is surely handicapped in conjunction with the third element, economic conditions at large.

It would seem common sense for a gradual retirement, therefore, of areas which were evidently made for or made over into regions for the hunter and the summer resorter. Let the nudists take them for their retreats. They have stripped most folks who tried to farm them.

Then we may be better assured that a dollar spent for fertilizer will return real profits and satisfaction and that the total production valuation may not be constantly threatened by so-called virgin acres,—which by the way are better off as "old maids" than married to a farmer who can't support himself.

THE drought in some of the Midwestern areas of intensive dairying has naturally led to bunching herds for grazing, using brands like the cowboys to identify their cattle. Nearly half a million head of these bony derelicts of dairying had gone to Government slaughter by July 1. This, too, harks right back in some cases to overstocking of unsuited lands. Overstocking western ranges is bad enough, but carrying too many cattle where every spear they eat must come from mechanical agriculture dependent upon intensified soil fertility—that is waste incalculable.

Old Boss Nature suddenly went cranky and dried up in some of the regions where he had previously been generous. But his partners in husbandry bet the wrong way on the old gent's temper, and found that it takes more than the master's eye to fatten the herds and flocks when there are no ways to tell when the Chief will make it hot for the rest of the firm.

This brings up the matter of being able to dodge the worst drought effects by careful advance planning. Science is making observations that

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Phosphorus *and* Potash Responses *in* Apple Trees

By Fred W. HofMann

In Charge of Horticultural Research, Virginia Agricultural Experiment Station

CHEMICAL analyses of the fruit of apples show that 100 pounds of apples remove about .059 pounds nitrogen, .027 phosphoric acid, and .16 pounds potash from the orchard soil. Analyses of the foliage and wood of 40 apple trees show the following intake—.08 pounds nitrogen, .02 pounds phosphoric acid, and .06 pounds potash the first year after setting out in the orchard; 11.85 pounds nitrogen, 5.74 pounds phosphoric acid, and 14.22 pounds of potash the ninth year after setting; and 28.10 pounds nitrogen, 9.26 pounds phosphoric acid, and 27.22 pounds of potash for the entire nine years. During these nine years the amount returned to the soil by foliage is 12.84 pounds of nitrogen, 2.53 pounds phosphoric acid, and 12.97 pounds potash leaving a net removal of 15.26 pounds of nitrogen, 6.73 pounds of phosphoric acid, and 14.25 pounds potash. It is seen from these analyses that the heavier removals are for nitrogen and potash and that both of these removals are in a very close proportion.

Fruits Buds Taken from Differently Fertilized York Apple Trees—Horticulture Department, Virginia Agricultural Experiment Station. One year after fertilizer application.

Upper row—Check—No fertilizer.

Second row—From trees receiving nitrogen only

Third row—From trees receiving same amount of nitrogen as the second row but also phosphorus and potassium.

TABLE I—Approximate Amounts of Nitrogen (N), Phosphoric Acid (P_2O_5), and Potash (K_2O) Taken up by Trees of a Given Circumference With a Given Total Yield.

Age Years	Size of Circumference Inches	Total Average Yield of Crop Pounds		—Amount of Elements in Pounds Taken Up— N	P_2O_5	K_2O
			In wood	.5	.12	.4
1-6	1-11		In fruit	0	0	0
			Total	.5	.12	.4
			In wood	5.0	1.0	4.0
6-11	11-21	500	In fruit	.3	.14	.8
			Total	5.3	1.14	4.8
			In wood	20.0	6.0	16.0
11-16	21-31	2,000	In fruit	1.2	.5	3.2
			Total	21.2	6.5	19.2
			In wood	31.0	9.0	23.0
16-21	31-36	3,500	In fruit	2.0	1.0	5.6
			Total	33.0	10.0	28.6
			In wood	44.0	13.0	34.0
21-26	36-41	6,000	In fruit	3.5	1.6	9.6
			Total	47.5	14.6	43.6
			In wood	54.0	16.0	42.0
26-31	41-46	10,000	In fruit	5.9	2.7	16.0
			Total	59.9	18.7	58.0
			In wood	68.0	20.0	52.0
31-36	46-51	15,000	In fruit	8.9	4.0	24.0
			Total	76.9	24.0	76.0

Approximations have been made by the writer for the amounts of the three elements taken up in wood by the time apple trees reach a given circumference. These are brought out in Table I. Average crop yields for trees of different circumference were estimated, and on the basis that 100 pounds of fruit use up .059 pounds nitrogen, .027 pounds phosphoric acid,

The trees on this and the opposite page are Grimes Golden apple trees of the same age and from the same orchard at the Virginia Agricultural Experiment Station.

Left—Nitrogen Alone

Unfertilized

and .16 pounds potash, the total amounts of these three elements taken up over certain periods are indicated. According to the approximations in Table I, by the time a tree has grown to 40 inches in circumference its wood will have taken up 44 pounds nitrogen, 13 pounds phosphoric acid, and 34 pounds potash. With a total yield of 6,000 pounds of apples, an additional 3.5 pounds nitrogen, 1.6 pounds phosphoric acid, and 9.6 pounds potash will be withdrawn making a total removal of 47.6 pounds nitrogen, 14.5 pounds phosphoric acid, and 43.6 pounds potash in a period of some 25 years.

On the whole, more stress is generally laid upon the value of either phosphorus or potassium to the cover crops rather than to the direct benefit that may be secured by apple trees themselves. To be sure, the more direct responses are first noticeable by the cover crop growth. Cover crops are the first to get the benefits of phosphorus and potassium applications when these elements are necessary in the soil, but ultimately, direct responses will show also in the apple trees. Excellent examples of such responses in apple trees are present in some extensive experiments carried on by the writer since the fall of 1930.

One set of trees was given an application of 10 pounds calcium cyanamid per tree, another the same equivalent of nitrogen but with phosphorus, and the third with potassium added. The more immediate response showed up in a heavy cover crop growth by the last of May in the plats that had either phosphorus alone or phosphorus and potassium added. By the end of the dormant season of the next fall, the trees in the latter plat showed up with much heavier growth, but most strikingly with the larger and heavier fruit buds. The contrast in the size of the fruit buds is best brought out in the accompanying picture. The upper row of buds in this picture was taken at random from the check York trees, those in the second row from

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Nitrogen—Phosphorus—Potash

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

OUT in California, Dr. W. P. Kelley, soils chemist of the University and of the Citrus Experiment Station located at Riverside, has proved a real Elisha to the fruit growers and farmers of that State.

When Elijah, the greatest and sternest of the Hebrew prophets, was caught up in a whirlwind, Elisha, his disciple, donned the mantle of his teacher, carried on his work, and became the restorer of peace and prosperity in distress and drought devastated Israel. One of his beneficent acts was the healing of the water of Jericho by putting salt in it for land where "the water was naught and the ground barren," and another the bringing of water to the army of Jehosophat in the arid wilderness of Edom by "making the valley full of ditches."

Dr. Kelley, following in the footsteps of his illustrious predecessor Dr. E. W. Hilgard, like Elisha, has successfully coped with the problems of irrigation, water supply, and the banishment of barrenness in millions of acres of once desert land in the Golden State.

He has fought the demon of black alkali which rendered the vast areas of sun-kist land absolutely sterile, and has shown how white alkali, another enemy of citrus trees, grapevines, and other fruit-producing plants, may successfully be overcome. As a result of the painstaking scientific work of himself and his able assistants, E. E. Thomas and S. M. Brown, soil that could raise nothing but a heavy crust of plant-destroying chemical salts has been made to produce 10 or more tons of alfalfa per acre annually, and great tracts which once were clad with prolific vineyards, but became sterile by alkali prevalence, have been restored to productiveness.

The Quality of Water

We who have not had to deal with farming problems in arid sections of the country may have had an idea that the provision of abundant water for irrigation purposes would, with certainty, make such sterile areas "blossom like the rose" and become lands "flowing with milk and honey," but that, apparently, is not the case. The quality of the water supplied is of vital importance. The beneficent rains from the skies cannot be excelled for plant watering and, in California, water from the snow-capped peaks of the Sierras would come next in quality; but the supplies of such priceless water have been inadequate and much water, available for irrigation purposes, is highly impregnated with noxious salts which add to the difficulty of the alkali problem. This matter has had to be studied and the difficulty overcome by Dr. Kelley and his associates, as well as the removal of alkali from both the surface soil and the subsoil, in order that arid lands may be made

productive. Success has blessed their efforts, but the good Doctor still wishes that some plan could be devised to insure adequate supplies of purer water for irrigation purposes.

He and E. E. Thomas believe that the excellent water which falls in the mountains of California may be so conserved as to augment materially the volume of water now obtained from them, thereby making it possible to discontinue the use of at least a portion of the saline water. Concentrations of boron, we are told, occur in certain waters of southern California that are toxic to citrus and walnut trees. In some small areas injurious quantities of soluble boron also occur in the soil. Leaves of citrus trees poisoned by boron tend to fall off in the winter and early spring months. Boron-affected walnut leaves also tend to fall off prematurely. When boron is introduced in irrigation water it gradually accumulates in the upper layers of the soil, as a result of evaporation. Heavy rains may carry downward some of the boron, from time to time, and thus retard the accumulation of soluble boron in the region of tree roots.

Dr. W. P. Kelley

For many years, copious irrigation justly was deemed the boon and blessing we have mentioned, for on wide areas of previously sterile land, its advent made establishment of thrifty orchards of citrus trees and prolific vineyards possible. But in time the prolonged flooding of the fields with water induced new problems which Dr. Kelley has had to tackle and solve. Originally the "water table" was far down under the soils made fertile by irrigation. Gradually it rose so that roots of the growing plants, by capillarity, drew alkali-impregnated water from the saturated subsoil and were killed thereby; then evaporation surcharged the surface soil with alkali and plant growth became impossible. These soils which had reverted to their pristine, sterile, alkali-poisoned condition were studied and experimented upon by Dr. Kelley, and it is through his success in restoring them to fertility and productiveness that great fame has come to him as a research soil chemist.

Shares Credit

And now that he has become deservedly famous, it is fine to note that he does not take all the credit to himself, but cheerfully grants a great measure of it to his capable assistants and never forgets what he owes to his teacher and counsellor, the late Dr. Hilgard. Of that eminent gentleman and scientist he graciously says:

"Those who are familiar with his extensive publications, realize that the principles enunciated by him are not only sound, but far reaching, both in theory and practice. He who essays to investigate any of the various phases of the alkali problem will do well indeed to scrutinize the publications of Dr. Hilgard. Endowed with an unusually keen mind, broad training, and enthusiastic devotion to theory and

practice, the major portion of his active life was spent on this subject. The compass of his researches is far greater than casual reading will reveal, and the results of his labors will continue to yield an unmeasured harvest. The present-day student of this subject has a rich heritage in his records."

"Never-say-die"

Dr. Walter Pearson Kelley is of Scotch-Irish extraction, which no doubt accounts for much of the determination, perseverance, and exactitude of his character. The "never-say-die" trait of the Scot is stamped upon his countenance and he possesses too, the alertness, humor, and congeniality of the high-class Irishman. He was born February 19, 1878, at Franklin, Kentucky, the son of John W. and Mary Eliza (Mayes) Kelley, both of whom were descendants of early colonial immigrants, the former having settled in North Carolina in pre-revolutionary days, and the latter in Virginia, about the same time. He was reared on a farm in southern Kentucky and obtained his preliminary education in the country schools and high school of the community. In 1900, he entered the Chemistry Department of the State University of Kentucky at Lexington, from which institution he graduated in 1904, with the degree of B.S.

The following collegiate year he pursued graduate studies in the same institution. In 1905 he accepted a position as Assistant Chemist at the Indiana Experiment Station of Purdue University, which position was held until June, 1908. The years 1906-1907 were spent in graduate work at Purdue University in connection with Experiment Station duties, for which he received the M.S. Degree in 1907.

In July, 1907, he accepted a position as Chemist to the Hawaii Experiment Station, Honolulu, which position was held for a little over six years. During this period he pursued graduate studies under the late Dr. E. W. Hilgard. In the years 1911 and 1912, he was a graduate student at Berkeley, in connection with which the degree of Ph.D. was granted in 1912. On August 6, 1913, he was married to Miss Sue Kathrine Eubank. From 1914 to date he has held his present position.

Doctor Kelley was elected to Sigma Xi, Alpha Tau Omego, and Phi Beta Kappa, and the honorary chemical fraternity, Phi Lambda Upsilon. He was president of the American Society of Agronomy in 1930, and is a member of the following scientific societies: Fellow of the American Association for the Advancement of Science, American Chemical Society, American Society of Agronomy, Western Society of Naturalists, Western Society of Soil Science, and International Society of Soil Science. In 1933, he was elected one of the twelve soil scientists from different parts of the world who were requested to submit manuscripts for a Jubilee Number of the Hungarian Journal of Soil Research, which was issued in honor of Professor A. A. J. de'Sigmond, an international authority on Soil Science. Doctor Kelley has for years been a member of committees of the International Society of Soil Science and of the National Research Council.

Research in Soils

From the first Dr. Kelley has been engaged chiefly in soil chemistry research work. When in the Hawaiian Islands, he devoted his attention principally to the pineapple-producing soils, with the result that the relation of manganese to the troubles affecting the pineapple was discovered. He also studied, to some extent, the rice soils of the Islands and established the fact, which has subsequently been abundantly confirmed, that rice absorbs its nitrogen chiefly in the form of ammonia. His work in Hawaii likewise led to a sound basis of fertilizing rice crops.

In his studies of the alkali problem in California, Dr. Kelley has examined

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A cluster of typical Fuerte avocado fruits.

Fertilizing *for* Better Avocados

By E. E. Knight

Fullerton, California

THE growing of the avocado is comparatively a new industry in California, but owing to increased demands due to its rapid growth in popularity, large plantings have been made. Consequently, it is now assuming the proportions of a major industry.

Because of the short period this fruit has been grown on a commercial scale, little is known regarding its fertilizer requirements. An analysis of the flesh of the fruit, taking the Fuerte variety for example, showed that 2,000 pounds will remove from the soil 4.67 pounds of nitrogen (N), 5.29 pounds of phosphoric acid (P_2O_5), and 8 pounds of potash (K_2O). Comparing this analysis with that of many other fruits, it will be noted that the demands of the avocado for phosphoric acid are unusually heavy. The potash requirement also is unusually heavy, exceeded only by the olive.

From a study of this analysis, it was evident to the writer that phosphoric acid and potash must play a very important part in the fertilization of the avocado. Consequently, in order to get a better understanding as to its fertilizer needs, in 1930 different fertilizer tests using 100 fruiting trees divided into 10 plots were started.

There were test plots in which nitrogen, phosphoric acid, and potash were used separately; test plots of nitrogen and phosphoric acid; also of nitrogen and potash used in combination; and one plot in which all three were employed. One plot was given a straw mulch only. Two tests were made with phosphoric acid and potash applied broadcast. All other tests had the phosphate and potash either placed about three inches under the surface or dissolved in water and applied in a band about four feet wide around the drip of the tree. This last method was the practice employed in most cases.

Time Tests

These tests were followed up for four years, with the exception of that of nitrogen alone and where the phosphate and potash were broadcast. At the end of the third year, the trees in the nitrogen test showed die-back at the ends of the new growth, and the crop was the poorest of all the tests. On the location where the phosphate and potash was applied broadcast, some irrigation difficulties were experienced. For these reasons these two tests were discontinued.

The soil used had received straw mulch and manures. All tests were under the low sprinkler system. Naturally there was a certain amount of carry-over of nitrogen, phosphoric acid, and potash. The amount of fertilizer used depended upon the diameter of the trunk in inches one foot above the ground.

The treatments given were as follows: (for ease of calculation the figures are all based on trees as being ten inches in diameter at one foot above the ground) each of the trees in the NPK plot were given 20 pounds of a 5-10-10 fertilizer equivalent to 1 pound of nitrogen (N), 2 pounds of phosphoric acid (P_2O_5), and 2 pounds of potash (K_2O). The amounts applied to the trees receiving but two elements were 1½ times as much of each as given to the trees receiving the 5-10-10, thus in the NP plot each tree received 1½ pounds of nitrogen, and 3 pounds of phosphoric acid. In the NK plot each tree received 1½ pounds of nitrogen, and 2 pounds of potash. In the PK plot each tree received 3 pounds of phosphoric acid and 3 pounds of potash. Where but one element was applied the amount given each tree was double that applied in the 5-10-10 plot, thus, the trees receiving nitrogen only were given 2 pounds of nitrogen, the trees receiving phosphoric acid only were given 4 pounds of phosphoric acid, and the trees receiving potash only were given 4 pounds of potash.

At the end of the four years (three years for nitrogen alone) the fruit was tested. The nitrogen test produced the fruit of highest flavor, but it darkened almost as soon as cut and would not stand shipment. The fruit from the phosphoric acid test lacked flavor and shriveled badly at the stem end. The potash test yielded fruit that was superior in flavor to that of the phosphoric acid though not as good as that of the nitrogen test, but this fruit gave the highest shipping test of all. Covering the four year's set of fruit, phosphoric acid set the largest crops, but later dropped most of it. Phosphoric acid and potash set well but dropped some fruit. Potash set small crops, but the fruit did not drop. The mulched test was about medium in every way.

The Yields Compared

The crop of fruit for the last year of these tests, given in pounds per tree, was: nitrogen (alone) 6 pounds; potash (alone) 24 pounds; phosphoric acid (alone) 70 pounds; nitrogen and phosphoric acid 80 pounds; nitrogen and potash 76 pounds; phosphoric acid and potash 112 pounds; nitrogen, phosphoric acid, and potash 310 pounds; and straw mulch 100 pounds.

Judging from the appearance of the foliage and wood growth at the end of the four years of fertilizer test, the complete fertilizer was best, potash

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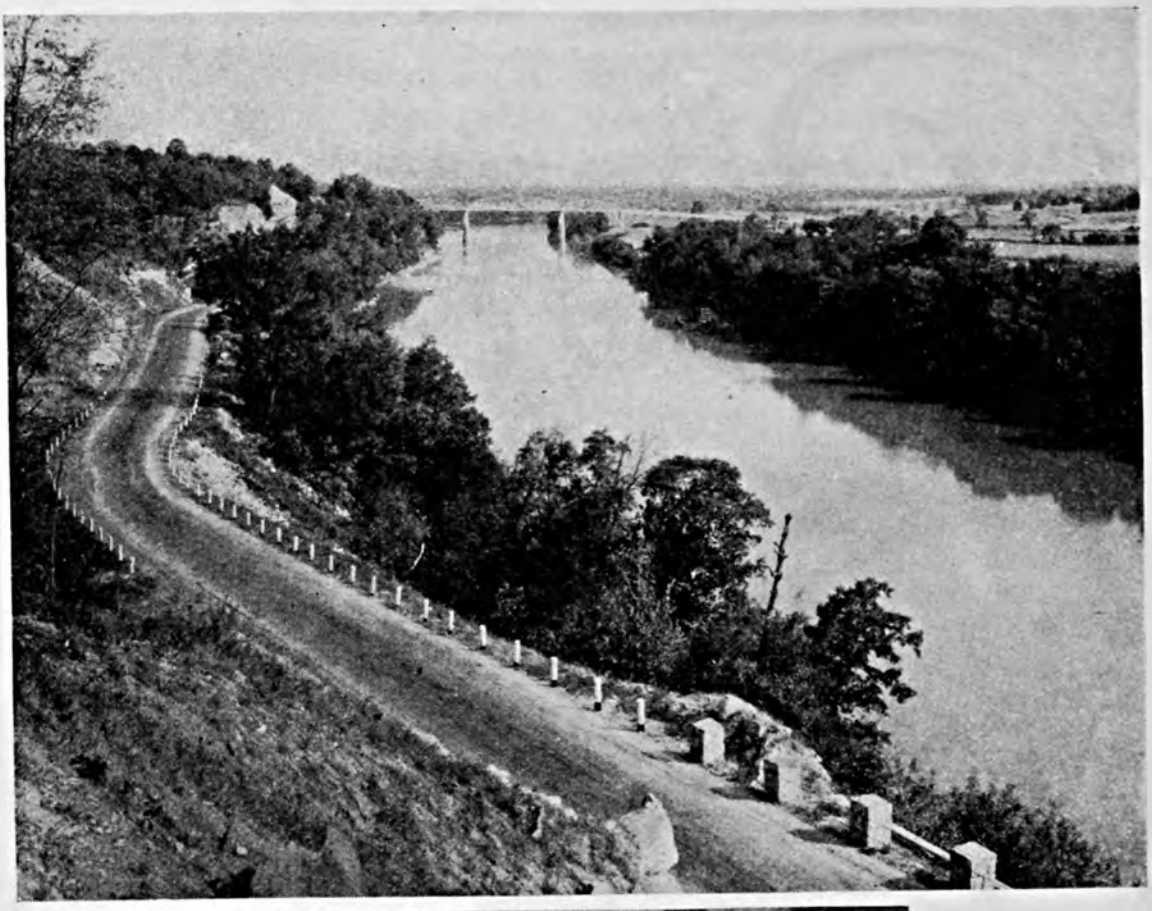
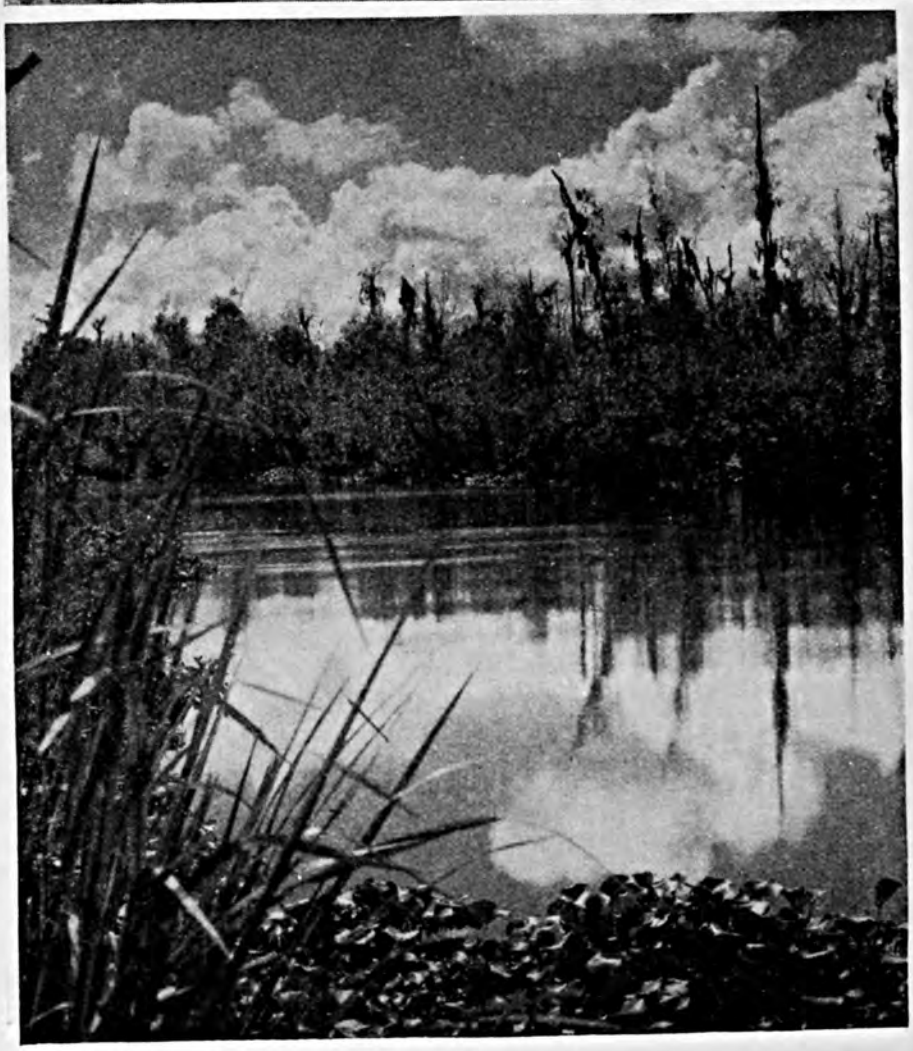
Pictorial

BRUSHING UP FOR SCHOOL.

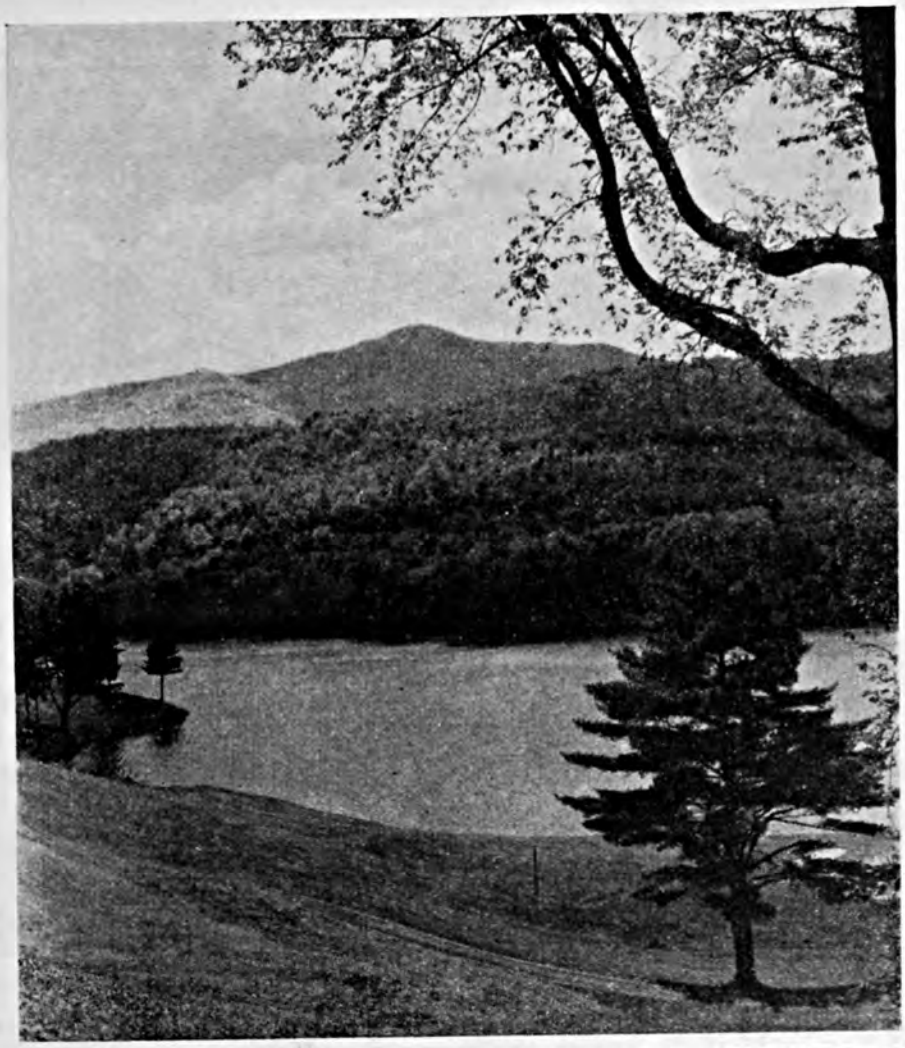




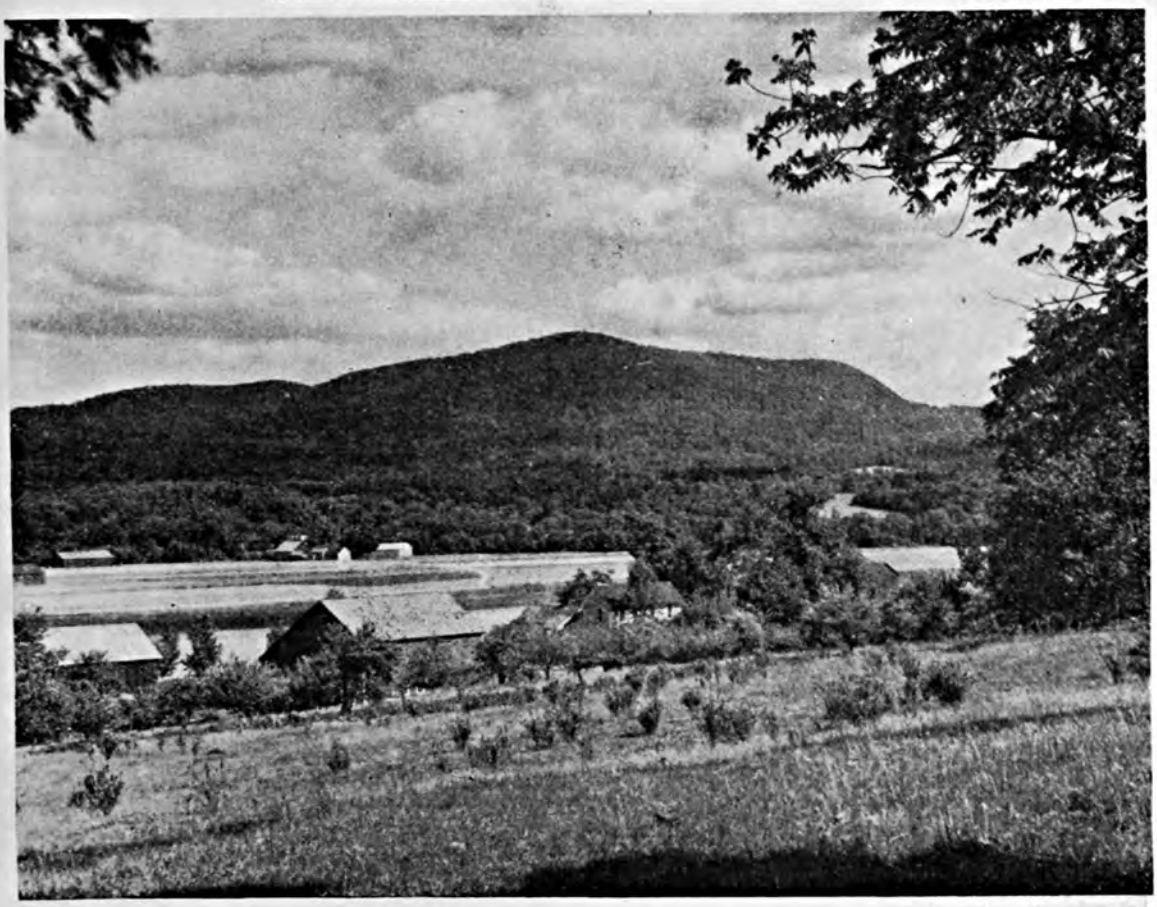
Above: The Cumberland River near Clarksville, Tennessee.

Left: A pretty scene near Lake Charles, Louisiana.

Right: Mt. Ascutney near Windsor, Vermont.

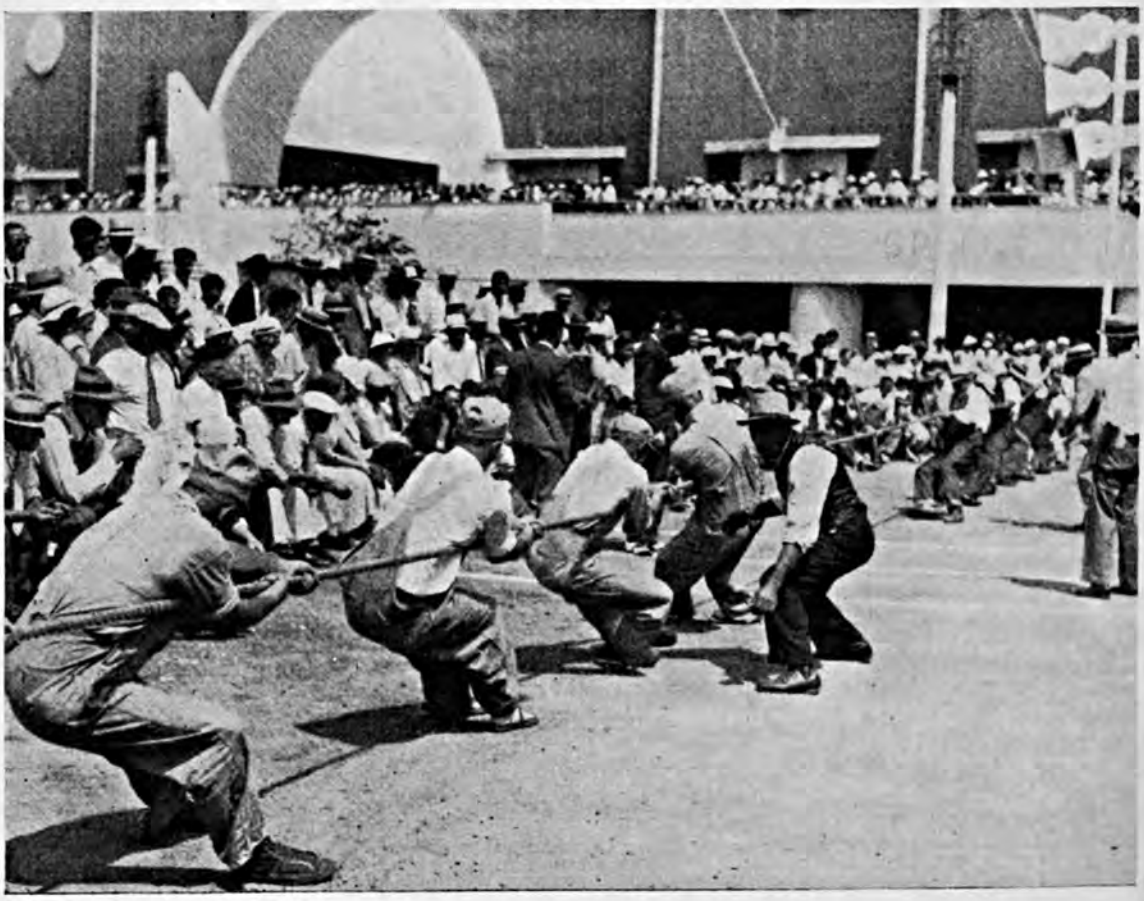


Below: Mt. Toby near Amherst, Massachusetts.



Left: Mrs. Charles Hayes of Alta, Illinois, was crowned Queen of America's Husband Callers at the World's Fair in Chicago, August 18.

Below: Dane County, Wisconsin, won in the finals of the tug-of-war contest held during Farmer's week at the World's Fair.



The Editors Talk

Adequate Fertilizer Statistics

When fashion demanded an elaborate preface to books as to the why and wherefore of another volume appearing on the scene, it was frequently the custom to include in the apologia of a technical or scientific book the statement that it was written "to fill a long-felt need." These words could have been used with reason and justification by A. L. Mehring and A. J. Peterson if they had written a preface to their recent pamphlet "Changes in Composition of American Fertilizers, 1880-1932," issued as United States Department of Agriculture Circular 315. The authors have collected data on the consumption of nitrogen, phosphoric acid, and potash in mixed fertilizers by States and for the country as a whole, and expressed the results in terms of average composition of fertilizers.

These significant and interesting data show that since 1880 the nitrogen and potash contents of complete mixed fertilizers have increased considerably, the latter more than the former, while phosphoric acid has increased slightly. Total plant food in the fertilizer also has increased. These mixed fertilizers constitute the bulk of fertilizers consumed. Mixtures containing only phosphoric acid and potash are much lower in tonnage, but have changed more in composition. During the same period, phosphoric acid content in these increased very little, while potash increased over four times.

Of the materials used in making the fertilizer mixtures, nitrogen compounds have changed the most since 1880. The proportion of nitrogen derived from organic material has greatly decreased, while the ammonia compounds used in fertilizers have greatly increased. The phosphoric acid and potash carriers have changed comparatively little.

The authors point out that the percentage of filler in fertilizers also has increased. However, the curves for total plant food and filler are about parallel for the last several years. Thus, in spite of the increase in filler, the fertilizer contains more plant food. This shows that the increased filler is due to the increased use of more concentrated fertilizer materials. Any criticism for filler in mixed fertilizers should not be leveled entirely at the manufacturers, since the customers indirectly demand it. Too often the manufacturers have found that a 6-12-12 fertilizer without the filler will not compete with a 4-8-8 with filler, because the price per ton of the latter is lower. When fertilizers are bought by analysis rather than entirely by price per ton, the filler in fertilizers will decrease to that necessary to maintain good mechanical condition. Much progress is being made in this direction, but the data show that great improvement still is needed.

The average composition of complete mixed fertilizers in the various States for a number of years also is given. The analyses vary considerably from State to State, not only in total plant food, but also in the relative amounts of nitrogen, phosphoric acid, and potash in the mixtures.

To give a complete picture, it would have been well to have included in

the publication total plant-food consumption in the States and in the country, so as to include the materials used without mixing and also the fertilizers containing two nutrients. In some States the picture would not be much different from that given by the complete fertilizer data, but in others there probably would be appreciable differences.

The authors are to be complimented on the excellent compilation they have prepared. The task involved can be appreciated fully only by those who have worked with fertilizer statistics in this country. With fertilizer control in the hands of each State to handle as it sees fit, there is as yet no uniformity of the keeping of data. Some States compile excellent and complete data, others almost none. The control officials, through an association, have agreed on uniform methods of chemical analyses of very high standards. It would seem as though they should be able also to agree on uniform and adequate methods of keeping data on fertilizer and plant-food consumption. It is to be hoped that Mehring and Peterson's circular will hasten the time when the country will have adequate fertilizer statistics.

Lifelong Learning

Schools and colleges soon will be opening. For those of us who have passed our "school days" there is sound advice in some recent remarks by Professor Leon J. Richardson, Director of the University of California Extension Division.

"We learn as long as we live," he says. "School days end, but education goes on, either moving aimlessly like driftwood or progressing like a well-managed ship. We learn from work and experience, from people, from reading, and, if ambition has not forsaken us, from study.

"Every man should give himself unstintingly to his vocation, which in the course of his life will turn out to be a great thing, if not the greatest thing. As he goes along he will do well, as opportunities arise, to improve himself; for no one can be fully trained in youth. However painstaking he may be in his work, he will from time to time miss some aim through his limitations. One man's success is hampered by the defective use of the English language; another lacks some branch of mathematics or science; still another needs a better grasp of economics or similar foundational subject. An engineer may chance to meet a person who enjoys discussing philosophy. A new world dawns upon him. His leisure hours are soon occupied by a new line of study. He is rounding out his nature, being carried forward by what Carlyle called a 'self-perfecting vitality.'

"We wish to know what is going on; what the progress of science is; what leaders of the nations are doing; how our civilization is faring; and whether our community is what it should be. Though the matters to be dealt with are multifarious, one thing comforts us: only a people rich in culture has a wealth of problems. Nations that have slipped backward have been governed too little by what they knew or might have known, too much by indifference or superstition. Great changes swept over them before they realized what was happening. We wish to be alive to our country's needs and play a part in meeting them. We aspire to be free, realizing that freedom in our world of dense population is no longer a by-product of vacant lands, but a cultural achievement."

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

General fertilizer recommendations for various crops on different soils are issued in bulletin form by a number of Experiment Stations. These publications serve as handy and practical references and guides in the use of fertilizers. The latest recommendations in North Carolina, Ohio, and Michigan are contained respectively in North Carolina Agricultural Extension Circular 199, "Fertilizer and Lime Recommendations for Vegetable Crops in North Carolina" by E. B. Morrow, H. R. Niswonger, and R. Schmidt; Ohio Agricultural Extension Bulletin 136, "Fertilizing Field Crops in Ohio" by R. M. Salter and E. Jones; Michigan Agricultural Experiment Station Circular Bulletin 53, "Fertilizer Recommendations for 1934" by C. E. Millar, G. M. Grantham, and P. M. Harmer.

Cranberries are an important crop in some localities, but information on their proper fertilization is rather scarce. Investigations under the direction of the New Jersey Cranberry and Blueberry Substation are therefore of special value and interest. Fertilizer recommendations based on this work have been summarized by C. S. Beckwith in New Jersey Agricultural Experiment Station Circular 313, entitled "Cranberry Fertilizer." The conditions under which fertilizer should be used, the most advantageous mixtures, and the results likely to be obtained are given. It is stated that the proper use of fertilizer will increase the total crop, increase the size of the individual berries, and reduce the amount of rot.

A careful study of the effects on the plant, from a chemical standpoint, of a deficiency of potassium has been made by T. G. Phillips, T. O. Smith, and R. B. Dearborn, reported in New Hampshire Agricultural Experiment Station Technical Bulletin 59, "The Effect of Potassium Deficiency on the Composition of the Tomato Plant." The authors compared tomato plants receiving all necessary nutrients with plants from which potassium had been withheld during the latter period of growth. The plants were harvested before fruiting and analyzed. The potassium-deficient plants, although showing clear signs of a lack of potassium, were not so stunted and abnormal as were the plants grown throughout the period without this nutrient. The comparisons the authors thus obtained would probably more nearly resemble conditions in the field when the plant was insufficiently fertilized with potash. The results showed that the plants grown with potassium were larger and heavier, with more ash, dry matter, and potassium, but with lower percentages of dry matter, sugars and starches, calcium, magnesium, and phosphorus. Very noticeable were the higher amounts of potassium in the more actively growing portion of the potassium-deficient plants than in the older parts of these plants, again showing that the older parts of the plants were being robbed of their potassium in an effort to keep

the plant growing. An interesting discussion of the results in comparison with the findings of other investigators is given.

A comprehensive survey of the phosphorus and potash needs of Vermont pasture soils was made by G. L. Lea and A. R. Midgley and the results published in Vermont Agricultural Experiment Station Bulletin 373, entitled "Available Potash and Phosphorus Contents of Vermont Pasture Soils." Samples of the various types of soils, as mapped by the soil survey, were systematically taken and the acidity, lime requirements, and available phosphorus and potash were determined. The results showed that nearly all soils were low in lime and phosphates, and a large majority were low in potash. The data correlate well with the soil types and permit general conclusions to be drawn as to the probable fertility of the various groups of soils. More or less standardized methods were used in the lime requirement and phosphate determinations, but lack of such a method for potash determinations necessitated a comparison of several methods. Investigators will find interesting the results of this comparison, as well as the methods used in conducting a State-wide survey of soils in relation to fertility and crop production.

"The Use of Limestone in Mixed Fertilizers," Agr. Exp. Sta., Auburn, Ala., Cir. 67, June, 1934, J. W. Tidmore and C. F. Simmons.

"Laboratory and Greenhouse Studies of Rice Nutrition," Agr. Exp. Sta., Fayetteville, Ark., Bul. 302, May, 1934, L. C. Kapp.

"Commercial Fertilizers, Agricultural Minerals for the Year 1933," Dept. of Agr., Sacramento, Calif., Spec. Publ. 124, 1934.

"Nitrogenous Fertilizers for Top-dressing Field Crops," Agr. Exp. Sta., Lafayette, Ind., Bul. 386, Nov., 1933, A. T. Wiancko, G. P. Walker, and R. R. Mulvey.

"Liming New Hampshire Farm Lands," Agr. Exp. Sta., Durham, N. H., Sta. Cir. 44, Apr., 1934, Ford S. Prince and Paul T. Blood.

"Inspection of Commercial Fertilizers for 1933," Agr. Exp. Sta., Durham, N. H., Bul. 278, Dec., 1933, T. O. Smith and H. A. Davis.

"Five Years' Results on Pasture Fertilization and Rotation Management," Agr. Exp. Sta., New Brunswick, N. J., Bul. 564, Apr., 1934, Carl B. Bender.

"Relation of Nitrate Nitrogen to the Carbohydrate and Nitrogen Content of Onions," Agr. Exp. Sta., Ithaca, N. Y., Memoir 156, Mar., 1934, A. L. Wilson.

Soils

A handy compendium of information on "Soil Management in Kentucky" has been prepared by Professor G. Roberts in Kentucky Agricultural Extension Circular 272. In this are considered briefly, but adequately, soil tillage, erosion control, fertilizers and their use, liming, organic matter, and rotations. Farmers, County Agents, and Teachers of Vocational Agriculture will find this bulletin very useful and practical.

One of the important problems of an Agricultural Experiment Station is to be able to tell a farmer what he needs on his farm. General recommendations of what fertilizer is likely to be beneficial can be made, but soils are so variable and so influenced by previous treatment, that a general recommendation might not suit conditions on a particular farm. Soil samples may be sent to the Experiment Station, so that the officials can have an idea of what the soil is like. However, this often has not been of much help, since just looking at the soil does not tell much as to the actual state of its fertility. The expense and shortcomings of complete chemical analyses of soils are too well known to need enlargement here. Recent developments of short chemical methods for testing soils for their acidity and available nutrients have gone a long way to simplify this problem. These tests still present many problems of interpretation, but even in their present stage of development they permit much more accurate recommendations than formerly could be made. Recent publications show how three States are handling the situation. Connecticut Agricultural Experiment Circular 95, "The Interpretation of Soil Tests" by M. F. Morgan, gives a resume of what the tests can show and how they are interpreted. Massa-

chusetts Agricultural Extension Leaflet 56, "Chemical Examination of Soils" by A. B. Beaumont, discusses briefly the problems as mentioned above and tells how the Experiment Station can help farmers to obtain the information on their soils which they may want. J. B. Hester in Virginia Truck Experiment Station Bulletin 82, "Micro-Chemical Soil Tests in Connection with Vegetable Crop Production," gives a more complete discussion of soil tests for fertilizer needs. Results of the tests on soils of known treatment are included to show their reliability and practicability. Instructions on how to take a satisfactory soil sample and the information that should be sent to the Experiment Station with the sample, so that the tests can be interpreted more intelligently, are given.

"Effects of Frequent Fires on Chemical Composition of Forest Soils in the Longleaf Pine Region," Agr. Exp. Sta., Gainesville, Fla., Tech. Bul. 265, March, 1934, Frank Heyward and R. M. Barnette.

"A Study of the Colloidal Fraction of Subsoils from the Standpoint of Electrodializable Bases and Buffering," Agr. Exp. Sta., Newark, Del., Bul. 186, Tech. 14, Oct., 1933, P. B. Myers and G. M. Gilligan.

"Soil Survey of the El Cajon Area, California," U. S. D. A., Washington, D. C., Series 1930, No. 15, R. Earl Storie and E. J. Carpenter.

"Soil Survey of Washington County, Iowa," U. S. D. A., Washington, D. C., Series 1930, No. 17, C. L. Orrben and W. H. Buckhannan.

"Soil Survey of Craven County, North Carolina," U. S. D. A., Washington, D. C., Series 1929, No. 23, R. C. Jurney, W. A. Davis, and J. J. Morgan.

"Soil Survey of Greenwood County, South Carolina," U. S. D. A., Washington, D. C., Series 1929, No. 26, F. R. Lesh, B. H. Hendrickson, A. H. Hasty, W. J. Latimer, and S. R. Bacon.

"Soil Survey of Grayson County, Virginia," U. S. D. A., Washington, D. C., Series 1930, No. 19, R. E. Devereux and G. W. Patteson.

"Soil Survey of Hardy and Pendleton Counties, West Virginia," U. S. D. A., Washington, D. C., Series 1930, No. 14, B. H. Williams and H. M. Fridley.

Crops

The 1934 Yearbook of the United States Department of Agriculture is in circulation. Secretary Wallace in his foreword states: "In this book the Department reports what has been done recently toward adjusting production and promoting efficiency . . . . These two kinds of departmental activity do not conflict, but go together. Agriculture needs not less science in its production, but more science in its economic adjustment." Undoubtedly this Yearbook will be eagerly sought by those who wish to fully understand what has been accomplished along these lines during the past year.

Among the other publications which have come to hand this month, several on pastures seem to indicate the growing interest in a profitable management of this important farm crop. Bulletins on the subject from different sections of the country widen the scope of information already obtained.

"Forty-third Annual Report Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., Auburn, Ala., M. J. Funchess.

"Summary of Research 1887-1933—Forty-fifth Annual Report," Agr. Exp. Sta., Fayetteville, Ark., Bul. 297, Apr., 1934, Dan T. Gray, E. B. Whitaker, G. W. Ware, and G. H. Banks.

"Genetic Relations of Nankeen Lint to Plant Color and Leaf Shape in Upland Cotton," Agr. Exp. Sta., Fayetteville, Ark., Bul. 300, May, 1934, J. O. Ware.

"Oat Variety and Production Studies," Agr. Exp. Sta., Fayetteville, Ark., Bul. 301, May, 1934, C. K. McClelland.

"Bush Berry Culture in California," Agr. Exp. Sta., Berkeley, Calif., Ext. Cir. 80, Dec., 1933, H. M. Butterfield.

"Growing and Handling Garlic in California," Agr. Exp. Sta., Berkeley, Cal., Ext. Cir. 84, Feb., 1934, Roy D. McCallum.

"Tobacco Substation at Windsor—Report for 1933," Agr. Exp. Sta., New Haven, Conn., Bul. 359, Feb., 1934, P. J. Anderson, T. R. Swanback, and O. E. Street.

"Annual Report of the Extension Service in Agriculture and Home Economics," Agr. Exp. Sta., Newark, Del., Bul. 20, Feb., 1934, C. A. McCue.

"Annual Report of the Director for the Fiscal Year Ending June 30, 1933," Agr. Exp. Sta., Newark, Del., Bul. 188, Mar., 1934, C. A. McCue.

"Transactions of the Peninsula Horticultural Society 1933," State Bd. of Agr., Dover, Del., Bul. Vol. 23, No. 5.

"1933 Report Cooperative Extension Work in Agriculture and Home Economics," Agr. Exp. Sta., Gainesville, Fla., Wilmon Newell.

"Cultural Practices for Alfalfa in Northern Idaho," Agr. Exp. Sta., Moscow, Idaho, Cir. 72, Mar., 1934, H. W. Hulbert and F. L. Burkart.

"Asparagus Yields as Affected by Severity of Cutting," Agr. Exp. Sta., Urbana, Ill., Bul. 401, Apr., 1934, E. P. Lewis.

"How Use Contracted Acres—Some Questions and Answers," Agr. Exp. Sta., Urbana, Ill., Cir. 420, Apr., 1934, J. C. Hackleman and C. M. Linsley.

"Aster Culture," Agr. Exp. Sta., Lafayette, Ind., Cir. 200, Oct., 1933, E. R. Honeywell.

"Report of the Agricultural Experiment Station for the Years 1931-1933," Agr. Exp. Sta., Baton Rouge, La., C. T. Dowell.

"Cotton Spacing in Southern Louisiana in Relation to Certain Plant Characters," Agr. Exp. Sta., Baton Rouge, La., Bul. 246, Mar., 1934, John R. Cotton and H. B. Brown.

"Sugar Cane Variety Report 1933," Agr. Exp. Sta., Baton Rouge, La., Bul. 247, Apr., 1934, C. B. Gouaux and E. C. Simon.

"The Forty-Sixth Annual Report of the University of Maryland, 1932-1933," Agr. Exp. Sta., College Park, Md., H. J. Patterson.

"Producing Snap Beans for Canning," Agr. Exp. Sta., College Park, Md., Ext. Cir. 104, Mar., 1934, T. D. Holder and H. A. Hunter.

"Soybeans for Massachusetts," Agr. Exp. Sta., Amherst, Mass., Bul. 309, May, 1934, A. B. Beaumont and R. E. Stitt.

"Seventy-second Annual of the Secretary of the State Board of Agriculture and Forty-sixth Annual Report of the Experiment Station From July 1, 1932 to June 30, 1933," Agr. Exp. Sta., Lansing, Mich., H. H. Halladay and V. R. Gardner.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 16, No. 4, May, 1934.

"Oats in Minnesota," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Spec. Bul. 165, Dec., 1933, H. K. Hayes, H. K. Wilson, and R. F. Crim.

"Tung Oil—Mississippi's New Agricultural Industry," State Dept. of Agr., Jackson, Miss., Bul. No. 1, June, 1933, E. Squire Brooks.

"Report from Holly Springs Branch Experiment Station for 1933," Agr. Exp. Sta., State College, Miss., Bul. 302, Dec., 1933, C. T. Ames.

"Cultural Practices in Winter Wheat Production," Agr. Exp. Sta., Lincoln, Neb., Bul. 286, Apr., 1934, T. A. Kiesselbach, Arthur Anderson, and W. E. Lyness.

"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1933," Agr. Exp. Sta., Reno, Nev.

"Agricultural Research in New Hampshire," Agr. Exp. Sta., Durham, N. H., Bul. 280, Mar., 1934, J. C. Kendall.

"The New Jersey Standard for Judging the Growth Status of the Delicious Apple," Agr. Exp. Sta., New Brunswick, N. J., Bul. 559, Feb., 1934, M. A. Blake and O. W. Davidson.

"Improving Pastures in New Jersey," Agr. Exp. Sta, New Brunswick, N. J. Bul. 565, Apr., 1934, H. B. Sprague, N. F. Farris, and C. S. Cathcart.

"Effects of Temperature on the Growth and Composition of Stayman and Baldwin Apple Trees," Agr. Exp. Sta., New Brunswick, N. J., Bul. 566, Apr., 1934, G. T. Nightingale and M. A. Blake.

"Effects of Temperature on the Growth and Metabolism of Elberta Peach Trees with Notes on the Growth Responses of Other Varieties," Agr. Exp. Sta., New Brunswick, N. J., Bul. 567, Apr., 1934, G. T. Nightingale and M. A. Blake.

"Garden Iris," Agr. Exp. Sta., New Brunswick, N. J., Ext. Bul. 121, May, 1934, Charles H. Connors.

"The Place of Field Crop Production in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 294, Feb., 1934, Howard B. Sprague.

"Hardy Chrysanthemums," Agr. Exp. Sta., New Brunswick, N. J., Cir. 315, Apr., 1934, Charles H. Connors.

"Results of Irish Potato Experiments in the Bluewater, New Mexico, Irrigation District," Agr. Exp. Sta., State College, N. M., Bul. 218, Jan., 1934, Fabian Garcia and S. C. Young.

"Red Currants and Gooseberries," Agr. Exp. Sta., Geneva, N. Y., Cir. 112 (Rep.), Jan., 1933, G. L. Slate.

"Growing Wood as a Crop on New York Farms—Part 1—Trees and Products," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bull. 270, Nov., 1933, J. A. Cope.

"The Control of Diseases and Insects Affecting Vegetable Crops on Long Island," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bul. 278, Jan., 1934, C. R. Crosby and Charles Chupp.

"History, Culture, and Varieties of Summer-Flowering Phloxes," Agr. Exp. Sta., Ithaca, N. Y., Bul. 588, Mar., 1934, A. M. S. Pridham.

"Soil, Field-Crop, and Pasture Management for Suffolk and Nassau Counties, New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 600, May, 1934, A. F. Gustafson, D. B. Johnstone-Wallace, and F. B. Howe.

"A Study of Some Ecological Factors Influencing Seed-Stalk Development in Beets," Agr. Exp. Sta., Ithaca, N. Y., Mem. 154, Mar., 1934, Emil Chroboczek.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIX, Nos. 168 and 169, May-June and July-August, 1934.

"Walnut Production in Oregon," Agr. Exp. Sta., Corvallis, Ore., Cir. 108, Mar., 1934, C. E. Schuster.

"Forty-Sixth Annual Report 1933," Agr. Exp. Sta., College Sta., Texas, A. B. Conner.

"Abstracts of Bulletins 474-488, Circulars 67-68 and Other Publications During 1933," Agr. Exp. Sta., College Station, Texas, Cir. 71, Dec., 1933, A. D. Jackson.

"Rotations and Cropping Systems," Agr. Exp. Sta., Logan, Utah, Cir. 103, Apr., 1934 D. W. Pittman.

"The Vermont Five-Point Pasture Plan," Agr. Exp. Sta., Burlington, Vt., Ext. Cir. 79, May, 1934, P. R. Miller.

"Emergency Crops for Summer Planting," Agr. Exp. Sta., Burlington, Vt., Ext. Emerg. Leaf. 46, July 13, 1934, P. R. Miller.

"More Alfalfa for Vermont," Agr. Exp. Sta., Burlington, Vt., Ext. Brief. 388, May, 1934, P. R. Miller.

"Good Gardening in Vermont," Agr. Exp. Sta., Burlington, Vt., Ext. Brief. 387, Apr., 1934.

"Department of Agriculture Immigration of Virginia," Dept. of Agr., Richmond, Va., Bul. 316 and 317, June and July, 1934.

"A Comparison of Rotational and Continuous Grazing of Pastures in Western Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 294, Apr., 1934, R. E. Hodgson, M. S. Grunder, J. C. Knott, and E. V. Ellington.

"Methods of Measuring Pasture Yields with Dairy Cattle," Agr. Exp. Sta., Pullman, Wash., Bul. 295, May, 1934, J. C. Knott, R. E. Hodgson, and E. V. Ellington.

"Farm Orchards," Agr. Exp. Sta., Madison, Wis., Ext. Cir. 265, Feb., 1934, C. L. Kuehner.

"Strawberry Culture in Wisconsin," Agr. Exp. Sta., Madison, Wis., Ext. Cir. 268, Mar., 1934, James G. Moore.

"List of Available Publications of the United States Department of Agriculture January 2, 1934," U. S. D. A., Washington, D. C., Misc. Pub. 60, (Rev.), Jan., 1934, F. L. Zimmerman.

"The United States Department of Agriculture—Its Structure and Functions," U. S. D. A., Washington, D. C., Misc. Pub. 88 (Rev.), Dec. 15, 1933, M. S. Eisenhower and A. P. Chew.

"A Pasture Handbook," U. S. D. A., Washington, D. C., Misc. Pub. 194, Apr., 1934, A. T. Semple, H. N. Vinall, C. R. Enlow, and T. E. Woodward.

Economics

"General Indicators of the Condition of Arkansas Banks," Agr. Exp. Sta., Fayetteville, Ark., Bul. 298, May, 1934, B. M. Gile and Fred L. Garlock.

"Annual Index Numbers of Farm Prices, California, 1910-1933," Agr. Exp. Sta., Berkeley, Cal., Bul. 569, Feb., 1934, H. J. Stover.

"A Study of the Cost of Handling Citrus from the Tree to the Car in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 266, Apr., 1934, H. G. Hamilton and Marvin A. Brooker.

"Prices of Farm Products in Northwestern Indiana," Agr. Exp. Sta., Lafayette, Ind., Bul. 387, Feb., 1934, Lynn Robertson and F. V. Smith.

"Prospects for Agricultural Recovery—V. Is Our National Farm Plant Too Large?" Agr. Exp. Sta., Ames, Iowa, Bul. 314, Mar., 1934, Theodore W. Schultz.

"Factors for Successful Farm Management in Todd, Christian, and Warren Counties," Agr. Exp. Sta., Lexington, Ky., Bul. 347, Apr., 1934, W. L. Rouse.

"The Farmer's Interest in Exports," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Spec. Bul. 164, Sep., 1933, O. B. Jesness.

"Raspberry and Strawberry Production Trends in Minnesota," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 305, Apr., 1934, W. H. Alderman, J. D. Winter, and Rex W. Cox.

"Montana Farm Taxes," Agr. Exp. Sta., Bozeman, Mont., Bul. 286, Mar., 1934, Roland R. Renne and Bushrod W. Allin.

"Types of Farming in Southeastern Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 287, Apr., 1934, Virgil D. Gilman.

"Production of Crops and Livestock on the Newlands Project in 1933," Agr. Exp. Sta., Reno, Nev., Bul. 134, Apr., 1934, F. B. Headley and Cruz Venstrom.

"Studies in Economics of Apple Orchardding," Agr. Exp. Sta., Durham, N. H., Bul. 279, Mar., 1934, H. C. Woodworth and G. F. Potter.

"Farm Mortgage Experience of Life Insurance Companies Lending in South Dakota," Agr. Exp. Sta., Brookings, S. D., Cir. 16 (Suppl. to Cir. 7) Feb., 1934, Harry A. Steele.

"Agricultural Adjustment—A Report of Administration of the Agricultural Adjustment Act May, 1933 to February, 1934," U. S. D. A., Washington, D. C., G-8, C. C. Davis.

"The Citrus Program Under the Agricultural Adjustment Administration," U. S. D. A., Washington, D. C., G-9, May, 1934, E. W. Braun.

"Working Together in the Corn-Hog Program," U. S. D. A., Washington, D. C., G-10, H. A Wallace.

"The Most Complete Agricultural Recovery in History—The Example of Denmark," U. S. D. A., Washington, D. C., G-11, Mar., 1934, Frederic C. Howe.

"Marketing Agreement for Fire-Cured and Dark Air-Cured Tobacco—Types 21, 22, 23, 24, and 36," U. S. D. A., Washington, D. C., Marketing Agreement Series—Agreement No. 41, Form M-56.

NATURE STUDY

Teacher of Zoology: "What is it that ladies and gentlemen have that wild beasts do not have?"

Little Eunice: "Sex appeal."

GEOGRAPHY

Teacher (in geography class): "Can anyone tell me where Pittsburgh is?"

Small Voice (in rear): "Please, ma'am, they're playing in Chicago."

Better Avocados

(*From page* 14)

next, followed by the others, with that of phosphate alone as the poorest.

The avocado requires more fertilizer than any tree-fruit in California. That should be evident to anyone who compares the avocado with other fruits. The above application of complete fertilizer may be enough for groves that have received good care in the past, but the writer has yet to see any avocado grove in California that does not contain trees that are in need of extra applications of one or more of the three chief fertilizer ingredients.

In order to increase the flavor and shipping qualities of the fruit and give the tree greater resistance to frost and disease, a 6-10-12 complete fertilizer is favored for the avocado.

A Fuerte avocado tree fertilized over a period of years with a balanced fertilizer containing generous amounts of potash.

Science Helps Maine Grow Better Potatoes

Potato-breeding experiments of the United States Department of Agriculture in Maine now give promise of overcoming some of the most baffling disease problems of potato growers throughout the country. Aroostook County, Maine, is the largest potato-producing county in the country and is likewise a center of seed production.

The most notable achievement of the plant breeders thus far is the Katahdin, a variety developed in 1931. It produces a good crop of uniform tubers with shallow eyes, and it has a remarkable resistance to the disease—mild mosaic—one of the most widespread of all potato diseases.

Varieties resistant to other diseases have resulted from the work of the Department of Presque Isle, Maine. Last year several hundred seedlings were grown in an unsprayed plot to test them for resistance to late blight. A heavy epidemic of the disease occurred, and six of the seedlings showed notable resistance. Other new varieties are resistant to scab. No variety shows resistance to all the various diseases, but the scientists believe they have now laid the foundation for the development of such a variety.

Fertilizer experiments by the Department and the Maine Experiment Station have determined the most effective proportion of nitrogen, phosphoric acid, and potash for potatoes, the best sources of fertilizer ingredients, and the most economical rate of

application. Field tests have shown that high-analysis fertilizers compare favorably with ordinary low-analysis mixtures, and many farmers are now using the concentrated forms, and are saving money on freight, bags, and hauling.

Fertilizer placement studies show that best results are obtained when the fertilizer is placed in narrow bands on each side of the seed piece about 2 inches away. Injury to the seed pieces resulting in poor stands and lowered yields often results when fertilizers are placed too near the seed.

In recent years Maine potato farmers have had many stunted plants, resulting in poor yields. Cooperative investigations showed this trouble was caused by continued use of fertilizers tending to increase soil acidity, and that the addition of magnesium compounds to potato fertilizers in the proportion of 20 pounds of magnesium oxide to the ton overcame the trouble.

The Inquiring Mind

(*From page* 12)

thousands of samples of soil, and tested them by means of cleverly contrived cylinders. In these, moist alkali-impregnated soil is saturated with water, which is forced through clay, collected and then analyzed.

As a result of his extensive experimental work, Dr. Kelley has concluded that drainage, especially if it is accompanied by flooding, is a reasonably successful means of removing white alkali from soils. If large amounts of black alkali are present, however, ordinary drainage probably will not restore the land to a state where crops will succeed, unless the black alkali first be neutralized in the soil mass. As yet he has found no economical means of neutralizing large amounts of black alkali where it occurs in the subsoil; but where it occurs mainly in the first foot of the soil, reclamation possibly may be accomplished by drainage and an application of gypsum. Sulphates and chlorates predominate in white alkali, and carbonates in black alkali. The experiments have shown that when chemical salts were applied to alkali soils, sodium replaced calcium in the clay and turned it into insoluble sodium clay which cannot be washed from the soil. Sulphur, when applied was, however, converted into sulphuric acid in the soil, and the acid dissolved the calcium carbonate, forming calcium sulphate which, in turn, made sodium clay into calcium clay, from which the salts can be removed by drainage and leaching.

In the reclamation of the Fresno, California, type of black alkali soil, Dr. Kelley has had beneficial results from the application of gypsum, sulphur, iron sulphate, and alum, but at different rates. Gypsum produced uniformly successful results on this soil only when applied at the rate of more than 10 tons per acre. Relatively large amounts of iron sulphate and alum also are required. On the other hand, excellent results have been obtained by applying not more than one ton of sulphur per acre. Sulphur has proved much more economical than the other materials. Large yields of alfalfa—6 to 11 tons per acre per annum—have been produced on soil that was badly affected with alkali and entirely unproductive at the outset by applying one ton of sulphur per acre. When used in conjunction with stable manure, 1,000 pounds of sulphur per acre has given good results.

Leaching experiments, without the

application of any material except water, thus far have failed to bring about a satisfactory reclamation of this soil.

Dr. Kelley considers it extremely important to irrigate young alfalfa on alkali soil. He has found it desirable to irrigate twice a month during the first summer after the alfalfa is planted. Alkali soil should never be allowed to dry out while crops are being grown, and success in alkali reclamation will depend to an unusual degree upon careful attention to the details of soil preparation and irrigation.

Consider Subsoil

Since injurious alkalinity commonly occurs in the subsoil as well as in the surface soil, Dr. Kelley teaches that the successful treatment of black alkali soils involves the necessity of considering the subsoil. Gypsum, although less effective chemically than elemental sulphur or sulphuric acid, nevertheless may be preferable in practice, since it is frequently necessary to employ leaching and the alkaline silicates present are capable of being converted into calcium silicates by the action of calcium salts. These silicates probably perform highly important functions in soils.

Both ferrous sulphate and alum neutralizes the CO_3 in soil, and the results of experiments have shown that either of these materials might be useful in the treatment of black alkali soil. An excess of soluble ferrous iron or aluminum is considered toxic to plants, and the precipitate formed by each of these materials is gelatinous and may produce undesirable physical properties, especially when large amounts of black alkali occur. Culture experiments extending over a period of two weeks have indicated, however, that the soil after treatment with ferrous sulphate and leaching may be a favorable medium for plant growth.

Relative to harmful ingredients in irrigation water, which have already been mentioned, Dr. Kelley says: "It has been found that a considerable number of citrus groves located in several districts in California have been severely injured by alkali and that a large percentage of the injury has been due to the irrigation water which is highly charged with alkali. Chlorides are undoubtedly the most injurious constituents that occur in the irrigation waters of Southern California, but it must not be concluded that other alkali salts can be ignored. In certain localities, some of the waters also contain injurious amounts of sulphates and carbonates."

Hilgard said: "When a large proportion of solids in irrigation water consist of carbonate of soda, or common salt, even a smaller proportion of salts than 40 grains per gallon might preclude its regular use."

Dr. Kelley and E. E. Thomas commented on this as follows: "We regret to state that a considerable number of irrigation waters contain salts in excess of this limit, some of them greatly so!"

It has been shown by Dr. Kelley that the continued application of nitrate of soda may bring about an increase in the amount of alkali in the soil. Unless drainage effectively leaches the salts from the soil, the continued application of sodium nitrate, or of saline irrigation water, will ultimately produce a harmful concentration of alkali in any soil. (Kelley-Thomas).

Disease Symptoms

An excess of chlorides causes the tips and margins of citrus leaves to become yellow or brown, followed by defoliation. An excess of sulphates and bicarbonates, on the other hand, is more likely to stunt the growth of the trees and causes the leaves to become chlorotic. More or less mottle leaf also may occur. Lemon trees apparently are injured by lesser amounts of alkali than oranges.

As a part of his reclamation work in the famous Imperial Valley, where

the land had been fertile and productive but was poisoned by alkali, our California Elisha "made the valley full of ditches," to drain away the surplus subsoil water. For the purpose, a canal 10 feet deep was dug and into it empty numerous lateral ditches which carry the alkali-impregnated water and eventually empty it into the Salton Sea. By this canal system and the surface application of gypsum, sulphur, etc., fertility has been restored, and Dr. Kelley and his enterprising helpers are given the credit for enabling growers again to produce bountiful crops of fruit, grain, and forage.

The busy Doctor has not been idle in other matters. Dr. L. D. Batchelor, Director of the Citrus Experiment Station, says that in addition to his scientific achievement Dr. Kelley has been much interested in public affairs, especially for the betterment of the community in which he lives and works. In addition, his knowledge of international affairs relating to agriculture and economics has been so sound and useful that he has been asked many times to discuss such problems at conventions of various important local and state organizations.

His congenial and cordial personality also has made him popular with his co-workers and the general public. We, with all of his friends and admirers, hope that he will be spared for many more years to carry on his work, which has been of inestimable value in California, and that he may make new discoveries in soil chemistry that will redound further to his fame and amplify his already splendid record.

Phosphorus and Potash Responses

(*From page 9*)

the trees receiving nitrogen alone, and those in the third row from trees treated with nitrogen, phosphorus, and potassium.

In the other pictures interesting responses for Grimes Golden apple trees from this same experimental layout also are brought out. Although the trees receiving nitrogen alone in the form of ammonium sulphate showed marked responses as compared to the check or unfertilized trees, the most marked response is shown in the trees receiving potash and phosphorus in addition to the nitrogen.

The following table brings out the responses of the differently treated apple trees in the second year:

TREATMENT	Average Circumference Increase in Inches	Average Terminal Growth Length Per Shoot in Inches	Average Yield in Pounds
Calcium Cyanamid 10 lbs. Fall	1.22	2.78	.74
Ammoniated Phos. 13 lbs.	1.24	5.75	4.16
Ammoniated Phos.-Pos. 17½ lbs.	1.43	6.44	3.87

In an address at the last meeting of the American Society for Horticultural Science in Boston, Massachusetts, the writer showed the significant relationship that exists between the growth responses and the yielding potentialities in apple trees. The high growth response shown in the above table for the treatment in which potash was added to the other elements is thus very significant. Although calcium cyanamid is the nitrogen source illustrated in this table, similar benefits have been secured in these experiments where other nitrogenous fertilizers also were used in the complete fertilizer combinations.

The fusion method of analysis

shows an abundance of phosphoric acid and potash in the soil but according to the fifth normal nitric acid solubility method, the amounts present in available form as plant food are inadequate to maintain capacity growths and crops for apple trees planted 40 feet apart after they have reached a 40-inch trunk circumference or approximately after some 25 years as shown in Table I.

What to Consider

It is quite possible that there may be adequate amounts of the essential elements in Virginia soils to produce optimum growth and yields in apple trees for even more than the average life of apple trees. Furthermore, disintegrating rock and certain chemical changes in the soil may release sufficient amounts that can be utilized. On the other hand, however, losses that may be caused in various ways also must be borne in mind. In addition to elements tied up in wood and removed in picked fruit, losses may be caused by leaching as well as from mechanical and chemical fixation. The ultimate occupation of the soil by the roots and the consequent displacement of this area by them, also should be considered. Even in 40 by 40 feet planting distances the soil areas will become appreciably occupied so that the trees become practically root-bound. Even if there are considerable unexploited depths in the subsoil, the heavy texture may preclude efficient penetration. When trees reach such a condition they are in danger of reaching a physiological limit, and as a consequence going on a down grade into old age or senescence. To anticipate this limit and thereby postpone a down grade into senescence it should be advisable to provide all of the essential elements.

It is rather difficult to recommend definitely how much of these three elements should be used in the profitable production of apples. In a large measure trial and error procedure must still be resorted to. The analyses presented at the beginning of this discussion may offer some suggestion as to the proportions that are required. For every thousand pounds of apples harvested together with the usual amount of pruning that should be done for the production of so many apples, there should be restored to the orchard soil thus depleted, .6 pound nitrogen, .16 pound phosphoric acid, and .48 pound potash. This suggests a ratio of approximately 7-2-5. An application measured upon this basis should be profitable at least from the standpoint of maintaining available plant food at just about the rate that the apple tree needs it for normal growth and fruit production. A basis is also suggested for figuring the fertilizer expense for a definite amount of fruit. This suggested ratio should, of course, be modified to meet special conditions and differences in soil fertility. To also take care of non-leguminous cover crop needs and what may be tied up in the wood, a 7-6-5 ratio based upon an ammonia percentage for nitrogen is suggested where more nitrogen is needed and a 4-8-5 for soils planted to legumes or those richer in nitrogen.

How to Apply

In another set of experiments in this same apple orchard a most marked response contrast showed up wherever either phosphorus or potassium or both were added to calcium cyanamid. The response was so outstanding that apple growers are advised to give these combinations very special attention. It is the conclusion of the writer that far better benefits can be secured from calcium cyanamid when either or both, preferably both, phosphorus and potash are added to the calcium cyanamid applications. The better results are secured if the calcium cyanamid is applied first, then the superphosphate on top of this, with the potash to the last. It is not well to apply the superphosphate first as it fixes very soon in the upper soil layers. If applied on top of the calcium cyanamid, it has a

good chance to unite with the ammonia given off and become ammoniated. As ammoniated phosphorus, it is highly available and more efficiently distributed. We have found it better here at this station to scatter these different fertilizers directly in the orchard than to go to the additional trouble of mixing them before hand. Orchardists may prefer to do the latter but we believe that, on the whole, time will be lost as compared to making the applications directly in the orchard. We also have found we get satisfactory results by scattering the fertilizer between the rows as well as entirely under the branches of the tree. This is particularly so with the older trees. With the older trees, the roots often meet even in 40 by 40 feet planting distances.

This is a good time to think and talk over fertilizer problems. The fall will often arrive just a bit too soon. For best results, these applications should be made in the fall. Wherever his apple trees need fertilizing, the wise apple grower will do best to make his preparations for fall applications and make his plans well in advance.

Nature & Co.

(*From page* 6)

tend to indicate that there are cycles of dry weather in the growing season over vast sections of the country usually blessed with ample soil moisture. If that can be refined a bit and charted a little closer to accurate determinations, the time is coming when farmers can escape the bad results of low feed reserves by timely warnings. As it is now, you can't get a highly scientific weather expert to risk his reputation betting against Nature for the sake of the Company. One week in advance is considered a long shot.

Then by combining that acquired wisdom with the ancient program of Joseph when he was custodian of the grain bins for Pharaoh, we are probably going to set aside rigidly withheld portions of the food and feed harvests for stuffing the ribs of man and beast in lean years, always being extra careful to ear-tag the surplus so that speculators will not punish the farmer for using fertilizer and good tillage to grow it. And the sob-sisters who weep briny tears over control of production when some folks are starving, will also be quieted by a judicious use of such surplus.

Trying to enforce mutual welfare regulations against recalcitrant human Nature is just about as tough a task as gambling against the hazards of elemental Nature. In other words the grand old constitution and its fancied rights to every man to pursue the dollar over the halt, the lame, and the blind is still a precedent that tangles up the reformers.

HUMAN Nature run amuck puts us up against half of our troubles with Nature. Witness the land-go-mania in all its aspects and the inescapable consequences, timed to a tragic nicety with the boom in stock and land values and the financial fevers of the past decade. Some folks said it was all a freak coincidence or a plague in punishment. It would be better to call it bad management on the part of the Junior Partner—& Company.

Reformers and adjusters have two courses open to them in negotiating "treaties" with reluctant human Nature for the supposed general welfare of the Company. The one method is to use diplomacy, discretion, and patient arbitration, education, and pleading. The second system is the rough and tumble, hard-boiled way, which

leads to much open debate and gross billingsgate on both sides, threats and innuendoes, and perhaps a round or two in lower and higher courts.

Your author, if you please, has had some experience in both. The proper tactics to follow so as to gain the ends sought and produce the desired reform and adjustment needful for the Company at large depend on the issue itself and its clarity, and the degree of meanness and its capital resources involved.

Likewise, they depend on how sincere and well-equipped the reformers are to undertake the pressure required to see the issue through to the bitter end. It is idle to remark that the courts are the resort of knaves as long as the reformers seem to have little serious intention to carry the cases into court and meet the knaves with their own weapons. Before the issue really gets to court it is tried in newspapers and rumblings of public opinion often shatter the firm resolve of reformers.

At this stage all bombastic attitudes and charges of graft assume a childish aspect on the part of reformers, as they might get equally far by sticking out their tongues at public enemies. In a democracy where votes and vetoes are imminent, the pursuit of the economic highbinder through the mazes of punishment is a calling for calloused dictators.

IF recourse is taken to a sort of vindictive educational method in lieu of drastic court enforcement, we at once divorce ourselves from practical considerations. The knaves and grafters whom we seek to reform by pressure or persuasion still live, own their institutions, hire and fire employees, and continue to be a concrete part in the economic picture. By a continual attitude of criticism toward them, the reformer, unsupported by enough fundamental law, is helpless to take action and is obliged to fret and fume in a hot-bed of bad feeling which engenders rather than removes the real source of trouble.

I reckon we have not proceeded far enough yet to discount human Nature, in or out of court. It does not seem logical to advocate resignation in the midst of such a wave of righteous anger at discredited agencies. Something should be done to take advantage of the white-hot heat in which the Company of Citizens finds itself before that temperature cools down. Without show of fight or sign of practical action to follow up the gestures of reform, however, there is danger that the ardor will die out with a return of somewhat more easy economic conditions. In other words, "put up or shut up."

YET this is not any time to feel discouraged over the possibilities of making things safer and better for the Company. It is a gradual process and some real objectives have been reached in our attempt to set up social insurance against the crudities of all forms of Nature. The protection against all forms of over-emphasis and over-expansion is a hard lesson to learn, especially when self-imposed. It will take decades to settle this and tons of grease to stop the creaking.

After all, our principal comfort lies in this fact: That the tantrums of Dame Nature and the instances of human deviltry are more an exception than the rule; and most climates and most peoples are more civilized and tractable than they get credit for.

Nature itself probably always was that way, and we can't give the credit to reformers for this. Human cussedness was far more general and damaging a few hundred or a thousand years ago than it is today. I am sure the reformers and adjusters deserve due recognition for part of this improvement.

Most of us feel that, biding the time of renascence, we can best survive by dodging the blows of the elements and the schemes of mankind. In doing this, of course, we remain in a state of suspension——mighty dizzy in our domes.

FITTING NO OBJECT

An old Negro recently approached a relief worker and asked for clothing. He particularly wanted a pair of pants.

"What size do you wear?" he was asked.

"A 38."

"I'm afraid I don't have your size," she informed him. "The smallest I have is a size 50."

"Well, that's all right. You see, Miss, we ain't so much for fittin' as for hidin'."

Ants are supposed to be the hardest working creatures in the world. Yet they seem to have time to attend all picnics.

A NEW OFFICE

Rastus: "Brothaw president, we needs a cuspidor."

President of the Eight-Ball Club: "I appoints Brother Brown as cuspidor."

"Do you know how to tell a professor from a student?"

"Oh, all right, have it your own way and tell it."

"Ask him what 'it' is, and if he says it's a pronoun he's a professor."

Professor: "Name the five most common bugs."

Student: "June, tumble, lady, bed, and hum."

FATE TOOK A FOOT

Teacher (after recess): "Percy, why are you crying?"

Percy: "Harold kicked me in the stomach."

Teacher: "Harold, did you mean to kick Percy in the stomach?"

Harold: "Naw. He turned around just when I kicked."

Timothy Hay: "Yes, I've seen a few bad crop years in my time, too. One year our string beans were so poor that the crop didn't even pay for the string."

Al Falfa: "That's nothing, Tim. In '94 our corn was so bad that my old dad, who had a very poor appetite, ate up 14 acres of corn at a single meal."

An old lady in church was seen to bow whenever the name of Satan was mentioned.

One day the minister met her and asked why she did so.

"Well," she replied, "politeness costs nothing, and—you never know!"

He is a wise man who has his afterthoughts first.

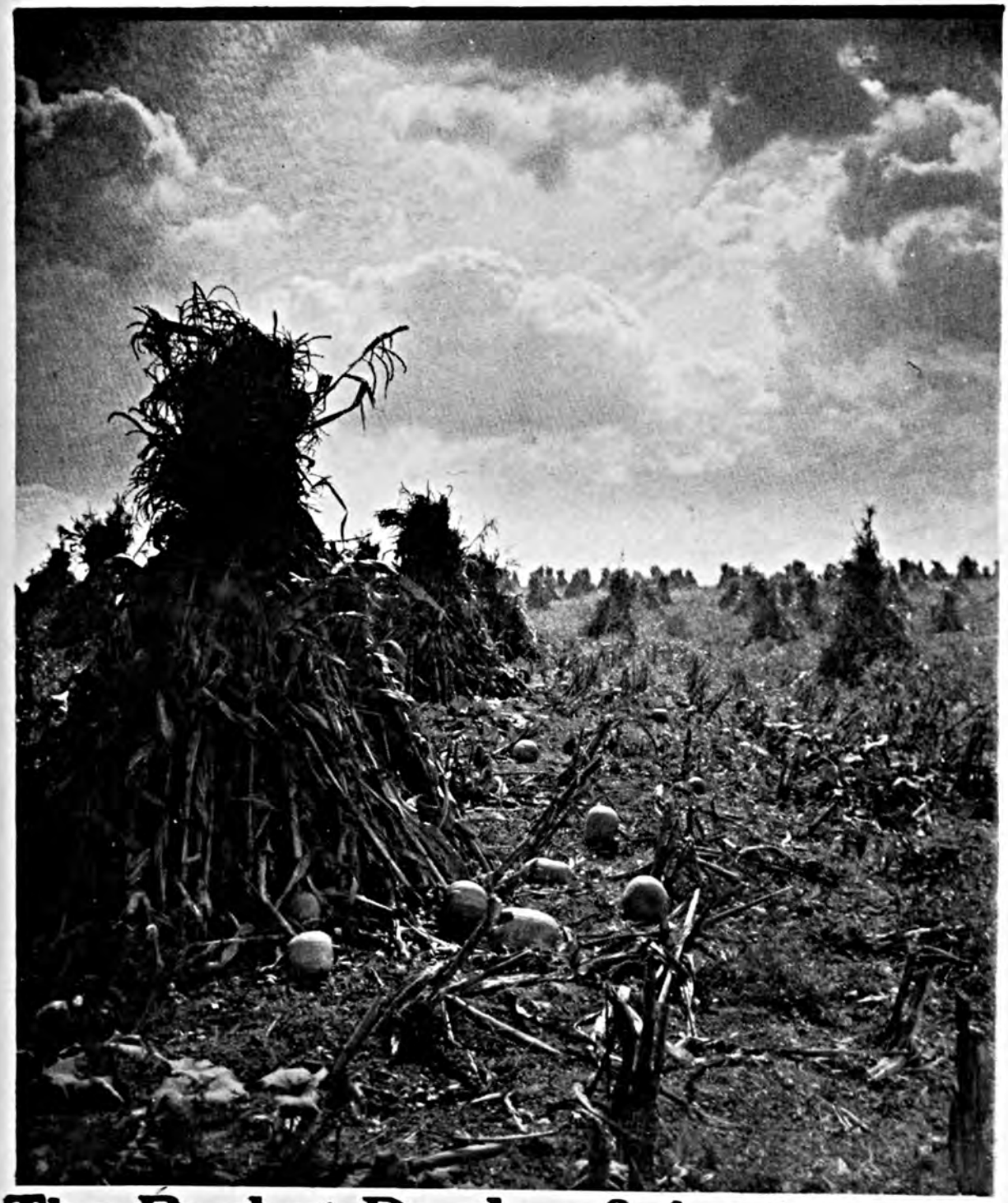
DIDN'T SHOW

"Oh, dear," exclaimed the girl student who was planning to go to college next fall, "I just can't adjust my curriculum to save my life."

"It doesn't show any," snickered the boy friend.

Better Crops WITH PLANT FOOD

Oct-Nov. 1934 10 Cents

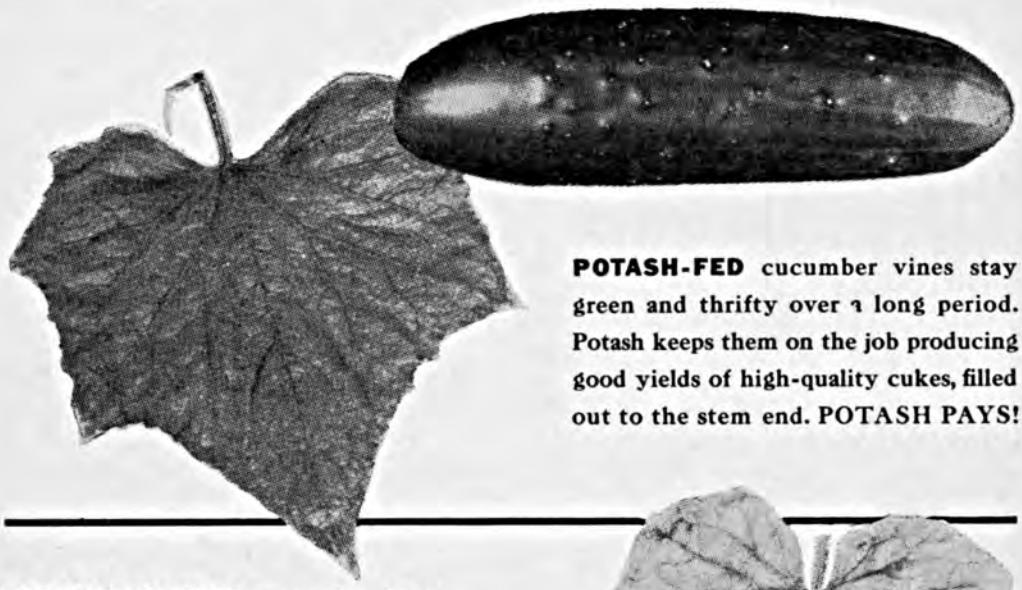


The Pocket Book of Agriculture

POTASH *Starvation Symptoms*

No. 2
of a series

CUCUMBER plants are luxury feeders on potash. When they are starved for this essential element their leaves turn ashen-gray and later bronze-colored, becoming brittle and harsh to touch. Leaf margins show "brown edge scorch." Potash-starved cucumber fruits are poor quality, not filled out properly and often gourd-shaped. Fertilizer well-balanced with plenty of potash is needed to produce good yields of high-quality cucumbers.



POTASH-FED cucumber vines stay green and thrifty over a long period. Potash keeps them on the job producing good yields of high-quality cukes, filled out to the stem end. POTASH PAYS!

POTASH-HUNGRY cucumber leaves turn ashen-gray and later bronze-colored. Their cukes are often gourd-shaped and poor quality. They are starved for potash—the quality-producing element.

Better Crops with PLANT FOOD

The Whole Truth — Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XIX NUMBER TEN

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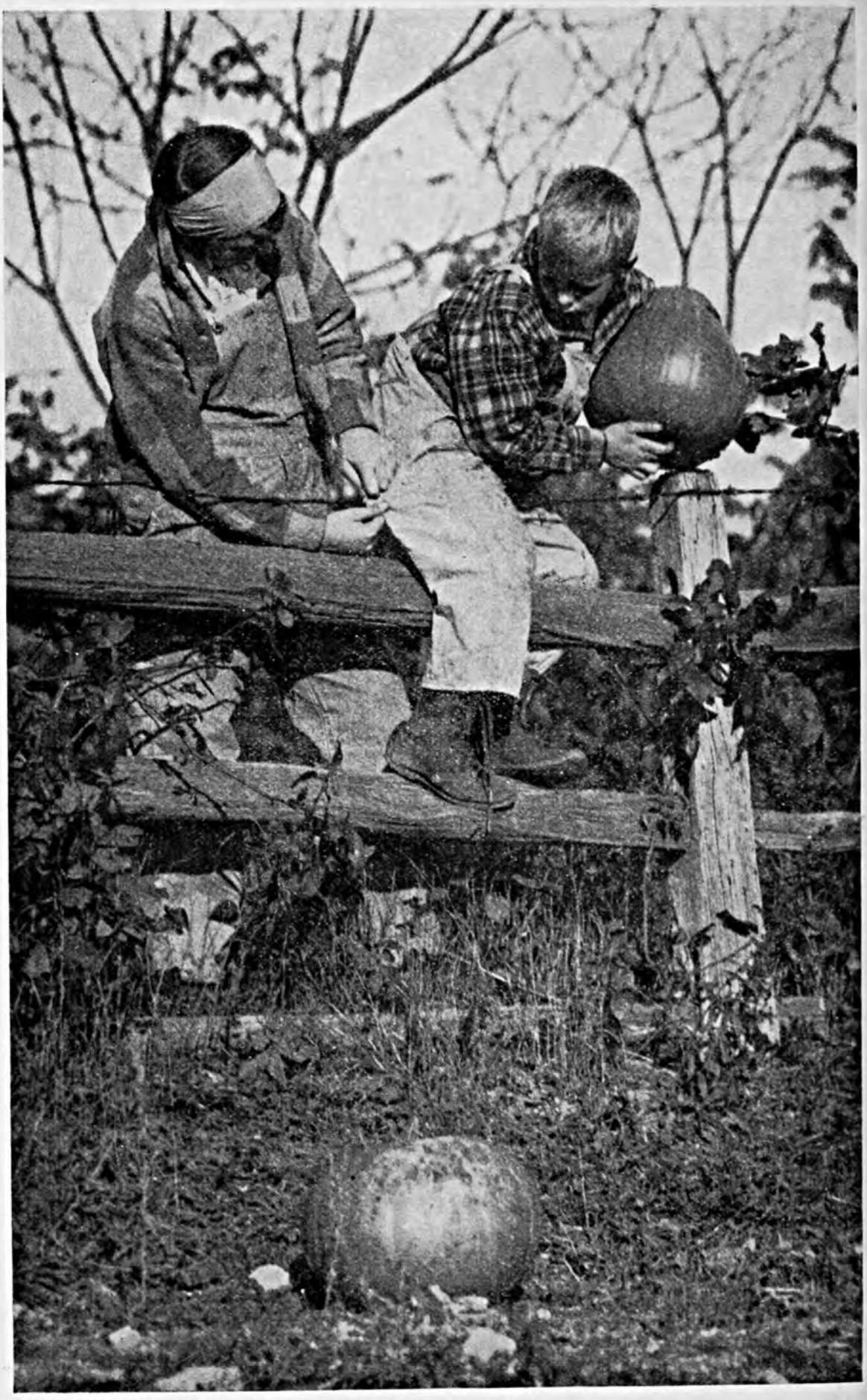

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Memories of a Devil

By Jeff McDermid

IN this age when news is stale before it happens, when teletypers, telephotos, and hourly editions engulf us in a fog of non-essentials, how does the country printer find ways to attract apprentices to his smudgy craft? Are the old thrills gone from the country sanctum and its mystic aisles of stones and cases? Does youth fail to see glamor in the flimsy sheets clacking off an old flat-bed press, just as many young moderns sense no beauty in the race-horse beside the latest tri-motor passenger plane?

Yet I dare say the three hundred provincial newspapers in my home state are as carefully read and clipped for scrap-books as the dozen or more upstanding dailies which have to label part of their pages "the comic section" so readers will actually know that the balance of the stuff is really heavyweight and serious matter.

Twenty years ago a boy with a hankering for journalism (with a big J) first took a type louse course in his home-town print shop. To become a scoop artist, a star correspondent, a

scourging editor, or a feature writer meant first becoming a devil. When schools of journalism grew apace and newspapers got ritzy, the order was usually reversed. The sophisticated geezer became a devil afterwards and stayed that way.

As I knew him the devil in our rural town establishment devoted to the advertising and gossipy arts had more real estate than third estate visible on his claws, clothes, and countenance. He first arrived at the fascinating realm of paste, ink dust, forms, and cases with his high-school gift pencil sharpened and his graduate suit nicely pressed so that he might get an assignment fitted to his acknowledged talents. That very news sheet had just published his own commencement oration and predicted for him a scintillating career amid the stars of the arts preservative.

BY night he crept home in utter disillusionment after a day spent in the borrowed overalls of a fat foreman, his hair and nostrils filled with the dirt and grime of a sweeper's job and his shiny shoes spattered with washwater from a window brush. His impatient pencil was untouched and forgotten.

Shades of Greeley, James Gordon Bennett, Joseph Pulitzer and Marse Henry Watterson! Is this the threshold of service to the commonweal? The only salve to his injured pride was a glimmering memory of a picture in a library book showing young Ben Franklin carrying his worldly goods in a bundle and munching a bun while a saucy miss derided him from a colonial doorway.

But within a fortnight the ignominy of the chore boy had given place to the first delights of typographical composition. The high and slippery stool, the blue denim apron with pockets for a shiny nickel rule and a knobby plug of twist tobacco, the possession of a rusty stick with a stiff clamp, and a slow accumulation of upper and lower case lore made the goal seem less remote. During this interval the usual initiative errands had been run in mockery for type stretchers and press tuners, while the patient face of the shock-haired tyro had received its dash of sponge water while bent over metal galleys hunting for injurious insects.

At this juncture the neophyte came to the crossroads. Which was the more desirable of the two enthralling professions, represented by a kindly printer foreman in the back shop, and the pompous, bustling city editor, who ran amuck from card parties to fires and funerals, covering them all and himself with wordy magnificence unknown to Roget or Webster?

As a matter of secret confidence, our observant novice often thought that the foreman was more capable of good English composition than the language butcher who hooked his hen-scratch copy on the door jamb of the mechanical department. Once in a moment of revolt over a bungling tribute written by the newshawk, the foreman ground the copy under foot and set up a new piece fresh from the case with fierce jabs and snorts. His breach of office etiquette was excusable, for the foreman insisted that his next-door neighbor, with whom he had fished, played checkers, and watered lawns for years, was entitled to a decently worded obituary. "His widow is *not* a relic and he did *not* die *intestine*," growled Tony, toiler of the types, while the devil stood with grimy satisfaction at his elbow.

AND how joyfully flattered the devil felt when Tony shaped his long Sunday walk so as to include a few minutes' visit with the devil's family on the summer lawn, maybe with a little lemonade and a few reminiscences of the old days for good measure. "Gosh, Ma, I guess Tony thinks I'm a regular guy now."

Although the foreman had that cramped awkwardness of an artisan in his best clothes, there was a depth of

finish and verve in his conversation which indicated that his work was imbued with some of the distinctive intelligence belonging to the best traditions of the rural press. But good old Tony never left the back room for the more notable place in the front office, although many old-timers pushed on through the news room to consult him on weighty matters relating to publicity or advertising layouts.

When the devil had mastered the cases and fonts so that he knew 18-point DeVinne from 12-point Cheltenham and knew better than to use Old English face on an auction bill or a stud-house poster, he had a chance to pick type and make up display advertising or headlines. From this his progress was hardly rapid enough to suit to the point where the occasional make-up, lock-up, and planing down for the press was permitted him under the scrutiny of the sub-foreman. Meanwhile Tony oiled the Whitlock in readiness for the mammoth weekly run of five thousand copies.

Then came the lock-up and the rat-tat of the planer smitten with a Quoin key. With a "yo heave" a double-page chase would be jerked up edgewise and held with one hand while the proud devil shifted his quid knowingly and scanned the sloppy surface of the stonetop table to spy any loose type or copper spaces that might have slipped out below. "Is she all tight and well justified?" was the query, and if so, the form was slung up under the arms and across the devil's greasy overalls at the belly, to be hurriedly taken to the rear room for the press.

Majestic as Moses with his rod or a starter for a cup race, the old foreman stood at the foot of the press while the forms were screwed in securely on the oily bed. Then his snuff-box came out, receiving its familiar tap on the cover, perhaps with a proffered pinch to the devil. Glancing up at the red-haired sub-foreman perched near the electric switch behind the high feed-board, Tony raised his streaky arm and snapped his inky fingers. It was the signal which sent the juice jumping into the heart of the groaning and bumping press, and the rubber-tipped middle finger of the sub-foreman began its swift and tireless lifting and shoving of the blanket-like sheets down toward the steely grippers above the thudding cylinders.

The devil envied Jim his feeding job aloft, even as the cook's galley helper looked with longing at the reefer high in the rigging of old clipper ships in days of yore. With resignation he sat down at the head of the press where his humble job was to keep an eye on the printed sheets on the receiving table, catching an occasional ripper or lifting up new stocks of paper to the feeder.

And memory brings the bitter and the sweet—mingled like the smell of climbing roses and lilacs in the neighboring yard with the interior odors of the craft on slumberous summer afternoons.

The bitterest of the bitter was the awful pile of pi, a conglomeration of leads, slugs, metal furniture, linotype metal and miscellaneous type, flung back and down one winter night in a terrific sling of the unclamped press bed. The crack of doom and the fall of Jericho! Nothing but several brooms, a hoe, a scoop shovel, and a bushel basket served to retrieve the mess from odd corners. How shamefully the devil was blamed for his miscue at the press clamp, and how his professional pride seared and cankered as he was forced to run six

blocks to the rival weekly paper for a loan of its forms for service to subscribers of the wrecked palladium! The spare time of the devil for the next six weeks was spent in the jigsaw puzzle game of sorting the evil remnants of that careless hour.

AH, yes, and also thoughts of the sweet! When the lights glimmered in the murky composing room in the last hour of some winter day before the six o'clock chimes boomed and the faithful apron was leaned against the wall, romance stole its pleasant march. Tripping coyly from her desk in the front sanctum, beside the old boss, where she kept books and took want-ads, the devil's heroine stopped to touch a type or two with dainty finger tips, bending over so as to fan the freckles on his cheeks with her perfumed tresses.

"Can you really dance?" or "Perhaps by next Saturday your nails and knuckles will be in better shape for a party," or "Do you like Fox's Tale of the Lonesome Pine? Don't you just *love* the Hiawatha waltz?"

I can't really believe it now as I shave across the facial seams of time —but there must have been a mite of passing attraction for the little lady in the gawky devil, fumbling at his work while the printer's going-home-time brought hints of social sofas and family albums. And of course in one or two interludes there was a jubilee shindig at the armory hall, where the annual firemen's ball and masquerade brought forth all the musty treasures of attic raiment. However, like the political eulogies in our faded files, nothing but hope and a little outlay of savings resulted from this companionship of the front office fairy and the goblin of the shop.

Training thus secured by degrees from both the menial and the mental standpoints was not only fruitful of patience and care, but it developed a less generally recognized quality which has often failed to appear in modern journalism with its quick turnover and its glamorous haste. This quality is not only of basic value to the profession of a newspaper man, but it cannot help leaving over a long span of years its benefits to the residents of the community itself.

It is the nursing of local and county tradition with the relation of that tradition to the growth and perpetuation of the state. It takes on unconsciously something of the flavor of the earnest community loyalty and sense of honor which typified the viewpoint of the old South during the Civil War period. I do not mean a musty or mushy romanticism gone to seed, but a living force that should be encouraged for the creation of nobler aspirations and the pride that falters at nothing so much as cheap notoriety and ruthless ambition.

WE of the old town publishing craft were discriminating, guarded, judicious, and considerate lest we do some grave personal injustice or stir up some private mistakes that made men their own worst enemies rather than public ones. We laughed at foibles tenderly, indulged in harmless wit that left no permanent scars, and tried our best to grant every man a proper hearing. We never tried to convict the accused before the trial or printed yarns of dirty things in alluring feature slop. Surely, we made errors and accumulated enemies, but the enemies we made were our principal insurance.

Of course this conservatism may have allowed some of our public to become the occasional victims of a local Shylock or a cheat; but financial domination had not at that time become alarming or powerful, and the small town commercial rascals usually were found out and punished "off the record" by word of mouth and the withholding of patronage.

And as for "crusading"—I am not always so sure that it has been well done even by papers with power and independence. For if we put our

(*Turn to page* 32)

Mr. B. S. Morris in a field of soybeans and cowpeas on his farm near Salisbury, Maryland.

Better Crops *for* Del-Mar-Va

By George R. Cobb

Salisbury, Maryland

EVER since 1620 when Squanto demonstrated to our Pilgrim forefathers the art of growing corn with dead fish as a fertilizer, this particular crop has, indeed, been King.

It is true that the Indians were unable to continue growing corn on the same land year after year as yields and quality decreased, but they, not knowing why, simply abandoned fields and planted their corn on another section of land. Later they followed a sort of rotation in that they let fields lie fallow for a year and then burned off the weeds, grass, and other growth that had developed. They noticed that where the growth was burned the corn did better and they reasoned that the ashes must have had some beneficial effect. Gradually they began the use of wood ashes in addition to the fish, and larger yields resulted.

Although records are not available as to yields back in those Colonial days, it seems rather safe to assume that with the present-day knowledge larger and better crops of corn are grown. For many years Experiment Stations and Extension Services have been discovering new truths regarding the culture of nearly every known crop, and surely with the information they have issued to farmers and others, yields of all crops, as well as improved quality, have increased to a great extent.

Statistics compiled by the Department of Agriculture do not bear out

the assumption that yields of corn have increased greatly during the past years. For example, in 1891 the average yield of corn per acre in the United States was 27.6 bushels (56 pounds shelled corn) while in 1924 the yield had dropped to but 22.9 bushels per acre. Admitting that low yields may have been caused by weather conditions, insects, and diseases, the fact remains that from 1891 to 1929 the highest yield was in 1920 when the average was 31.5 bushels per acre as compared with 27.6 bushels in 1891—not a striking increase.

Del-Mar-Va Figures

Confining our attention to the States, counties of which comprise the Del-Mar-Va Peninsula, we find the following statistics: In 1899 the State of Maryland had 658,010 acres in corn and the total yield was 19,766,510 bushels or an average of 30 bushels per acre. In 1929 Maryland had 463,-293 acres devoted to the crop with a total yield of 14,543,218 bushels or an average of 31.3 bushels per acre. Figures for Delaware and Virginia are: In 1899 these two States had 192,025 and 1,910,085 acres in corn, respectively, with total yields of 4,736,580 and 36,748,410 bushels. The averages, per acre, were 24.6 and 19.2 bushels. Thirty years later, in 1929, we find that the acreage has been reduced in each State and the average yields were 26.8 and 24.2 bushels, respectively.

It is safe to assume that the decreased acreage in part may have been due to the abandonment of marginal acres or land that would not produce a profitable crop of corn. Admitting this to be true, the increased yields for the three States during this 30-year period were: Maryland, 1.3 bushels; Delaware, 2.2 bushels; and Virginia, 5.0 bushels.

The above figures are submitted as preliminary to the report on demonstrations and farm practices conducted on the Del-Mar-Va Peninsula which have resulted in greatly increased yields and improved quality.

There are more than 400,000 acres of land devoted to the culture of corn on the Peninsula and it is perhaps one of the most important crops grown, although very often neglected. Before the days of the Hoffer test on corn for plant-food deficiencies, many and varied were the methods employed to detect and correct these deficiencies. But some of the methods employed brought results in no uncertain terms.

B. S. Morris, a farmer residing near Salisbury, Maryland, consulted his County Agent regarding the corn crop on his farm. The stalks were short, many of them less than knee high, and the majority of them fell over during the season, with resultant low yields of poor, chaffy corn and practically no fodder. Mr. Morris had been in the habit of using rye as a cover or green manure crop and applied per acre 1,000 pounds of superphosphate each year with a generous application of lime once every three years. The initiated would assume at once, in the light of present-day knowledge, that this practice had depleted the potash supply, but at that time many facts regarding plant foods were not available or proved.

Called on Science

Extension specialists were called in by the County Agent, and when they examined the corn they noticed that many cobs were discolored, the color ranging from a pink to a dark red, which they decided indicated a diseased condition. The first thought was that if only clear-colored cobs were selected and the corn from them planted, an improvement would be noted. Several hours were spent with Mr. Morris in assisting him to select seed free from diseased symptoms. Tips and butts of hundreds of ears of corn were chopped off with a corn knife; cobs were examined; all discolored specimens were set aside; and only the clear cobs were selected for planting.

In order to obtain more detailed information and to act as a check, cobs showing heavy discoloration and others showing but slight color also were used in planting what we may call additional check plots. This demonstration was continued for three years and the average increase secured from the grain on clear-colored cobs over that on discolored cobs was 11 bushels per acre. But the stalks still continued to fall over, although not as many as before, and the grain itself was not of high quality.

Although treating the seed before planting cost but about three cents per acre, the increase in yield was only from three to six bushels.

One particular five-acre piece of land had such a poor crop that Mr. Morris did not "even step into the field to gather any corn or fodder as it would have been a waste of time and labor." It was decided to concentrate on this five-acre field and as the first step a legume was to be introduced into the rotation replacing the rye crop. A mixture of soybeans and cowpeas was seeded broadcast. As the legumes began to develop, it was noticed that the foliage was of a peculiar green color—a rather blackish green. It was learned that lack of potash tends to cause such an abnormal green color and that later in the season the leaves may show a yellowing and browning on the edges, or what has been termed Chlorosis.

Incidentally soybeans can be used very efficiently as a potash indicator. They will show either the blackish green color or a chlorotic condition early in their growth and the crop may then be turned under, the proper fertilizer applied, and another crop seeded so as to mature that season.

A local fertilizer concern donated 100 pounds of muriate of potash for the demonstration and this amount was applied to one acre in the five-acre field, after the legumes had been cut for hay in one instance and turned under entire in another. Corn was planted in the usual manner with an application of superphosphate and lime, but no nitrogen as it was thought that the legumes would supply sufficient.

The crop started off vigorously and it reached a good height before tasseling. No falling stalks were noted during the first part of the season, and indications were that each stalk would have two ears, which is a rather unusual occurrence on the light soils of the Peninsula.

At harvest time the corn was gathered and weighed and the weights were checked by extension men. The acre receiving no potash and having no legumes but getting an application of superphosphate and lime yielded but

Left—Fertilized with well-balanced plant food. **Right—No fertilizer.**

5½ bushels of poor corn, mostly nubbins. The stalks on this acre were short, most of them had fallen, and no fodder was available. On the acre receiving phosphate and lime and planted to a legume but with no application of potash the yield was 17 bushels of poor quality corn. Many of the stalks on this acre had fallen during the season, and there was a decided lack of foliage or fodder.

The acre receiving potash in addition to superphosphate and lime and having the legumes turned under yielded 73 bushels of corn. This very striking increase might be considered a "flash in the pan" were it not for the fact that since the demonstration Mr. Morris has followed similar methods with resulting yields of approximately 60 bushels per acre.

If one considers the experimental evidence available, the above result cannot be set aside as incorrect or any "miracle." It is a fact that potash develops the starches and sugars, and as good quality corn contains a large proportion of starch, it is reasonable to assume that without potash little, if any, starch will develop.

Potash Makes Starch

In Bulletin No. 175 from the Purdue University Agricultural Experiment Station, entitled "Composition of Maize at Various Stages of Its Growth," we find evidence that the greatest starch formation period is between September 24 and October 1, when the supply of available potash very often is very low. Without complete formation of starch the corn is chaffy, and the investigations reported in this bulletin show that starch formation is hindered or prevented when the potash supply is low or lacking.

Referring again to the Purdue Bulletin the authors, W. L. Jones, Jr. and H. A. Huston, conclude that the "maize plant took up about the same amount of phosphoric acid, about 35 per cent more nitrogen, and *more than twice as much potash* as the authorities usually state the crop contains."

A very valuable reference for farmers along the Coastal Plain, especially those living in New Jersey and on the Del-Mar-Va Peninsula, is Delaware Bulletin No. 146, "Corn Production Experiments in Delaware." This bulletin reports the results of 15 years' experimental work with fertilizers on certain crops grown on a Sassafras silt loam soil. As there are more than a half million acres of this soil in the States mentioned, the results cited in this bulletin should be of much value to farmers and others dealing with this soil.

Potash Increases Yields

In summarizing the results on corn as reported in the Delaware bulletin, we find that in yield per acre, yield of sound corn, and percentage of sound corn, the plots receiving potash produced more than those plots with no potash. Nitrogen, phosphorus, and potash were applied separately and in combination to the several plots. Average yields on plots receiving potash were 71.2 bushels per acre as compared to 42.6 bushels on the no-potash plots; yields of sound corn were 60.5 and 26.8 bushels respectively, or 84.8 and 62.9 per cent of sound corn. Considering these results and others obtained in the investigations, the author, George L. Schuster, concludes that on this soil and with the rotation followed (1—corn, followed by a cover crop, 2—soybeans, 3—wheat, and 4—timothy and clover) potash was the first limiting factor. He also concludes that potash produced the greatest increase in the percentage of sound corn of any of the single fertilizer materials applied.

Potato growers in Virginia plant corn between every other row of potatoes and thus produce two cash crops and a green manure crop, rye which is seeded at the last working of the corn, on the same piece of land each year. Fertilizer tests on 29 of these farms

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

FROM the far-away land in Russia that borders the southeastern shores of the Baltic Sea, came Michael Gregory Lipman, in 1887, to establish a home in the United States. In 1888, he was joined by his family, which included his fourteen-year-old son Jacob Goodale Lipman, destined to become, in 1911, the Dean of Agriculture and Director of the New Jersey Agricultural Experiment Station of Rutgers University at New Brunswick.

The immigrant boy had been given a sound early training in the rudimentary branches of learning, by tutors in Friedrichstadt and in Moscow, and in the Classical Gymnasium in Orenburg where, by his industry, he became an honor student. During that time he also learned much of the Tartar and Kirghis lore, while spending his vacations in the Steppes of the Ural region.

On arriving at his new home, he continued his education under private tutors, and being endowed with keen mentality, indomitable will power, perseverance, and fidelity to the tasks presented, his genius and talents found full scope. Opportunity and environment quickly developed the lad, and freed from deterrent influences and cramping conditions, in the new land of freedom he prepared himself for the onerous duties which later in life he undertook and conducted in the masterly manner which has made him famous.

In 1891 the family settled on a farm in the Baron de Hirsch Colony at Woodbine, N. J., where for three years young Lipman learned the art of farming by hard work and close observation. There, too, the inspiring teaching of Professor H. L. Sabsovich endued him with a strong love of agricultural science and inclined him in the direction of original research.

He graduated from the farm school of the colony, won a State scholarship at Rutgers, and entered college in the autumn of 1894. His experience in South Jersey, before entering college, included the building of roads and the usual training in the clearing and improvement of scrub-oak land. He also set out a peach and apple orchard and produced small fruits and vegetables for the shore market.

Inspiration from Teachers

As a student at Rutgers, he received inspiration from Dr. Edward B. Voorhees, his predecessor as Director of New Jersey Agricultural Experiment Station, and from such able teachers and scientists as Byron L. Halstead, John D. Smith, and Julius Nelson. Occupying a room at the College Farm, he met his expenses by doing farm work in his free hours, and spent some of his week-ends supervising two-day tests of Holstein cows in Somerset and Sussex counties. As an

undergraduate, he became especially interested in agricultural chemistry, soils, and fertilizers, and in advanced registry testing, which work was then in its early stages of development.

Graduating from Rutgers in 1898 with the bachelor of science degree, he was employed as assistant chemist in the fertilizer inspection laboratory of the experiment station, and analyzed thousands of samples of fertilizers, feeds, and farm products. In the autumn of 1899 he resigned to take up advanced study in soil chemistry and bacteriology under Dr. G. A. Caldwell and Dr. V. A. Moore at Cornell. There he earned the degree of Master of Arts in 1900, and that of Doctor of Philosophy in 1903. In 1900 he had been appointed a Graduate Scholar in Agricultural Chemistry and in 1901 Sage Fellow in Chemistry. That fellowship he resigned and he returned to Rutgers where in 1901 he organized the Department of Soil Chemistry and Bacteriology and began his investigations in these comparatively new phases of agricultural science.

In 1911 he was appointed Director of the New Jersey Experiment Station and in 1915 Dean of the College of Agriculture. In 1923 he was honored with the Doctor of Science degree by Rutgers University and in 1930 he received the degree of Honorary Doctor from the Catholic University of Santiago, Chile, and was made an honorary member of the faculty of the University of Santiago.

A Lesson and a Promise

All of these achievements have redounded to the credit and honor of Dr. Lipman's sterling forebears in that far-off section of the Duchy of Courland in Russia, which now forms a part of the Republic of Latvia, and to the early training wisely given him by his far-seeing parents, and more than all to his own talents, industry, and efficiency.

And now, looking back upon his own experiences and the progress of agriculture, he tells us that the story of the past fifty years carries with it a lesson and a promise. Crude methods have been refined. Human and animal power have given place, in large measure, to the seething energy of the electric motor and the internal combustion engine. Crude tools have been made more perfect and more numerous. There is more strength in our land, more vitality in our plants, and more quality in our livestock. Science has brought to us a new skill and a new confidence. It has shown us many a mystery and has revealed many truths. Thus, we know how to build better soils, better plants, and better animals. We know how to defend them against bacteria, fungi, and parasites. Our knowledge and skill have made it possible for us to become specialists in the fields of horticulture, dairying, poultry, and other branches of agricultural practice. They have given us higher standards of living, better homes, and a wider outlook on life.

Spreads Credit

Dr. Lipman not only is glad to give due credit to those great men who before him and in his day have contributed to the advancement of scientific and practical agriculture, but graciously remembers with admiration and appreciation the work of the wives and mothers in the modest farm homes of the country. He says that they, too, had tools and appliances, but they were pitifully inadequate. He marvels at their physical and moral courage as they went on with the bearing and rearing of children, the endless sewing and mending, the cooking and the baking, and all the tasks that were a part of the making and keeping of the farm home. Theirs was the faith and hope of the builder. Yet, despite the hardships they endured, there were songs and gladness in their simple and colorless days. They foretold the wider horizons of our own day, of an agricultural unfolding, and

of a national life clothed with a new meaning.

We have pressed forward to the conquest of material things and we have used the tools of science and research institutions to bring us greater understanding and comforts, surely, and, we hope, also nobler ideals. And assuredly all of us, with Dr. Lipman,

DR. JACOB G. LIPMAN

should appreciate the work of the pioneer farm women of America, without which the progress in agriculture and farm life we so commonly credit to the efforts of man alone could not have been achieved.

Dr. Lipman was born in Friedrichstadt, Russia, November 18, 1874. His father was born in the town of Bansk, and his mother, Ida Birkhahn Lipman, in the town of Friedrichstadt. Dame Lipman is still alive, and much esteemed and beloved. In 1902 Dr. Lipman was married to Cecelia Rosenthal, who was singularly charming and who cooperated with him in all of his undertakings until she passed away in 1928. Her decease was deeply mourned by her husband, three sons, and everyone connected with Rutgers College and the Experiment Station.

Dr. Lipman's career as an educator and scientist, outlined in the fine history of New Jersey's Agricultural Experiment Station written by Dr. Carl Raymond Woodward, assistant to the President of Rutgers University, and Ingrid Nelson Waller, formerly associate editor of the Experiment Station, has covered an exceptional range of activity. In Rutgers College he has served successfully as instructor in agricultural chemistry, 1902-06; assistant professor, 1906, and associate professor, 1906-07. From 1910 to 1913 he was professor of soil fertility and bacteriology. Since 1913 he has held the rank of professor of agriculture, and since 1915 he has been Dean of Agriculture. For brief periods also he has served other institutions.

He delivered series of lectures at the University of Illinois and at Cornell University in 1906, at the University of Tennessee in 1909 and 1910, at the Iowa State Agricultural College in 1910, and at the University of Nebraska in 1911. Among his contributions in the field of agricultural science may be noted numerous papers on soil microbiology, soil chemistry, commercial fertilizers, etc.

Inventories Plant Food

Within the past twenty years he has accumulated a large mass of data on the inventory of the plant-food resources of the soils of the United States. He is planning to devote his Sabbatical leave of absence (July 1, 1934—June 30, 1935) toward carrying forward this particular study. He has represented the United States at various international congresses, such as the General Assembly of the International Institute of Agriculture at Rome, Italy, in 1922, 1923, and 1926; the World's Dairy Congress, London, England, 1928; the International Conferences of Soil Science, in Prague, Czechoslovakia, in 1924, and at Rome, Italy, in 1926. He also was

a delegate at various international scientific meetings in France, Sweden, Denmark, Germany, and Holland. He was the first president of the International Society of Soil Science, and President of the First International Congress of Soil Science, which was held in Washington in 1927.

He has made agricultural surveys of the Everglades in Florida, of sugar plantations in Cuba, and of agricultural colonies in Palestine. He was the founder and is the editor of the international monthly magazine *Soil Science*, and is consulting editor of scientific journals published in Germany, France, and Russia. He has edited the series of text-books in Agricultural Science published by John Wiley and Sons.

Authority in Bacteriology

His *Bacteria in Relation to Country Life* (MacMillan, 1908) gained for him wide recognition as an authority in agricultural bacteriology. This work was followed in 1911 by the *Laboratory Guide of Soil Bacteriology*, prepared and published jointly with P. E. Brown. He is the author of a chapter on "Microorganisms in Soils" in Marshall's *Microbiology* (Blakiston, 1911) and a chapter on "Microorganisms in Relation to Soil Fertility" in *The Newer Knowledge of Bacteriology and Immunology*, edited by Jordan and Falk (University of Chicago, 1928). His other contributions include a chapter in *Too Many Farmers* by McMillen (Wm. Morrow and Co., 1929) and articles in Bailey's *Cyclopedia of American Agriculture* (MacMillan, 1908) and in the *Book of Rural Life* (Bellows-Durham Co., Chicago, 1925). His studies are further recorded in a long list of technical papers on soil chemistry, soil bacteriology, and agronomy.

Dr. Lipman was made a fellow of the American Association for the Advancement of Science, and has been honored with membership in a large number of professional and scientific societies. A partial list includes: American Public Health Association, American Chemical Society, Society for the Promotion of Agricultural Science, American Society of Agronomy, Association of Official Agricultural Chemists, Society of American Bacteriologists, Association of Land-Grant Colleges (Vice-President, 1928), New Brunswick Scientific Society, New Jersey Science Teachers' Association, New Jersey State Sanitary Association, Washington Academy of Science, New Jersey State Chamber of Commerce, New Jersey Cooperative Industrial Commission, American Academy of Arts and Sciences, and American Academy of Political and Social Science, National Research Council, International Commission of Agricultural Ecology, Reale Academia del Georfofili di Firenze, French Academy of Agriculture, Academy of Agriculture of Czechoslovakia, and the Swedish Royal Academy of Agriculture. In 1922 he was awarded a silver medal by the French Academy of Agriculture.

Active in Many Lines

During the past two years, Dr. Lipman has been very active in emergency relief work. As Dean of the College of Agriculture and Director of the Experiment Station, he has been given administrative responsibility over Federal projects involving mosquito control, surveys of housing, tax delinquency, and part-time farming in New Jersey; State projects involving the clearing, stumping, draining, and landscaping of 100 acres of land adjoining Route No. 26; the construction of a trunk sewer at the College Farm; surveys of the pollution of streams by industrial wastes; and other surveys relating to dietaries, bacterial quality of milk sold in the State, soil erosion, Dutch elm disease, etc. As a member of the State Planning Board, he is concerned with the planning of P.W.A. and C.W.A. projects,

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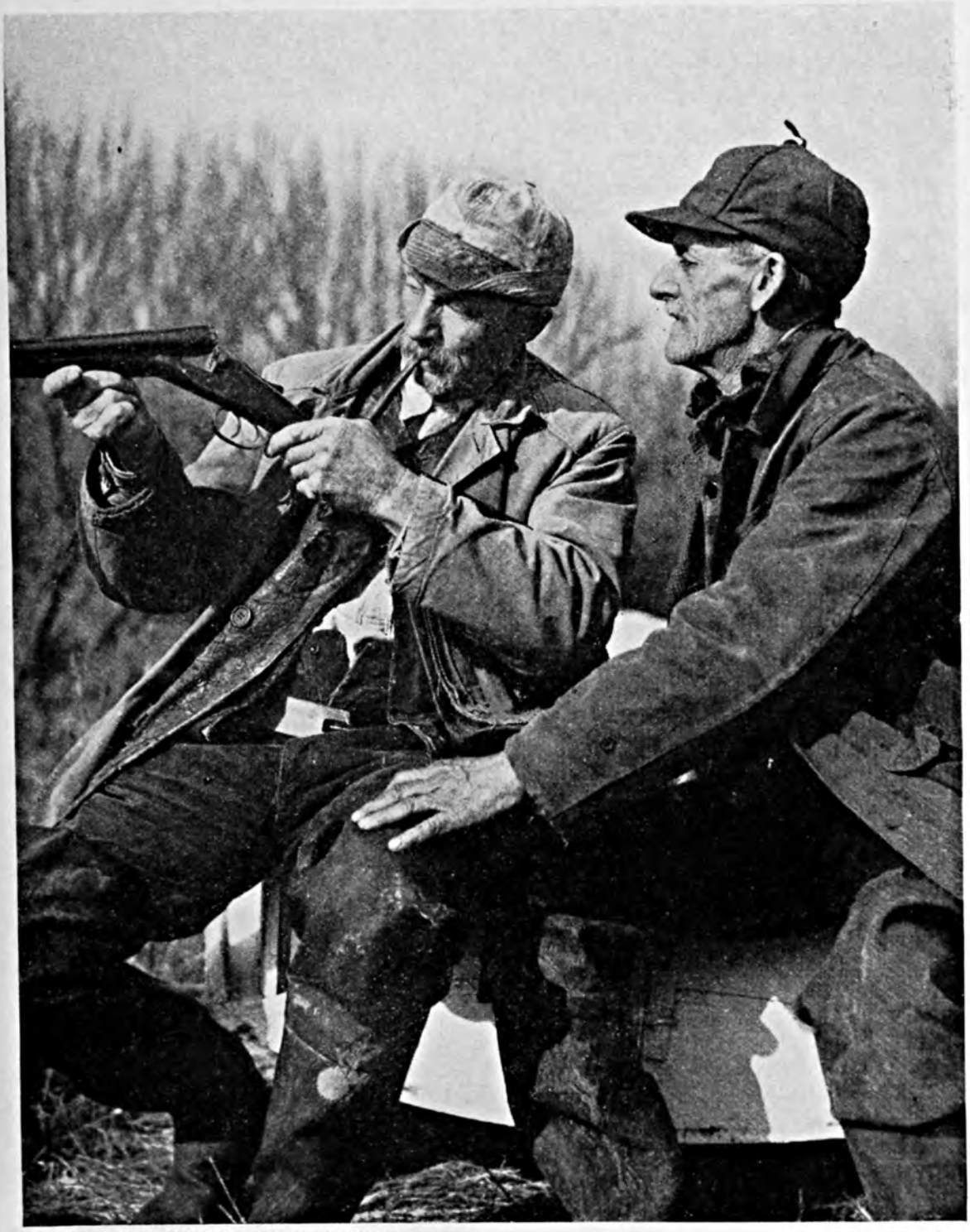
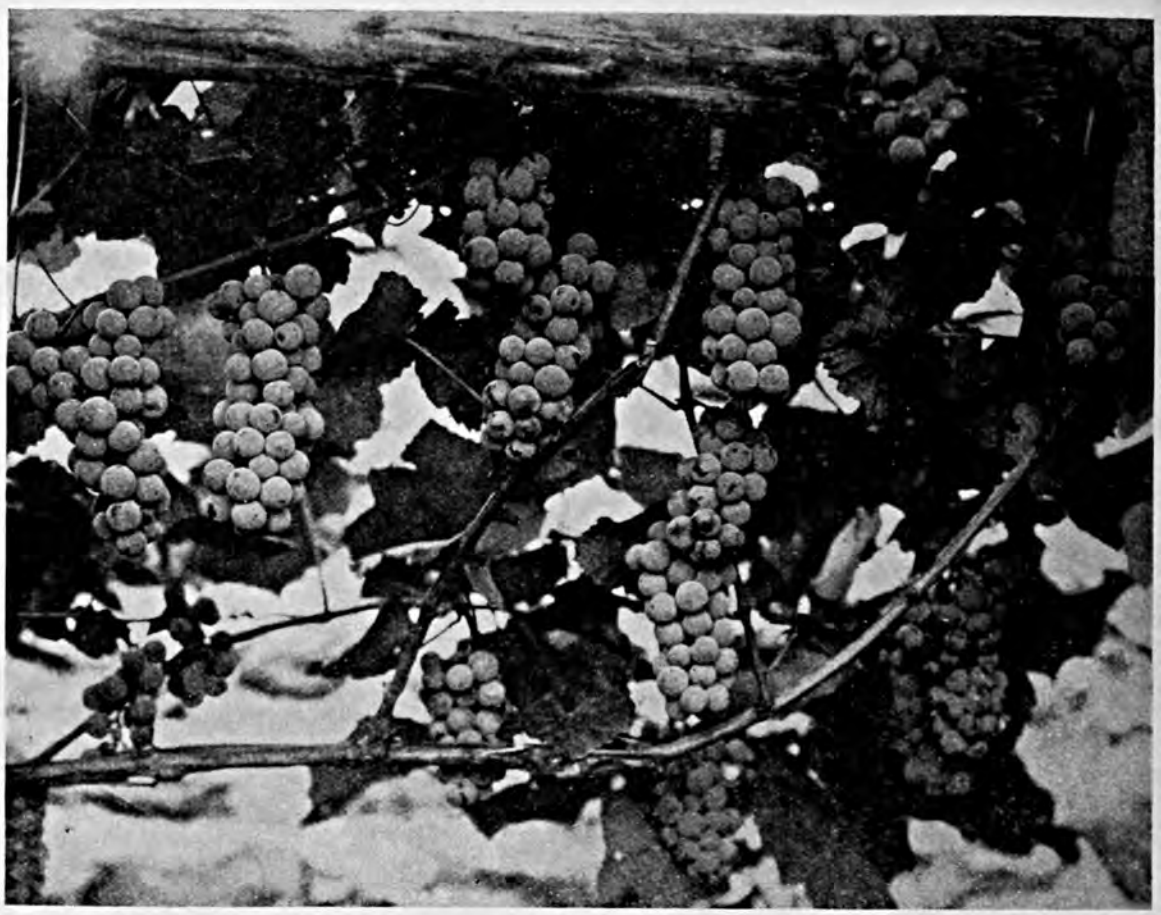
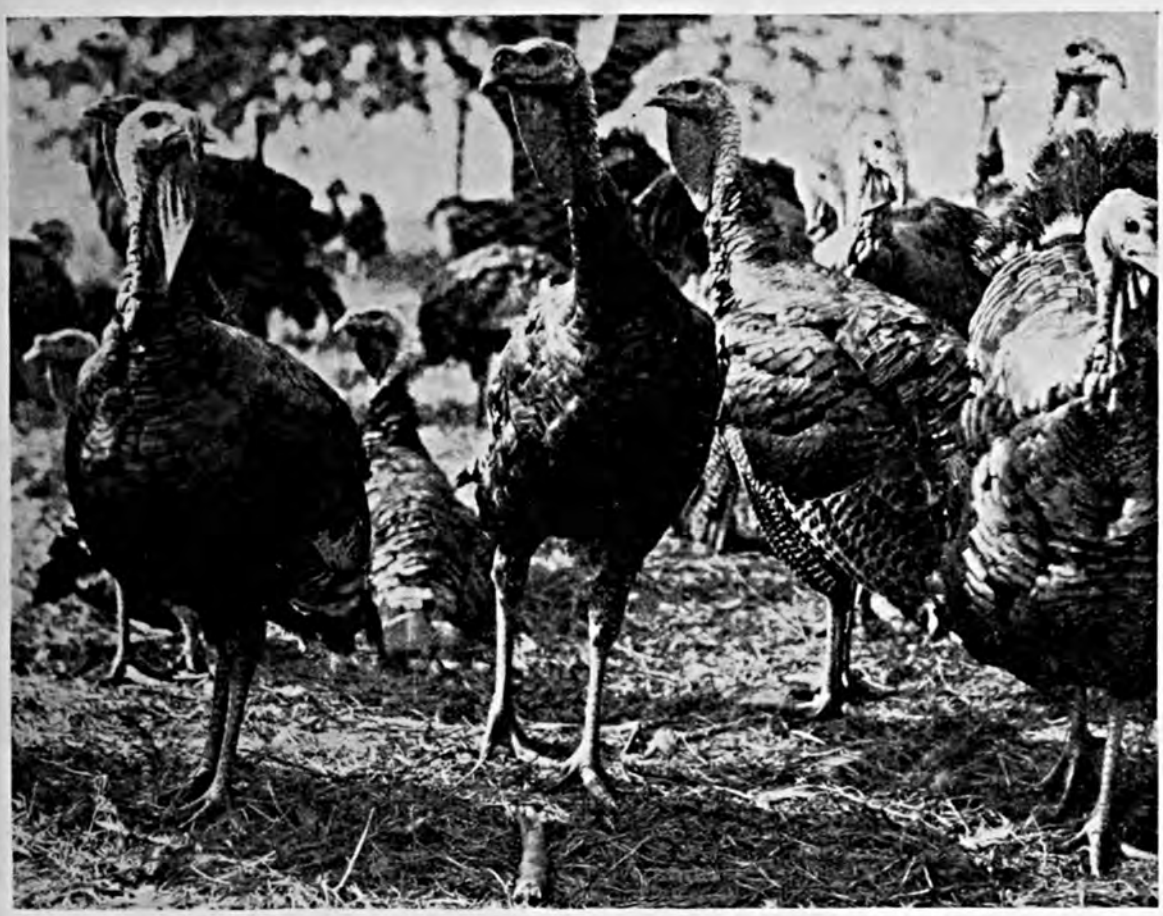
Pictorial



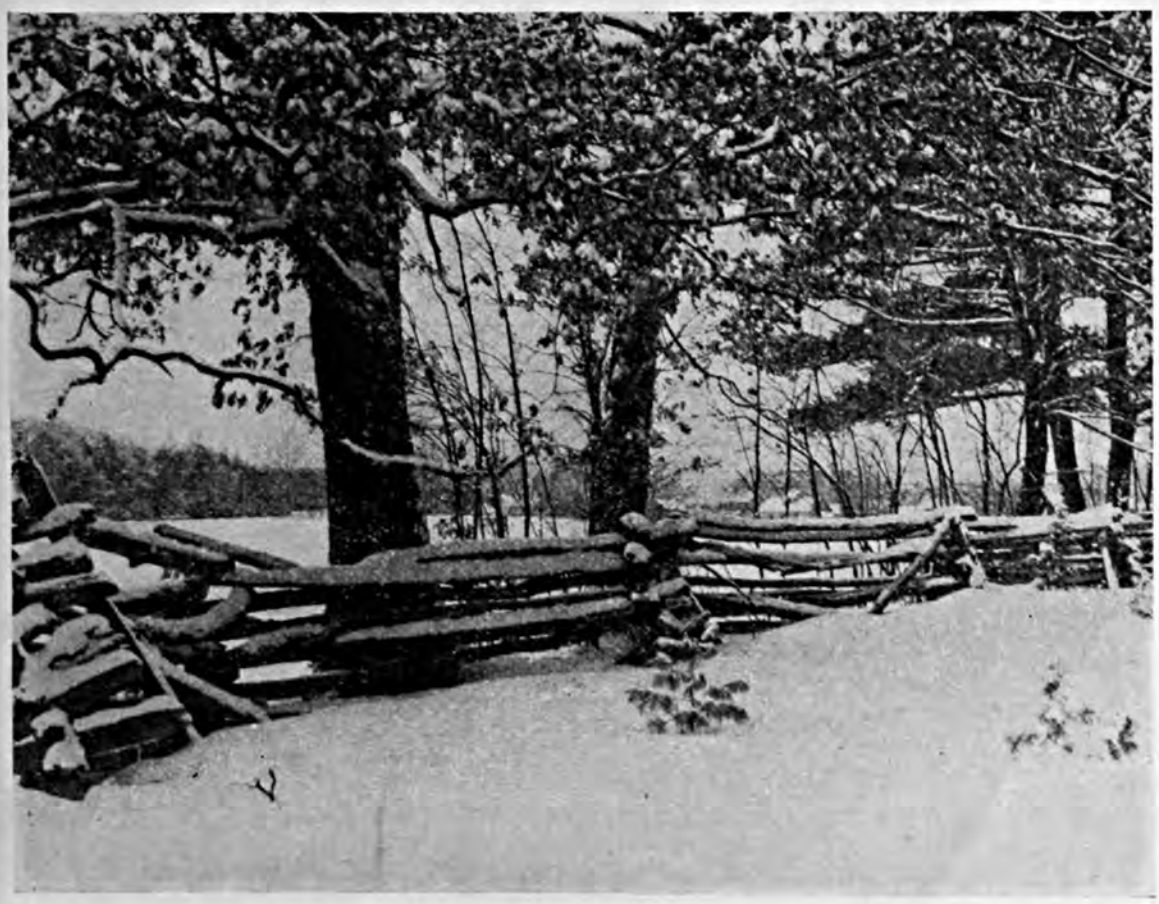
"HOW COME I MISSED THAT TIME?"



These, grown in New England, are representative of many of the fine fruits which will appear on Thanksgiving dinner tables.



The Thanksgiving piece de resistance and (below) "Grandmother's on the farm," scene of many family gatherings for the feast day.



Not the wigwams of "Injun Summer," but hemp in the shock.

The Editors Talk

We Give Thanks

With harvests secure, we again approach the day of our national Thanksgiving. As in other years, there will be many who will hesitate, pondering over just what individual blessings 1934 has dealt them. May all bitterness and regrets be forgotten in the spirit of the day. It is a time for reflection flavored by a sense of well-being resulting from laden tables in our American homes. Charitable organizations will work overtime to provide those, who might otherwise not feed well, with this sense of well-being.

Tradition tells us of the first Thanksgiving; of the farmer of plain sense who arose before the assembly of Pilgrims met to proclaim another fast day to be spent in prayer, seeking relief from heaven and laying their wants and distresses before the Lord; of his suggestion that constant meditation and discourse on these subjects kept their minds gloomy and discontented and that it would be more becoming the gratitude they owed the Divine Being if, instead of a fast, they should proclaim a thanksgiving; and of the acceptance of his advice. Throughout successive years, many of them fraught with adversity, this spirit has obtained. Let none of us forget it this year.

A Potash Problem

The disappearance of potash upon analyzing samples of mixed fertilizers is a perplexing problem which has baffled fertilizer manufacturers and chemists for some years. For instance, when enough potash salts are used in a mixed fertilizer to make say 10 per cent of actual potash in the mixed goods, and when the mixture is analyzed the results obtained often show less than 10 per cent potash, say 9.7 per cent, what happens to the .3 per cent?

The percentage of potash stated in the analysis of the mixture represents that portion of the potash which is soluble in water. But recent work on this problem by H. R. Kraybill and S. F. Thornton, the State Chemist and Assistant Chemist respectively of the Purdue Agricultural Experiment Station in Indiana, shows that extracting fertilizer samples with double the prescribed amount of boiling water and boiling the sample with water failed to give a complete extract of the available potash.

Some available potash is left in the residue. In some fertilizers, the amount of this available potash remaining in the residue is quite small, but with others it amounts to as much as 0.8 per cent of actual potash. The average as determined by Kraybill and Thornton is .3 per cent. They also show conclusively that this potash which remains in the residue and which is not extracted by water is still readily available to plants. For this purpose the Neubauer method of growing rye under controlled conditions was used. By this test the potash in the fertilizer residues was recovered by the rye. Kraybill

and Thornton found that extraction of a mixed fertilizer sample with a dilute salt solution extracts all the potash and gives a residue free of available potash.

It so happens that while this work was being done in Indiana, Dr. William H. Ross and several chemists of the Fertilizer Unit of the Bureau of Chemistry and Soils, United States Department of Agriculture, were attacking the same problem. Their results showed that there was no chemical change which caused a loss of available potash in the fertilizer mixtures but that with the present methods of analyzing such mixtures for the potash content, substances are formed in the course of analysis which create a coating over the potash thereby interfering with its determination. Thus the actual availability of potash in the average fertilizer mixture is not lessened by the contact with other constituents, but the method of extraction has caused a loss in the analyzed sample which does not occur in the mixed fertilizer used by the farmer.

The practical problem before the fertilizer mixer is that he must comply with the various State laws regarding the sale of fertilizers. The law requires that the amount of water-soluble potash stated in the analysis when the fertilizer is sold must be found when the mixture is analyzed by the State Chemist. If samples of mixed fertilizers consistently run under their guaranteed potash content, then the manufacturer is involved in various penalties. On the other hand, if he adds more potash than is required to allow for this loss, then the cost of the fertilizer is increased. Consequently, an improvement in the method of determining the potash available to plants in mixed fertilizers is a matter of importance.

Results of the investigations, both as carried on by Dr. William Ross and by Kraybill and Thornton, are being brought to the attention of the Association of the Official Agricultural Chemists at the annual meeting in Washington. It is hoped that the results of the work already reported can be used as a basis for making it possible to obtain more accurate results of potash analysis in mixed fertilizers.

A New "News" for Farmers

The New York State Agricultural Experiment Station is to be congratulated on the publication of a new paper entitled *Farm Research*. As stated by the editors, it is written for farmers. It is intended chiefly for New York farmers, but farmers everywhere who wish to keep informed on new developments in the work of the New York Station may be included among those to whom this little quarterly is sent.

Farm Research is an effort to put the work of the Experiment Station before the farmers in a direct and concise manner. It is designed to acquaint its readers with the personnel of the Experiment Station and to inform them on the wide range of work carried on in the Station laboratories and fields. The editors hope to make clear to the farm constituency just what is being done with the funds appropriated by the State of New York for research in agricultural work and just how farmers can best realize on this investment.

The paper is well edited and printed. The articles are practical and easy to read. *Farm Research* should not only serve a definite need in the State of New York, but serve as an example in places that already do not give periodically a bird's-eye view of what the State is doing.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

A thorough investigation of the action of nitrogen in various forms and amounts in the fertilization of tobacco has been made by W. W. Garner, C. W. Bacon, J. D. Bowling, and D. E. Brown and published in U. S. Department of Agriculture Technical Bulletin 414, "The Nitrogen Nutrition of Tobacco." The importance of an adequate nitrogen supply, together with phosphoric acid and potash, to produce good yields of high-quality tobacco is shown. The abundance of information presented in the bulletin precludes giving any of the details here. Growers, agricultural advisers, and fertilizer manufacturers will be especially interested in the work on rates of nitrogen application, comparison of nitrogen carriers, and the use of concentrated fertilizer materials. Investigators will be interested also in the chemical and physiological studies and the attempt to apply the Mitscherlich growth formula to the data obtained with increasing nitrogen applications.

The influence of phosphoric acid and potash on tomato plants grown in the greenhouse under experimental conditions is shown by George Janssen, R. P. Bartholomew, and V. M. Watts in Arkansas Agricultural Experiment Station Bulletin 310, "Some Effects of Nitrogen, Phosphorus, and Potassium on the Composition and Growth of Tomato Plants." This work will be of interest mainly to investigators. Of practical significance, it is brought out that the grower should strive to use a balanced fertilizer. The results indicate that the ratio of nitrogen, phosphoric acid, and potash may be as important as the absolute amounts present provided, of course, that sufficient nutrients for optimum growth are available. The work reported does not contain enough variation of nutrient ratios to enable to be drawn conclusions as to what might be the optimum ratio, since this was not the purpose of the investigations. The tomato plant appears able to adapt itself to a wide range of nutrient conditions and still make a normal growth.

An excellent bulletin describing short tests for the estimation of the lime and fertilizer requirements of soils and crops has been prepared by S. F. Thornton, S. D. Conner, and R. R. Fraser as Indiana Circular 204, "The Use of Rapid Chemical Tests on Soils and Plants as Aids in Determining Fertilizer Needs." The bulletin describes clearly how to prepare the chemicals, make the tests, and interpret the results. The system of testing presented can be used on both plant tissues and soils. This combination has advantages over the testing of either of them alone, since conditions have been found where only by testing both soil and crop would a correct estimation of the fertilizer needs be obtained. The authors include a good discussion of the advantages and limitations of short tests and precautions that must be observed

in using them and interpreting the results.

"The Phosphate of Southern California Soils in Relation to Citrus Fertilization," Agr. Exp. Sta., Berkeley, Cal., Bul. 571, Apr. 1934, H. D. Chapman.

"Sewage Sludge as Fertilizer," Agr. Exp. Sta., New Brunswick, N. J., Ext. Bul. 125, May, 1934, Willem Rudolfs.

"Recommendations with Reference to the Fertilization of Flue-cured, Sun-cured, and Shipping Tobacco Grown on Average Soils in Virginia, North Carolina, South Carolina, and Georgia for the Year 1935."

"Fertilizer Report 1933," Dept. of Agr., Harrisburg, Pa., Gen. Bul. 525, Vol. 17, No. 6, Oct. 1, 1934, John A. McSparran and James W. Kellogg.

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Clemson College, S. C., Bul. 297, Aug. 1934.

Soils

The results of the various soil experiment fields maintained by the Illinois Agricultural Experiment Station in 1933 again furnish much interesting and valuable information. The fields are located at 26 different places in the State on representative soils. The data thus furnish a good guide to the relative fertility of the principal soils in Illinois. The soils are shown to vary considerably in their natural fertility and, as might be expected under these conditions, the system of soil treatment that gave the best results was not the same on the various soils. The work emphasizes that the fertilizer must be adapted to the soil fertility and cropping system if best results are to be obtained. The data and discussions of these fields have been prepared by F. C. Bauer in Illinois Agricultural Experiment Station Bulletin 402, "Crop Yields from Illinois Soil Experiment Fields in 1933."

The influence of various liming materials on the leaching of lime, magnesia, potash, nitrates, and sulphates from two soils in Tennessee and Virginia are reported by W. H. MacIntire, W. B. Ellett, W. M. Shaw, and H. H. Hill, in Tennessee Agricultural Station Bulletin 152 entitled, "The Conservation of Burnt Lime, Limestone, Dolomite, and Calcium Silicate in Soil as Influenced by Methods of Incorporation." The results obtained varied in some cases with the two soils, while in others the added liming materials produced about the same effects at both locations. Large infrequent applications of liming materials in general caused more leaching of lime than smaller and more frequent applications. Dolomitic liming materials caused less loss of calcium than high-calcium material, but increased the leaching of magnesium, as might be expected. High-calcic limestones decreased the leaching of magnesium in most cases on the Tennessee soil, but not on the Virginia soil. Considering total calcium and magnesium combined, dolomite caused a greater loss of these on the Tennessee soil, whereas the various liming materials were inconsistent in this respect on the Virginia soil. In practically all cases the liming materials decreased the potash in the leachings. This is further evidence that under practical field conditions, liming does not make available the natural soil potash. Liming increased nitrate production on both soils, but at different times. On the heavy Tennessee soil the effects of the liming were greater during the first four years than during the second four years of the experiment. On the lighter Virginia soil the effects of liming were small and sometimes variable on nitrate production during the first four years. During the second four years the effects were much more beneficial. Liming increased somewhat the leaching of sulphates from both soils. This interesting and instructive work is the result of parallel experiments conducted at the Virginia and Tennessee Experiment Stations and is a fine example of what can be accomplished by cooperative work by two institutions.

"Testing Soil for Available Phosphorus," Agr. Exp. Sta., Urbana, Ill., Cir. 421, Apr. 1934, C. M. Linsley.

"Response of Illinois Soils to Limestone," Agr. Exp. Sta., Urbana, Ill., Bul. 405, June 1934, F. C. Bauer.

"Schuyler County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Report No. 56, Mar. 1934, E. A. Norton, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Experimental Studies on the Development of Heavy Claypans in Soils," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 210, June 1934, Guy D. Smith.

"The Physico-Chemical Properties of Soils Affecting Soil Erosion," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 212, July 1934, J. Fulton Lutz.

"Vineyard Soil Management," State Fruit Exp. Sta., Mountain Grove, Mo., Bul. 27, Jan. 1934, F. W. Faurot.

"Soils of Pondera County," Agr., Exp. Sta., Bozeman, Mont., Bul. 291, June 1934, L. F. Gieseker.

"The Principal Soils of New Jersey and Their Utilization for Agriculture," Agr. Exp. Sta., New Brunswick, N. J., Bul. 569, June 1934, Linwood L. Lee.

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Crops

For the growers of cotton, an important new bulletin appears in the form of "Control of Cotton Wilt and Rust," Bulletin No. 308 of the Arkansas Agricultural Experiment Station. J. O. Ware and V. H. Young, the authors, report in this publication a continuation and amplification of previous work on varietal resistance to cotton wilt and give the results of studies designed to secure practical control measures for the wilt of cotton caused by (*Fusarium vasinfectum*) and "rust," or potash hunger. In summarizing their detailed observations, it is indicated that if sufficient amounts of potash, either in the form of muriate of potash or kainit, are used to control "rust," or potash hunger, the incidence of cotton wilt is greatly reduced. When potash is applied alone, however, yields of seed cotton are often markedly inferior to those when the same amount of potash is used in a complete fertilizer. Nitrate of soda and superphosphate alone and in combinations are ineffective for the control of cotton wilt and "rust." Stable manure applied at the rate of 10 tons per acre gave yield increases comparable to those secured by the application of 600 pounds of a 6-8-6 fertilizer and gave good control of "rust." However, it was only slightly effective in cotton wilt control. The authors feel, that although further work is needed, indications are that the best program for the control of cotton wilt and "rust" will result from the use of a suitable wilt-resistant variety and the application of a mixed fertilizer containing sufficient potash to eliminate "rust," or potash hunger.

A very attractive publication, "Horticulture at the Ohio Experiment Station," Special Circular No. 45, is designed to bring together some of the more important practical results of the Ohio Department of Horticulture in convenient form for the readers. With previous Ohio publications of a similar nature, it may serve as a handbook of horticultural practices. This circular will be wanted by all who aim to keep abreast with this important field of American agriculture.

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"Late-sown Emergency Feed Crops for Illinois," Agr. Exp. Sta., Urbana, Ill., Cir. 423, June 1934, L. H. Smith.

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"Woodland Carrying Capacities and Grazing Injury Studies," Agr. Exp. Sta., Lafayette, Ind., Bul. 391, Mar. 1934, Daniel Den-Uyl and Ralph K. Day.

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The Inquiring Mind

(*From page* 14)

and he has served as personal representative of Governor Moore in dealing with the status of P.W.A. projects in New Jersey. There have been between 2,500 and 3,000 persons employed on these projects. Dr. Lipman also is Director of Emergency Relief for New Brunswick and Highland Park, and a member of the Middlesex County Emergency Re-employment Committee.

One marvels at the capacity of this great "man of parts" for work, and wonders that he has been able to carry on for so long the exacting duties as an administrator, while retaining his

active supervision of scientific research and his intimate touch with the development of science. But now he has been granted a Sabbatical leave of absence of one year, during which vacation(?) he will enjoy himself by making a comprehensive study of the soil resources of the United States. He then will prepare a monograph which will contain data dealing with the various types of soil and their adaptability to agricultural uses, particularly with reference to a long-time program of conservation and development based upon a sound governmental policy of land utilization.

It strikes one that these multifarious and strenuous tasks are far too exacting for any ordinary human to undertake and carry through; but Dr. Lipman evidently is an extraordinary man, and we trust he may survive without a nervous breakdown and serious weakening of his wonderful stamina and ability for versatile service. He was equally busy during the World War period, and thus commented on the tension it entailed, "I wake up in the morning with a vision of the pile of mail waiting for me, requests I cannot fill, complaints I cannot help, work piled and piled without end, and I have an idea I'd rather prefer the trenches."

New Jersey's Agriculture First

When Dr. Lipman assumed the directorship of the Experiment Station in 1911, he determined that its work should be closely related to the agricultural needs of New Jersey. He recognized the trend toward specialization in New Jersey agriculture, and sought to have the station point the way to new advanced practices. These objects he fostered and consummated. Within three years the five new departments of Agronomy, Extension, Farm Management, Plant Pathology, Poultry Husbandry, and Seed Analysis had been established, and gradually from that time forward, practically every phase of agricultural education, practice, scientific research, and methods of carrying messages of results to the farmers of the State were introduced, given due consideration, equipped, and made of real service to the people. During his administration the land holdings of the College and Experiment Station have increased from 142 to 535 acres. Other areas, operated or controlled by the institution, brought the total area of the college farm in 1930 to 690 acres. In that year, the land and buildings of the College of Agriculture were appraised at $2,175,720.

The Station's Responsibility

Relative to the future services of the Station, and other agricultural experiment stations, it is the opinion of Dr. Lipman that cognizance must be taken of the growing demand of our industries for research facilities that only a well-organized research institution can provide. With the coming years, our experiment stations will need to reckon more with conditions that govern the accepting of research grants from industries which are willing to pay for the research service, but which, as a part of the economic life of the State, have a right to expect help analogous to that given to the agricultural industry. Beyond that, various organizations, like those of the livestock breeders, dairymen, gardeners, distributors of various commodities, manufacturers of implements, garden clubs and country clubs, will expect the institution to formulate policies and to help toward their execution, for the sake of promoting interests not alone of individuals, but of larger or smaller groups that have an interest in economic and social progress. "The Station, through its research and educational policy, should aim to make the State more attractive to its residents culturally, as well as economically. If this assumption is correct, the institution will need to assume a larger responsibility in dealing with the esthetic and cultural needs of the State."

Shortly after Dr. Lipman succeeded

Dr. Voorhees as director in the autumn of 1911, he urged revision of the fertilizer, feed, and insecticide laws. Since the enactment of the first fertilizer control laws in 1874, there had been a phenomenal development in the use of fertilizers on New Jersey farms. More recently, too, there had been a similar increase in the volume of feeding stuffs and insecticides used. A new law was adopted by the legislature of 1912 and, with slight amendment, has remained adequate up to the present time. In the same year revised laws relating to feeding stuffs and to insecticides also were passed by the legislature, and in 1913 the inspection of lime was provided for by law. As a result of the enactment of the laws mentioned, farmers quickly learned to check up on their fertilizer purchases by studying the published analyses of various brands, many of which in the early days were made by Dr. Lipman. In 1855 it was said that "no other one line of work seems so fully understood and appreciated by farmers as the study of fertilizers." In 1902 it was observed that "The progressive farmer is now educated. He knows that in the purchase of fertilizers value depends, not upon the name of the manufacturer or his brand, but upon the kind, the quantity, and the quality of the plant-food constituents that are furnished."

Work Attracts Students

Dr. Woodward tells us that Dr. Lipman's accomplishments have attracted many graduate students to Rutgers who studying under his direction have acquired something of his enthusiasm and insight into soil science. A number of such men, in time, have become research assistants on the Experiment Station staff, some of them being advanced to positions of larger responsibility. Students have been attracted from many States in the Union, as well as from Australia, Austria, Belgium, Brazil, Canada, China, Cuba, Czechoslovakia, Denmark, England, Estonia, France, Germany, Greece, Holland, India, Japan, Palestine, Porto Rico, Russia, Santo Domingo, South Africa, Sweden, and Switzerland. The exchange of widely different ideas among students has been of inestimable benefit. The eminent men Dr. Lipman has trained have a strong sense of personal attachment to him, and a similar feeling of confidence and personal affection is to be found among many others who have come in contact with him in one way or another, and admire him for his reputation as a scientist and a public servant, and are appreciative of services rendered.

Rare Personal Charm

No estimate of Dr. Lipman would be complete without reference to his rare personal qualities. He is a man of great brain power, extraordinary vision, and great powers of endurance in arduous duties. Furthermore we are told by Dr. Woodward that he has a great sense of humor and is a delightful companion. His genius for telling stories suggests the traditional Abraham Lincoln. Often when in conference the atmosphere threatened to become tense during the debate on a controversial issue, Dr. Lipman has drawn upon his inexhaustible fund of anecdotes and told one so appropriate that the air was cleared.

Humor and profound wisdom and dignity rarely grace an individual, but Dr. Lipman is blessed with the combination which makes him the more likable and respected. Looking back upon his efforts, he has expressed the hope that the devotion to a good cause which has inspired them in him will abide and that strength and grace will be granted to make him a worthy follower of the seekers of truths and of the dreamers of dreams who have gone before. We share in that hope, know that the aspiration has been lived up to in the past, and feel sure that in his remaining years Dr. Lipman will earn and receive added honors and continued admiration, esteem, and sincere gratitude throughout the land.

Better Vegetable Seed

THE general quality of the seed offered to market gardeners and canners is distinctly better than it was 5 or 6 years ago, says Victor R. Boswell of the United States Department of Agriculture. Vegetable specialists of the Bureau of Plant Industry and of 20 State agricultural experiment stations are conducting intensive studies of the principal kinds and varieties of vegetables.

These studies are designed to create nationally known standards for varieties so that the various growers of seed of a certain variety are more likely to work toward the same ideal type than they were when each grower was selecting his seed-bearing plants according to his own judgment of what gardeners wanted.

By comparison plantings of the leading varieties of vegetables in several important truck and market garden areas, these specialists are collecting definite evidence as to which varieties are best for each region. Their studies afford a basis for untangling the confusion of names under which the same variety or strains closely similar have been marketed under a large number of names.

The result is that seed houses now realize that there is no need to handle so many varieties and differently named strains of each vegetable. They need no longer try to supply seed of 4 or 5 named varieties which are in fact almost identical. A valuable result is that growers and dealers can devote more care and attention to the seed crops of the important varieties and are better able to improve the quality and purity of the comparatively few strains of each vegetable which are really of superior value.

Sweetpotato Starch

A METHOD of producing high-grade starch from sweetpotatoes has been developed by the United States Department of Agriculture and it is believed a suitable market for this starch will be provided by the demand of cotton mills for sizing and by the requirements of other industries, according to H. S. Paine of the Bureau of Chemistry and Soils.

The sweetpotato is one of the most important vegetable crops grown in the United States, being second in value only to the white potato. It is particularly well adapted to soil and climatic conditions along the Coastal Plain from New Jersey to Texas. A large proportion of the crop consists of cull and second-grade potatoes, for which there is no adequate market.

Various starches differ in their properties and suitability for different uses, and for this reason sweetpotato starch is not competitive with domestic corn starch. Starch from sweetpotatoes, which has been produced up to this time, has been gray in appearance and of poor quality because of colored compounds and other nonstarch substances which have not been removed from it.

A procedure in which colored compounds are washed out of the starch during the manufacturing process by means of a dilute alkaline sulphite solution has been developed, and a starch of a high degree of purity and excellent color has been produced. The softening action of the chemicals on the fibrous material in the potato has also resulted in a more complete removal of starch from the pulp and a consequent material increase in the yield of starch.

Oregon Finds Profit *in* Potash Fertilizers

By Joe W. Jarvis

Agricultural Instructor, Imbler, Oregon

RESULTS of field demonstrations with commercial fertilizers on silt loam soil in Oregon, with such varied crops as cucumbers, raspberries, sweet corn, potatoes, and mangels, have been consistently favorable to fertilizers. When properly used, fertilizers increased yields and improved the quality of the crops, thereby contributing substantially to greater net returns. That potash occupies a very important place in the fertilizer application also was made clear.

The demonstrations, conducted over the past five years, were under the supervision of Glenn Weaver, Agricultural Instructor, Union High School, Gresham, Oregon. Mr. Weaver watched the work very closely. He was present at the time of measuring off the plots, applying the fertilizers, and at the time of harvest, besides observing the growth from time to time.

Three cucumber demonstrations were conducted, and all showed that a nitrogen fertilizer applied alone does not materially increase the yield of cucumbers; in fact, one plot showed a marked decrease. The yield was increased where phosphate was used more than by either of the other two elements applied singly. When applying 1,000 pounds of a mixture containing 3 per cent nitrogen, 10 per cent phosphate, and 10 per cent potash, the best results of any of the combinations were obtained. In one case the check plot that received no fertilizer yielded 12,260 pounds of cucumbers per acre, while the plot receiving the 1,000 pounds of 3-10-10 mixture produced 19,980 pounds of cucumbers, or an increase of 7,720 pounds per acre.

The raspberry plots gave results similar to the results from other demonstrations conducted by the county agents, and showed that nitrogen alone caused the berries to be soft; that phosphate enabled the canes to resist winter-killing to a considerable degree; and that potash produced a firm-textured berry. About 1,000 pounds of 3-10-7 mixture per acre seemed to be the best application.

When berries are used for freezing purposes, a firm-textured berry is desirable. Also, berries arriving on the market in a firm condition always sell readily. Therefore, it appears to be profitable to apply potash to berry soils.

There were four sweet corn demonstrations. One proved that the small amount of landplaster that sticks to the dampened seed before planting increased the yield considerably, making a production of 14,688 ears. The plot treated with phosphate and potash produced 14,240 ears. The one given phosphate alone yielded 14,016 ears; and the check plot dropped to 13,040 ears. In this demonstration the landplaster plot came up first, matured first, and gave the largest yield. In the case where phosphate and potash were used, a better quality was obtained.

In another demonstration 100 pounds of landplaster per acre were applied. In this case higher yields, earlier maturity, and better quality were noted. Another plot was treated with nitrogen. It came up last, matured slowly, and gave a lower yield

than the check plot receiving no fertilizer.

The third demonstration consisted of eight plots. The check plot again out-yielded the plot treated with nitrogen fertilizer. The area treated with 300 pounds of 3-14-14 per acre gave the best results, with the plot treated with manure supplemented by superphosphate rating second.

The fourth demonstration was checked by the number of pickings and the average weight per sack of each picking. One plot was treated with 350 pounds of 3-10-10 per acre. Another plot was treated with 150 pounds of landplaster and 150 pounds of sheep guano per acre, while the other plot was a check receiving no fertilizer. The 3-10-10 plot gave more sacks per acre, fewer pickings, one week earlier harvest (which is important in marketing sweet corn), a shorter harvest, heavier weights per sack, and the most desirable market grade.

In the case of potatoes, potash alone applied at the rate of 500 pounds per acre gave by far the most outstanding results. This plot produced 218 sacks of U. S. No. 1's per acre. The check plot yielded 115 sacks of U. S. No. 1's, or 103 sacks less than the plot receiving the potash. On the potash plot it was noted that vine color was better and no blight was present, evidence that potash makes healthier plants. With the 500 pounds of potash costing only $13, it is easy to see the profit in this treatment.

Other plots in this potato test were: 10 tons of manure per acre; 10 tons of manure, supplemented with 600 pounds of superphosphate per acre; 800 pounds of 0-10-10; 1,000 pounds of 3-10-10; and one with 600 pounds of superphosphate alone. All treatments gave an increase in yield except the plot on which superphosphate was used alone.

In the mangel experiment only one demonstration was conducted. A fertilizer mixture of 4-5-10 applied at the rate of 1,000 pounds per acre produced 30.76 tons per acre, and the check plot 18.4 tons per acre, or an increase of 12.36 tons per acre. With such an increase in the crop, the $20 per acre investment for fertilizers was well worth while.

New Phosphorus and Potash Tests

NOW farmers who wish to know whether their soils are lacking in phosphorus or potash have new, cheap, and practical tests which will help them to find out. Recently tests have been developed by which county agents, agricultural teachers, and others can quickly and easily determine whether any soil needs phosphorus or potash.

A new biological test, called the Cunninghamella test, was recently perfected by A. Mehlich, E. B. Fred, E. Truog, and W. H. Peterson of the University of Wisconsin. Samples of soil are planted with a mold organism called Cunninghamella. This mold grows on the soil sample. Then the soluble phosphate content of the soil sample is judged by the amount of growth of these mold colonies.

During the trial experiments some 15 different species of mold were studied, and Cunninghamella showed the fastest response of all to the amount of soil phosphates in a sample of soil. This mold is related to the common gray bread mold fungi. It produces a raised grayish mass of growth on top of the culture medium in the soil sample. The size of this mold growth is proportional to the amount of available phosphorus present in the soil.

The directions for making the test are to fill a small glass dish with a sample of soil to be tested, and wet it with a nutrient solution free of phos-

phorus. A standard amount of mold spores (seed) is then placed in the center of the soil sample. Next, the dish is put in a moist chamber and incubated (heated) at 77 degrees F. for 48 hours. After the 48 hours, the diameter of the mold growth is measured and compared with a chart made for this purpose.

This new method has been tried on many soil samples whose available phosphorus content is known and the test was found to be accurate. The amount of growth of Cunninghamella fungus on soil samples has been found to correspond to the crop growth on these same soils, which further confirms the test.

The quick, reliable potash test was devised by N. J. Volk and E. Truog at the University of Wisconsin. In making this test, a small sample of soil is shaken in a bottle containing a liquid which will dissolve out the available potash. Part of the dissolved potash is filtered out and placed in a small bottle to which is added a special solution of sodium cobaltinitrate. The potash will cause the liquid to form a cloudy, muddy solution.

The amount of available potash in the soil sample is then determined by comparing the cloudiness of the liquid with that in a special standard turbidity comparator (standard cloudiness scale). The results of this test compares favorably with those from more elaborate laboratory tests for available potash. The new test is now being used extensively in the State soils laboratory and is practical for use by county agents and agricultural teachers.—*L. Van Bossche*

The Compost Pile

MUCH use can be made of the leavings in the garden this fall if they are made into a compost pile. Owing to the scarcity of manure, here is a good way of saving the garden refuse, and by mixing with some soil and fertilizer a pile of good rich soil may be had in the years to come. Leaves, cornstalks, grass, straw, etc., may be used.

Make the compost pile to one side of the garden where it will not be in the way. Put down a good layer of soil, 6 to 8 inches deep and rectangular in shape, then put on a layer of leaves, stalks, or other refuse, to the depth of 6 or 8 inches and sprinkle with about 50 pounds of a high-grade fertilizer, containing a high percentage of phosphoric acid and potash per ton of soil and roughage. Cover with more soil, more refuse, and repeat with the fertilizer until you have the pile of the proper size. The top layer should be of soil leveled off in order to catch as much rainfall as possible. If manure is available, use manure instead of commercial fertilizer or phosphate.

By starting a compost pile this fall you will not only aid in cleaning up the garden, but will have the jump on those that wait until spring.

The compost pile should not be used until the materials have rotted. Generally, it is best to wait a year or so before disturbing. There are commercial products upon the market that one may purchase which aid and hasten the decomposition.

Greenhouse men find the compost pile almost indispensable for good soil for potting and growing plants. Their method of making a compost pile is by using a layer of thick sod followed by a good layer of manure and so on up as high as desirable and as long as needed. These piles of compost are built for use in the future.—*W. B. Ward, Extension Horticulturist, Purdue University*

Memories of a Devil

(*From page* 6)

minds to it a bit, is it not true that the deep morass of national blundering, the pandering to speculative orgies, and the unbalancing of fair opportunity in American life have all occurred in this present era of universal publicity?

Right in the midst of the metropolitan press, the far-flung, news-gathering bureaus, the marvels of radio, and the lightning speed of communication, we have witnessed the worst debauch of native morals and traditions since the sixteenth century. What crusading occurred in rare instances against unseemly practices in finance was blanked and offset by the advertising and the stock dope carried in adjacent columns. I am sorry to say some of our modest western sheets did not escape the gambling fever.

Then again, perhaps we had such a mess of muck that our hands grew weary of the raking and we asked for more livid entertainment and the solace of inertia.

It seems time, therefore, to count on that old bulwark of original native power—the rural press—to do for our country majority what the Broadway stunt artists and scandal hounds have undone for the ruralites who moved cityward a generation ago only to get a headache. Maybe it is time to advertise for a few zealous young fellows to return to the home town and expend their energy and courage starting as devils on the road to rugged command of sound public opinion and clean public information.

Just as it is so often said that America cannot completely recover industrial vigor without a sound agricultural structure, so do I earnestly believe that American resolve to rewrite the rules of the game depends largely on the restoration of those fundamentals belonging peculiarly to the age of the hand press and the country editor in his shirt sleeves.

And when that time comes I should be almost eager to answer the advertisement and go back to start over as a devil again. It would at least be simpler and nobler than trying to be a saint somewhere else. Especially if Tony was still generous with his snuff!

Better Crops for Del-Mar-Va

(*From page* 10)

where 200 pounds of muriate of potash were applied in addition to the regular 6-6-5 fertilizer resulted in doubling the yield of corn. As these growers applied 2,000 pounds of a 6-6-5 mixture on the land, it is evident that more potash than is being applied is needed to produce anywhere near an optimum crop under these conditions.

In view of the above experiments, demonstrations, and farm practices, it is evident that heavier applications of potash than are now being used, together with good seed, the proper rotation, etc., will result in a marked increase in yield of corn. Falling stalks due to root rot will be decreased, more fodder will be produced. There will be a better quality grain with more starch and thus less chaffy kernels and lower production costs because of the increase in yield and quality. The corn crop instead of being a "side issue" in so many cases will become one of the best paying crops produced on the farm.

SERVICE

First Collegian: "Gotta match?"

Second Ditto: "Sure."

First Collegian: "Gimme a cigarette."

Second Collegian: "Want me to light it for ya?"

First Ditto: "If ya don't mind."

Second Ditto: "How ya fixed fer spitt'n'?"

Bernice: "I suppose you have been reading all about those Canadian quintuplets in the papers."

Evelyn: "I should say so, and it looks to me like it was one Five-year Plan that went wrong."

A small boy was trying to lead a big St. Bernard dog up the road.

"Where are you going to take that dog, my little man?" asked a kindly passerby.

"I'm going to see where he wants to go first," was the breathless reply.

BIG-HEARTED

"I understand you've got your divorce, Mandy. Did you get any alimony from your husband?"

"No, Mrs. Jones, but he done give me a first-class reference."

It wouldn't hurt any if the colleges would work their way through some of the students.

Customer (suspicious) — "How is the hash made here?"

Waiter—"Made, sir? Ash aint made—it just accumulates."

HIS REWARD

Pat determined to pass his favorite "pub" on his way home. As he approached it he became somewhat shaky, but, plucking up courage, he passed it. Then, after going about fifty yards, he turned, saying to himself, "Well done, Pat, me boy. Come back and I'll treat ye."

A three-year-old girl was taught to close her evening prayer, during the absence of her father, with "—and please watch over my daddy."

One night, much to her mother's surprise, she added, "—and you'd better keep an eye on mamma, too."

Leader at village band practice: "Ezry,—ye'r two bars behind t'others."

Ezry (testily): "Never mind that! I kin catch up to 'em any time I want to."

A comely colored girl has just been baptized in the river. As she came to the surface she cried, "Bless de Lawd, I'se saved! Las' night I was in the ahms of Satan, but tonight Ah'm in de ahms of de Lawd!"

"Sistuh," came a baritone voice from the shore, "how is you all fixed up for tomorra ebening?"

NARROW ESCAPE

"Will you marry me?"

"No."

And they lived happily ever afterwards.

Better Crops with PLANT FOOD

Dec. 1934-Jan. 1935 10 Cents

The Pocket Book of Agriculture

POTASH
Starvation Symptoms

No. 3
of a series

THESE tobacco leaves show progressive deterioration due to potash starvation. The tips of the leaves first show a yellow mottling. This yellow mottling proceeds through the leaf. The leaves become puckered, rough, thick, and brittle. The margins die and dead areas develop, causing "leaf spot" troubles.

A tobacco crop of 1,000 pounds of cured leaf removes from the soil about 80 pounds of actual potash, or the potash in 1,000 pounds of fertilizer containing 8 per cent potash.

The tobacco plant is a shallow feeder that grows to maturity in a very short length of time. For this reason, very often even larger quantities of potash than the plant actually removes from the soil are needed in order that it may get sufficient potash to produce extra yields of high quality.

Potash is the quality-producing element in tobacco fertilizer. It pays to use fertilizer containing plenty of potash to reduce trash, improve body, make smoother leaves, reduce disease, improve price, and increase yields.

Better Crops with PLANT FOOD

The Whole Truth — Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XIX NUMBER ELEVEN

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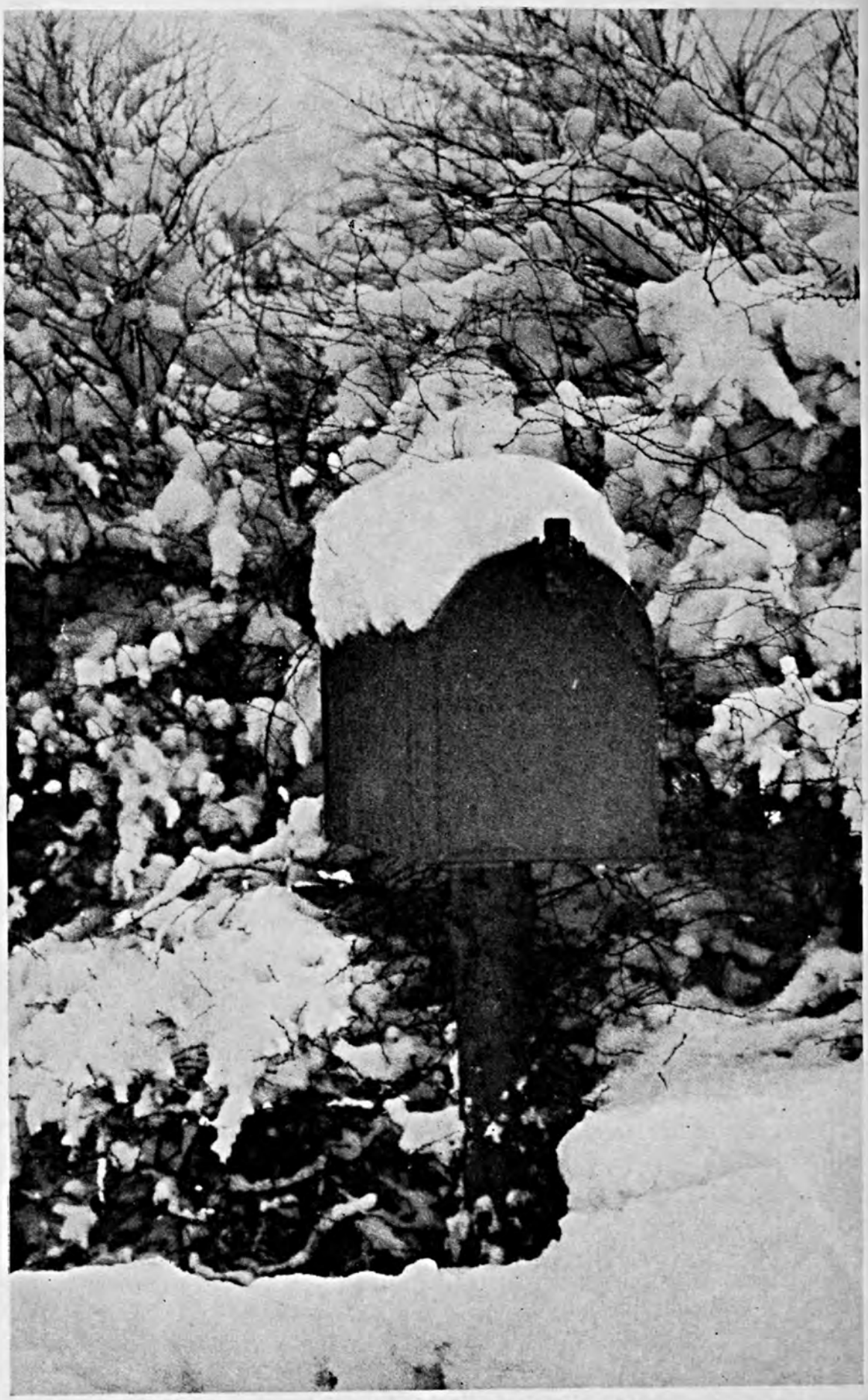


DO YOUR CHRISTMAS MAILING EARLY!!!

Better Crops with PLANT FOOD

PUBLISHED BI-MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK, WITH OFFICES AT 19 WEST 44TH STREET, NEW YORK CITY. SUBSCRIPTION, $1.00 FOR 12 ISSUES; 10c PER COPY.

VOL. XIX NEW YORK, DEC., 1934-JAN., 1935 No. 11

Jeff Wishes Us "A Happy New Era!"

Hearts *and* Hopes

By Jeff McDermid

OF all the things which may be said in praise of Christmas, I believe that it is the mutual joys and sorrows which we share, and which at this season we are most conscious of, that surround this ancient holiday with treasured reverence.

We forget that we are identified or labeled with this movement, or that creed or party, in the eyes of the narrow world in which we drive and dream; we lay aside the well-filled bank-book or else the patched garment; we quit posing and planning. We call to mind pictures in our lives, the high-lights and shadows of which are the common lot of mortals. We acknowledge that greater than all economics and deeper than all short-cuts to security are the foundations of human nature, and that until some bond of love cements the universe, there can be no solace in finance, legislation, or organization.

Christmas confessions, that take your friend's hand and lead him back through old incidents, faded remnants

of the memory, which in your past life reach out to kinship with his own experience—such a mood is mellow enough to match the bursting autumn pippins baking on your ruddy hearthstone. And if some recollection resembles the gray ashes beneath the Yuletide embers, that also is part of the reunion. For whether we watch the old year out in farm-house living-room, or pent-house perch, the gates of reminiscence, honestly opened, teach us how much alike we really are despite our "ologies" and "isms."

IT is two or three days before Christmas in 1896. The main trading street of the Midwestern town is lined with bob-sleds and jingle sleighs, whose nags bend their noses before a powdery snow, piled above the gutters and tramped hard with the brown marks of farm shod feet. In and out of the bank they stomp and jostle, in and out of the feed store, crowding up to the postoffice windows, exchanging muffled greetings since it is before the era of the rural free delivery and the sentimental post-card.

The Fair Store in the center of the block draws the most attention, for Woolworth has not yet crowded the local variety shop into do-do land. Smiling, rosy Mrs. Rohmer and her huge and hearty spouse, flanked by a motley crew of extra clerks, wrap packages and jerk traveling cash cages frantically in these days before change was "rung up."

Cautiously, with timid step and staring eyes of wonder, a lad of six steals into the dim aisles, pokes his way past furry overcoated farmers, and wedges himself before the "pretty dish" counter. He has earned a few cents loading cord-wood for a neighbor, and Mother has only a few nice plates left out of her wedding set. Mother really ought to have something better than a new cake plate, he thinks, because her best silk dress was new when Arthur was president, and that darn bonnet of hers is one reason why she never comes to town, even on Christmas week.

"How much are these plates, the ones with purple morning-glories on the edges and the bluejay in the center on a rose bough?"

Mrs. Rohmer's fat niece laughs and says, "Fifteen cents each and the wire handle fits over it for a nickel more."

"Wrap it up and give me a dime's worth of heart candies, some pink and yellow ones, not all just white."

Flushed with his precious purchase, the kid stops and buys two packets of Ole Virginny cheroots out of the blue box with the cottony nigger head on the cover. "Pa's favorite brand, these three-fers. I'll put 'em near his mustache cup for breakfast on Christmas morning."

He opens the door with its funny bell that tinkles customers out as well as in, tucks his brown parcels under his reefer, and waits in the snow for Neighbor Stock to sell his cordwood so they may begin the homeward jaunt over crunching trails. Yes, this is a happy Christmas, and the new cake plate on New Year's Day will hold a spongy raisin loaf, while the fumes of Dad's perfectos will be the only cloud on the horizon of 1897.

EVER since the kid, now long grown into manhood, can remember his Dad asked the blessin' at meal time. When he was pretty young the kid thought his Dad was "reading it off the plate." I guess the blessin' was one his Dad made up himself or had Elder Pitcher fix up for him. It was short—too short for spinach days and too dum long when they had chicken and apple pie. His Pa used to put his hands on the edge of the red-and-white check table cloth, and the kid recalled they shook a little from the palsy left by the consarned fever'n'ague that "Cump" Sherman led his boys into down in the bayous back in the Sixties.

The kid reckoned once that Dad never failed to asked the blessin' from the time the lad was a drooler until he left home for keeps. That meant about twenty-two thousand graces in twenty years, 'cause the old gent wouldn't give up the custom even when he broke his ribs falling off a hay rack, and he was never away from home on long trips.

Came one day long afterward, when the kid was a married man and had children of his own, and his old Dad was in his dotage. It was too hard on Mother to take care of him always and so the two of them decided to enter the war veteran's home. Son went up over Sunday and dolled his Dad up in the shiny blue serge he used to wear on Decoration Day and on campfire nights. He had to pin on all the buttons and emblems and reunion badges of the old Twenty-Second regiment and fasten the G. A. R. braid on his hat—nothing else would do for the great trip. Then Ma set the table with a few scraps left over, and Son bought some ice-cream.

It wasn't an "upper room" and there weren't twelve disciples, but it came over the Son, sudden like, that this was the Last Supper! He almost backed out into the kitchen pretending to look for something, but Ma told Pa to wait—and then—a blurred image of a weak, gray head, bent over a cracked plate: "For the comfort and sustenance of home and food, we ask to be truly grateful, Amen!"

ANOTHER scene—a group of college students who might have been sadly marooned in drab boarding-houses over Christmas, 1912, had it not been for a certain thoughtful old couple of the campus community. A week before the holidays mysterious invitations came to a dozen young men and women, who met for almost the first time around the table at this pleasant home and remained in the cheery companionship of each other and their hosts until late evening. Each found a practical present thrust into his or her pocket at parting, with a note which explained the origin of the unexpected privilege:

"Five years ago we lost a son and daughter in an accident on their return home for the holidays. Since then we have been very lonely, and especially so at Yuletide, when so many thoughts center on family reunions. Instead of crying softly to ourselves over the clothes, schoolbooks, and treasures of our children and hugging our cold misery to avail us nothing, we choose rather to populate our home again for this merry season with the gaiety and the freshness of youth, and preferably youth which also needs the comfort of a home at Christmas."

Every Christmas since 1912 this custom has been repeated with varying groups of home-hungry students, although one of the parents has since joined her loved ones in the Place where there are no heartaches and no partings.

ONE of the joyful, back-slapping brothers of a service club of civic lunch buddies felt it was time to do something for the city besides sing, eat, and erect booster signs. Hence their program at Christmas became less self-centered than selling tires, calico, and store teeth. Each one drove his car to the children's ward of the state hospital. Into each car the brethren packed the victims of inherited weaknesses, the bandaged limbs, the arms held pinioned remorselessly to stiff boards, the twisted faces

and the feeble, lolling heads.

Down to the gaudy theater; another tussle and tag of heaving bodies; the plush seats; the dim lights; the dancers; the fluttering film unfolding its marvels; the pealing concert organ bathed in rainbow rays; little eyes aglow; tiny hands waving in ecstasy; brave stumps in white trying to wave; some tears and much joy! Meanwhile two brothers of the boost remained in the wards, and when the caravan of happy misery returned, there was a fragrant fir tree, garlanded with baubles and jeweled with glowing points of flame; while each bed had its ribboned package, for some of them the first, and for others the last gift that Santa ever tendered.

Somehow the buddies who had kiddies of their own felt this holiday to be more purposeful than any in their lives before, and those who lacked the family favor pledged themselves to be worthy of the honor, and so they all met the New Year with a kindled zest.

HOLIDAYS come to Dakota sodbusters also, even to those who fly from mortgaged farms in Iowa to preemption claims in the wiry grass of far-flung Trans-Missouri lands. Here in the winter of 1908 are a group of merry, homespun mummers, crowded into a neighbor's tar-paper shack house. They are about to call forth the customs of their rural sires, as told to them in stories of Christmas back in New England or in up-state New York. Corn is popping, cider (from the store, bad cess!) is broached, home-made candy is off the fire to cool, and all hands beg Mister Cotter to unlimber the squeaky fiddle so that Money Musk and the Devil's Dream may loosen the stiff limbs of gumbo plowmen. Then the meagre furniture is shoved into the only other room—the kitchen—and couples bow and scrape to reels and squeeze hands in the corners. Outside a coyote slinks upon a frozen hill and yip-yaws to the northern lights.

When the morning shows a dim trace against the eastern prairie rim, and the last shout of good will to man is over, the buckboards wend across the sea of sod to other tiny habitations, where a long winter lurks to prey upon them until the horned larks presage the coming of another spring.

THE suburbanite tackles his length of sidewalk, blanketed in sticky snow, and then leans upon his shovel a few times to rest from unaccustomed heavings. The white doorway is decked with green and red, candles gleam from the two front windows, casting shadows on the bank where April crocusses sleep.

How pleasant it is! How friendly the shelter of the woodsy hills! How comforting the glow from neighbors' homes! How long he has sought this quiet haven! Yet deep in his mind lies the weight of a thinner income, so that he brushes the snowflakes absently and wonders if by another Christmas there will be wolf tracks around his cozy door. Selfishness, perhaps a little, but a common and a pardonable fault. If home becomes to such as him a place of worship, where else may solace be found when hard times tarnish the Yuletide tinsel?

Then suddenly, the door is standing wide, and seeing the Helpmeet there reassures him that he is only the Other Half after all, and that where confidence and loyalty abide, the wolf will lick his chops in vain. Christmas, or any day, is lovely and serene when family trust is well established and its love puts pride to rout, come good or evil, sun or cloud! "For I am persuaded that neither life nor death, nor angels, nor principalities or powers, nor height or breadth, nor any living creature can separate us from the Love of Jesus Christ, our Lord!"

Others with wider experience among the scenes of this world will vision again far fiercer and sterner themes than mine—grim trench

(*Turn to page* 32)

Field demonstration ready for harvesting on the farm of Joseph S. Burch, Port Tobacco, Maryland. The fertilizer used on the left was a 4-8-8; that on the right, a 4-8-12.

Tobacco—The Gold *of the* Province

By P. D. Brown

County Agent and Acting Tobacco Specialist, University of Maryland

CAPTAIN NEALE, (Master of Wollaston Manor): "There my man, before you lies the 2,000 acres of Wollaston Manor and as fair a parcel of land as you will find in the New World. Upon it you will make your home for the next four years and learn the cultivation of the gold of the province."

Phillip Trueman, (Redemptioner): "Did you say gold, Squire?"

Captain Neale: "Well, mayhap not the gold you have in mind, nor yet the pound sterling of our British markets, but none the less, the Gold of the Province of Maryland—Tobacco."

The "Pageant Lady," authoress of the "Magic Weed," portrays how Phillip Trueman and many other Redemptioners paid their passage to the New World 300 years ago by the cultivation of this magic weed; how tobacco was made the legal tender of the colony to pay taxes, fines, land rent, in fact pay for every want of the new settlers.

Tobacco still pays for almost every want of the Southern Maryland farmer. Although not legal tender for taxes, fines, and the like, it remains the legal payment for land rental now as it was in the early days of the Colony.

In those early days perhaps fertilization of Maryland Tobacco was not a problem. The clearing of new lands

for tobacco when the old fields became unproductive, the use of the so-called rest system where weeds were permitted to grow between tobacco crops, or the growing of tobacco in rotation with grain and sod, fairly well maintained yield and quality and thus delayed the necessity for general consideration of the value of fertilizers.

Long since, however, wooded areas have become limited, and in order to maintain yields and quality, fertilizers have become necessary. The increased demand for Maryland Tobacco for cigarettes and the limited area of soils that produce the best quality leaf have accentuated the interest in fertilization, in soils best adapted, and in rotations to supply the necessary organic matter for moisture control and efficient utilization of fertilizer.

Tobacco responds readily to fertilizer applications. It is a short-life crop, seldom remaining in the field more than 90 days. The quickly growing crop invariably has the best quality.

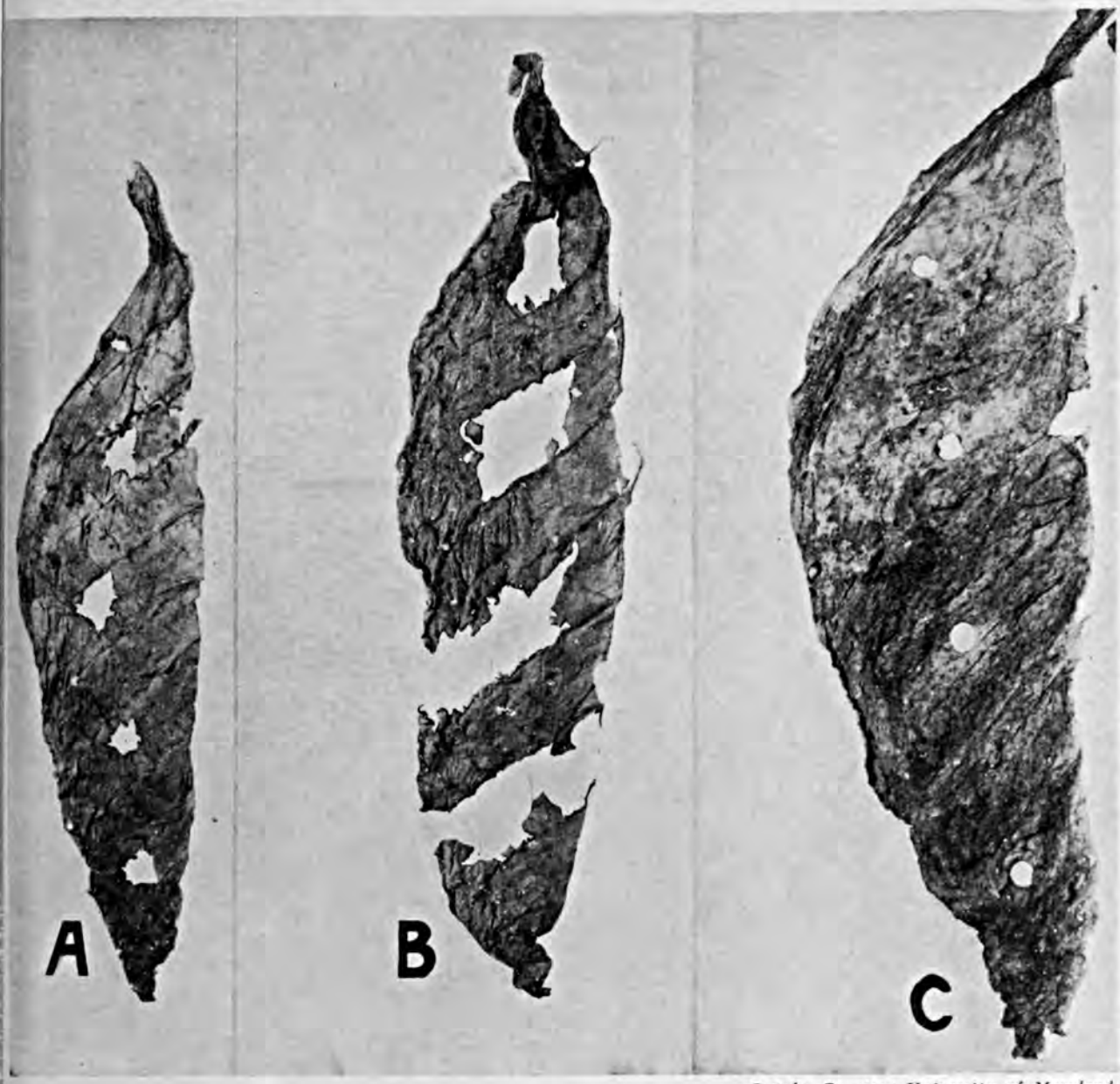
Tobacco has a smaller root system than most farm crops. Because of its rather rapid growth, broad leaf surface, and short life in the field, tobacco is a heavy feeder. It needs an abundance of readily available plant food if it is to make the greatest possible growth.

Of the three essential plant-food elements, nitrogen and potash are the most important. An excess of phosphoric acid, when not properly balanced with nitrogen and potash, results in a small yield of light, trashy leaves. Too much nitrogen results in coarse, heavy leaves that cure out dark. Insufficient nitrogen cuts down yield. The object, therefore, in nitrogen fertilization is to use enough to give a vigorous stalk and leaf growth, making sure that enough phosphoric acid and potash are available for a large yield of high-grade leaf.

Quality now plays a more impor-

Cut by Courtesy University of Maryland.

Tobacco plants showing effects of potash on growth: (A), plant grown with a liberal amount of potash supplied in the fertilizer; (B), plant grown with a deficient supply of potash in the fertilizer or in the soil. Note smoothness of leaf in A as compared with necrosis, chlorosis, and drawn appearance of leaves on plant B.



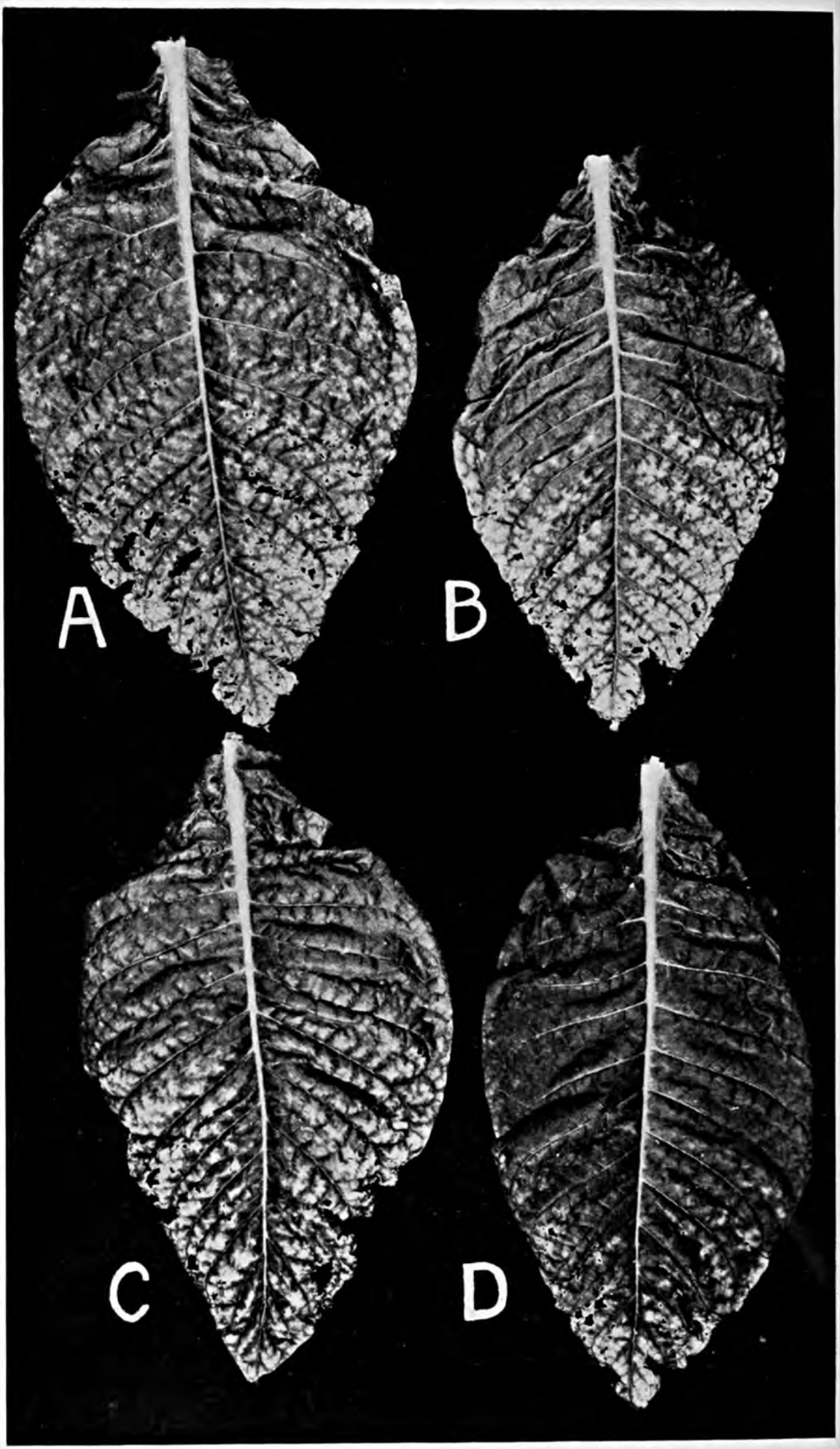
Cut by Courtesy University of Maryland.

Portions of cured leaves illustrating relative uniformity of color and fire-holding capacity (indicated by size of holes burned in leaf when ignited at four points), in relation to potash supply. (A), grown on no-potash treatment; (B), grown with a liberal potash supply, derived from sulphate; (C), grown with liberal potash supply, derived from muriate. The uniform color in (B) and large portion of leaf consumed on ignition are desirable characteristics.

tant role in tobacco growing than ever before. Definite grade standards are being established, and rigid adherence to these standards is being enforced. Difference in prices between grades varies widely from as low as 4 to 6c to as high as 60c per pound, and all gradations in between.

A large proportion of Maryland Tobacco Leaf is used for cigarettes. Leaf which has the desired flavor, aroma, and burning capacity is what constitutes quality in the Maryland market. Buyers, whether at auctions, cooperative or private sale, compete with each other in their eagerness to get such leaf, the result being a high premium for quality.

Many experiments in recent years have been conducted to find out what effect various fertilizers have upon burning quality of tobacco leaf. Fertilizer studies, carefully conducted burning and smoking tests, and chemical analyses all show that burning quality depends upon an abundance



(Legend at bottom of opposite page.)

Cut by Courtesy University of Maryland.

of potash in the leaf and a minimum of chlorine. This has been demonstrated conclusively at the Upper Marlboro Tobacco Experimental Farm, a joint project of the Maryland Experiment Station and the U. S. Department of Agriculture. Results of their long-time studies have been published recently in Bulletin No. 358 of the Maryland Experiment Station.

Summarizing briefly the more pertinent points in the above bulletin, as regards the effect of potash on quality, it is noted:

1. Potash appears to be in some respects the most important component of fertilizer mixtures in the production of quality leaf.
2. Varying the amount of potash did not influence yields so much as quality.
3. The best quality over a period of years was produced when 120 pounds or more of actual potash per acre were applied.
4. When sulphate and muriate forms of potash were compared the results on quality and value per acre were greatly favored by sulphate of potash.
5. Muriate is an undesirable source of potash for Maryland Tobacco.
6. Potash in excess of 120 pounds per acre is justified where leaf spot diseases are common and is good insurance against such disease.

The best tobacco soils of Southern Maryland (sand loams and clay loams that contain at least 20 per cent sand) are notably deficient in potash. This has been revealed by chemical tests as well as by actual field experiments where varying amounts of potash have been applied and results recorded. Whether on the Tobacco Experiment Farm at Upper Marlboro, in field tests by County Agents, or trials by individual farmers, the story has been the same. Potash has been the one element which has the most influence on quality, price per pound, and net income.

Farmers seldom read bulletins as much as they should. Realizing this, the Maryland Extension Tobacco Specialist, working through the five County Agents, in 1926 undertook to take the results of research directly to tobacco growers by means of field demonstrations. In approaching this problem, two types of demonstrations were employed, namely, potash variation and rate of application tests. All treatments were run in duplicate.

In the potash variation tests, fertilizers carrying 4 per cent nitrogen and 8 per cent phosphorus constituted the basic analyses, the rate of application employed being 800 pounds per acre. In this series potash was varied in steps of 4 per cent from 0 to 20 per cent. The results of the 1933 potash variation test on the farm of Joseph S. Burch, Port Tobacco, Maryland, are shown (Table I).

(*Turn to page* 24).

Table I—POTASH VARIATION TEST—1933

Joe Burch, La Plata, Maryland

Fertilizer Analysis	Yield per Acre Lbs.	Price per Pound Cents	Value per Acre Dollars
4-8-8	1141	15.9	181.42
4-8-12	1131	16.2	183.22
4-8-16	1225	15.9	194.77
4-8-20	1452	18.4	267.16

(See illustration on opposite page.)

Tobacco leaves illustrating types of chlorosis resulting from potash deficiency. A-D, leaves showing chlorosis and ragged appearance as a result of potash deficiency.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

EXPERIENCE, 'tis said, is the mother of science. One usually finds it forming a firm foundation in the equipment of a successful scientist like Dr. H. J. Wheeler, who from 1889 to 1912 was intimately associated with the Rhode Island Agricultural Experiment Station as chemist and research worker.

The earliest experience of the agricultural scientist-to-be is generally acquired on the farm, and in pioneer days was earned by the sweat of the brow, privation in some instances, and always with extremely hard labor. It was in Massachusetts that Dr. Wheeler learned his first lessons in agriculture. In his boyhood days on the farm he was inquiring earnestly into the mysteries of the soil, plant growth, and the wonders of nature spread before him on every hand, and today that study is to him as entrancing and engaging as ever.

Interested in Seaweeds

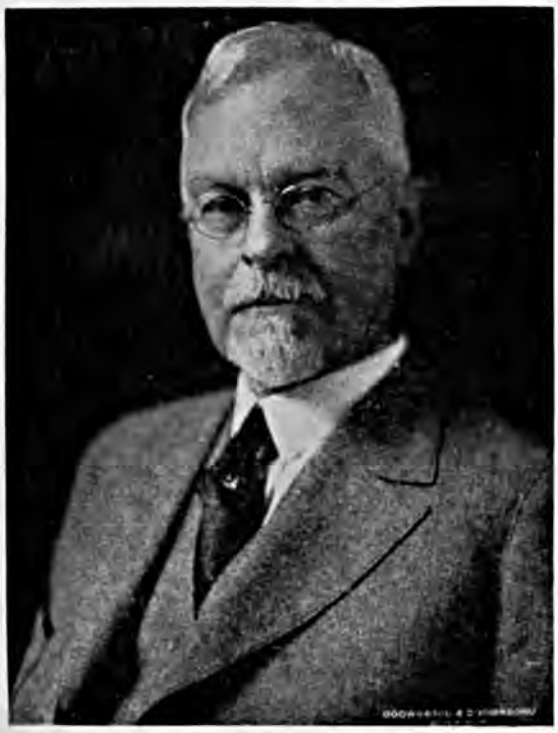
When he became chemist of the Rhode Island Agricultural Experiment Station Dr. Wheeler, with the able assistance of Dr. B. L. Hartwell, studied as a new experience the fertilizing value of the seaweeds cast up by the billows of the Atlantic on the seagirt farms of the State. He knew that farmers there had for generations fertilized their lands with seaweeds to produce larger and cleaner crops of potatoes and he determined to find out just why this soil "sea-food" had been so highly esteemed. The results of the exhaustive study then painstakingly made were published in an illustrated Bulletin No. 21 in January 1893. It included analyses of the various kinds of seaweeds commonly in use on Rhode Island fields as a source of both potash and nitrogen. Later Dr. Wheeler saw the use of bulky seaweeds rendered practically unnecessary by the introduction and dissemination of the artificial fertilizers he analyzed and helped to make popular. Indeed, he made the proper and profitable utilization of these new plant foods his life study and familiarized himself with the subject in a most masterly way.

A Radical Discovery

Dr. Wheeler was, undoubtedly, the first investigator in Rhode Island to show that even upland soils there were in such an "acid" condition that certain crops could not grow satisfactorily on them. This, according to Dr. Hartwell, was considered such a radical discovery that his contemporary research workers thought it could not be the case on other than a very exceptional soil in the State.

Today we find the Rhode Island scientist as interested as ever in this subject of soil acidity and as anxious

to have it clearly and properly understood by farmers. To that end he began in the columns of *The Rural New Yorker* of October 13, 1934, a series of articles on "The (Optimum) Soil, Reactions (pH Values) for the Growth of Different Plants." In the introduction to the series he says: "So-called 'sour' soils are now generally re-



DR. H. J. WHEELER

ferred to as acid—it means the same thing. The term 'pH Value' is now generally used in discussing acid, neutral, or alkaline (sweet) soils. Those having a pH Value of 7 are neither acid nor alkaline (the reverse of acid). If they range from slightly above 7 to 7.5 or 8, they are slightly to moderately alkaline, and if from 8 to 9 or higher they are moderately to very alkaline. A soil with a pH value rating just under 7 and down to 6 is slightly to moderately acid; if ranging from pH 6 down to pH 5, it is moderately to strongly acid; if it ranges from a little below 5 to 4, it is very acid; and if much below 4, it is extremely acid. Soils seldom react to below 3.5 to 3."

He states further that manure is first alkaline but later may have an acid effect. Fertilizers containing sodium and calcium nitrates make soils less acid, and those having most of their nitrogen in sulphate of ammonia make them materially more acid. If lime is needed to raise the pH value to a point favorable to the particular kind of plant to be grown, it should be applied without further delay in order to prevent greatly decreased yields. In some cases even plants of the same genus vary somewhat in their lime requirements as is shown by the different varieties of roses, lupines, strawberries, pines, and many other plants. Certain plants that on very acid soil would respond to heavy liming, were it not for a certain disease, must be limed at a light rate, whereas even heavier liming of other plants on the same soil may lessen the injury from another disease. In other cases too heavy liming causes a discoloration and unhealthy condition of plants due to the effect of the lime in rendering such elements as iron and manganese, which are essential to health and vigorous growth, so insoluble that the plants cannot take up enough of them.

The A. B. C.'s of Liming

In order to help farmers use lime wisely, Dr. Wheeler has hit upon the novel idea of suggesting in the series mentioned a new "A.B.C." on the subject. It gives the approximate pH values of soils that are usually considered best for the different kinds of plants, beginning with alfalfa, regarding which the author says: *ALFALFA.* "A survey of 200 Swedish farms has shown that alfalfa grew best where the pH value was between 7 and 7.5. As the pH value dropped from 7 to 4.5 there was a continual decrease in growth. At pH 4.5 and lower it is practically impossible to establish alfalfa. Another Swedish authority gives pH 6.5 to 7 as best for this crop. This agrees with American experience." Asparagus, Asters, Azaleas,

Apples, etc., follow in alphabetical order.

Dr. Wheeler very early became associated with the field experiments in agronomy at the Rhode Island Station and brought to bear not only a chemical attack but a plant physiological attack upon the problems. The combination of pot experiments and chemical laboratory has continued in close cooperation to this day and has had a potent influence on the value of the field experiments leading to the fundamental explanations of many of the problems. His long interest in soils and fertilizers holds him to his readings on the subject, but he has not committed himself to his closest friends as to what he intends to do with his findings. Perhaps he has considered the series he began in October 1934 in the columns of the agricultural paper, already mentioned, as a fitting outlet for the results of his experience and scientific research work in order quickly and directly to benefit the farmers of the Eastern States.

Work Was Varied

One of Dr. Wheeler's earliest contributions to agricultural science literature was a bulletin for the Rhode Island Experiment Station on the feeding of live stock which gave the then latest ideas on the subject. He was influential in securing laws for the inspection of fertilizers and feeding stuffs which proved so satisfactory that the station has been charged with this service as a non-research activity to this day.

In his experiments relative to the nutritive value of various feeds for live stock we do not find that he tried out seaweeds as a food for animals. In this connection readers in the corn belt and other sections far from the ocean may be interested to learn that in Scotland, Ireland, and Norway cattle sometimes may be seen browsing on seaweeds at low tide. In these countries some varieties of seaweed are used also as food for man. Dr. Wheeler tells us that the people of Rhode Island are familiar with the Irish or Carrageen moss and the dish known as *blanc mange*, which is prepared from it is considered a delicacy. We are not aware that seaweeds have been fed to farm animals in America, the abundance of more palatable and nutritious fodders no doubt having made that unnecessary.

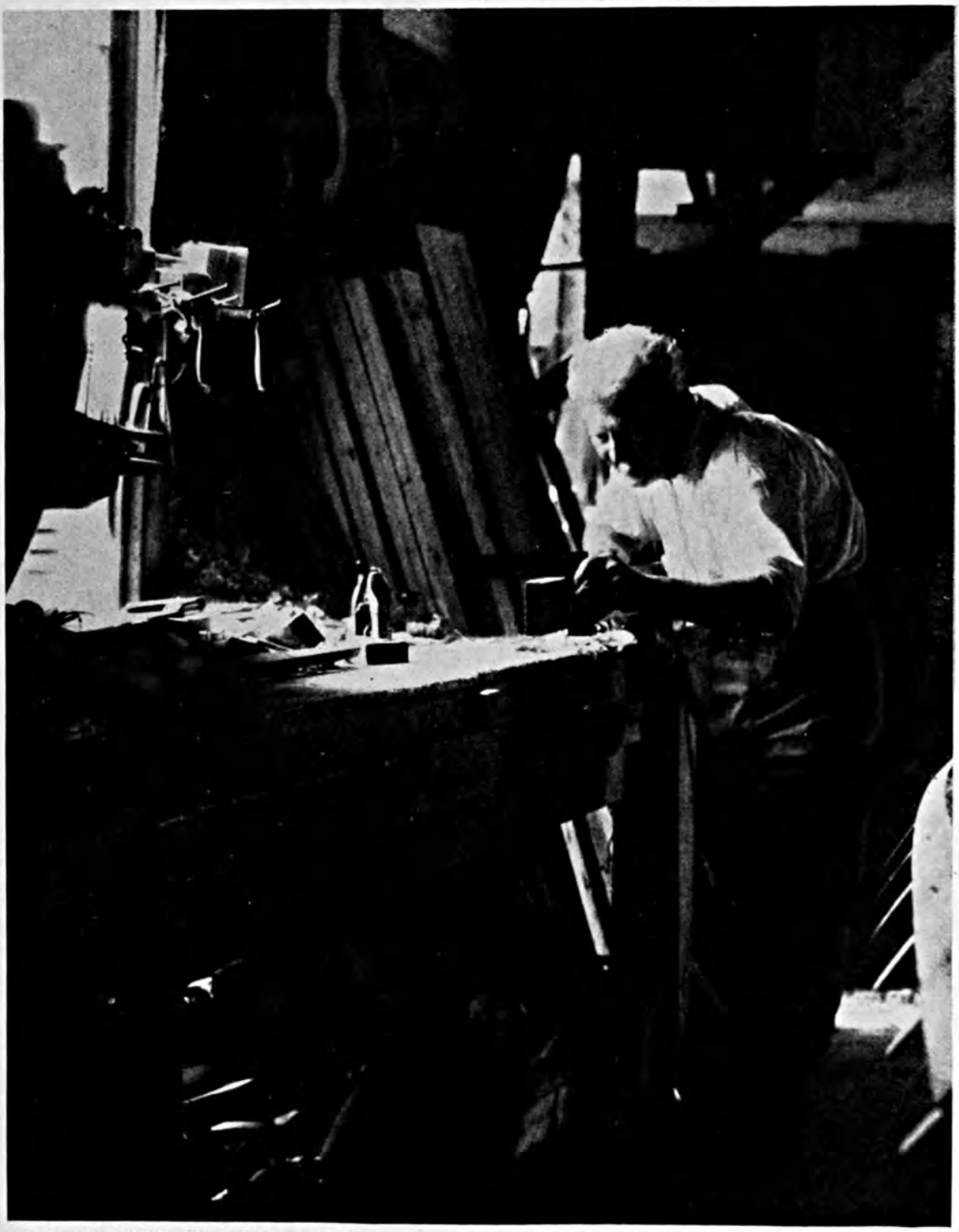
In the varied lines of chemical research work undertaken from 1889 to 1912 at the Rhode Island Experiment Station, Dr. Wheeler had, in addition to that of Dr. Hartwell who succeeded him as Director in the latter year, the cooperation of many other eminent scientists. Of these we find the names of C. L. Sergeant, A. W. Bosworth, G. E. Adams, J. A. Warning, B. E. Brown, J. C. Hogenson, F. R. Pember and others recurring in his publications. While his chief work concerned fertilizer and feeding stuff analyses, the numerous bulletins issued by himself and his assistants show that he also conducted experimental research regarding potato scab, lime and liming, nitrogen for grass, treatment of sandy soils, top-dressing of grass, rotations for various crops, rations for dairy cows, value of sodium salts, soil treatment in greenhouse culture, potato culture, alfalfa culture, continuous corn culture, tests of nine phosphates, effect of nitrogenous manures, and field tests on individual farms.

A Voluminous Writer

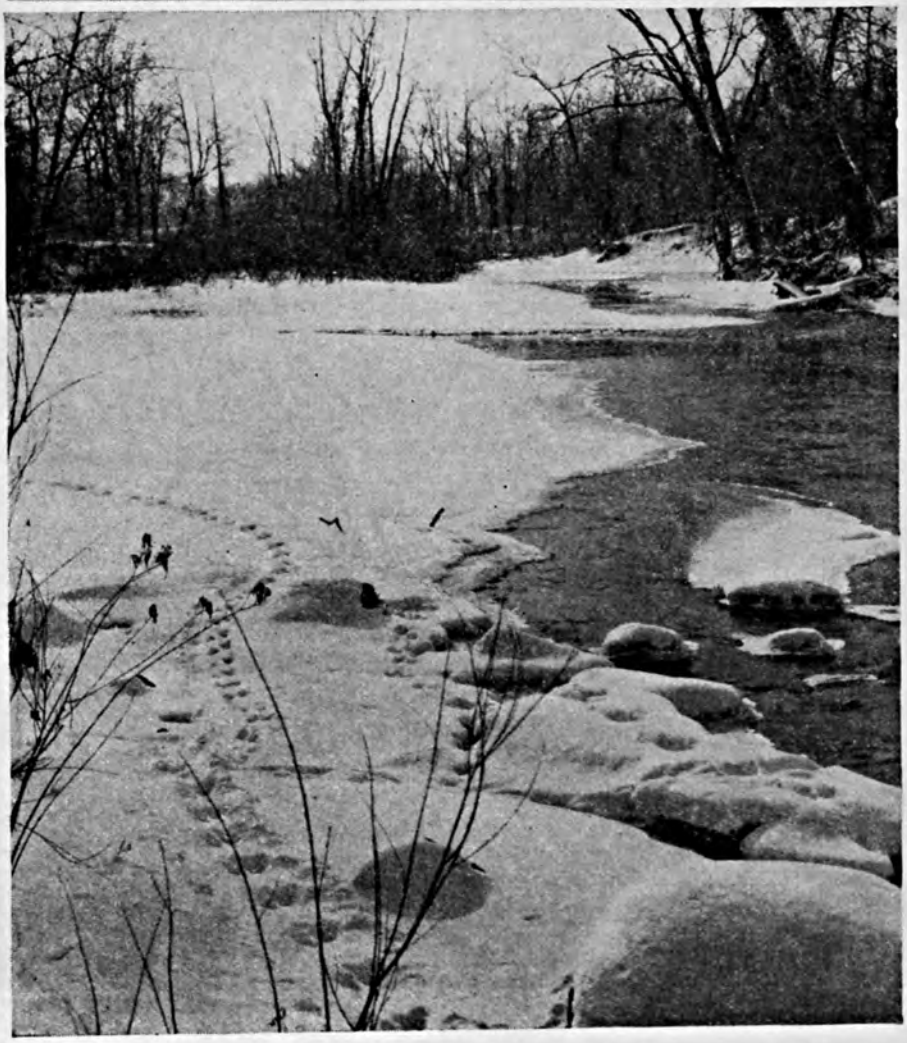
Dr. Wheeler has been a voluminous writer of papers on agricultural subjects for the Annual Report of the State Board of Agriculture, the United States Department of Agriculture, the American Society of Agronomy, and many other associations, newspapers, etc. Some of the subjects treated include wastes of the farm, commercial fertilizers and home manures, soda and potash, an apparatus for determining fat, requirements and improvement of soil, the agricultural use of lime, acid

(*Turn to page* 29)

Pictorial



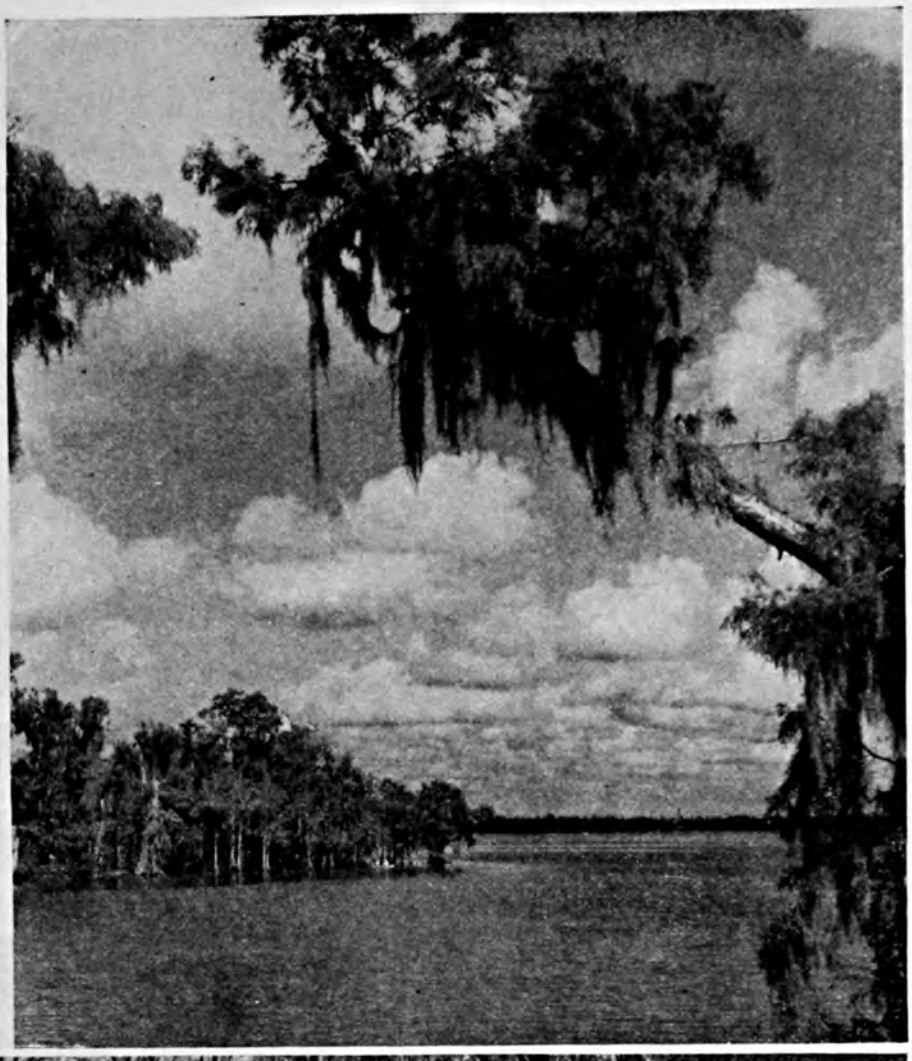
THE PLEASURE OF INSIDE WORK.



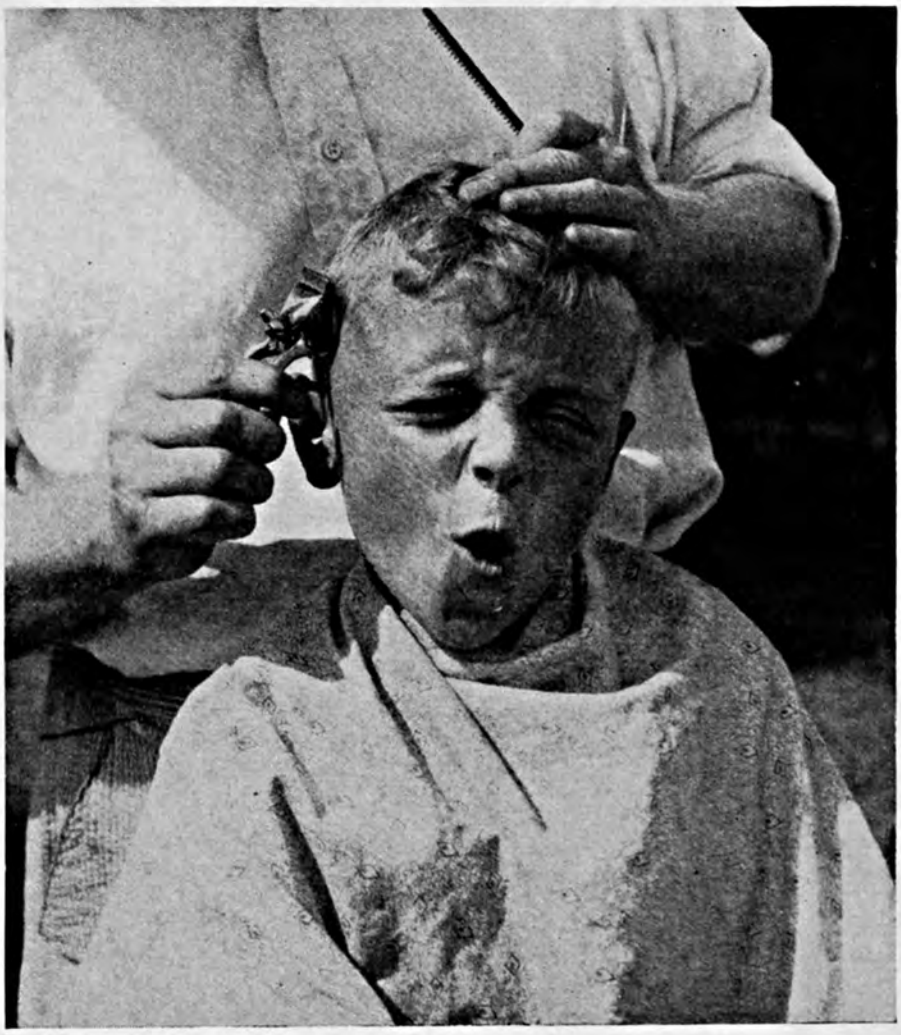
Above: Getting ready to enjoy a winter afternoon.

Left: Mute evidence of a recent traveler.

Right: Scene near Lake Charles, Louisiana.



Below: The river yields to Old Man Winter.



Above: A surprise for Daddy.

Left: Holy Smokes — Yeow—ow.

The Editors Talk

Our Changing Agriculture

The crisis through which American agriculture is passing is giving a new direction to agricultural activity. The crisis is emphasizing the social as well as the economic phases of the problem; it is giving a new direction to agricultural research towards problems of distribution as well as production and towards a more vital spirit of cooperation, not only between farmers themselves but between farmers as groups and government agencies. If these larger aspects of our newer outlook can be permanently achieved, then the depression may not have been in vain.

These changing aspects of agriculture are brought out well in the annual report of the Secretary of Agriculture. The social aspects are emphasized. For instance in discussing the land-utilization policy, the Secretary notes that it is "a social as well as an economic problem. It involves human beings as well as land." Again speaking of new paths in agricultural research that will join economic science to production science the report notes that as we move away from ruthless competition towards efficient social cooperation, the scope and need for such research increase.

But while a more stable social and economic life on the farm and a broader type of research looking towards these ends are ideals to be sought after, what is to be decided about the many problems which must be met to attain these ideals? The report discusses them fully. Of outstanding importance is the attainment of a "balanced abundance." The policy of further restricting domestic consumption along the lines of "scarcity economics" is declared to be of doubtful wisdom. As pointed out the problem is to retain fair and reasonable profits without falling into the pit of "scarcity economics." "Now that farmers enjoy powers which are fairly comparable with those of city industries with respect to production and price control, it becomes necessary for all of us to spend more time thinking about the road to 'balanced abundance' instead of 'competition for profits induced by scarcity.' "

Another problem is maintaining the volume of agricultural exports. The Secretary notes that from 1921 to 1930 this country exported more than 13% of its farm production, which constituted about one-third of its total exports. But since 1929 our farm export trade has declined nearly 60%. "The advantage to the American farmer of enabling Europe to buy here once more would be enormous." The reasons why there would be no countervailing penalties upon industries by the admission of foreign goods into the American market are discussed. It is pointed out that, the admission of foreign goods, since it would be accompanied by an increase in the purchasing power of the farmers, would handicap industry far less than the alternative policy of enforced farm contraction would handicap agriculture.

Among other problems are the forests' capacity to furnish employment; the land-utilization policy; part-time nonfarm work; the shift to grass and forage; new paths in agricultural research; and the need for continued cotton adjust-

ment. As a note of progress it is observed that, in part due to the three types of Federal aid now in operation, farm income including rental and benefit payments, has risen to $6,000,000,000 for 1934 as compared with $5,051,000,000 in 1933, and $4,328,000,000 in 1932.

The ideals of a "balanced abundance" and more secure social and economic conditions on the farm are indeed worthy ideals. Decisions must be made that may well affect agricultural and national life for generations to come. Many of the problems have technical aspects difficult for us all to understand. Not everyone will agree on the ways and means. But a desire to understand and the cooperative spirit are two things that the most humble among us can give towards a better agricultural and national life.

The Weather of 1935

What can we look for in the way of weather in 1935? Will there be another drought? Need farmers in badly stricken areas last year despairingly thumb the attractive seed catalogs which will soon be going through the mails and feel, "Oh, what's the use?"

According to W. R. Gregg, Chief of Weather Bureau of the United States Department of Agriculture, hopes may be as strong next spring as in any other year. While the most outstanding weather event of 1934 was the unprecedented drought that began in the early spring and spread rapidly westward there is nothing to indicate, he says, that this drought constitutes a permanent change to desert-like conditions in a large part of the United States. Present moisture conditions, he admits, are quite unlike those of many centuries ago, but no marked permanent change in precipitation has occurred within the last few years. On the contrary, judging by the longest rainfall records available, the 1934 drought was only what is naturally to be expected at intervals of 30 to 40 years.

Weather forecasts for any considerable length of time, of course, cannot be made with any great degree of accuracy. However, the Weather Bureau this past year paved the way for more accurate forecasts and forecasts of somewhat longer range. With the wider use of modern "working tools," such as radio and airplanes, Mr. Gregg says, the Bureau now stands on the threshold of an era of real progress in forecasting.

Hope for such progress, according to him, centers around the introduction of air mass analysis, the latest aid in forecasting the weather. Three objectives were sought in adopting this system to practical use—(1) training of forecasters in the use of the new method; (2) more frequent, more detailed, and better established observations of atmospheric conditions up to three or four miles above the earth; and (3) more frequent and more detailed reports of surface conditions, including observations at sea.

It is difficult to conceive the great benefit to mankind in the saving of human and animal life and of material goods if the forecasting of weather can, as it undoubtedly will some day, be worked out with accuracy and for some appreciable time ahead. Personal convenience alone should interest everyone in the progress which the Weather Bureau is making toward that end. We hope that 1935 will prove another outstanding year in its research and in the enlargement of its service.

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Fertilizer Experiments with Pecans" by G. H. Blackmon and R. W. Ruprecht of Florida presents data from considerable work with this increasingly important nut crop. Several varieties in orchards in numerous localities were fertilized with varying amounts of different fertilizer analyses. The influence of these fertilizers on the growth and yield of the trees and the size and composition of the nuts was determined. The data are too numerous to be considered here in detail. In general, however, a complete fertilizer was found to be far superior to no fertilizer, or to an incomplete fertilizer, so far as yields and tree growth were concerned. The best analyses and amount of fertilizer varied with the soil and variety of nut grown. Fertilizers did not seem to have much influence on the composition of the nuts during the course of these experiments. Definite information on the fertilizing of pecan trees is rather meagre and pecan growers will welcome these results published as Bulletin 270 of the Florida Agricultural Experiment Station.

The Fertilizer Control Reports of the various States are too numerous for all to be given individual review in these columns, but they contain much interesting and informative material. Unfortunately the data contained in these bulletins are not uniform among the States. In some cases the results of the fertilizer analyses are merely listed. In other cases these listings are reduced to a minimum and much more valuable data on tonnages of various fertilizers and plant-food consumption are given. A good example of this type of report is Purdue University Agricultural Experiment Station Circular 202 "Commercial Fertilizers" by H. R. Kraybill and his co-workers. It is interesting to note that fertilizer tonnage and plant-food consumption increased in 1933 over 1932. However, the tonnages still are only about half of what they were during the 20's. Significant and marked changes in the relative proportions of plant food consumed during the last 14 years are shown. The fertilizers on the average are more concentrated than formerly and contain more of all three plant nutrients. Nitrogen and potash have increased relatively more than phosphoric acid. Many other interesting tables on fertilizer consumption in Indiana are given in the bulletin.

"Fertilizers for Arizona Soils," Agr. Exp. Sta., Tucson, Ariz., Ext. Cir. 80, *Oct.* 1933, *W. T. McGeorge.*

"Quarterly Bulletin," State Bd. of Agr., Dover, Del., Vol. 24, *No.* 2, *June* 30, 1934.

"Effect of Frequent Cutting and Nitrate Fertilization on the Growth Behavior and Relative Composition of Pasture Grasses," Agr. Exp. Sta., Gainesville, Fla., Bul. 269, *July,* 1934, *W. A. Leukel, J. P. Camp, and J. M. Coleman.*

"A Study of Ammonia and Nitrate Nitrogen for Cotton," Agr. Exp. Sta., Experiment, Ga., Bul. 182, *May,* 1934, *K. T. Holley, T. G. Dulin, and T. A. Pickett.*

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Lexington, Ky., Bul. 336, *Dec.* 1932, *H. E. Curtis, H. R. Allen, and Lelah Gault.*

"A Study of the Effect of Certain Ammonium Compounds on the Soil and on the Crop," Agr. Exp. Sta., New Brunswick, N. J., Bul. 571, June 1934, A. L. Prince and A. W. Blair.

"Winter Injury of Baldwin Apple Trees and Its Relation to Previous Tree Performance and Nutritional Treatment," Agr. Exp. Sta., Geneva, N. Y., Bul. 647, July 1934, R. C. Collison and J. D. Harlan.

"Commercial Fertilizers," Agr. Exp. Sta., Burlington, Vt., Bul. 381, July 1934, L. S. Walker and E. F. Boyce.

"Tomato Fertilization—II. The Effect of Different Fertilizer Ratios on the Chemical Composition of Tomatoes," Va. Truck Exp. Sta., Norfolk, Va., Bul. 81, Oct. 1, 1933, R. L. Carolus.

"Nitrogen in Relation to Composition, Growth, and Yield of Wheat," Agr. Exp. Sta., Pullman, Wash., Bul. 296, May 1934, L. D. Doneen.

Soils

Practical suggestions on how to handle sandy soils so as to make the best use of them are contained in Michigan Agricultural Experiment Station Special Bulletin 248 entitled "Sandy Soils" by G. M. Grantham and C. E. Millar. Factors to be considered in determining whether or not to farm a soil at all are briefly given, but most attention is paid to methods of improving those sandy soils worthy of being cultivated. The great importance of organic matter is stressed, the necessity of lime on many of the soils is brought out, and the value of complete fertilizers in producing profitable yields is shown. The growing of adapted crops, crop rotations, and tillage practices also are given. When sandy soils are properly handled, remarkable improvement in yield and quality of crops is produced by correct fertilization. The authors deserve much credit for showing what can be done under actual field conditions on these soils in the profitable production of crops. The bulletin naturally is prepared primarily for Michigan conditions, but the principles underlying sandy soil management given will apply to nearly all such soils.

"Soils and Crops of the Imperial Valley," Agr. Exp. Sta., Berkeley, Calif., Cir. 334, June 1934, Stanley W. Cosby and L. Gordon Goar.

"Soils in Relation to Fruit Growing in New York—Part IV. The Significance of the Oxidation-Reduction Potential in Evaluating Soils for Orchard Purposes," Agr. Exp. Sta., Ithaca, N. Y., Bul. 592, Apr. 1934, Richard Bradfield, L. P. Batjer, and Joseph Oskamp.

"Soils in Relation to Fruit Growing in New York—Part V. The Vineyard Soils of the Westfield Area, Chautauqua County," Agr. Exp. Sta., Ithaca, N. Y., Bul. 609, June 1934, Joseph Oskamp.

"Liming Western Oregon Soils," Agr. Exp. Sta., Corvallis, Ore., Bul. 325, June 1934, R. E. Stephenson and W. L. Powers.

"Need and Use of Lime on Vermont Soils," Agr. Exp. Sta., Burlington, Vt., Bul. 371, Apr. 1934, A. R. Midgley and V. L. Weiser.

"Studies in Tolerance of New England Forest Trees—XI. The Influence of Soil Temperature on the Germination and Development of White Pine Seedlings," Agr. Exp. Sta., Burlington, Vt., Bul. 379, June 1934, W. R. Adams.

"Soil Survey of Frio County, Texas," U. S. D. A., Washington, D. C., Series 1929, No. 25, M. W. Beck, H. W. Hawker, and L. G. Ragsdale.

"Soil Survey (Reconnaissance) of The Trans-Pecos Area, Texas," U. S. D. A., Washington, D. C., Series 1928, No. 35, W. T. Carter, M. W. Beck, H. M. Smith, H. W. Hawker, E. H. Templin and T. C. Reitch.

"Soil Survey (Reconnaissance) of The Columbia Basin Area, Washington," U. S. D. A., Washington, D. C., Series 1929, No. 28, A. T. Strahorn, E. J. Carpenter, W. W. Weir, Scott Ewing, H. H. Krusekopf, A. F. Heck, and H. A. Lunt.

Crops

One of the most complete treatises of an important crop to be recently published is Bulletin 364 "Tobacco Culture in Connecticut." In this publication, Dr. P. J. Anderson, in charge of the Tobacco Substation at Windsor, Connecticut, has clearly brought up to date many years of observation and research work on the profitable growing of tobacco in this New England State. The subject matter is inclusive. Beginning with an introduction outlining the development of the crop from 1640, the author treats of varieties, acreage and distribution, types of soil suitable for tobacco, and seed beds. Much work has been done in this State on the fertilization of this crop and this is well

summarized. Other important problems discussed include setting the plants, cultivation, topping and suckering, harvesting, curing, taking down, stripping and bundling, cover crops, diseases, and insect pests. This bulletin surely will be much sought after by everyone interested in any phase of tobacco production.

"Plant Association and Survival, and the Build-Up of Moisture in Semi-Arid Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. No. 53, June 15, 1934, J. F. Breazeale and F. J. Crider.

"Grapefruit in Maricopa County—Response of Young Trees to Environment and Practices," Agr. Exp. Sta., Tucson, Ariz., Ext. Cir. 77, Apr. 1933, George W. Barr, Reuben M. Hess, and J. H. O'Dell.

"Growing and Handling Market Peas in California," Agr. Exp. Sta., Berkeley, Calif., Ext. Cir. 85, Apr. 1934, Parker Talbot and A. A. Tavernetti.

"Annual Report for the Fiscal Year Ending June 30, 1933," Agr. Exp. Sta., Gainesville, Fla., Wilmon Newell.

"Dead Grapefruit Refuse—A Valuable Feed," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 466, Oct. 1934, W. M. Neal, R. B. Becker and P. T. Dix Arnold.

"Science Aids Idaho Farmers," Agr. Exp. Sta., Moscow, Idaho, Bul. 205, May 1934, E. J. Iddings.

"Report of Moses Fell Annex Farm, Bedford, Indiana," Agr. Exp. Sta., Lafayette, Ind., Cir. 203, June 1934, H. J. Reed and H. G. Hall.

"Sudan Grass," Agr. Exp. Sta., Lafayette, Ind., Leaflet No. 188, Apr. 1934, R. R. Mulvey.

"Fory-sixth Annual Report of the Agricultural Experiment Station of the University of Kentucky for the Year 1933," Agr. Exp. Sta., Lexington, Ky., Thomas P. Cooper.

"Corn and Soybean Production," Agr. Exp. Sta., Baton Rouge, La., Bul. 253, July 1934, Harold T. Barr.

"Effect of Size of Seed Piece of Irish Potato on Recovery from Freeze Injury," Agr. Exp. Sta., Baton Rouge, La., Bul. 254, Sept. 1934, W. D. Kimbrough and David Costa.

"Growing Fall Irish Potatoes," Agr. Exp. Sta., Baton Rouge, La., Cir. 11, Aug. 1934, W. D. Kimbrough.

"Sudan Grass for Hay and Pasture," Agr. Exp. Sta., College Park, Md., Ext. Cir. 107, May 1934, F. W. Oldenburg.

"Duluth Vegetable Crops: Up to Now—Summary of Annual Report of the Northeast Exp. Sta., Univ. of Minn. for the year 1933," Agr. Exp. Sta., Duluth, Minn., Feb. 1934, M. J. Thompson.

"Arrowhead Vegetables: Varieties and Fertilizers," Northeast Exp. Sta., Duluth, Minn., Mar. 1932, M. J. Thompson.

"A Compilation of Experimental and Other Data on Winter Legumes," Agr. Exp. Sta., State College, Miss., Bul. 303, Aug. 1934.

"The Family Garden," Agr. Exp. Sta., Columbia, Mo., Ext. Cir. 311, Feb. 1934, J. W. C. Anderson.

"Good Pasture Practice," Agr. Exp. Sta., Columbia, Mo., Ext. Cir. 313, Mar. 1934, C. A. Helm.

"Establishing Permanent Pastures in Missouri," Agr. Exp. Sta., Columbia, Mo., Ext. Cir. 314, Mar. 1934, C. A. Helm and H. H. Krusekopf.

"Potato Growing in New Hampshire," Agr. Exp. Sta., Durham, N. H., Ext. Bul. 45, Apr. 1934.

"Fifty-third and Fifty-fourth Annual Reports of the New Jersey State Agricultural Experiment Station and the Forty-fifth and Forty-sixth Annual Reports of the New Jersey Agricultural College Experiment Station for the 2-year Period Ending June 30, 1933," Agr. Exp. Sta., New Brunswick, N. J.

"Cotton Breeding Investigations, 1928 to 1932," Agr. Exp. Sta., State College, N. M., Bul. 217, Jan. 1934, G. N. Stroman.

"Narcissus for Garden and Home," Agr. Exp. Sta., New Brunswick, N. J., Ext. Bul. 119, May 1934, H. M. Biekart.

"Pear Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 146, July 1, 1934.

"Spinach Production," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bul. 282, Apr. 1934, F. O. Underwood.

"Physiological and Chemical Changes in Carrots During Growth and Storage," Agr. Exp. Sta., Ithaca, N. Y., Mem. 161, Apr. 1934, Hans Platenius.

"Vegetative and Reproductive Responses Associated with Fruit Development in the Cucumber," Agr. Exp. Sta., Ithaca, N. Y., Mem. 163, June 1934, John P. McCollum.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIX, No. 171, Nov.-Dec. 1934.

"Putting Green Grasses and Their Management," Agr. Exp. Sta., Kingston, R. I., Bul. 245, July 1934, H. F. A. North and T. E. Odland.

"The Production of Spring Vegetables in the Lower Rio Grande Valley," Agr. Exp. Sta., College Sta., Tex., Cir. 72, Sept. 1934, W. H. Friend and S. W. Clark.

"Forage Sorghums in Texas," Agr. Exp. Sta., College Sta., Tex., Bul. 496, Oct. 1934, J. R. Quinby, J. C. Stephens, R. E. Karper, and D. L. Jones.

"Shortening the Rest Period of the Potato," U. S. D. A., Washington, D. C., Tech. Bul. 415, July 1934, William Stuart and E. H. Milstead.

"The Feeding Value of Artificially Dried Young Grass. III," Agr. Exp. Sta., Burlington, Vt., Bul. 368, Mar. 1934, O. M. Camburn.

"Forty-seventh Annual Report, 1933-1934," Agr. Exp. Sta., Burlington, Vt., Bul. 380, July 1934, J. L. Hills.

"Department of Agriculture-Immigration of Virginia," Richmond, Va., Bul. 321, Nov. 1934.

"Our Changing Agriculture Served by Science," Agr. Exp. Sta., Madison, Wis., Bul. 428, June 1934, Chris L. Christensen.

"Wisconsin Farming Under Adjustment," Agr. Exp. Sta., Madison, Wis., Ext. Cir., 269, May 1934, Chris L. Christensen.

Economics

"Prospects for Agricultural Recovery—VII. Requirements for Economic Plans Affecting Agriculture," Agr. Exp. Sta., Ames, Iowa, Bul. 316, July 1934, John A. Hopkins, Jr.

"Prospects for Agricultural Recovery—VIII. Who Pays for the Hog Reduction Program?" Agr. Exp. Sta., Ames, Iowa, Bul. 317, July 1934, Geoffrey Shepherd.

"The Destination of Iowa's Commercial Corn," Agr. Exp. Sta., Ames, Iowa, Bul. 318, June 1934, Ronald C. Bentley.

"Methods Used in an Economic Study of Land Utilization in Tompkins County, New York, and in Other Similar Studies in New York," Agr. Exp. Sta., Ithaca, N. Y., Mem. 160, Apr. 1934, A. B. Lewis.

"An Economic Study of Grape Farms in Eastern United States—Part I. Production," Agr. Exp. Sta., Ithaca, N. Y., Bul. 605, May 1934, G. P. Scoville.

"An Economic Study of Farms in the Spring Wheat Area of South Dakota," Agr. Exp. Sta., Brookings, S. D., Cir. 19, May 1934, C. M. Hampson and Poul Christophersen.

"Estimated Returns from Farms of Large, Medium, and Small Size of Business in the Spring Wheat Area of South Dakota," Agr. Exp. Sta., Brookings, S. D., Cir. 20, May 1934, C. M. Hampson and Poul Christophersen.

"Estimated Returns from Operating 800 Acres in the Spring Wheat Area Under Four Different Plans," Agr. Exp. Sta., Brookings, S. D., Cir. 21, May 1934, C. M. Hampson and Poul Christophersen.

"The Economics of Certified Seed Potato Production—I. The Seed Potato Enterprise," Agr. Exp. Sta., Burlington, Vt., Bul. 370, June 1934, John A. Hitchcock.

"Studies in Vermont Dairy Farming—VIII. Orleans, St. Albans, Randolph, and Richmond Areas," Agr. Exp. Sta., Burlington, Vt., Bul. 376, June 1934, S. W. Williams.

"Trends in Agriculture in Washington 1900 to 1930—Types of Farming Series, Part II," Agr. Exp. Sta., Pullman, Wash., Bul. 300, June 1934, Neil W. Johnson and Rex E. Willard.

"Nature and Distribution of Types of Farming in Washington—Types of Farming Series, Part III," Agr. Exp. Sta., Pullman, Wash., Bul. 301, July 1934, Neil W. Johnson and Rex E. Willard.

Tobacco—The Gold of the Province

(*From page* 11)

In the rate of application test, the analyses used in three separate series were 4-8-7, 4-8-10, and 4-8-12. Walters Brothers of Hughesville, Maryland, conducted the 1931 test in Charles county, and here are their results (Table II).

The combined summary of the tests

Table II—RATE OF APPLICATION TESTS—1931
Walters Brothers, Hughesville, Maryland

Plot No.	Rate per Acre	Yield per Acre Pounds	Price per Pound Cents	Value per Acre Dollars
1	0	667	10.9	72.70
2	400	797	12.9	102.81
3	600	837	14.1	118.01
4	800	985	18.5	182.22
5	1000	974	25.4	247.39
6	1500	1128	25.1	283.12

completed in all the Southern Maryland counties is shown in Tables III & IV, which speak for themselves.

Maryland Tobacco growers have never had such an opportunity to realize a profitable income from tobacco growing as now. Their Experiment Station has developed information on soil types, varieties, cultural practice, fertilization, and proper handling and marketing of the crop. The Extension Service is continually reminding farmers of the best practices and is endeavoring to carry direct to the farmers the most practicable information obtainable.

(*Turn to page* 26)

Table III—Summary—RATE OF APPLICATION TESTS
(11 Tests on 11 Farms)—1926-1931

Plot No.	Rate per Acre Pounds	Yield per Acre Pounds	Price per Pound Cents	Value per Acre Dollars
1	0	873	24.8	216.50
2	200	905	25.9	234.39
3	400	973	28.2	274.38
4	600	1002	28	280.56
5	800	1048	29.2	306.01
6	1000	1068	33.4	356.71

Table IV—Summary—POTASH VARIATION TESTS
(17 Tests on 17 Farms)—(1928-1931)

Plot No.	Fertilizer Analysis	Yield per Acre Pounds	Price per Pound Cents	Value per Acre Dollars
1	4-8-0	898	21.2	190.37
2	4-8-4	965	22.8	220.02
3	4-8-8	999	25	249.75
4	4-8-12	1022	26.2	267.76
5	4-8-16	1063	26.7	283.82
6	4-8-20	1051	25.3	265.90

Field demonstration ready for harvesting on the farm of Joseph S. Burch, Port Tobacco, Maryland. Left, fertilized with 4-8-16. Right, with 4-8-20. Note the smoothness of leaf.

As a result of the years of research by the Experiment Station and the carefully conducted field tests by the County Agents, recommendations for practically all local needs of the tobacco crop have been decided on as follows:

FERTILIZER RECOMMENDATIONS FOR MARYLAND TOBACCO

Without either manure or legumes in the rotation and on rested land	4-8-12*
With both manure and legumes in the rotation	0-12-10*
With manure in the rotation	2-12-8*
With legumes in the rotation	2-8-10*
For tobacco seed-beds	6-6-8*

*** All Potash from Sulphate of Potash**

These recommendations have been made flexible enough to fit prevailing practices as to rotations on typical tobacco soils. Generally speaking, the 4-8-12 at 1,000 pounds per acre on rested land without manure or legumes should be satisfactory. Exceptions to this would be for conditions where manure or manure and legumes in the rotation are used, in which cases the 2-12-8 and the 0-12-10, respectively, are preferred.

If a soil is suited to tobacco and these recommendations are carefully followed, leaf of better texture, brighter color, and better burning quality will be grown. Such leaf commands better price per pound and, as Captain Neale pointed out to Phillip Trueman more than 300 years ago, tobacco truly becomes the "Gold of the Province of Maryland."

Soil Survey Map Key To Land-Use Problem

A possible key to the solution of the land-utilization problem hangs on the wall of an office of the United States Department of Agriculture in Washington. It is a large map of the country in 250 color patterns, each representing a soil type.

Like individual breeds of cattle, the soil scientists say, each soil type has definite characteristics, needs, and possibilities. Every soil is most fertile for certain plants. Some are most fertile for pine trees, others for grasses, some for crops, and so on. To be made productive for cultivated plants, certain soils need lime, or potash, or irrigation, or terracing, etc.

Soil scientists of the Department have classified and mapped the soils of about one-half of the arable portion of the United States in the last 35 years. With the aid of field and laboratory tests and making use of actual experience gained by farmers, ranchers, and foresters, the character of each is established.

The large many-colored map has recently been assembled from all the information thus far available. This map is on a scale of 1 inch to 40 miles. Although necessarily very general, it gives the location of groups of similar soils shown in detail on the county soil maps published on the much larger scale of 1 inch to the mile. This large map of the country does not furnish the detailed data necessary in comparing one farm with another, but it does allow important regional comparisons. It furnishes the best summary of the soil resources in this or any other country.

Pastures — Irrigated *and* Fertilized

By R. E. Stephenson

Oregon State College

FIFTY-FIVE per cent of the land area of the country is devoted to grazing. On the average the quality is poor and grazing stock are only half fed for a large portion of the season. Considering the entire country, nine acres are required to support an animal.

Fifty per cent of the grazing area is arid or semi-arid, where lack of water permits such sparse growth of grass that 24 acres are needed for each animal unit. The average for the humid section is in the neighborhood of four acres, whereas the better humid pastures support an animal on two and one-half acres.

Compared to these general conditions the most select irrigated Ladino clover pastures in Oregon on fertile soils carry four mature animals per acre. This is 16 times the average or nearly eight times the carrying capacity of the better pastures of the improved lands of the humid sections. Furthermore the irrigated pastures on fertile soil add about one month to the grazing season because of earlier and later grazing.

Great Asset to Dairymen

The dairy farmer is best situated to make pastures profitable. The dairyman can advantageously use every available means to increase pasture production. Records secured by Arthur King show that dairymen by the help of irrigated pastures have produced butterfat at an average annual cost of 16 cents a pound, this, in a section in Oregon where the annual rainfall averages 42 inches. Water is abundant at times, but is poorly distributed through the grazing period. There is very little rain from June till September. During this period irrigation has paid good profits wherever tried.

Grass responds readily to irrigation. The shallow roots soon exhaust the surface of its moisture, and growth stops. Any period of two weeks without two inches of rain is a drouth for grass. Those who irrigate apply two or three inches of water every two weeks through the dry part of the summer. Recently a farm owner described pasture irrigation as "the greatest thing that ever happened to the Willamette Valley" in Oregon.

It is probably safe to predict that every dairyman in the country where summer drouths are at all common can profitably irrigate provided water is easily obtainable. Some of the best bluegrass pastures of the Midwest and East are dry and parched for a long period of the summer. During this time a drop in the milk flow is nearly unavoidable even with the best supplemental feeding. With good irrigated grass, production is held pretty uniform through the whole summer.

Under normal conditions the peak of pasture growth is about June. Recent studies in Connecticut show that 68 per cent of the total yield is grown before July 15, and only 32 per cent during the three or more months which follow. This indicates pastures with only 50 per cent carrying capacity during the last half compared with the first half of the season. The quality as well as quantity is very poor as the grass dries up. The use of water levels production to a uniform

rate for the whole summer.

Fertility as well as water is needed to produce grass. The stimulation of big yields with water can only exhaust the soil more rapidly unless fertilizer is used. The milk produced by two good cows through one grazing season removes fertility equivalent to that supplied in a 100-pound bag of good fertilizer. Four cows grazed on an acre remove the equivalent of two bags of fertilizer. Grazing is not hard on land. In fact the use of land for grazing makes soil building easy, if fertilizer is used.

Fertilization Without Water

The German or Hohenheim system of pasture management depends upon liberal fertilization without the aid of irrigation water to supplement an erratic rainfall. This system involves the use of limestone, (about a ton per acre) where needed to correct acidity, and a liberal dressing (1,000 pounds an acre) of mineral fertilizer rich in phosphate and potash. In addition a nitrogen fertilizer is applied about three times during the season. The first application of 150 pounds of nitrate of soda, or the equivalent of sulfate of ammonia, is made in March or April. Another application follows in June, and the third about August. The latter applications may be a little lighter than the first.

The Hohenheim system where tried in this country has doubled the carrying capacity of good pastures. Reports indicate that where this system is used one to one and one-half acres may feed a mature cow well through the grazing season. But the Oregon system (supplementing natural rainfall with irrigation water) enables the dairyman to carry two to four cows an acre and have them well fed. Thus fertilizer without supplemental water in humid sections doubles the carrying capacity. When the water is supplied the carrying capacity is more than doubled again. The cost of watering by irrigation is seldom more than the cost of fertilizing. Where one is profitable, both are at least twice as profitable. Records show that cows have been well fed on irrigated grass at a cost of less than 5 cents a day per head.

Fertility is half the story and water is the other half. Neither can be overlooked without reducing the effectiveness of the other. Observers report that after the third year of watering, if fertilizers are not used, the production of grass takes a decided drop. By controlling moisture, fertilizers are made effective and profitable. Furthermore they are safe to use in amounts impossible under the menace of drouth.

Data from the Connecticut station (without irrigation) indicate that when moderate amounts of fertilizer are used, better returns are obtained when the entire amount is applied early in the spring. Nitrogen, part from sulfate of ammonia and part from nitrate of soda, was used in amounts equivalent to 400 pounds of nitrate an acre. Half applied in April and half in July produced smaller yields than when all was applied in April. Lack of moisture undoubtedly reduced the effectiveness of late fertilizing. The average production of grass for five years was doubled by minerals alone (2 tons of lime, 1,000 pounds 16 per cent superphosphate and 200 pounds of muriate of potash in five years). The increase was much greater in favorable seasons. The importance of water is indicated by comparing two years. In 1928 the rainfall in July and August was 50 per cent above the average. During that year more than 49 per cent of the growth of grass occurred after July 15. In 1930, August and September were unusually dry. During that season only 16 per cent of the yield of grass was produced after July 15. As an average for the whole period the growth of grass for one month, May 15 to June 15, was nearly equal the entire growth produced after July 15, covering three months or more. One

may fairly hear the stunted grass crying for water.

The area of land devoted to crops for stock feed is about one-fourth that used for grazing. Yet the sustenance of animals is about equally divided between grass and dry feeds. Two and one-third acres of feed-producing land are required for each animal unit. These data indicate that grass land produces less feed than cropped land. This apparent result is due to the large area of poor land used for pasture.

Careful studies in Pennsylvania indicate that when good soil is used, pasture yields slightly more dry matter and appreciably more digestible protein than cultivated crops grown in rotation. The labor of producing an acre of cultivated crops averaged 28 times as great as that to produce an acre of grass. To produce a ton of digestible protein in cultivated crops cost in labor 63 times as much as when produced from pasture. Economy dictates therefore that as much stock feed as possible should be produced in the form of grass.

Pasture has been described as "the most neglected crop." But sentiment, based upon established facts, is rapidly changing. The conclusion is justified, that "no land is too valuable to become profitable under grass," especially on the dairy farm. The more valuable the land, the more important it becomes to push yields to the maximum with fertilizers, water, and good management. Dairymen have reported net returns of $35 to $45 an acre from grass. How many cultivated crops yield as much even under favorable conditions!

The Inquiring Mind

(*From page* 14)

soils, chief needs of New England agriculture, tendencies in station work, preventions in plant experimentation, after-effects of certain phosphates on limed and unlimed soil, alfalfa and its culture, cover crops, fertilizers and cover crops for fruits and vegetables, the potash shortage, humus content of soil, farming the air, the relationship of the chemistry of soils and fertilizers to the growth of nursery stock, fertilizers for florists, air-nitrogen fertilizers, etc.

In the interval from December 1912 to December 1931 he published for the American Agricultural Chemical Company 60 or more bulletins, circulars, and booklets among which were: "How to Get the Most out of Fertilizers;" "Crops That Pay (Illustrated);" "Citrus Culture in California;" "Citrus Culture in Florida;" and a service bureau news letter. In 1932 and 1933 his series of articles on "Some Mysteries of the Soil" and "The Care of the Lawn" in the columns of the *Rural New Yorker* were received favorably and gave the farm readers much information of an interesting and practical character. The new series begun in that paper in October 1934 has again attracted wide attention.

Evidently he has kept busy all of the time and has considered "idleness the rust of the mind" and believed that to beget esteem, one must benefit others. That, he certainly has done for the farmers of Rhode Island and of many other States, thus earning and deserving their approbation and gratitude and building up a national reputation that will endure.

Native of Massachusetts

Homer J. Wheeler was born at Bolton, Massachusetts, September 2, 1861, the son of Jesse B. and Martha Ann Sykes Wheeler. He was reared on the farm and obtained his early educa-

tion in the district schools. In 1883 he received the B.S. degree from the Massachusetts Agricultural College and Boston University, and in 1899 the Ph.D. degree from the University of Goettingen, Germany. In 1911 Brown University conferred upon him the degree of Doctor of Science. He is an ex-President of the Association of Official Agricultural Chemists and of the American Society of Agronomy, and is a member of Alpha Sigma Phi.

From 1883 to 1887 he was assistant chemist of the Massachusetts Agricultural Experiment Station, and from 1889 to 1907 chief chemist of the Rhode Island Experiment Station. He served as Professor of Geology at Rhode Island State College, 1891 to 1902; Professor of Agricultural Chemistry, 1902 to 1910; acting President, 1902-1903; and Director, Rhode Island Experiment Station, 1900 to 1912. In the latter year he became chief agronomist of the American Agricultural Chemical Company, New York City, a position he held until 1932, when on account of advancing years he retired on a part-time basis. On May 15, 1891, he was married to Frieda H. F. Ruprecht of Germany. They have three sons.

General Knowledge Necessary

Students and research workers will find in Dr. Wheeler's notable book "Manures and Fertilizers" many interesting and instructional conclusions based on the experiments he conducted at the Rhode Island Station.

As a result of his long experience he advised that the person examining the soil should have a good general knowledge of the region from which it comes. He also should know as completely as possible the previous manurial treatment of the soil and the crops that are to be grown, before attempting to recommend special manurial application. This he deemed necessary because of the long-continued beneficial or injurious effects of previous applications of fertilizers, dependent upon the kinds employed, and because of the widely varying requirements of the different varieties of plants.

Experimental work on individual farms in Rhode Island was begun by the Experiment Station in 1890. In that year 11 one-acre fields in as many sections of the State were employed. The idea was to test the relative efficiency, for Indian corn, of nitrogen in nitrate of soda, in sulphate of ammonia, and in dried blood; and also to ascertain the relative lack, in the respective soils, of nitrogen, potash, and phosphoric acid. The results were published in Bulletin No. 139. Extensive experiments in 1892 and 1893 established the fact that the soil on the farm of the Experiment Station at Kingston was greatly in need of lime. The general need of lime was determined in 1896 by experiments conducted on the higher part of the college farm at Kingston and on 10 farms in various parts of the State. Such investigations were conducted in 1898 and 1899 and from 1902 until 1911. Results were published by Dr. Wheeler in Bulletin No. 149 of January 1912.

Value of Work Wide-spread

The experimental work of Dr. Wheeler and an assistant in the use of lime on farm soils brought out facts of considerable interest and value. He found that the addition of carbonate of lime to soils often increases their power to hold potash, ammonia, and other bases, either by chemical or physical means, or perhaps both. He found, too, that liming acid soil lessened the relative amount of weeds, chiefly common sorrel, and increased in a marked manner the growth of timothy, orchard grass, awnless brome-grass, and clover. The increased growth of meadow oat grass, brought about by liming, was less marked than that of the grasses just mentioned. Successive applications of nitrate of soda seemed to lessen the acidity of soils by virtue of

the soda left behind after the utilization of the nitric acid by the plant, while the tendency of sulphate of ammonia upon unlimed soil was just the reverse, making the conditions for the growth of sorrel even more favorable than they would otherwise have been.

There can be no question that the analytical work of Dr. Wheeler and his associates relative to the chemical composition of commercial fertilizers and feeding stuffs offered for sale in Rhode Island was of inestimable value to farmers. As already mentioned he was influential in securing laws for the inspection of those commodities, which proved highly satisfactory. His work in many other lines of agricultural activity has proved of equal benefit.

Versatility Is Marked

The versatility of Dr. Wheeler and the remarkable way in which he has been able to interest himself in new subjects, in new environments, are well evidenced by the work he has done in relation to citrus fruit culture in California and Florida since resigning from the Rhode Island Experiment Station. He has published two instructive booklets which indicate much study and a clear understanding of the citrus fruit growing industry in all of its phases. In them he even gives much useful information regarding the insects and diseases which prey on the orange and other citrus fruits. Other numerous circulars and bulletins written in his new sphere of work give practical advice on the better methods of producing other fruit, farm and truck crops, in the States mentioned.

Concerning the inception of the culture of citrus fruits in America, Dr. Wheeler gives the credit to the Spaniards. He says that in 1769 the Franciscan Fathers led by Junipero Serra, leaving lower California and moving northward, founded the Mission of San Diego. They taught the Indians not only a religion, but the arts of peace, especially agriculture. Vineyards and orchards were set out, traces of which may still be seen, and various sub-tropical fruits were grown. The San Gabriel Mission near Los Angeles was among the most flourishing, and here was planted in 1805 the first large orange grove in the present State of California. This covered six acres and numbered about 400 trees, a few of which still bore fruit 80 years later.

Further, he states that the Washington Navel is particularly adapted to California, and its trademark "the navel end" and absence of seeds give it special advantages, since it cannot be grown successfully in Florida because of developing a thick peel, much rag, and high acidity. The navel, sometimes called the "King" of oranges, is now gradually yielding its title to the former "Queen"—the California Valencia.

Keep Orchard Trees Healthy

Keeping orchard trees fully clad with healthy leaves is, by Dr. Wheeler, considered of vital importance. He says that the process of assimilation, or the formation of sugar, starches, and proteins in the leaves, continues as long as leaves remain green. This necessitates a constant supply of available mineral substances in the soil. As these mineral substances in soluble and readily available form are not present in most soils in sufficient quantities, and especially in sandy soils, the frequent and regular application of suitable fertilizers becomes imperative. And, regarding the feeding of all kinds of farm, garden, and orchard plants, he advises that the important principle to be borne in mind is that *there must be present in the soil during the entire growing season a sufficient amount of all of the necessary elements, in an immediately available form, to meet the fullest requirements of the plant.* Only fertilizers which are so compounded as to furnish all of the lacking plant-food elements in the necessary forms throughout the en-

tire growing season can be expected to give the best results.

One wonders how Dr. Wheeler has managed to retain sufficient vitality, at his time of life, to interest himself so keenly in the subjects to which he has so long and actively directed his attention; but we fancy that his early life on a farm, and the fishing, hunting, and golfing he has done since for exercise and recreation, have conserved his good physical condition and alertness of mind. To his beloved wife also must be given much of the credit for "keeping him in order" and comfortable in their ideal home at Upper Montclair, New Jersey. Here, we hope, they may enjoy together peace, contentment, health, and happiness for many more years to come.

Hearts and Hopes

(*From page 6*)

nights amid the terrifyinig rockets of the Great War, patient and pitiful mine disasters, wrecks and rescues at sea, men and women on the brink of self-inflicted death through tragedies seemingly too heavy for their soul's resistance. Yet after all, the simpler incidents which weave our daily ordinary lives seem closer to the usual aspects of the winter holidays.

DURING the four years or more in which we have missed some of the customary lilt and dash of Christmas and the enthusiasm and hope of the dawning year, has there not been more constant, steady, devoted—albeit blundering—progress ahead toward a goal which will bring us closer to the ultimate meaning of Christmas?

It may be that folks have talked in "parties" and taken divergent views of the identical problem, yet humanity since 1929 has reached higher and searched deeper toward the ideal of brotherhood, so oft repeated and as quickly forgotten.

The Christmas spirit, like all other worth while things, is undergoing transformation, perhaps evolution. It began as a mystic symbol, a hidden Grail; grew into orthodox pageantry; branched out into commercialism and hectic rivalry; and now it seems to be coming out of its Calvary of pain with a new meaning. Probably it now begins to assume its intended hue after all these groping centuries. What has been so long an annual sentiment or spree may become for us a new constitution and a living code.

Piety that counts and goodness that lasts cannot be produced on fear, hunger, and insecurity. A full belly and a decent home are greater inducements to good citizenship than *some* sermons, many laws, and *all* penitentiaries.

AND so this is in reality not a sad time or a time for woebegone predictions and funereal pessimism. This is the dark hour just before the "toppiest" old morning that the country ever greeted.

For every shirker who claims the world owes every man a living there are twenty other willing ones who exclaim: "But the world owes every man the right to *live*." And since it may be too late to wish you Merry Christmas, let us echo the modern spirit by extending to one and all the broader message, "Happy New Era!"

NOT MUCH OF A SMOKE

"Have a cigar?" said the man with the smiling face.

"Don't mind if I do," said his friend. "But what's the occasion? Why this lavish display?"

"Oh, I've got an addition to the family."

"You don't say so? Congratulations!" said the other man, enthusiastically, as he put a match to his cigar. After a few puffs he observed, "About the fifth child, I should say."

"You are charged with being intoxicated," said the judge to a man before him. "What is your name?"

"My name is Angus McPherson MacNabb," replied the prisoner.

"And who bought you the whiskey?" asked the judge.

Father: "My son, I hear you have been most recalcitrant."

Son: "Be yourself, Pop, you've been doing cross-word puzzles again."

Prof. of English: "What is a metaphor?"

Freshman: "To keep cows in."

Smiff: "Bridget, do you know anything concerning my wife's whereabouts?"

Bridget: "Yes, sir, I put them in the wash."

EYE FOR AN EYE

The story is told that when Bishop Candler was riding on a train out West, a big, strapping, rough fellow came in and sat down beside him. Sizing up the Methodist prelate, he exclaimed, "Where in hell have I seen you before?" To which Bishop Candler replied, "I don't know; what part of hell are you from?"

Boy-Friend: "Guess who it is; and if you can't guess in three guesses, I have a right to kiss you."

Helen: "Jack Frost—Father Time—Santa Claus."

GOOD FOR BOTH

The conductor helped the fat lady aboard the street car and remarked, "You ought to take yeast, lady, it would help you to rise."

"Take some yourself, young man, and you'd be better bred," was the reply.

"Wives are sold in the Fiji Islands for $5 each.

"Shame, isn't it?"

"Yep," growled the grouchy bachelor, "more profiteering."

"Jim," said Brown, "what did you call your mother-in-law after you got married?"

"Well," replied Jones, "for the first year I addressed her as 'Say,' and after that we called her 'Grandma.' "

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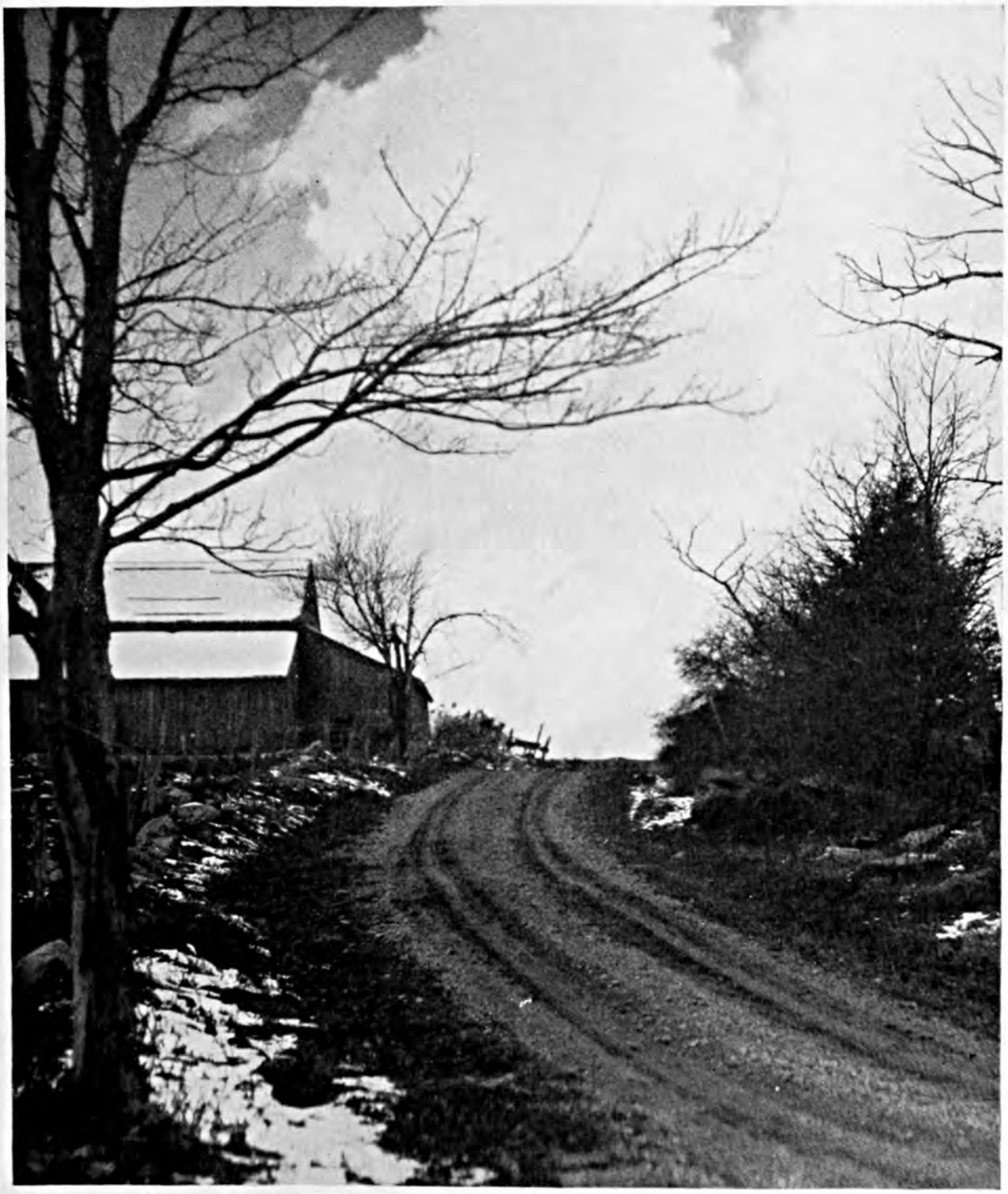

Spring Fertilizer Number

3-8-8

NITROGEN PHOSPHORIC ACID POTASH

a better-balanced fertilizer for BRIGHT TOBACCO

3-8-8 The biggest and best news you will find in the new fertilizer price lists is the very small difference in cost between a low-potash fertilizer and a fertilizer well balanced with plenty of **NV** POTASH. For example, compare 3-8-3 fertilizer with 3-8-8 fertilizer. The 3-8-8 contains 35% more actual plant food, yet it costs you very little more than the 3-8-3. Figured in terms of an acre the extra cost is so small it will surprise you.

3-8-8 3-8-8 TOBACCO FERTILIZER has proven its value throughout the entire bright tobacco belt. Many leading farmers in this section use 3-8-8 or increase the potash in their regular fertilizer to 8% or even more by using extra applications of potash.

3-8-8 The U. S. Department of Agriculture and the North Carolina State College of Agriculture recommend a fertilizer containing 6 to 10% potash for bright tobacco.

3-8-8 Chemical analysis of high-quality tobacco plants proves that a 1,000-pound crop contains more than three times as much potash as 800 pounds of 3%-potash fertilizer contains.

3-8-8 Fertilizer containing too much nitrogen produces rough, bony tobacco. Avoid this by selecting a fertilizer mixture in which the nitrogen has been well-balanced with plenty of potash.

3-8-8 3-8-8 TOBACCO FERTILIZER gives best results with closer rows, closer spacing, ridge cultivation and late topping. Set more plants per acre and top after about half the crop is gathered.

3-8-8 3-8-8 TOBACCO FERTILIZER holds the tobacco on the hill after it matures, without burning, producing a thin, grainy leaf with "high-dollar" quality.

3-8-8 Remember that 800 pounds of 3-8-8 usually costs less than 1,000 pounds of 3-8-3, yet 800 pounds of 3-8-8 contains more actual plant food and is a much better balanced fertilizer.

3-8-8 Plan now to produce a thin leaf on the bright side. Use the best cultural methods, correct spacing, high topping and the proper amounts of 3-8-8 TOBACCO FERTILIZER. The extra potash in this fertilizer adds the extra quality that brings more on the floor.

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Say it and mean it —

"Go *to* Grass"

By Jeff McDermid

WHY is it that in the common parlance of America the phrase "go to grass" has become a symbol for a sort of decadence, a shiftless let-go policy, or a dull reversion to type?

Maybe it's the hill-billy idea; perhaps it's because half of the so-called wild grass land of our country is mesquite, sage, wire grass, scrub and desert growth. Perhaps it's because one can let grass grow after a fashion without so much tramping hither and yon over and over the acres to coax up a crop—like much farming was conducted before Jethro Tull "invented" his horse-hoeing husbandry.

Yet after all I suspect that we have so long regarded grass as a free gift of the gods of nature that it denotes trying to resign from active partnership when mankind is content to put his holdings into meadow or pasture.

You probably recall the story about the plains Indian who slid off his pony to observe a squatter breaking the tough Montana sod. Pointing to the antelope and bison herds in the distance, the ignorant old aborigine grunted, "Huh, white man put wrong side up!" This remark greatly amused

the ambitious settler, whose anxious descendants have since borrowed countless sums to stave off the effects of drought. It only added one more bit of evidence, according to the farmer, that only simple minds would "go to grass."

AS long as this nation was in debt to the Old World and had room for expansion and huge export trade, the wisdom of the founders of agriculture pointed with unerring logic to the fact that as a rule a rotation of cultivated crops with grain and hay produced fifty per cent more nutrients to fatten livestock or to produce wool and milk than the same area allowed to "go to grass." Labor counted for little and so it became gospel to speed the plow over the prairies and drain the marshes. What small portions there were left to grass consisted of the rough and wooded sections, where snags and stones discouraged the ardor of the adventurers.

It seems a far cry indeed from ad valorem tariffs or lists of import and export balances, or nationalism versus internationalism to the proper seeding, fertilizing, and stocking of *Poa pratensis* and *Trifolium repens*, otherwise known as Kentucky bluegrass and white clover. Our fathers would have taken anyone to the bug-house who mixed up such terribly unrelated things in their day.

BUT we have since learned that many things are related in strange ways and intermixed in confusing combinations which seem as opposite as the poles. Such, for instance, as the nitrogen in explosives and the nitrogen that may help grow the feed to make a juicy bullock to serve at a peace conference banquet.

Efficiency in agriculture has been spelled in terms of hustle and full plant capacity for so long that anyone who talks less intensity of operation is rated with the Indian. But diminishing returns may catch up with the zealous ones who insist on planting high-yielding crops on every available acre. It is not so big a piece of heresy as imagined to suggest that a general shift toward hay and pasture and to soil-improving crops would tend to build up farm incomes and restore the almost ruined farms in many states.

Those who claim this doctrine is "hogwash" might consider the "rainwash," and what it has done to us. Surveys taken in painstaking detail throughout the land by the Bureau of Chemistry and Soils reveal a system of private mismanagement that smells like a public scandal. It never gets the front page with the kidnappers, but it is a serious charge against the men who have been entrusted with the basic wealth of the nation. They brag loudly about it in conventions, but this same foundation of American life known as farming and stock-raising exposes its seamy side in countless crevices, gullies and gashes left in the wake of soil robbing and mineral-food mining. Although most evident in areas of low natural fertility, the devastating effect of erosion on the better farm lands is less spectacular but no less ruthless and inexcusable.

AN area exceeding the total arable land in Japan, once cultivated in America, has been so horribly chopped into a mass of caves and gullies that nothing else compares with it except the shell fields of Flanders. The down rush of flood waters over the ungrassed slopes has carried gravel and debris and heaped it high on more than three million more acres of naturally fertile bottom lands. Wide and trickling sheets of freshet water have likewise slowly stripped the best plant food from thousands of acres of upland topsoil.

Plenty of land once consisting of productive mellow loams and sandy loams, easy to till and bursting with virgin fertility, have been changed by

(*Turn to page* 45)

Feed Southern Crops According to Their Needs

By A. B. Bryan

Editor, Clemson Agricultural College of South Carolina

THE intelligent feeding of plants with fertilizer rations properly balanced to satisfy the particular hunger and needs of each crop is gaining full acceptance as a first principle in economic crop production. Hence the significance of new results from researches regarding fertilizers.

Among Southern research agencies the South Carolina Agricultural Experiment Station is outstanding for the timeliness and appropriateness of its studies in fertilization problems. Director H. W. Barre acts upon his awareness of the value of such studies in a state and section where commercial fertilizers play so big and so necessary a part in production; and Dr. H. P. Cooper, agronomist of the station and noted authority on soils and their ailments, is always keen to see and solve a hungry soil's needs.

Manganese-deficient oats, showing yellowing of leaves.

The present results of South Carolina studies in 1934 and several preceding years mean much to Southern farmers in particular and to farmers in general where soil types and conditions are comparable. Something of the results with potash and other plant-food elements in producing tobacco, cotton, grain, hay, and certain vegetables merits brief consideration in this article as having wide application.

Tobacco Is Fastidious

Growers of bright-leaf, flue-cured tobacco in the Southeastern states have a delicate fertilizer problem in their efforts to get good yields and to keep their bright tobacco bright. The tobacco fertilizer analyses found best in recent years are: (1) for heavy productive soils 3 per cent nitrogen, 10 per cent available phosphoric acid, and 6 per cent potash, applied 700 to 800 pounds per acre; (2) for light, less productive soils a 3-8-6 analysis, 800 to 1,000 pounds per acre.

Tests at South Carolina's Pee Dee Experiment Station in 1934 indicate the importance of a liberal supply of potash in the fertilizer mixture. The plots which received the normal supply of nitrogen and phosphoric acid, but no potash, showed the usual characteristic symptoms of potash hunger. The leaves were somewhat drawn and rough, showing mottled discolorations and coppery specks at the tips and around the margins. The leaves curved downward towards the underside. The specks later enlarged, forming dead areas between the veins and giving the plant a rusty brown appearance. In practically all cases where potash was left out or the supply in the mixture was limited, the yield was reduced and the quality of leaf was very poor.

One thousand pounds per acre of a 3-8-9, with two per cent of the potash derived from muriate of potash and the balance from sulfate of potash, produced a good yield and a high grade of leaf during the 1934 season. Higher rates of potash, such as the 3-8-15 and 3-8-21, at the same rate per acre and carrying the usual two per cent chlorine, did not produce as much of the red-colored leaf in the cured product as in previous years. This may have been due partly to the extremely dry weather during the growing season.

An interesting new light on fertilizing tobacco shows where fertilizer is best placed with reference to the tobacco plant. In some tests conducted last season fertilizer mixtures were applied separately by a combination transplanter and fertilizer distributor which makes it possible to apply the mixture at the desired distance to either the side of or underneath the root crown of the plant. The best stand of tobacco was obtained where the fertilizer was placed 2½ inches to the side of the root crown at the time of transplanting. The poorest stand resulted where the fertilizer was mixed with the soil around the plant. Mixtures placed directly below the root crown of the plant gave comparatively poor stands. The side placements not only resulted in better stands, but the plants grew off much faster and more evenly and uniformly than with any of the other placements.

Has Definite Dislikes

Another serious tobacco fertilizer problem is the injury to the color and quality of the product caused by the presence of too much chlorine and sulfur in the fertilizer mixtures.

Experimental data and practical experience are showing that while a small quantity of chlorine in the tobacco fertilizer increases the acre value of the crop, an excessive amount not only injures growth but reduces quality by producing a thick, brittle leaf which when cured becomes thin, saggy, and dull in color, and also produces an unfavorable effect on burning quality. Trial-and-error results indicate, and tobacco specialists and agronomists therefore recommend, that fertilizer mixtures should con-

tain not over two per cent of chlorine.

So too with sulfur, results show that maturity of the crop is delayed and color of leaves is too red when there is much sulfur in the fertilizer. Hence the advice that fertilizers be formulated to contain a minimum of sulfur, preferably by reducing the soluble sulfur compounds used in the fertilizers.

Left—A normal corn plant. Right—A corn plant showing typical potash-deficiency symptoms.

To control sand-drown, or magnesia hunger, it seems desirable to have in the fertilizers two per cent magnesia (MgO), half of which should be water-soluble or come from water-soluble materials.

Southern farmers have long known or thought they knew that the cotton plant wants a generous ration of a "complete fertilizer," which interpreted means "mixed goods" containing the three long-recognized plant-food elements—nitrogen, phosphorus, and potash. Common analyses have been 3-9-3, 4-8-4, and more recently more concentrated analyses. But there is more to it, they are learning, than just that, thanks to the inquisitive agronomists and soil specialists like Dr. H. P. Cooper. These men through their studies are throwing many side-lights on the subject of fertilizing cotton. Here are a few of these.

1—The recent trend in the use of cheap nitrogenous fertilizer materials has increased the acidity of some soils to the point where it is not possible to produce crops economically until the soil is limed. Previous to 1905 mixed fertilizers were non-acid; the average base equivalent was equal to 10 to 40 pounds of limestone per ton. At the present time the average equivalent acidity of mixed fertilizers is about 150 pounds of limestone per ton. The continued use of fertilizers with a high equivalent acidity has rendered much land totally unfit for the economical production of many important crops.

"In general," says Dr. Cooper regarding his studies of this matter, "high acidity in the gray Coastal Plains soils is not as serious as in the red Piedmont and Upper Coastal Plains soils. The possibility of successful growth of crops on gray Coastal Plains soil with a relatively high degree of acidity is very probably related to the relatively low content of manganese and iron which

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Courtesy Canadian Government Motion Picture Bureau, Ottawa

Barley is a profitable crop to grow either as a feed or cash crop. This shows a typical Ontario scene of a field of O.A.C. No. 21 barley.

Malting Barley

By Peter Stewart

Ex-secretary, Canadian Seed Growers' Association

THOSE of us who have stood behind the old-fashioned straw carrier all day long, at threshing time, know something of the feeling of unrest, not the economic kind, that came over one as scores of barley awns seeped down behind the red bandana handkerchief and became firmly embedded in the "gansey" undershirt. Fortunately the straw carrier has given place to the straw blower, and it seems as though even the saw-toothed barley awns themselves will go the way of the woolen undershirt. Plant breeders are finding ways of growing barley with smooth awns.

For many years Ontario barley was used almost entirely for the feeding of livestock, and even at the present time about four-fifths of the barley produced in Ontario finds its way to the feed bin. This is as it should be, for barley outyields any other cereal in digestible nutrients per acre.

But of late years more and more barley is being used in industry. Breakfast foods, tonics, invalid preparations, bread, biscuits, confectionery, infant foods, food preservatives, and numerous other products are based on barley. These highly refined commercial preparations made from barley require a specially high-grade grain to begin with; containing high starch content

from well-matured kernels.

The first step in the manufacture of most barley products for human use is the conversion of the barley into malt. In this process, the barley is first cleaned carefully to remove grain impurities, weed seeds, and inert matter. After cleaning comes steeping. The barley is placed in large cisterns in running water and allowed to remain there for two or three days. From the steep cisterns the grain is conveyed to the germinating compartments where ideal conditions for growth are provided. After germination has proceeded sufficiently in the compartments, the sprouted barley is elevated to the kilns where it is thoroughly dried and cured. Following kilning it is again screened to remove loose sprouts and rootlets.

In appearance, barley malt resembles barley very much because the outer covering of the original barley kernel is not changed to any extent by the malting process. The endosperm, however, is changed by malting in as much as the starch becomes friable and can be easily crushed into a white floury mass without breaking up the husk. Hence the main purpose of malting is to produce from the barley the greatest possible value of starch in a free or "tender" physical condition.

Probably no cereal requires the exercise of greater care and judgment in its production than barley intended for malting. Such factors as variety, soil, time of seeding, fertilizing, and harvesting all are important. Fortunately our plant breeders have solved the question of variety, for the well-known O. A. C. No. 21, a six-rowed type originating at the Ontario Agricultural College leaves little to be desired either for feeding or malting purposes.

The best types of soil for barley production are fairly clearly defined. Clay loams and the heavier types of

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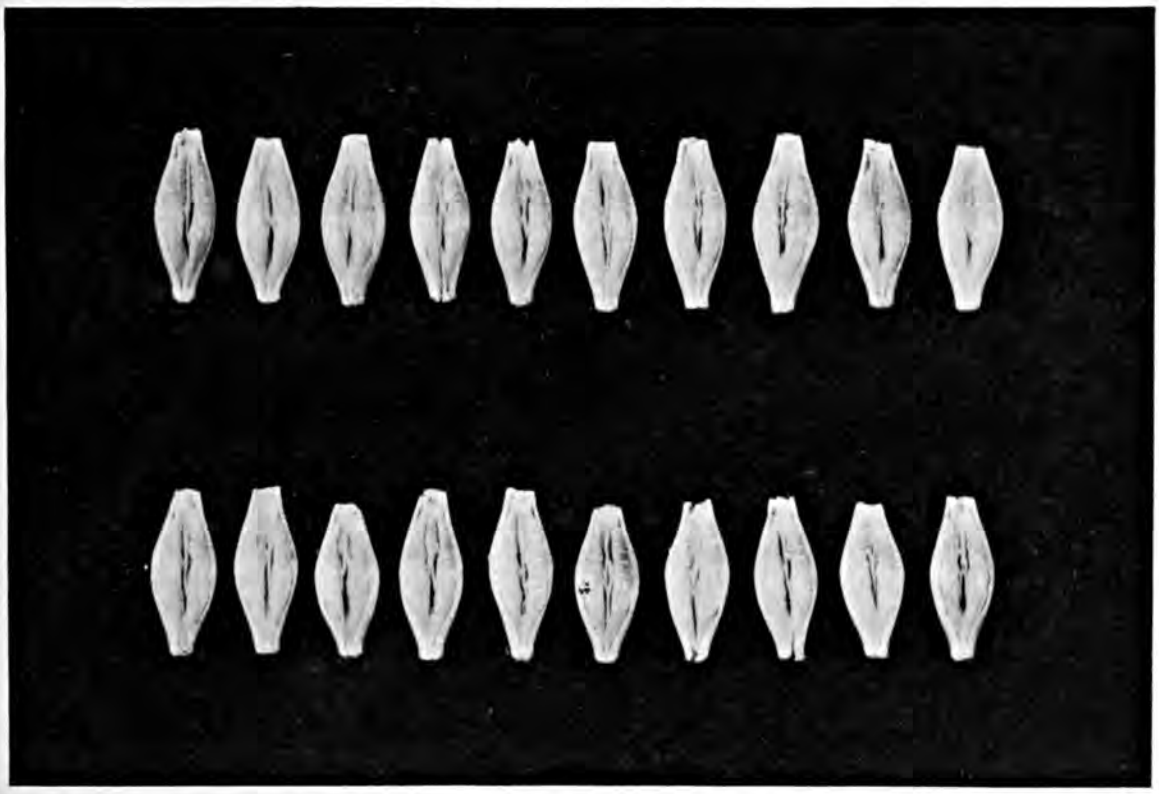

Courtesy Canadian Government Motion Picture Bureau, Ottawa

This is a sample of the exhibit of malting barley which won the gold medal and $500 award for Donald Scott of Cityview, Ontario, at the Royal Winter Fair, 1934. This barley is plump and thoroughly ripened; it has a strong husk of good adherence and is free from mechanical injury or unsoundness of any kind.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

"IF you make a study of chemistry, and stick to it, you will be able to do *something* some day that no one has ever done before."

So said Dr. F. J. Alway, Chief of the Division of Soils of the University of Minnesota, to Dr. Ross Aikin Gortner, many years ago, when the latter noted scientist was a student under him at Nebraska Wesleyan University. Today, both of them are still looking for that mysterious "something" in their laboratories, less than one hundred yards apart on the Minnesota Campus at St. Paul, where each has accomplished wonders in his chosen field of effort.

Dr. Alway has been and is a veritable missionary of science in the wide-open spaces of Minnesota, and is regarded as a guide, philosopher, and friend by the farm folk of that northern land. To him they have brought their problems, confident that he would solve them in a masterly way and give them advice that was not merely theoretical, but based upon a thorough study of the question involved and long practical experience with the various phases of agriculture in the different sections of the state.

Eminently conservative, he has been cautious, careful, and circumspect in the opinions he has expressed, and in the counsel he has given in person, on the platform, and in his voluminous writings. It has not satisfied him to give what might be termed wholesale instructions for the proper farming of a given area of land. Although he is personally acquainted with every district of Minnesota in a practical way, and bases his instructions on an intimate knowledge of the general and specific conditions in each of them, he prefers to tell the inquiring farmer to try out the suggested plan of working and fertilizing his land on a small scale and then apply it extensively if he finds it successful. Whether the farmer is located on rich mineral soil, sandy land, or peat, he has found that he will be safe in asking Dr. Alway to prescribe the best methods of dealing with crop production on each of them and without danger of making a lavish expenditure of time, effort, and capital at a possible loss. "Try my plan on 5 or 10 acres," Dr. Alway tells the farmer, "and see what the results are before spending money for fertilizers for a larger acreage."

A Great Teacher

William Paul Kirkwood, editor of publications and professor of journalism at the University of Minnesota, to whom we are indebted for particulars about the life and work of Dr. Alway, considers the scientist a marvelous teacher and says: "When he gets up before a group of farmers to talk to

them about their soils, he wins their confidence at once by a friendly and gracious good humor and an evident knowledge of what he is talking about. He attempts to tell nothing without *knowing* the facts. Then, he has a wonderful faculty for putting things simply and talks to the farmers in their own language. The result is, they like him, they believe in him, and they follow his instructions; then, getting results from his advice, they be-

DR. F. J. ALWAY

come enthusiastic 'boosters' for him and his work."

We admire the conscientious and canny way in which Dr. Alway deals with every vital problem of soil management in Minnesota. His conservatism is well illustrated by his advice relative to the handling of the peat soils which occupy about one-eighth of the surface of Minesota, or approximately 7,000,000 acres. He does not tell the owners to undertake at once the drainage of this immense area of land, spend millions of capital in the work and more in the application of lime, commercial fertilizers, or farmyard manure. On the contrary he cautions all concerned to "make haste slowly." In his opinion it will, in general, be the wise method of procedure for those men already living upon farms which have more or less peat land, either already provided with or convenient to outlets, to try out the complete reclamation of but a few unprofitable acres, making use of modern methods. So far as the greater portion of the immense peat acreage is concerned, he thinks that at the present time the profit of reclamation is to be regarded as extremely doubtful even under the most skilled supervision and with every resource and faculty of conducting the work economically, while many extensive tracts could be improved only at a loss. When immediate reclamation is not proposed, it would, in his opinion, be better to leave the grass-covered bogs to serve as wire-grass meadows, or to drain them just enough to allow cutting of wild hay.

A Wide Territory

In Minnesota, Dr. Alway has had to make himself intimately acquainted with the various soils of 84,682 square miles of territory—a field 400 miles long and 354 miles wide. Driving an automobile, at what some folk would deem a reckless speed over hard-surfaced roads and, anon, crawling slowly over rough trails by lakes and streams, through dense forests and desolate tracts of cut-over and rocky land, and now and then wallowing, staggering, and skidding "in low" on the wet, slippery, red clay of some newly worked or improved (?) highway with a water-filled ditch menacing on either hand, he has visited and scrutinized practically every acre of the Gopher State. Soils, everywhere, have had to be tested for acidity; fertilizer needs have had to be determined and thousands of soil samples obtained for analysis. Drainage problems on all kinds of peat and marsh land have had to be studied *in situ*, and inquiring settlers and farmers interviewed and counselled.

It has been a trying life for the

good Doctor and has taken its toll of his strength, tried his nerves, strained his eyes and many a time threatened exhaustion; but ever this indomitable servant of science and the people has continued his work, rendered practical and scientific assistance to the farming community, and satisfied everyone—but himself—with the results of his endeavors. An evidence of the thoroughness and correctness of his investigations is the fact that his soil surveys have been accepted as the model for similar work undertaken by the United States Department of Agriculture.

Versed in Many Sciences

"One science only," said Pope, "will one genius fit." But Dr. Alway has not restricted his researches to the soil alone. His contributions to other phases of chemical science have been innumerable and important. In his time he has taught geology and mineralogy, and his investigations have carried him into the fields of nitrocompounds; hydroxylamins and nitrose compounds; phosphorus and sulphur contents of plants; inoculation for leguminous plants; flour bleaching; the strength of wheat flour; occurrence of prussic acid in sorghums and maize; losses from cornstalk disease; relation of the breaking of hog bones to the composition of ash; protein content of reed canary grass; quantity and nutrient contents of pine-leaf litter; composition of the leaves of some forest trees; agricultural value of marl; amount and placement of fertilizers for cultivated crops; and a host of other related subjects.

Little wonder then that Professor Kirkwood has called Dr. Alway "an indefatigable worker and tireless researcher."

Frederick James Alway was born at Rockford, Norfolk county, Ontario, Canada, May 28, 1874, the son of Frederick and Rachel (Mason) Alway. He was reared on a farm. When he was four years old his parents moved to Vittoria, nearer Lake Erie, and there Frederick Junior attended the public schools until 12 years old; then he entered the high school at Simcoe, and was graduated four years later. At the age of 16 he went to the University of Toronto, expecting to register for the study of medicine. Instead, he became interested in chemistry and majored in that subject, taking courses in physics as his minor. He graduated with the degree of Bachelor of Arts in 1894, at the age of 20, and then did graduate work at the University of Heidelberg, Germany, and received the degree of Ph.D. in 1897.

Returning to America, he became Science professor at Nebraska Wesleyan University in 1898, and remained there until 1906, teaching chemistry, geology, and mineralogy. In 1906 he was called to the University of Nebraska at Lincoln to teach chemistry. In 1911 he became a naturalized citizen. In 1913 he was invited to take the professorship of soil chemistry in the Department of Agriculture of the University of Minnesota. In 1914 he was made chief of the Division of Soils in that institution and has occupied that position ever since. In 1898 he had married Eve Mary Cook of Delhi, Norfolk county, Ontario. They have five children: Filomena Erica is married and lives in Hibbing, Minnesota. Lazelle Martha is doing Y. W. C. A. work in Hibbing, and Leonore, physical education at the University of Nebraska. They are twins. Fredericka Jane is living at home in St. Paul, and Robert Hamilton is a student of medicine in the University of Minnesota.

Received Many Honors

Dr. Alway's services to chemistry and allied subjects have been recognized in various ways. The University of Toronto conferred upon him the degree of Doctor of Science in 1927 and had him enroll in its Golden Book which is restricted to its distinguished sons who have given signal service in the fields of arts, letters, and

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Pioneering *in* Corn

By C. T. Gregory

Purdue University Agricultural Extension Department

THIS is a story of two Tippecanoe County Indiana farmers, George Bailey and his son James, whose persistent pioneer spirit has led them away from the beaten paths on to success with corn. The father, with his walls covered with corn-show ribbons, coveted a gold medal, the officially recognized proof of his ability to raise 100 or more bushels of corn per acre on five acres. He left no stone unturned to accomplish his aim and in so doing he has revealed some corn facts that are valuable.

Thirty-three years ago the father cleared a field of unflooded bottom land along the south fork of the Wildcat Creek. It was corn land just like Tecumseh's tribe of Indians had always used for their corn fields only a few miles north of this spot until General Harrison introduced a corn-reduction program to them following the Battle of Tippecanoe. So George Bailey followed the practice of the Indians and planted corn among the stumps. But he kept on growing corn on this same field every year and each year he scalped both the corn and stover from this soil. Experience has led us to believe that the root-rot disease would have retaliated by cutting the yields of corn. That the Baileys found a way to overcome this trouble is proven by the official records of the Indiana Corn Growers' Association in the five-acre-yield contests.

In the drought year of 1930 the yield was 96 bushels per acre; in 1931 it dropped to 86 bushels; but in 1932 the yield came back to 105 bushels; 1933 it was 113.5 bushels; and in 1934, a relatively tough corn year, the Baileys produced 128.8 bushels per acre.

Mr. Bailey taking a basket of Hoosier Hybrid to feed the colts.

What does this mean? Have we been wrong in our ideas of the nature and destructiveness of the root rot? On the contrary, when we look into the explanation of these bumper yields, we find that it really proves two important facts concerning the control of this disease. First, a corn plant that is properly nourished will be stronger and will be able to successfully resist the attacks of root rot. Second, a well-adapted, vigorous strain of corn will outyield and produce better quality grain than poorly adapted strains.

Let's look at some of the facts as told by these men. About five years ago they complained to a representative of the Purdue Agricultural Experiment Station that their corn lodged badly. The stalks were weak and collapsed. An examination was made of the plants at that time and it was recommended that they increase the potash content of their fertilizer, notwithstanding the fact that they applied cow manure liberally each year. They changed from a 3-18-9 to an 0-20-20 used at the rate of 200 pounds in the drill row. The effects were immediately apparent. The stalks remained standing and the quality of the grain was improved.

For the past 15 years they have manured this land during the winter. During the past 10 years they have planted sweet clover in the standing corn after the last cultivation. Previous to that time they sowed rye after shocking the corn and still rely on it for winter cover when they fail to get a catch of sweet clover. Impressed by the appearance and size of the Reid Yellow Dent and its record of winnings at corn shows, they were purchasing prize-winning strains of this variety for seed. In order to mature the prize-winning Reid, they were compelled to plant it late in April or early in May in cold soils where seedling troubles cut heavily into their stands. They planted soon after the cover crop of rye or sweet clover was turned under, making it seem essential to them that they use nitrates in their fertilizer. On this rich bottom land this extra dash of nitrogen induced excessive suckering, but was not enough to help feed the grain. With this late-maturing, large-eared variety of Reid the percentage of barren stalks was always high and the yields never reached the coveted record of 100 bushels per acre.

In 1930 the Baileys decided to try some of the much-discussed hybrids. Since none were available in Indiana at that time, they bought expensive seed from out of state. The results were disappointing. The corn looked good at tasseling time, but broke over before harvest, and time and again they were compelled to check their five acres in the Reid variety. Ninety-six

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Even the dog is interested in checking up the 128-bushel yield of Hoosier Hybrid on Mr. Bailey's field this year.

Pasture Must Carry A Cow Per Acre

By Ford S. Prince

Agronomist, New Hampshire Agricultural Experiment Station

PASTURE that will carry a cow for each acre should be the aim of a dairyman when he starts on a program of pasture improvement. Land that has a lower carrying capacity than this will prove expensive for fertilizer, fencing, and oftentimes for brush removal. That the goal of a cow to the acre can be reached, making due allowances for the vagaries of the weather, has been abundantly demonstrated recently on many farms.

Controlled Grazing

In the worn and depleted pasture areas of the Northeast, this pasture utopia cannot be attained except where fertilizers are used under a system of management that controls the grazing. Controlled grazing means not allowing the cows the run of all of the pasture the whole time, but a division of the pasture area so that one definite section of the pasture will not be grazed more than a week or ten days each month. Grazing one part of the pasture a week or so at a time and resting it the remainder of the month will add much to the amount of feed produced there and at no cost except for the fencing involved.

Where this system of pasture management is practiced, together with fertilizers of the right type and amount, there is every reason to believe that more farmers will have the satisfaction of pasturing a cow to the acre, an end that should make their dairy farming operations more profitable.

To get enough grass from an acre to support a cow means approximately two tons of dry matter harvested, as the cow eats it, when the grass is young, tender, and nutritious. This means that the land must yield as much as when carrying a good hay crop. Not only must it yield at that rate, but the vegetation in the stand must be so mixed that growth will occur every month of the year. This will happen only under conditions of normal rainfall and on soils which are heavy enough to support a stand of pasture clover as well as grass. Unless the pasture soil meets this requirement, there will certainly be one month, perhaps more, in the July-August period when it will be necessary to supplement the permanent pasture with green feed or other crops grown especially for pasture.

Study Fertilizer Needs

Broadly speaking, pasture yields can be tripled with the judicious use of fertilizers. Under a system of annual top-dressing, land carrying a cow to three acres can be made to produce enough feed in the space of a single season to support a cow to the acre.

Pasture soils and stands vary con-

siderably in their response to the different elements and materials used for top-dressing purposes.

Where the stand is the determining element, the response is governed by whether grass or clover is more abundant. In fields where there is no wild white Dutch clover, or where it cannot be induced to grow by applications of fertilizer, the response for top-dressing will come mainly from nitrogen. It has, at least, in our New Hampshire tests. This means that the pasture season can be lengthened by getting the cows out earlier in the spring after top-dressing and that the flush will last a little longer in June and July. However, there will always be a short period in late July and August.

Two pastures answering this description were studied over a three-year period with the following average annual yields of dry matter:

Treatment	Yield Dry Matter 3-year Av.
LNPK	1583 lbs.
LPK	699 "
Nothing	466 "

While the yield was slightly better on the LPK plots than on the plots that had no fertilizer, the difference is so slight that it probably is not significant and would not be profitable. It should be thoroughly understood that although there was an excellent stand of grass in these two fields, no Dutch clover was produced on any of the plots during the three-year period. Pastures like this are common in many sections, but are not of the best order and cannot be made to produce high yields of pasture through the entire season except they be plowed, heavily manured, and reseeded. In these trials, limestone at the rate of 1½ tons per acre, 600 lbs. of 16% superphosphate, and 200 lbs. of muriate of potash, were applied but once during the three-year period, while the nitrogen, equal to 312 lbs. nitrate of soda, was applied annually.

Contrast with these two pastures two other fields where similar tests were carried out, but where the vegetation contained a good proportion of white Dutch clover. The average annual yields for the three treatments as noted for the grass pastures, with the fertilizer scale the same, were as follows:

Treatment	Yield Dry Matter per A. 3-year Av.
LNPK	3225 lbs.
LPK	2632 "
Nothing	1229 "

In this case, the LPK treatment increased the yield over the untreated plots by 114%, whereas the increase for this treatment in the case of the grass pastures was but 50%. That the clover pastures were higher yielding is evidenced by the fact that the untreated portions gave more than double the dry matter yield of the untreated portions of the grass pastures. Furthermore, these clover pastures grew all through the season, especially where they were fertilized.

The response for phosphorus and potash on the clover pastures was not identical, a fact which indicates why some regions are justified in recommending superphosphate alone, or lime and superphosphate for pasture improvement, while in other regions potash must be added to the fertilizer for clover stimulation and perhaps for grass as well.

For example, in one of these pastures, the average annual increase for superphosphate alone was 920 lbs. of dry matter and for potash but 238 lbs., while in the other superphosphate gave a gain of 671 lbs. and for potash an increase of 672 lbs. was recorded. The latter response is more typical of results we have obtained in New Hampshire pastures, so that we do not feel justified in recommending superphosphate alone for pasture improvement. It usually takes a combination of the two for effective results.

The responses for lime that have been obtained in our tests which cover pastures in every county in our state are somewhat conflicting. Usually a small increase is obtained for broadcasting lime on the sod, a response that would doubtless be magnified if the lime could be worked into the soil. We are rather firmly convinced that in top-dressing old pastures the superphosphate, potash, and nitrogen requirements should be taken care of

1,000 lbs. 0-10-0 plus lime.

1,000 lbs. 0-10-10 plus lime.

1,000 lbs. 5-10-10 plus lime.

first, where funds are limited. Liming can be undertaken when some profits have accrued from the other treatments.

Potash and superphosphate needs are even more strongly indicated in the Connecticut Valley area where a severe potash deficiency exists for practically all crops. In an elaborate test near Claremont, N. H., nitrogen alone does not increase grass yields nearly so much as in other sections of the state, and maximum results are obtained only when high-potash, complete fertilizers are used. The yields per acre, both for dry matter and protein, illustrate this point.

	2-year Average	
Treatment	Yield, Dry Matter	Yield, Protein
N	2019 lbs.	420 lbs.
NPK	3640 "	596 "
PK	2193 "	520 "
Nothing ..	1576 "	264 "

In this case, N alone is an average of five different nitrogen carriers, NPK is equal to 500 lbs. of a 10-20-20 fertilizer, and PK is 500 lbs. of an 0-20-20 fertilizer, all applied annually.

The protein yields are inserted here because in most cases dry matter yields do not tell the whole story. The composition of the grass is strongly affected by fertilizer treatments. On this pasture, the PK treatment analyzed highest with an average of 23.71%, N second with 20.8%, while the protein content of the NPK and untreated plots was 16.37% and 16.76% respectively.

Encourage Clover

The PK plot in this test was an interesting study. During early spring and summer it yielded no more than the untreated sections, but in midsummer the clover began to grow, appeared to get thicker, and the heaviest yields came in August and September, at a time when forage is usually most needed. This so often has proved the case in our trials that we believe the encouragement of Dutch clover in pastures where it will grow is of paramount importance. On many farms, where Dutch clover abounds and where there is already enough growth to support the dairy herd during May and June, attention to the clover by fertilizing with a phosphorus-potash mixture is all that is necessary to complete the pasture picture.

We have analyzed the results that

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Wicomico County Leads *in* Cucumbers

By George R. Cobb

Salisbury, Maryland

THE aim of cucumber growers is to develop a fruit of the proper size, shape, and color, and in addition a fruit that will stand up well in hot weather and under shipping conditions.

That Maryland growers are achieving this aim is evidenced by the fact that out of approximately 8,180 carloads of cucumbers grown and shipped in the United States annually, 692 cars are shipped from the State of Maryland. Of these 692 cars, about 84%, or 582 cars, are grown and shipped from one county, Wicomico. In November 1933 several of the local newspapers carried stories with prominent headlines to the effect that "Wicomico County Leads United States in Cukes." Subheads further amplified the statement with the words: "Ranks First in Acreage and Production, According to Government Report."

Years of Experience

During the past 40 years that farmers in this section have been growing this crop, many cultural practices necessary to producing large yields of high-quality cucumbers have been developed. The slicing cucumber, which is the demand of their market, must be shipped in a fresh and natural state. Based on the consensus of opinion of 15 buyers who purchase large quantities of these for commercial houses and large establishments in such cities as New York, Chicago, Pittsburg, Detroit, and Philadelphia, the ideal slicing cucumber must be a dark green color over all, straight from tip to tip, and a fruit that measures seven inches in length and seven inches around its largest circumference.

Can Produce Primes

One of the drawbacks in the production of a cucumber crop is that only a comparatively small percentage of the total fruits produced can be graded as marketable. There are too many "yellow bellies, pinched tips, crooked ends, etc," in practically every field, and these culls cut down the yield of saleable fruits and decrease returns from the crop. Weather conditions, it is true, may have a depressing influence upon not only the yield but the shape, size, and color of the fruit. However, too often under ideal weather conditions culls constitute more than 50% of the crop.

Maryland growers have gone far and are going farther toward increasing the percentage of primes. They have discovered that cucumbers are more tolerant to acidity than are cantaloupes, for example, and that too much nitrogen not only produces soft fruit but lessens pollination. The prevailing idea was that too much nitrogen produced excessive foliage and this prevented, to a great extent, pollination by winds and insects. However, one authority has recently suggested that excessive nitrogen develops an abundance of male blossoms.

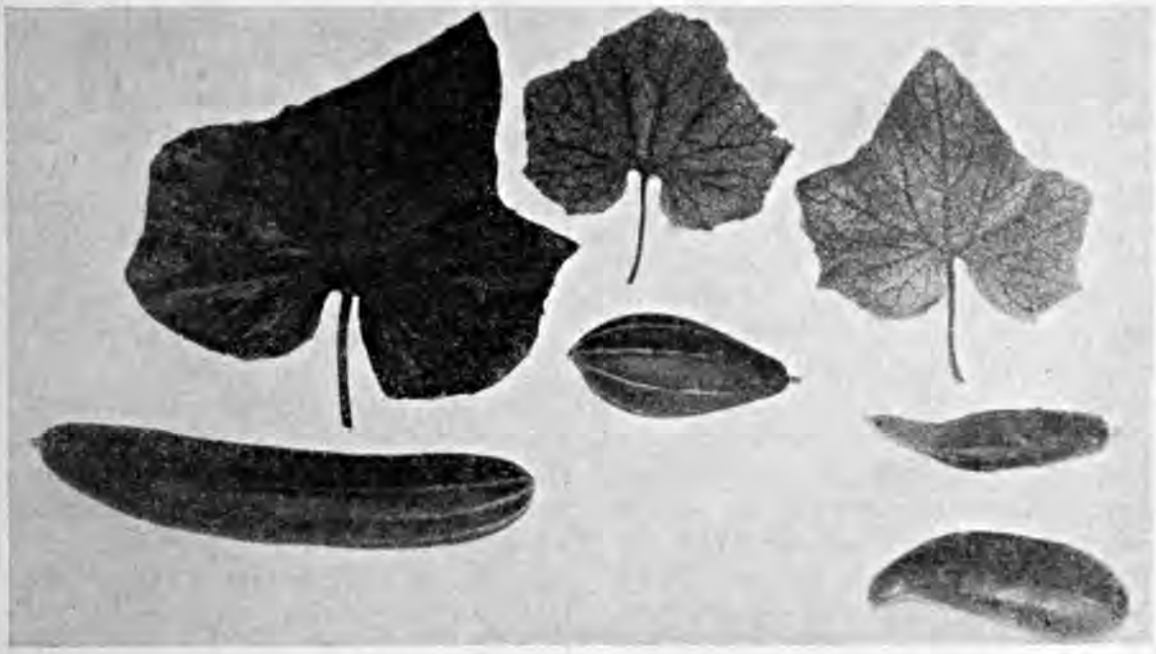
A standard practice among cucumber growers in Wicomico county until recently was to apply manure in the rows and from 600 to 800 pounds of a 4-8-4 fertilizer per acre. In 1928 G. Leroy Huston conducted experiments in which he compared 1,000 lbs. of 4-8-4 fertilizer with the same amount of the same analysis plus 200 lbs. of muriate of potash. The results were surprising and indicated very strongly that potash was doubtless a limiting factor in the production of cucumbers.

The yield from the 1,000 lbs. of 4-8-4 was 79 bushels per acre, whereas the plot that had the 200 lbs. of muriate of potash in addition to the regular application of fertilizer produced 109 bushels.

Although the greatly increased yield was striking and very profitable there were other features that showed the advantage of the additional potash. The fruits were of more uniform shape and size; the vines stood up longer, with less signs of disease and break-down; the fruits on the extra-potash plot were of a rich green color and retained this color for an extended period of time.

A member of one of the local fertilizer companies made several visits to these plots and on one trip he picked three average samples from each of the plots. These samples he placed in the rear of his car and carried them about with him on his many trips. In spite of the fact that very warm weather prevailed at the time, the fruits from the extra-potash plot retained their firmness for about three weeks while those fruits from the plot that did not receive the extra potash became soft within five days and started to decay within a week.

Another interesting experiment was conducted by C. M. Thompson in which an application of 800 lbs. of a 5-8-5 was compared with 1,500 lbs. of the same analysis. The comparative yields were 87 bushels from the plot receiving the 800-pound application and 129 bushels from the acre where 1,500 lbs of the 5-8-5 fertilizer were used.



The leaf and cucumber to the left were removed from a plant receiving complete fertilizer. The leaf is normal green and the fruit is well developed and of desirable shape and color.
In the middle, the leaf and fruit were removed from a plant receiving nitrogen and phosphorus only. The leaf shows the characteristic dying of the leaf margin indicating potash starvation. The fruit with enlarged tip end characterizes the result of deficient potash.
The leaf and cucumbers to the right are from plants lacking nitrogen. The leaf is yellow and the fruits have undeveloped tips.

In this experiment records were kept of the yield at each picking, and the results were very interesting. On July 8, for example, 19 bushels were gathered from the 1,500-pound plot, as compared with but 13½ bushels from the other plot; on the 10th of the same month the yields were 10 and 8 bushels; on the 12th the 1,500-pound plot yielded 12½ bushels and the 800-pound plot but 8½ bushels. Further records served to indicate that not only were 800 lbs. of a 5-8-5 fertilizer not enough to mature a good crop but that more plant food would result in more early maturity, which in some cases brought greater returns on the market.

Son Beats Father

In 1934 Luther Huston, a 4-H Club member, prepared and seeded a half acre of cucumbers, separate and distinct from his father's field. Mr. Huston, following the usual practice of the section, applied a 5-8-5 commercial fertilizer but Luther, knowing the value of potash on other crops he had helped grow, decided to use a 4-8-10 mixture. The writer happened to be at the auction block on several days when Mr. Huston brought cucumbers to be sold. His report on the yields secured from the two plots ran as follows: "Luther picked 34 hampers (bushels) from his 12 rows this morning, while I gathered but 11 hampers from mine. Luther is still beating me as he picked 24 this morning and I only got 13"; and so on during the season.

A carefully planned, thoroughly supervised, and officially conducted series of experiments were one of the outstanding features of the 1934 cucumber season in this section. With the hearty cooperation of the growers, County Agents, and Vocational "Ag" Teachers, these tests were as nearly official and unbiased as could be desired.

These tests were conducted on the farms of John Moore, Bridgeville, Delaware (Sussex County), Joseph Hill, Seaford, Delaware (Sussex County), and Willard Toadvine, Salisbury, Maryland (Wicomico County). In spite of a serious drought in lower Delaware, the comparative yields were conclusive and surely indicated that extra potash is needed to grow an optimum crop of cucumbers under the conditions of soil and climate in this section.

The experiment consisted of four plots on each farm. Plot 1 received 1,000 lbs. of a 5-8-5 commercial fertilizer mixture; Plot 2 the same amount of the 5-8-5 plus 200 lbs. of muriate of potash; Plot 3 had 1,000 lbs. of a 5-8-12 fertilizer; while Plot 4 had 1,000 lbs. of the 5-8-12 plus 200 lbs. of muriate of potash. In all other particulars the four plots were as uniform as possible in soil type, contour, cultural operations, and harvesting methods.

The records of yields on the farm of Mr. Moore show a steady increase as the potash was increased. Plot 1 produced 42 bushels; Plot 2, 54 bushels; Plot 3, 55 bushels; and Plot 4 gave a yield of 66 bushels. (It should be recalled that a drought seriously affected the yields on all plots.) It is noticed that the 5-8-12 combination produced 55 bushels as compared with 42 bushels on the 5-8-5 plot, or a gain of 13 bushels per acre. The 200 lbs. of extra potash increased yields 12 and 11 bushels, respectively.

The Story Continued

On the farm of Mr. Toadvine a still greater increase was shown. The yields on Plot 1 which received the 1,000 lbs. of 5-8-5 was 100 bushels, while the yield on Plot 2 with the extra 200 lbs. of potash was 124 bushels. It is also interesting to note that on this farm the yield on Plot 4 was the same as on Plot 2, i.e., 124 bushels, but Plot 3 only produced 96 bushels.

Total yields on the farm of Mr. Hill indicate that here again more potash resulted in a larger crop and

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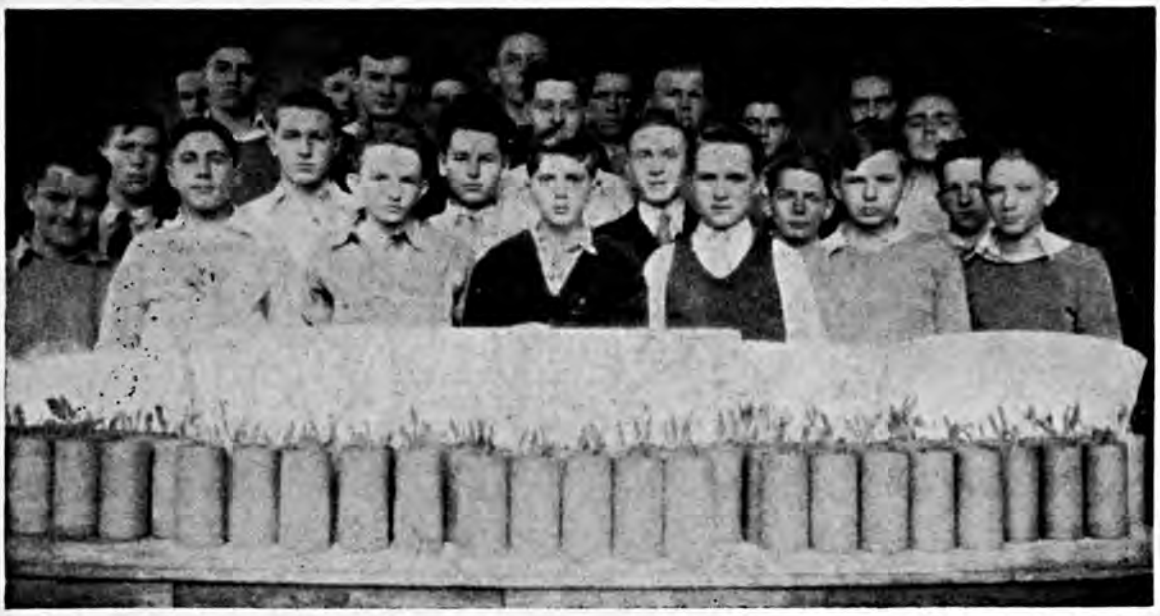

These boys can tell their fathers what fertilizers they need to apply on their farms.

Youthful Soilsmen

By Forest E. VanPelt

Vocational Teacher, Orland High School, Orland, Indiana

THE farmer who has a son studying soil fertility in a school teaching vocational agriculture has a simple and practical way to check up on his soils' needs. Through his boy he can gain the knowledge necessary to formulate a satisfactory fertilizer program.

With the beginning of the school year in September of 1934 the twenty-five boys enrolled in our vocational course were introduced to the idea of making an accurate map of the home farm. All of the boys knew within fairly accurate limits the size of the respective fields, as also did their fathers, but in only one case had accurate measurements ever been taken over the entire farm. It was easy for the boys to see a need for this work in view of certain local problems that had arisen because of faulty measurements of fields to comply with the Agricultural Adjustment Act.

Various means of measurement were devised by boys working in pairs or singly, and within two weeks' time the maps were completed with permanent tracing, legend, and scale. To provide space for fertility record, crops grown, and acre yields of previous years, a sketch of each field was prepared on smaller sheets and the complete history of fertilizer treatment, liming, manure application, crops grown, yield, etc. was recorded. The amount of this information varied widely between farms, but a start was made on all farms and the interest stimulated will result in more complete information as seasons come and go in the future.

While the weather was still fine in the fall, each boy took from three to five soil samples in each field and

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Potash Has Big Role in a Fertilizer Program

By Dr. R. E. Stephenson

Oregon State Agricultural College

POTASH long has been recognized as one of the major nutrients, ranking next to nitrogen in the quantity required to meet the needs of crop production. At the same time it is one of the most abundant of the mineral nutrients found in the soil. Faith in the efficacy of abundance has been responsible for the omission of potash in many fertilizer programs, sometimes no doubt when it could profitably have been included.

For several years phosphorus was the chief fertilizer recommended and used on any extensive scale in this country. While in theory legumes should supply nitrogen, in practice not nearly enough legumes were grown to supply sufficient nitrogen for satisfactory crop production. Stimulated by a reduction in the price, the consumption of nitrogen fertilizers has rapidly increased, until nearly equaling the consumption of phosphate. The relative consumption of potash has likewise considerably increased during the last several years, but the increase has hardly yet been sufficient to meet the real needs.

There is little doubt but that the use of both phosphorus and nitrogen should be still further extended, and as more of these elements are used, more potash should likewise be added. There are very few things in which a farmer may invest his money with as sure or as quick returns as in fertilizers, often with profits that are much larger than can be obtained in the business world.

Certain soil types are characteristically deficient in potash. Almost without exception peats need it. Many sands need it. The older, more exhausted, and badly leached soils are often seriously lacking in it. Certain geologic formations are sometimes associated with potash need. Thus the soils of geologic areas known as "coal measures" (formations where coal is likely to be found) are frequently needing this plant food.

"Hand in Hand"

Such deficient soils seldom need potash only. In fact potash has little chance to function to its full capacity in producing plant growth until other necessary nutrients including lime, superphosphate, and nitrogen are adequately supplied either naturally or by the use of a suitable form of fertilizer.

It is worth observing that with the increased consumption of nitrogen and phosphate fertilizers, and the resulting larger crop yields, the available

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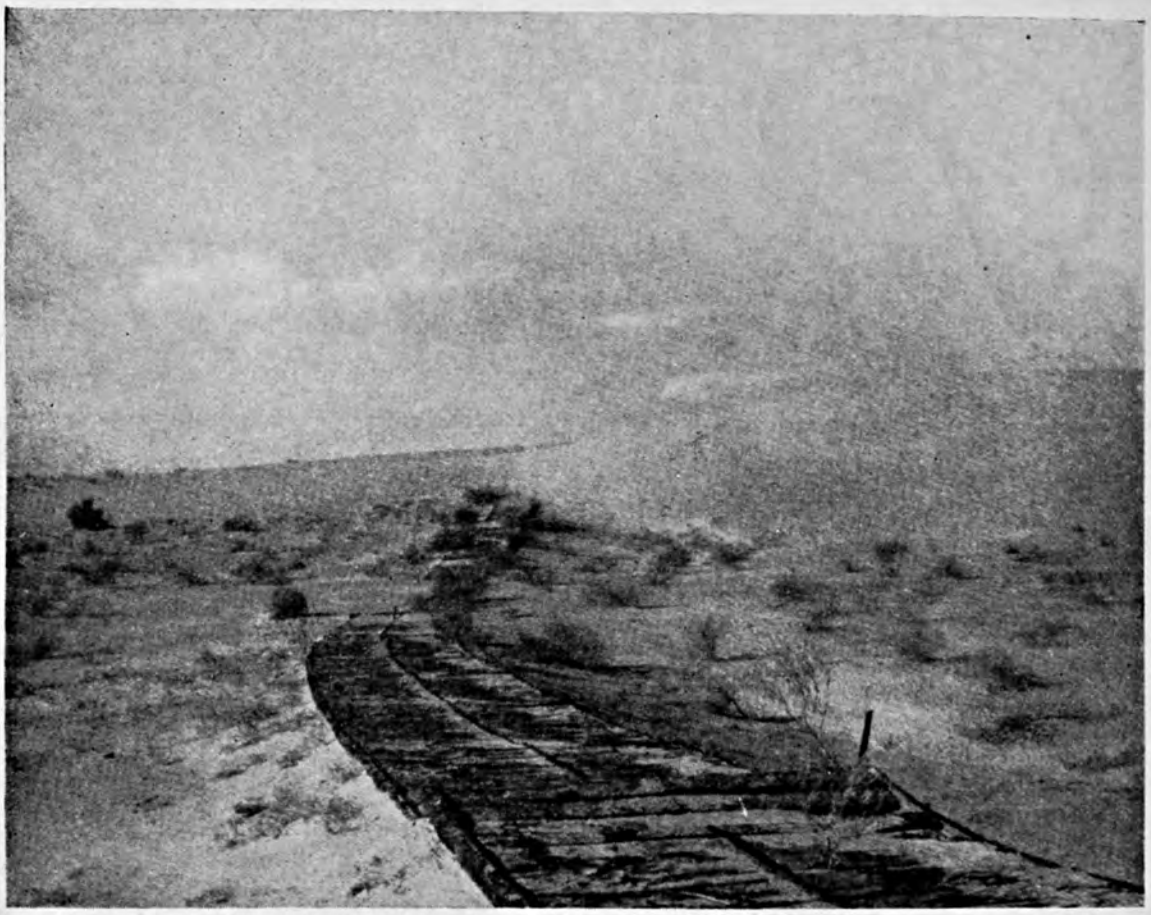
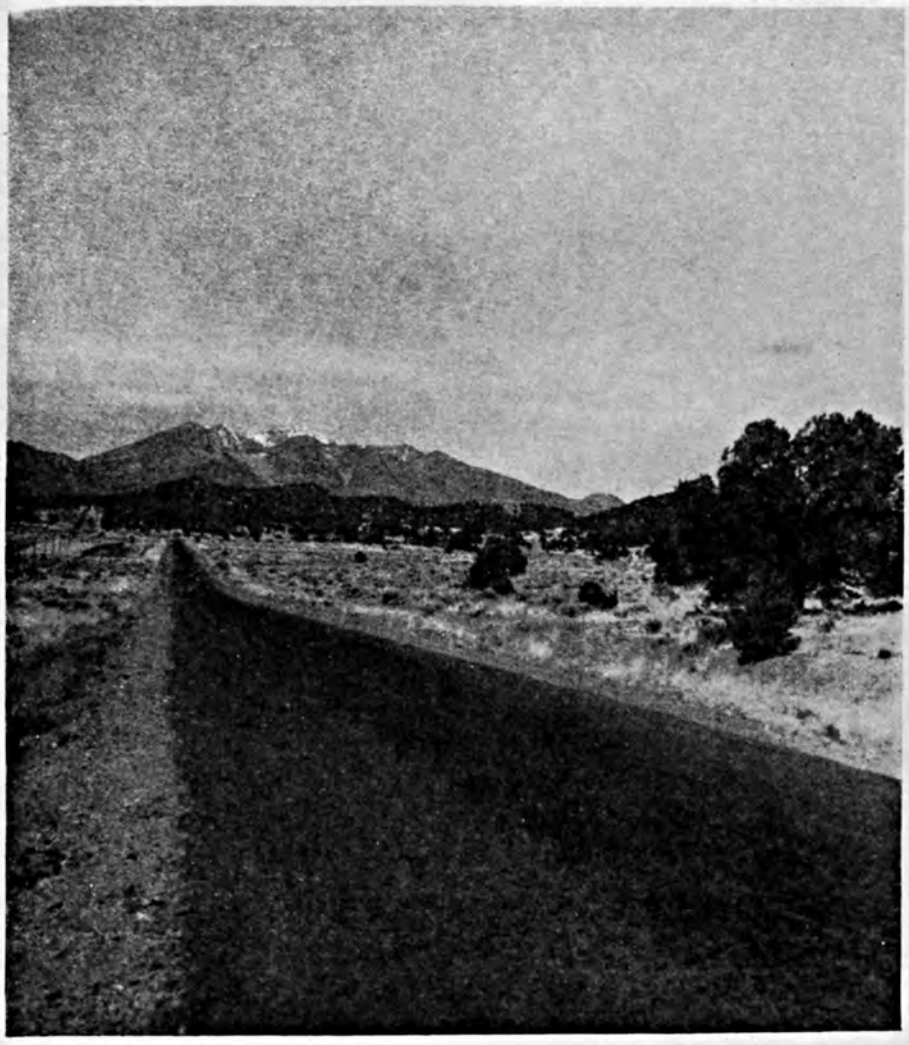
Pictorial

IT'S GOOD TO GET THE OLD BIKE OUT AGAIN.

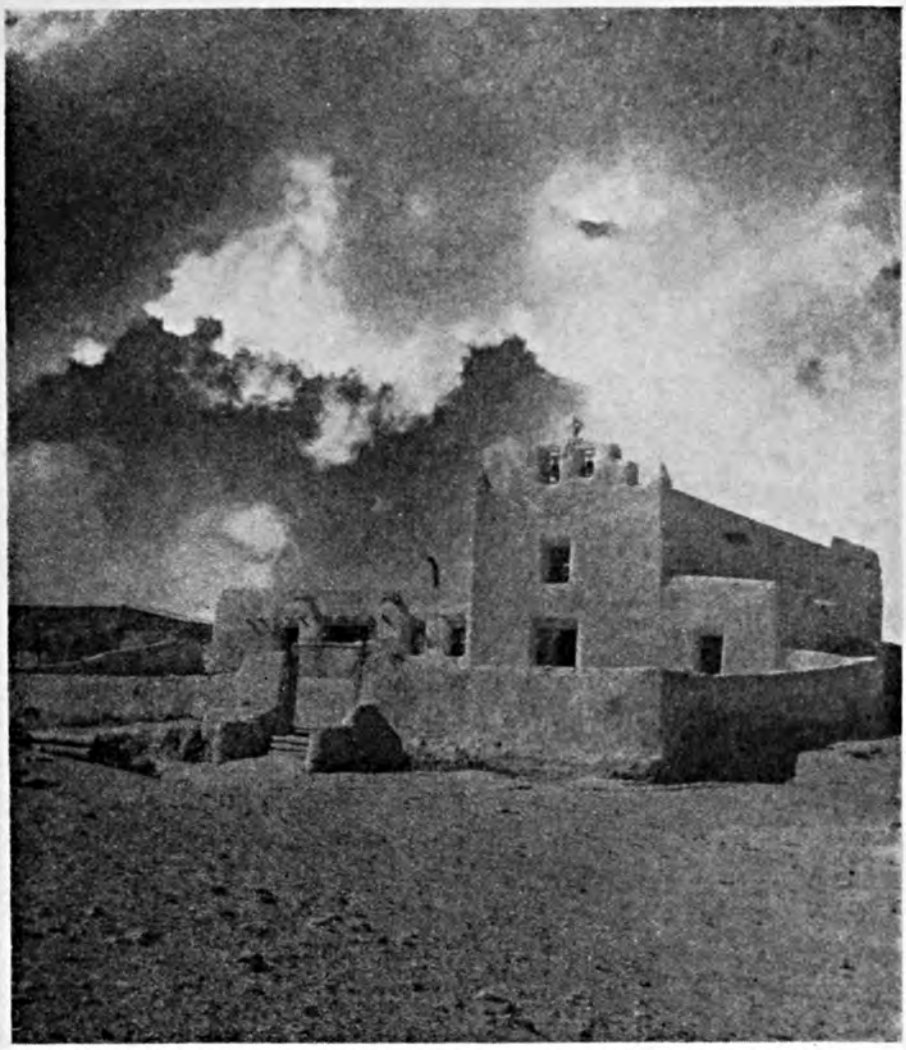




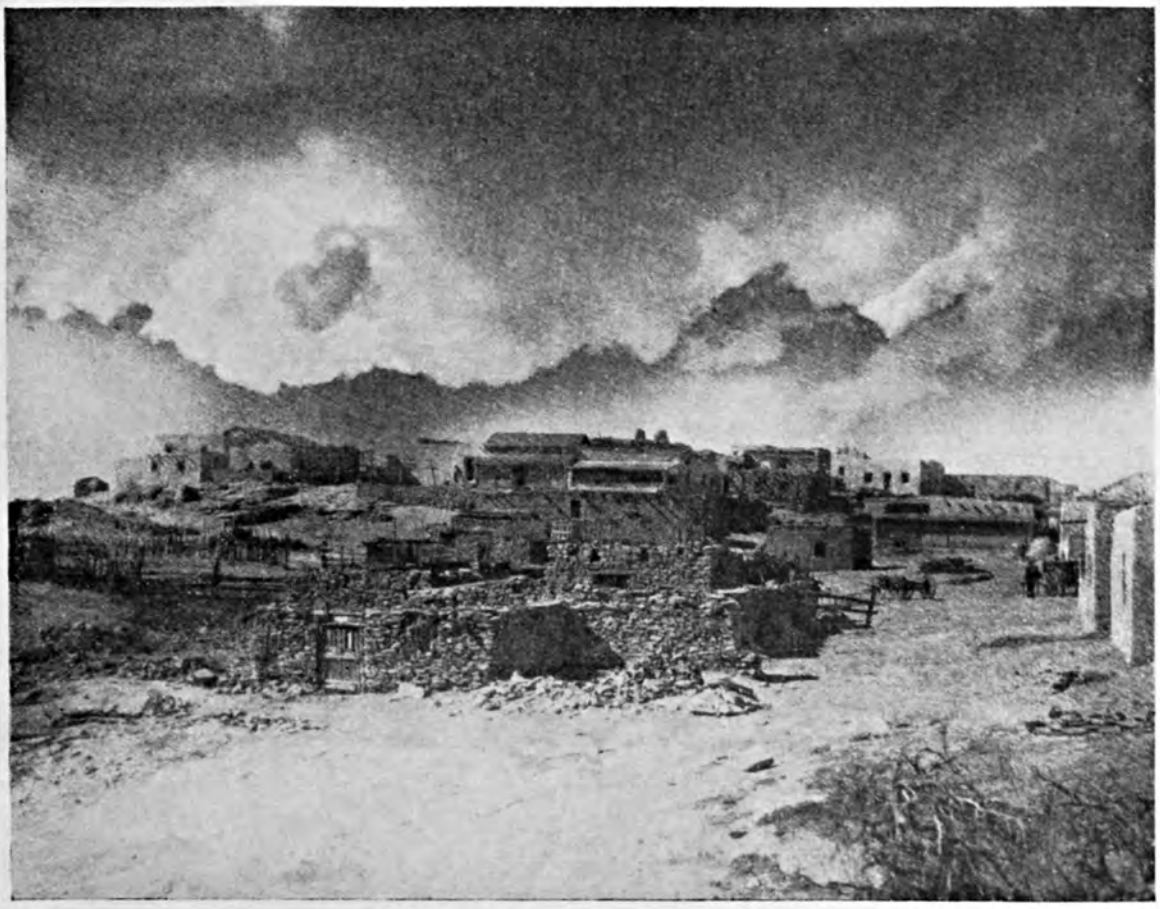
Above: Remains of the famous old corduroy road over the American Sahara desert a few miles north of Yuma, Arizona.

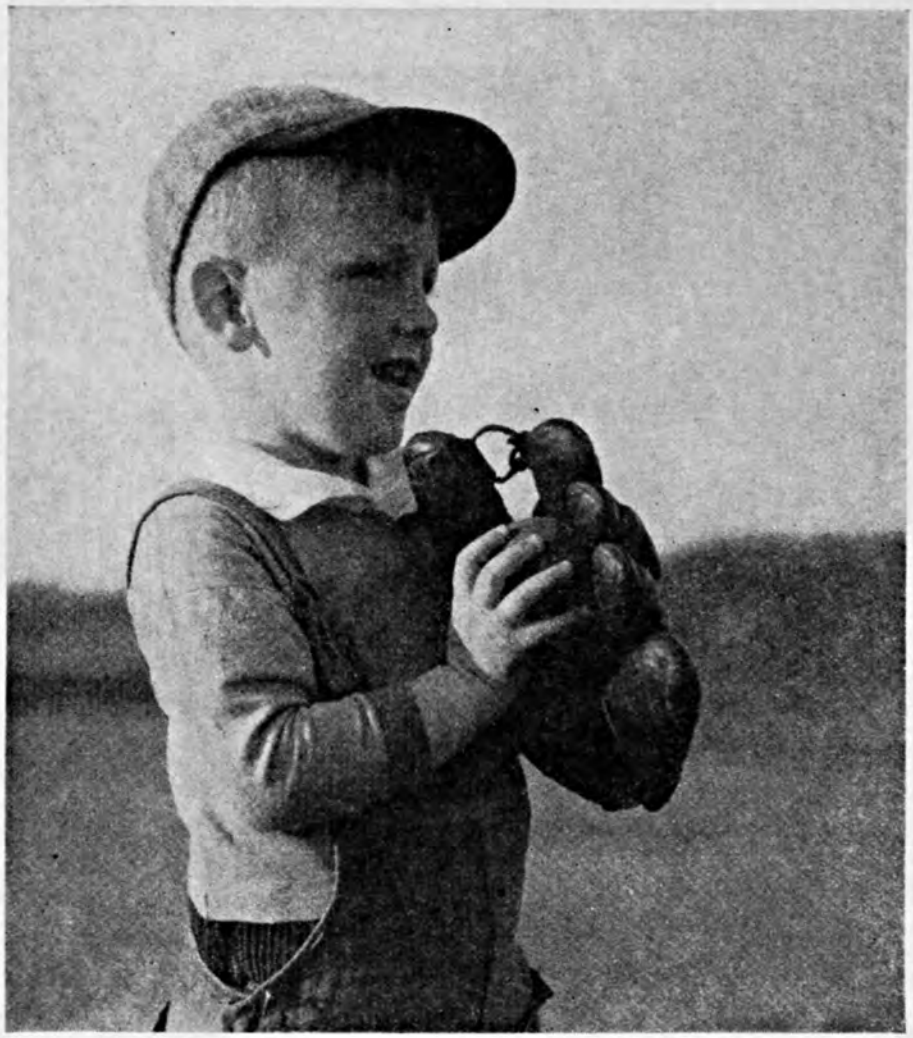
Left: The modern highway leading into the desert.

Right: The old church in the Pueblo Laguna Indian Village, Laguna, New Mexico.



Below: Pueblo Laguna Indian Village, Laguna, New Mexico.





Signs
of
Spring

The Editors Talk

Fertilizers and Farm Income

With the season for using fertilizers already begun in some states, it is encouraging that this Spring the farmer is in a much better position to buy fertilizers than he has been since 1930.

The "low" of the farmer's cash income occurred in 1932. His income increased in 1933 and again in 1934. According to O. C. Stine of the Bureau of Agricultural Economics, U.S.D.A., the farmer's cash income for 1934 will be about $6,200,000,000, or an increase of $1,830,000,000 or 42 per cent over 1932. Rental and benefit payments made material contribution to this increase. It also is noted that during 1930 to 1932 farm income was not sufficient to pay expenses but in the two years following, 1933 and 1934, the income was sufficient to pay expenses "and to return something to the operator for his management and capital. The income to farm operators from 1934 production, for labor, capital, and management, after paying expenses, probably would purchase about twice the quantity of the goods that could be bought by that for 1932."

It should be borne in mind, however, that this great improvement in purchasing power in the last two years is from the very low level. It is fortunate that from the latest data available fertilizer prices stand at 105% of normal —1910 to 1914 being considered the base—while the prices of all commodities used in farm production show an index of 131% of normal. In fact the price of fertilizers shows the smallest increase. The purchase of fertilizers out of the increased cash income is therefore one of the farmer's most profitable investments.

Whatever the methods of marketing and distribution, the problem of efficient and low cost production is always with us. As a factor in the solution of this problem, in many crop-producing areas, fertilizers play an important part. Then too, if the fertility of our soils is to be maintained, the proper use of the right fertilizers is very necessary. Too long a period with a low volume of fertilizer consumption is neither good for the farmer or our national agriculture.

Mr. Stine further notes that the position of the farmer also has been improved by the refinancing of debts and the establishment of Federal credit agencies for providing loans to farmers on the basis of liberal appraisals and comparatively low rates. The refinancing of debts and the reduction of interest charges have contributed toward restoring the farmers' credit and have thus increased their current purchasing power, as rapidly perhaps, if not more rapidly, than the actual current increase in income.

From the Farm Credit Administration comes the indication that the crisis in refinancing farm debts has passed, although the demand for loans still continues. From the same source comes the strong statement that "the ability of any farmer to repay loans in these times depends on the efficiency of his business. There is no profit for anyone in crops that are poorly managed."

Southern Agricultural Workers Meet

The rehabilitation of the farmer, agriculture under the New Deal, cotton production and export, and the control of erosion were some of the subjects, among many others, which were ably discussed at the Thirty-Sixth Annual Convention of the Association of Southern Agricultural Workers in Atlanta recently. The Convention was attended by some 650 members of the association, not only from all parts of the South, but from other sections of the country as well.

The Association of Southern Agricultural Workers is unique in that its membership includes all types of agricultural workers and its conventions afford a common meeting ground for all types of problems affecting Southern agriculture.

A large number of papers of vital interest were presented. Under the section on Agronomy, fertilizers occupied a prominent place. Important papers also were given in the sections devoted to crops, soils, animal husbandry, dairy science, home economics, horticulture, poultry, forestry, etc. Various societies held their meetings in conjunction with the Convention, among them the Southern Section of the American Society of Agricultural Engineers, the Cotton States Branch of the American Association of Economic Entomologists, and the Southern Division of the American Phytopathological Society.

In the sessions of the various groups problems affecting an efficient and economical crop production were discussed from different angles. Efficient production and the changing phases of such production have always taken a prominent place in the Association's program. The problem of finding an export market for cotton, the coordination of cotton research programs, and the possible increase in cotton production in other countries received a great deal of attention.

The Newer Emphasis

The newer emphasis at the present meeting might be summed up in rural rehabilitation, the relationship of the New Deal to agriculture, and a broad emphasis on the economic, social, and spiritual values of rural life in addition to the more purely scientific problems. Under these broad headings research and land planning, the ultimate effect of marketing agreements, present farm credit activities, and the ultimate effect on agriculture of the present monetary policy were included. Subsistence homesteads made another topic as did the obligation of the extension services and vocational teachers to agriculture.

The Extension Service, which originated in the South under the auspices of Dr. Seaman A. Knapp, held a two-day conference. The relationship of their work to present agricultural policies was discussed under such headings as the Integration of the AAA Program in the Regular Extension Program; Responsibility of Extension in Connection with Rehabilitation; Organization of Extension Forces for Soil Erosion Control; Budgeting Farm Needs on a Live-at-Home Basis; and Relocation of Stranded Families in Rural Areas.

Out of the convention came another indication that our national agriculture is changing in its viewpoint and emphasis. Research is needed as badly as ever, but the big problem of research now, in its broader aspects, would seem to be its relationship to a more equitable, controlled production and distribution, especially as they affect a sound development of both the economic and social values of rural life.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The form of the fertilizer may have an important influence on the results it will produce, according to work reported by R. C. Collison and J. D. Harlan in New York State Agricultural Experiment Station (Geneva) Bulletin 646, "Fertilizer Responses of Baldwin Apple Trees on an Acid Soil." The experiment reported was primarily a comparison of various nitrogen fertilizers, but the results obtained and certain modifications in treatments during the course of the work broadened the scope of the conclusions that could be drawn. The physiological or residual acidity or alkalinity of the fertilizer markedly influenced the yield and quality of the fruit. This was somewhat surprising, since apples are usually considered as being tolerant of rather wide ranges of soil acidity. The neutral or alkaline fertilizers were distinctly superior in yield and quality of fruit. However, when the acidic fertilizers had lime treatments compared with them, the results were about as good as those from most of the alkaline fertilizers.

Of the various fertilizer materials used, potassium nitrate applied alone gave outstandingly good yields and quality of fruit during the experiment. The authors could not give a satisfactory explanation for this as the treatments used in the experiment did not permit of direct comparisons. Since approximately the same amount of nitrogen was applied in the form of nitrate of soda, the superiority of nitrate of potash might be ascribed to the potash. However, complete fertilizers with smaller amounts of potash did not produce such good results. The authors seem inclined to feel that some peculiarity of combination of the nitrogen and potash in nitrate of potash, or the wide nitrogen-potash ratio of this fertilizer combined with its physiological neutrality, favored the assimilation of nitrogen or potash, or both by the tree, thus producing the favorable results obtained.

"Commercial Fertilizers—Report for 1934," *Agr. Exp. Sta., New Haven, Conn., Bul.* 365, *Oct.* 1934, *E. M. Bailey.*

"Tests for Phosphate, Nitrate and Soluble Nitrogen in Conducting Tissue of Tomato and Lettuce Plants, as Indicators of Availability and Yield," Agr. Exp. Sta., Lexington, Ky., Cir. 43, *Sep.* 1934, *E. M. Emmert.*

"Report of Analyses of Commercial Fertilizers," Dept. of Agr., Baton Rouge, La., Fer. Rept. Season 1933-1934, *Harry D. Wilson.*

"Commercial Fertilizers, 1934," *Agr. Exp. Sta., Orono, Me., Off. Inspect.* 153, *Oct.* 1934, *James M. Bartlett.*

"Fertilizer Analyses and Registrations, 1934," *Dept. of Agr., St. Paul, Minn., H. A. Halvorson.*

"Report of Analyses, Commercial Fertilizers and Fertilizer Materials, Seasons 1932-1933," *State Dept. of Agr., Jackson, Miss., Dr. W. F. Hand.*

"Analyses of Commercial Fertilizers, Fertilizer Supplies, and Home Mixtures for 1934," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 578, *Nov.* 1934, *Charles S. Cathcart.*

"Interpreting Fertilizer Analyses with Reference to the Sources of Nitrogen," Agr. Exp. Sta., New Brunswick, N. J., Cir. 331, *Sep.* 1934, *A. W. Blair.*

"Inspection of Fertilizers," R. I. State College, Kingston, R. I., Ann. Fer. Cir., Sep. 1934, *W. L. Adams, and A. S. Knowles, Jr.*

"Cell Size and Structure in Plants as Affected by Various Inorganic Elements," Agr. Exp. Sta., Burlington, Vt., Bul. 383, *Sep.*

1934, *B. F. Lutman.*

"The Relation of Fertilizers to the Control of Cotton Root Rot in Texas," U. S. D. A., Washington, D. C., Tech. Bul. 426, *Aug.* 1934, *H. V. Jordan, P. R. Dawson, J. J. Skinner, and J. H. Hunter.*

"Experiments with Nitrogen Fertilizers on Cotton Soils," U. S. D. A., Washington, D. C., Tech. Bul. 452, *Oct.* 1934, *J. J. Skinner, R. A. Lineberry, J. E. Adams, C. B. Williams, and H. B. Mann.*

"A Review of the Patents and Literature on the Manufacture of Potassium Nitrate with Notes on Its Occurence and Uses," U. S. D. A., Washington, D. C., Misc. Pub. 192, *July* 1934, *Colin W. Whittaker and Frank O. Lundstrom.*

Soils

"Measuring Soil Fertility," Agr. Exp. Sta., New Brunswick, N. J., Cir. 335, *Nov.* 1934, *A. W. Blair.*

"Soil, Field-Crop, and Pasture Management for Herkimer County, New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 612, *June* 1934, *A. F. Gustafson, D. B. Johnstone-Wallace, and F. B. Howe.*

"Acidity, Antacid Buffering, and Nutrient Content of Forest Litter in Relation to Humus and Soil," Agr. Exp. Sta., Ithaca, N. Y., Mem. 166, *June* 1934, *Max J. Plice.*

"About Soil Testing," Agr. Exp. Sta., Logan, Utah, Leaf. 12, *Mar.* 1934, *D. W. Pittman.*

"Orchard Soil Management," Agr. Exp. Sta., Logan, Utah, Leaf. 29, *Mar.* 1934, *Francis M. Coe.*

"Application of Steam in the Sterilization of Soils," U. S. D. A., Washington, D. C., Tech. Bul. 443, *Aug.* 1934, *Arthur H. Senner.*

"Soil Survey of Vermillion County, Indiana," U. S. D. A., Washington, D. C., Series 1930, *No.* 20, *W. H. Buckhannon, J. S. James, A. T. Wiancko, and S. D. Conner.*

"Soil Survey of Poweshiek County, Iowa," U. S. D. A., Washington, D. C., Series 1929, *No.* 29, *T. H. Benton and A. E. Shearin.*

"Soil Survey of St. Clair County, Michigan," U. S. D. A., Washington, D. C., Series 1929, *No.* 27, *E. B. Deeter, H. W. Fulton, B. E. Musgrave, and L. C. Kapp.*

"Soil Survey of Hennepin County, Minnesota," U. S. D. A., Washington, D. C., Series 1929, *No.* 24, *P. R. McMiller, C. C. Nikiforoff, E. A. Fieger, Sam Hill, C. H. Mattson, G. A. Swenson, and W. C. Boatright.*

Crops

Spring will soon be upon us and already farmers are making their plans for the new growing season. To the countless home-owners whose enthusiasm in that direction is limited to a lawn or garden, the care of these small plots becomes a timely topic. A new Extension Bulletin No. 296, "Lawns —Construction and Maintenance," by R. W. Curtis and J. A. DeFrance, of the New York State College of Agriculture, will find its way to many of these interested people. That this publication will be of great help is guaranteed by its many suggestions for success in acquiring an attractive setting for the home.

"Alfalfa in Ohio," Bulletin 540 by C. J. Willard, L. E. Thatcher, and J. S. Cutler of the Ohio Agricultural Experiment Station, is this commonwealth's latest presentation of its experimental work and observations on this important crop. The bulletin discusses all factors involved in success with alfalfa, and with carefully tabulated data and a great many pictures, should set on the right track growers who would seek profit from this valuable legume.

"Permanent Pasture Studies on Upland Soils," Agr. Exp. Sta., Auburn, Ala., Bul. 243, *Jan.* 1935, *E. L. Mayton.*

"Control of Cotton Insects and Diseases," Agr. Exp. Sta., Auburn, Ala., Leaf. 10, *July* 1934.

"The Fall Crop of Irish Potatoes," Agr. Exp. Sta., Auburn, Ala., Leaf. 11, *Oct.* 1934.

"Care and Pruning of Ornamental Shrubs," Agr. Exp. Sta., Auburn, Ala., Leaf. 12, *Oct.* 1934.

"Improving the Uniformity of Cotton Fiber by the Use of the Pressley Sorter," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 54, *Nov.* 15, 1934, *E. H. Pressley.*

"Forty-sixth Annual Report, Fiscal Year Ending June 30, 1934," *Agr. Exp. Sta., Fayetteville, Ark., Bul.* 312, *Nov.* 1934, *Dan T. Gray, E. B. Whitaker, G. W. Ware, and G. H. Banks.*

"Forcing Gladiolus Outdoors by Heating the Soil with Electricity," Agr. Exp. Sta., Berkeley, Calif., Bul. 584, *Oct.* 1934, *James R. Tavernetti and S. L. Emsweller.*

"Electric Heat for Propagating and Growing Plants," Agr. Exp. Sta., Berkeley, Calif., Cir. 335, *Aug.* 1934, *B. D. Moses and James R. Tavernetti.*

"The Forty-seventh Annual Report of The Colorado Agricultural Experiment Station, Fiscal Year 1933-34," *Agr. Exp. Sta., Fort Collins, Colo., E. P. Sandsten.*

"Avocado Production in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 272, *Oct.* 1934, *H. S. Wolfe, L. R. Toy and Arthur L. Stahl.*

"Fourteenth Annual Report 1933-1934," *Ga. Coastal Plain Exp. Sta., Tifton, Ga., Bul.* 24, *June* 1934, *S. H. Starr.*

"Physiologic Factors Affecting the Germination of Seed Corn," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 176, *Oct.* 1934, *Joe L. Robinson.*

"Collards—A Truck Crop for Louisiana," Agr. Exp. Sta., Baton Rouge, La., La. Bul. 258, *Oct.* 1934, *Julian C. Miller.*

"The Forty-seventh Annual Report of the University of Maryland 1933-1934," *Agr. Exp. Sta., College Park, Md., H. J. Patterson.*

"Raspberry Growing in Michigan," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 152, *Oct.* 1934, *R. E. Loree.*

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 17, *No.* 2, *Nov.* 1934.

"The Cultivation of the Highbush Blueberry," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 252, *Oct.* 1934, *Stanley Johnston.*

"The Composition, Quantity, and Physiological Significance of Gases in Tree Stems," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Tech. Bul. 99, *May* 1934, *Warren William Chase.*

"Work of the Agricultural Experiment Station—The Report of the Director for the Year Ending June 30, 1933," *Agr. Exp. Sta., Columbia, Mo., Bul.* 340, *Sep.* 1934, *F. B. Mumford and S. B. Shirky.*

"Adapted Red Clover for New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 330, *Sep.* 1934, *Howard B. Sprague.*

"Cucumber Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 150, *Aug.* 1, 1934, *W. D. Enzie.*

"Muskmelon Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 151, *Sep.* 1, 1934, *W. D. Enzie.*

"Cauliflower and Sprouting Broccoli," Agr. Exp. Sta., Geneva, N. Y., Cir. 152, *Sep.* 1, 1934, *W. D. Enzie.*

"Raspberry Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 153, *Oct.* 1, 1934, *G. L. Slate and W. H. Rankin.*

"Vegetable-Crop Production in Suffolk and Nassau Counties," Agr. Exp. Sta., Ithaca, N. Y., Bul. 611, *June* 1934, *F. O. Underwood.*

"Growing Wood as a Crop on New York Farms—Part 2—*Care and Culture," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bul.* 291, *June* 1934, *J. A. Cope.*

"Twenty Years of Management of the Cornell University Woodlots," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bul. 292, *A. B. Recknagel.*

"Factors Affecting the Development of the Cotyledonary Buds of the Common Bean, Phaseolus Vulgaris," Agr. Exp. Sta., Ithaca, N. Y., Mem. 167, *June* 1934, *C. F. Moreland.*

"Precautions to Observe in Making Crop-Acreage Reductions and Adjustments in North Carolina," Agr. Exp. Sta., State College Sta., Raleigh, N. C., Agron. Inform. Cir. 90, *Nov.* 1934, *C. B. Williams.*

"Experiments on Thinning Peaches," Agr. Exp. Sta., Wooster, Ohio, Bul. 541, *Oct.* 1934, *J. S. Shoemaker.*

"Cereal Hays for Ohio," Agr. Exp. Sta., Wooster, Ohio, Bul. 543, *Nov.* 1934, *L. E. Thatcher.*

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. 20, *No.* 172, *Jan.-Feb.* 1935.

"The Panhandle Bulletin," Panhandle Agr. Exp. Sta., Goodwell, Okla., No. 55, *Dec.* 1934, *Everett R. Clark.*

"Forty-seventh Annual Report for the Fiscal Year Ended June 30, 1934," *Agr. Exp. Sta., State College, Pa., Bul.* 308, *July* 1934, *R. L. Watts.*

"Sorghums for Forage and Grain in South Dakota," Agr. Exp. Sta., Brookings, S. D., Bul. 285, *Apr.* 1934, *A. N. Hume and Clifford Franzke.*

"Tomatoes in the Farm Garden," Agr. Exp. Sta., Knoxville, Tenn., Ext. Pub. 180 (*Rev. of Pub.* 148), *June* 1933, *W. C. Pelton.*

"Grapes in the Farm Garden," Agr. Exp. Sta., Knoxville, Tenn., Ext. Pub. 181, *June* 1933, *W. C. Pelton.*

"Korean Lespedeza," Agr. Exp. Sta., Knoxville, Tenn., Cir. 49 (*Rev. of Ext. Pub.* 172), *Oct.* 1934, *C. A. Mooers.*

"Summary Report of Progress July 1, 1932 *to June* 30, 1934," *Agr. Exp. Sta., Logan, Utah, Bul.* 250, *Sep.* 1934, *P. V. Cardon.*

"Crested Wheatgrass," U. S. D. A., Washington, D. C., Leaf. 104, *H. L. Westover.*

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"Potato Production in the South," U. S. D. A., Washington, D. C., Farmers' Bul. 1205 (*Rev.*) *Aug.* 1934, *William Stuart.*

"Flax-Fiber Production," U. S. D. A., Washington, D. C., Farmers' Bul. 1728, *July* 1934, *B. B. Robinson.*

"Alfalfa Varieties in the United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1731, *Sep.* 1934, *H. L. Westover.*

"Report on the Agricultural Experiment Stations, 1933," *U. S. D. A., Washington, D. C., June* 1934, *J. T. Jardine and W. H. Beal.*

Economics

The attractive and well-set-up Bulletin 305 of the Pennsylvania State College, "Types of Farming in Pennsylvania," should adequately serve the purpose for which this research was undertaken. The authors, Emil Rauch-

enstein and F. P. Weaver, in their introduction state that the kind of farming in any area is the result of the experience of farmers in trying to adjust their business, mainly to topography, soil, climate, and price changes. "A study of these factors in relation to the systems of farming and practices followed over a period of years, therefore, may give a basis for judging, in a general way, what crops and livestock can be produced to best advantage, the proportions of each, and what shifts may be expected in the future with anticipated price changes. It may also give a basis for planning programs of research, extension, and development." This bulletin contains many hints of procedure which might be put to good use in formulating forward-looking programs in other regions.

"Economic Readjustment in the Dairy Industry in Delaware," Agr. Exp. Sta., Newark, Del., Bul. 190, *June* 1934, *R. O. Bausman.*

"Types of Farming in Idaho—Part 1—*Agricultural Resources and Factors Affecting Their Use," Agr. Exp. Sta., Moscow, Idaho, Bul.* 207, *May* 1934, *Harold A. Vogel and Neil W. Johnson.*

"The Place of Pasture in Iowa Farming," Agr. Exp. Sta., Ames, Iowa, Bul. 323, *Oct.* 1934, *Edgar B. Hurd and H. L. Thomas.*

"An Economic Study of Land Utilization in Montgomery County, 1932," *Agr. Exp. Sta., Ithaca, N. Y., Bul.* 613, *June* 1934, *F. F. Hill and George T. Blanch.*

"Ohio Agricultural Statistics 1933," *Agr. Exp. Sta., Wooster, Ohio, Bul.* 542, *Nov.* 1934, *G. S. Ray, A. R. Tuttle, and P. P. Wallrabenstein.*

"Farm Price of Cotton in Relation to Quality," Agr. Exp. Sta., Knoxville, Tenn., Bul. 153, *Aug.* 1934, *C. E. Allred, G. H. Hatfield, and P. B. Boyer.*

"The Mixed Carload in Distribution of Vegetables from the Lower Rio Grande Valley of Texas," Agr. Exp. Sta., College Sta., Tex., Bul. 497, *Nov.* 1934, *W. E. Paulson.*

"Virginia Farm Statistics 1934," *Va. Dept. of Agr., Richmond, Va., Bul.* 11, *Oct.* 1934, *Henry M. Taylor.*

"The Market for Mid-western Potatoes," Agr. Exp. Sta., Madison, Wis., Ext. Cir. 272, *Nov.* 1934, *Henry H. Bakken.*

"Market Distribution of Car-lot Shipments of Fruits and Vegetables in the United States," U. S. D. A., Washington, D. C., Tech. Bul. 445, *Sep.* 1934, *J. W. Park.*

"Cotton Production in Egypt," U. S. D. A., Washington, D. C., Tech. Bul. 451, *Oct.* 1934, *P. K. Norris.*

"Community Production of Acala Cotton in New Mexico," U. S. D. A., Washington, D. C., Cir. 314, *June* 1934, *A. R. Leding.*

"Items Relating to the Administration of the United States Cotton Standards and Cotton Futures Acts," U. S. D. A., Washington, D. C., Serv. & Regul. Announcements No. 10, *Sep.* 1934.

Potash Has Big Role

(*From page* 22)

supply of soil potash is the more quickly exhausted. When exhausted to the extent that the soil no longer supplies it fast enough, then the nitrogen and phosphorus become proportionately ineffective. The ultimate and only solution is to add potash to the nitrogen and phosphate combination, thus forming a complete fertilizer. This condition is already present in the older sections of the country, and the recognition of the need has been met by the increased use of potash. On the newer lands on the other hand, the need is not very urgent as yet.

The crop must be considered in thinking of plant-food needs. Legumes and the starch and sugar crops rank high in potash demands. Many of the common vegetables, because they grow so quickly, must have an abundance of easily and quickly available nutrients, which necessitates liberal fertilizing. The combination of quick growth and big yields make potash fertilizing the more urgent. The continuous production of crops which are sold off the farm hastens the time when a potash deficiency becomes a critical factor. Root crops are often much helped by potash. So important is this element to the root development of crops that the percentage of lodged corn has been re-

duced by its use. It stimulates stronger root growth and better root anchorage.

Quite recently potash has become noticeably effective in pasture improvement in the older grazing sections. Minerals generally are necessary to bring back clovers, and the use of potash on the grazing lands results almost invariably in more clover and a richer and more palatable grass mixture for animals. Potash increases succulence, and this no doubt is a factor in producing more palatable grazing.

Available Potash

There are few soils from which plants cannot obtain some potash. As the supply becomes more limited, the plant adjusts itself to obtain its nutrition from a dilute solution. But the degree of adjustment cannot extend beyond a certain limit. Before growth occurs, proteins must form; and before protein formation, there must be the production of carbohydrate. But carbohydrate cannot form except in proportion to the supply of potash, and therefore the growth rate may depend upon the rate of potash availability. In fact the functions of the various nutrients are so coordinated that a deficiency or slow rate of availability of any important one may render all the others nearly useless.

The amount of available potash in the soil fluctuates from time to time. That soluble in water is very readily available to all plants, and that soluble in weak acids has been found reasonably easily available to most plants. When the soluble portion is used up, it becomes a question of how quickly the reserve supply of the soil can be changed over to an available form.

Potash is conserved by saving and returning manure to the land and by using care to return straw and crop residues. The sale of cash crops may remove potash rapidly, especially the sale of hay and leafy vegetables which carry a great deal of it. Trees and fruits generally remove potash more slowly, but even then a deficiency may develop in time.

All of the common carriers of potash have proved highly satisfactory for general use. For special uses a particular form may be preferable. When tobacco is fertilized with muriate of potash, the chlorine sometimes impairs the burning quality of the leaf, in which case the sulphate is preferable. On a few soils such as some of the sands of Connecticut and the Carolinas, magnesium deficiency has limited crop production. This condition has been corrected by the use of potash salts, such as sulphate of potash-magnesia, which carry some magnesium. Stable manure, when available, also is a very satisfactory carrier of potash.

The rate of potash fertilizing varies a great deal with different soils and crops. In general the preference should be given to frequent moderate applications. The soil absorbs this plant-food element quite readily, and the loss by leaching is not large. The chief objection to heavier but less frequent applications is that plants "gorge" themselves with potash when it is abundant in easily available form, and thus do not use it most efficiently. The rate and frequency of application, however, must be modified to meet specific needs.

Interest Is Increasing

That interest in the use of potash is increasing is quite apparent. Advances in truck crop production have especially stimulated appreciation of the importance of thorough fertilizing. As agriculture becomes more highly specialized, fertilizers in general become more necessary. In producing crops of high acre-value, a fertile soil brought to its maximum production by wise use of fertilizers is a first essential to success. No fertilizer program can be quite complete if any one of the major plant nutrients is overlooked.

Better Cantaloupes

By George R. Cobb

Salisbury, Maryland

ALTHOUGH it is generally conceded that root crops are improved both in yield and quality by the use of high-potash fertilizers, the fact that vine crops also respond to liberal applications of potash in a similar manner is not so well known. According to Van Slyke, however, a crop of beets removes but 17.5 lbs. of nitrogen, 5 lbs. of phosphoric acid, and 32.5 lbs. of potash, whereas an average crop of cantaloupes (muskmelons) removes 22 lbs. of nitrogen, 8 lbs. of phosphoric acid, and *40 lbs. of potash.*

Vegetable growers in Florida, according to a bulletin from that state, apply 1,500 lbs. of a 4-8-8 fertilizer, and Voorhees advises a liberal application of a 4-8-10 mixture. Growers on the Del-Mar-Va Peninsula claim that potash develops a better "net" which is at once a sign of maturity and an indicator of quality, matures the crop earlier, and produces a crop of fruits much more uniform in size.

Check with Tests

As a check on these various claims several tests have been conducted, during recent years, in which high and low potash have been compared. In 1928 the plan of the plots was as follows: Plot 1 received 1,000 lbs. of 5-8-5; Plot 2, 1,000 lbs. of 5-8-5 plus 200 lbs. of muriate of potash applied between rows; Plot 3, 1,000 lbs. 5-8-5 plus 400 lbs. of muriate of potash.

The yields at harvest time showed a consistent and marked increase in favor of higher potash. Plot 1 produced 5,677 melons. Plot 2, 5,833 fruits; and Plot 3 yielded 7,146 melons —gains of 156 and 1,469 melons, respectively. In addition to the increased yields, due to the influence of higher potash, maturity was hastened and there was more uniformity in size and shape. The plot receiving the 400 lbs. of muriate matured its fruits and the ground was prepared and seeded to clover before harvesting was completed on Plot 1, which received no extra potash.

Verify Results

In 1929 the plan of the tests was changed somewhat, in that the extra potash was included in the mixed goods instead of being applied between the rows after the plants were starting to vine. Plot 1 received 1,000 lbs. of 5-8-5; Plot 2, 1,000 lbs. of a 5-8-10; and Plot 3, 1,000 lbs. of a 5-8-20 mixture.

The results in 1929 were similar to those secured in 1928, as a consistent increase in yield was shown as the potash content of the fertilizer was increased. The number of melons produced was 4,335, 4,411, and 5,310. Vines on Plot 3 showed more vigor and better color throughout the season. The fruits were more uniform in size, net, and shape at harvest time. Early maturity again was developed on the highest potash plot, and a test for sugar showed more sugar in fruits from the high-potash plots than in those from the plots receiving smaller amounts of potash.

As a result of these tests and subse-

quent tests, as well as results from actual farm practices, one of the large fertilizer manufacturing concerns on the Peninsula developed a 5-8-12 mixture for cantaloupes and other vine crops. Thus, the plan of tests for 1934 included a plot to which this newer analysis was applied in a comparison to the popular 5-8-5 mixture.

These 1934 tests were conducted on farms widely separated, but a report on two of them, one on the farm of Wilson Figgs, Seaford, Delaware, and the other on the farm of G. H. Richardson, Salisbury, Maryland, fully illustrate the results secured from farms of the entire series. For the benefit of those growers who think and talk in terms of bushels, hampers, crates, barrels, etc., one report will state yields in crates (carriers) while the other report will show the yield in individual melons.

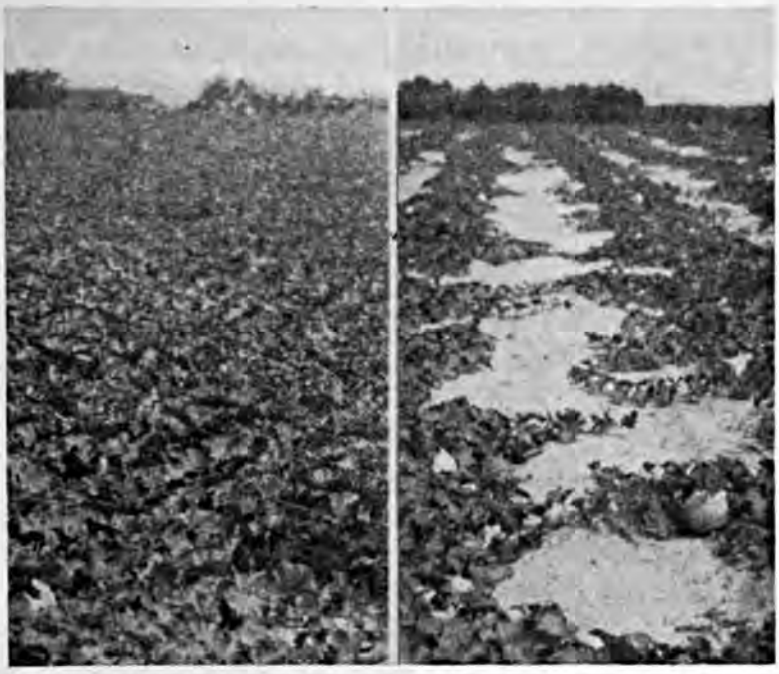
The plots were fertilized as follows: Plot 1 received 1,000 lbs. of a 5-8-5 commercial fertilizer mixture; Plot 2, 1,000 lbs. of the 5-8-5 plus 200 lbs. of muriate of potash; Plot 3, 1,000 lbs. of 5-8-12; and Plot 4, 1,000 lbs. of the same 5-8-12 plus 200 lbs. of muriate of potash. On the Figgs farm the 5-8-5 and 5-8-12 were applied in the row while the extra potash was spread broadcast. On the plots at the Richardson farm the extra potash was broadcast one month before the seed was sown and the 5-8-5 and the 5-8-12 were broadcast at time of planting.

Incidentally this practice of applying straight potash some time before the crop is planted or the seed sown, or a "pre-application," is very popular with truck growers in general. The growers feel that there is less danger of injury to the seed and that the potash is more readily available to the plants when pre-applied. Sweet potato growers in several sections of New Jersey, for example, apply 500 lbs. of muriate of potash per acre as early in the season as possible, which in most cases is during the winter months.

Although yields on all farms were cut by a rather prolonged dry spell, consistent and marked differences showed up in the figures, with increases developing as the potash supply was increased.

On the Figgs farm the plot receiving the 5-8-5 with no extra potash produced 4,540 melons, while Plot 2 which received the 200 lbs. of muriate in addition produced 5,312 melons, a gain of 772 melons. Corresponding plots on the farm of Mr. Richardson showed a yield of 112 crates (carriers) on Plot 1 and 124 crates on Plot 2, a gain of 12 crates or approximately 432 melons in favor of the extra potash.

Referring to the reports of these two tests, figures show that Plot 3 which received 1,000 lbs. of 5-8-12 produced 4,327 melons, whereas Plot 4 with the extra



Left: 1,000 lbs. of 5-8-12; note better vine growth and absence of exposed soil. Right: 1,000 lbs. 5-8-5; note exposed soil area and lack of vine growth. Farm of G. H. Richardson, Salisbury, Md.

potash in the form of 200 lbs. of muriate yielded 4,972 fruits, a gain of 645 fruits. Reviewing the yields secured at the Figgs farm, it is noted that the 5-8-5 plot to which 200 lbs. of muriate of potash also were applied gave the largest yield, and it also is to be noted that this combination of fertilizers developed an analysis of about 5-8-15, which is rather a high-potash fertilizer for cantaloupes as compared with analyses now being used by the general run of growers.

A comparison of yields on the four plots at the Richardson farm shows a gain of 12 crates for Plot 2 which received the extra 200 lbs. of muriate, checked against Plot 1 which had only the regular 5-8-5 application. Plot 3 which received 1,000 lbs. of the 5-8-12 fertilizer produced 308 crates or a gain over Plots 1 and 2 of 12 and 184 crates respectively. Reduced to individual fruits these gains would be 432 and 6,624—rather a startling increase in favor of the higher potash mixture.

Potash Hastens Maturity

Daily harvesting records reveal that the high-potash plots were first in maturing their melons, an advantage in most seasons as the early crop usually brings higher prices than the mid-season crop. Again, the net on the melons from the high-potash plots was very prominent and not flat like the net on the melons from the low-potash plots.

Uniformity in size, a decided asset to the grower, is clearly displayed by the report from the Richardson farm as it shows that 240 crates of the 308 produced on the 5-8-12 plot were packed and shipped in only three different sized packages whereas it is not unusual for growers to purchase anywhere from 5 to 7 style crates of varying dimensions in order that their crop may be packed in the approved manner.

A close-up of primes from the Wilson Figgs farm, showing uniformity of type.

It is needless and almost useless, in an article of this nature or in a report issued to the public, to present the dollars and cents value of either costs, profits, or losses. As prices for fertilizer, seed, labor, and packages may vary from season to season and prices received for the product are rarely the same for two years in succession, it is evident that returns and costs during 1934 would rarely be the same for any other year.

However, a review of the data presented does show that vine crops respond to high applications of potash. It might be added that soil conditions as to acidity were favorable and that the soils were at least of moderate fertility. Total yields were lower than might have been the case had the crop received more rainfall, but it is doubtful that the differences in yield between crops would have shown a reversal or even would have varied a great deal in the comparative results.

Malting Barley

(*From page* 9)

sand loams undoubtedly are to be preferred, while heavy clay soils, light sands, and high humus soils are not suitable, particularly the latter two. Clay soils if in good tilth and well drained may produce good crops but are more susceptible to extremes of heat and moisture conditions.

Barley should follow either a cultivated crop such as corn or roots or a fall-plowed clover sod. Spring-plowed land is seldom satisfactory for barley in Ontario; neither is heavy manuring desirable as it tends to produce too much straw, thereby delaying maturity. Kernels produced under these conditions are usually improperly filled out and the protein content often is too high for good malt.

Most successful barley growers use some commercial fertilizers in which phosphorus and potash predominate. It is important that only small amounts of nitrogen be applied, not more than two or three per cent, or the same undesirable results may occur as in over-manuring. Phosphorus should be used in liberal amounts. It stimulates a more rapid root development and enables the plant to forage for itself more quickly. Potash should be applied in sufficient amounts to strengthen the straw and build up the all-essential starch of the kernel.

The Ontario Fertilizer Board recommends the use of 2-12-10 for producing barley for malting purposes, and this mixture has found favor with many of the best growers.

There are other mixtures which may suit specific conditions. For instance, if the soil is in a high state of fertility and too much straw growth is feared, the nitrogen may be omitted altogether and 0-12-15 or an 0-12-10 substituted. The rates usually recommended are from 250 pounds to 350 pounds per acre. The fertilizer should be applied at the time of seeding the barley and drilled in at about the same depth as the barley is planted.

Barley usually responds to the application of fertilizers, for it is a shallow-rooted plant as well as an early-maturing one. Consequently it requires its food supply in a quickly available form and within easy reach of the young roots. It must be emphasized that phosphorus and potash are the greatest needs of this crop in the development of stiff straw, plump kernels, and early maturity.

Not only is the growing of good malting barley an art, but the harvesting operations must be carried out with great care. The crop should not be cut until thoroughly ripe, for unlike wheat or oats the ripening processes cease almost as soon as it is cut.

The stooking of barley intended for the malting market deserves some special care. A great deal can be done in this step of the harvesting process to preserve the vitality and soundness of the grain by capping the stooks. Threshing is also important, and under no circumstances should the grain be broken or peeled by careless operation of the threshing machine.

Cucumbers

(*From page* 20)

the fruits were "better shaped and more uniform in size, color, and shape." Plot 1 with its 5-8-5 yielded 172 bushels, whereas Plot 3 produced 224 bushels.

Yields in Bushels, Primes

Grower	Plot 1	Plot 2	Plot 3	Plot 4
Mr. Moore	42	54	55	66
Mr. Toadvine	100	124	96	124
Mr. Hill	172*	144*	224*	228*

(* Total number of fruits produced)

The chief difference between the 5-8-5 and 5-8-12 mixtures was the more uniform shape and size of the cucumbers grown with the latter. Of the two methods of applying the fer-

tilizer in general practice, it appeared that extra potash broadcast, whether on the 5-8-5 or 5-8-12, was more effective than that applied in the row.

The results show very clearly that under the conditions of these tests more potash is needed for a high yield and high quality than is supplied by 1,000 lbs. of a 5-8-5 mixture. Whether this extra potash is applied in the mixed goods or as a separate application does not appear to be important.

Incidentally it might be added that results of the 5-8-12 mixture on cucumbers, cantaloupes, and watermelons have been so satisfying that both Maryland and Delaware, through their Agromomists and other officials, have adopted this analysis as one of the official analyses for recommendation to the growers of the two states.

Feed Southern Crops

(*From page 7*)

may become soluble in toxic proportions in the highly acid red and chocolate soils that contain relatively large amounts of these materials.

"In making liming and fertilizer recommendations for various soils, the probability of the presence of toxic amounts of such materials as manganese and iron in chocolate and red soils should be taken into consideration. Soil acidity as such may not be an important factor in the growth of crops over a relatively wide range of pH values, but it is the differential in the nutritional complexes in various soils which determines the growth of plants. In the gray Coastal Plains soil crops may be grown successfully at a relatively high degree of acidity on account of the very low content of such materials as manganese and iron to become soluble in toxic amounts. When such soils are limed heavily there may be a serious deficiency of manganese in the production of many crops."

2—Not *when* applied but *how much* applied seems the important consideration in feeding *potash* to the cotton plant. Results of comprehensive tests in South Carolina, in which all plots receive 600 pounds per acre of a 5-10-0 fertilizer before planting, with varying amounts of potash applied at different times, may be thus stated:

There does not seem to be a significant difference in yield from the various times of applying potash fertilizer with the lower rates of application. However, when as much as 45 to 75 pounds of potash per acre are applied, it is often desirable to apply some of the potash before the crop is planted or as a top-dressing.

These data suggest that for the rates used under the conditions prevailing on many farms, one might expect the addition of one pound of potash to increase the yield 8 to 15 pounds of seed cotton.

There has been an unusual amount of rust, or potash deficiency, in the cotton crop in the southeastern section of South Carolina. The early loss of the leaves of the cotton plants prevents a large proportion of the bolls from developing properly. The bolls produced on plants grown on soils deficient in available potash do not open normally, and the cotton is often difficult to pick. Potash deficiency in cotton is often serious during a relatively dry growing season, particularly following a relatively dry winter. These conditions prevailed in the southeastern section of the state for the past two crop seasons, and this is very probably one of the important reasons for the acute potash deficiency

Tobacco leaf (left) low in sulfur, compared with normal leaf (right).

in cotton observed in such a large proportion of the crops in 1934.

3—Suggesting the use of dolomitic limestone as a filler to neutralize equivalent acidity of materials used in mixed fertilizers, Southern agronomists call attention to the fact that a heavy application of lime material may reduce the availability of potash in the soil. On this point Dr. Cooper says:

"This effect is often observed in the cotton crop following such crops as alfalfa where the soil is limed heavily. Where cotton follows alfalfa it is often necessary to make a heavy application of potash fertilizer materials to the soil to prevent serious injury from potash deficiency or cotton rust."

The presence of the cotton boll-weevil makes it impracticable to grow cotton on low, moist land which produces a tall cotton plant with an abundance of leaves, and these low, moist areas are now being used largely for grain and legume hay. But much of this potentially good corn and hay land is deficient in available potash because not usually fertilized with a complete fertilizer mixture containing potash.

The common impression that corn and legume crops do not respond to potash probably results from data on rotation and fertilizer experiments where these crops are included in a rotation in which cotton is liberally fertilized with potash. It is true that where sufficient potash has been used for cotton in such rotations there is sufficient available potash left in the soil for several corn and hay crops. This is not true, the results show, when corn and hay crops are grown continuously, and the potash deficiency results in corn root rots and other ailments.

The common field crops, besides cotton, affected by potash deficiency are soybeans, cowpeas, corn, and oats. Cotton yields are the first to be seriously reduced by potash deficiency. Cotton is followed by soybeans and cowpeas. Oats are much more resistant than corn. One of the first symptoms observed in the oat crop is weak straw and serious lodging, or plants falling down before maturity.

On the basis of reports of vegetable crop failures the South Carolina Experiment Station has been making some fertility tests with cucumbers, squash, cantaloupes, and watermelons.

The soil samples collected from areas which do not produce satisfactory crops of cucumbers and squash are often very strongly acid. Recent tests show that these crops may give a

marked response to an application of lime materials. Basic slag seems to produce cucumbers with a dark green color, which is often a highly desirable characteristic. Taking the yield of the plots receiving 4-8-8 fertilizer and unlimed as 100 per cent, the basic slag and limed plots produced 148 and 123 per cent, respectively, of the unlimed plots. The yields on the plots which did not receive potash were very low.

The yields of the squash on the plots receiving basic slag and lime were 245 and 205 per cent, respectively, of the unlimed plots. These data suggest the reason for almost complete failure of these crops on certain strongly acid soils.

Cantaloupes also showed a marked response to an application of lime and basic slag. This crop is not successful on strongly acid soils.

The results secured with watermelons show that there was very little response to lime materials, but there was a marked response to potash fertilizer.

Youthful Soilsmen

(*From page* 21)

tested them for acidity. The result of this testing was summarized in tabular form for permanent record along with the drawings of each field which showed the location from where the soil sample was taken.

Three of the boys enrolled in the classes do not live on farms. They each made an enlarged drawing of our township from a county map and brought it up to date by changing the names to conform with present owners of the land. As the acidity testing, soil testing, and fertility programs develop these township maps will be colored to indicate the extent of the soil improvement project in the township.

The Agricultural and Scientific Bureau of the N. V. Potash Export My., Inc., Lafayette, Indiana, cooperated with us by furnishing mimeographed directions for conducting class experiments in determining soil plant-food needs. This company and the local Farm Bureau store supplied fertilizer for carrying on the experiment and samples of soil which were representative of entire fields were carefully prepared by members of the class. Class time was allowed for the experiment on samples from fields to be planted to wheat and corn in 1935, but the other crops that were to be grown were tried out during the students' spare time at home after two successful experiments had been performed at school under supervision.

Reviewed by Fathers

When the tests were ready for reading, we invited the Fathers in for the class period. In general the effect noted was that the lighter soils seemed to do better in the pots containing nitrogen. Potash showed decided advantages on the darker soils, while the complete fertilizer treatment resulted in larger growth in almost every test.

This work proved so interesting that one Senior enrolled in Farm Management quit one of his academic studies at the end of the first semester in order to repeat his Soils and Crops work, since this experimenting had not been carried out when he took the course.

The boys of the Farm Management class used their maps in a study of field reorganization. One project is

now under way in which a five-field arrangement will gradually become a four-field farm which will fit the rotation better, have fewer angling sides, point rows, and end posts to bother with. The present time seems to be advantageous for this study because of the need for replacing many farm fences during the next few years.

A study of the soil conditions of each farm is bringing out the fact that certain portions of the acreage is unadapted to economic crop production. One of the developments that is coming from the study will be plans for a conservation project. Trees and grassland will gradually stop the erosion that has been allowed to go unchecked for many years.

Pioneering in Corn

(*From page* 14)

bushels per acre was the result. In 1931 they tried several more hybrids with slightly better success. These failures did not quench the fire of their determination. They had been told that there was no magic assurance that a hybrid was a superior type of corn. They understood that it was a problem of obtaining a strain of corn that would respond better under their conditions than their home-grown strain.

Three years ago they were able to obtain seed of a locally grown Indiana hybrid corn, Hoosier Hybrid. This corn rather offended Mr. Bailey's ideas of beauty in corn, but it was a better adapted strain with a shorter growing season. They were able to plant it two or three weeks later, thus permitting the sweet clover or rye to begin decomposition. They could plow the land, work it down, and permit the weeds to start growth. A thorough discing just before planting destroyed these little weed plants and made the problem of subsequent weed control much easier.

The Hoosier Hybrid clicked, as is shown by the mounting yields of the past three years. They gained the coveted goal with yields of 105 bushels, 113 bushels, and 128 bushels. Another significant fact is that their corn made No. 2 grade when husked in the middle of October, something unheard of in this territory so early in the year, and this corn would shell without a wrestling match. "More good feed in less space, and the water was left in the field instead of damming it up in the crib," remarked James Bailey.

These experiences add just one more grain to the mountain of evidence that corn root rot is a disease of improperly nourished plants. They show the value of proper fertility practices because these men previous to about 1930 had been using phosphate and nitrate, but without the proper amounts of potash. The stalk symptoms revealed the lack of potash balance and when this was corrected the corn responded quite satisfactorily.

In this case Hoosier Hybrid was apparently much better suited to the conditions than the large Reid. Naturally, this does not mean that Hoosier Hybrid is always best. As a matter of fact, Mr. Bailey each year is trying more new hybrids and searching for one which will do even better on his farm than Hoosier Hybrid. It does prove, however, that when corn shows the effects of root and stalk rot, part of the trouble may be an unadapted strain. The undaunted pioneer spirit of these Indiana farmers and their willingness to be guided by the scales and gains of their livestock are leading them to the top.

Pasture Must Carry Cow Per Acre

(*From page* 17)

have been secured in many pastures, comparing the cost of the increased dry matter and protein with its cost in commercial feeds of equivalent value, and find that on reasonably good sods, especially where they contain white Dutch clover, the cost of the increase is from one-fifth to one-half what the feed costs in other forms. This leaves little or no room for doubt as to the practicability of top-dressing.

Up to the Farmer

The questions a farmer has to decide in his own case are whether he needs more feed during the pasture season, whether he has any pasture that is worthy of being top-dressed, and if so, what materials he should use and in what amounts.

It is only rarely that a farmer does not need a greater volume of pasture grass during the summer season than he now has. Even if there is enough feed for May and June, there is the short season of July and August to be considered. Stimulating the clover growth with a prior application of phosphorus and potash will go far toward tiding the herd over these normally lean pasture months.

The increase in feeding value of the grass and clover due to judicious fertilization is also a factor that should not be overlooked. In our trials, fertilization has produced an average of about 3% more protein in the pasture forage, making it a better balanced ration for the cows so that less grain is required.

If the normal amount of fall pasture, from September on, is not sufficient, an application of nitrogen in mid-August before fall rains start will do much to supply any deficit of feed from then on. Producing more pasture when it is actually needed is possible in a great majority of cases.

The better sections of the pasture should be top-dressed first. Here the greatest increase will be secured. If these portions are regular in shape and lend themselves to fencing for judicious grazing, the situation is ideal. Many farms have two or more pastures anyway, and these can be kept separate to attain the end of rotation grazing. No matter if the better areas are not regular, when the pasture is already divided.

The amount of fertilizer to be used will depend on two factors. The density of the sod is one of these. The better the sod, the more fertilizer can be used with profit. The needs of the herd and the area to be treated also will govern the rate of top-dressing. Speaking generally, the lower the rate of fertilizing, the greater will be the returns per dollar invested. In our trials where fertilizers have been used at different levels or rates, the returns for 25 lbs. of nitrogen as against 50 lbs. or a double application have been in the proportion of 6 to 10. In other words, the first 25 lbs. of nitrogen represented by 160 lbs. nitrate of soda or its equivalent is about 50% more effective than the second 25 lbs. on the same sod.

Frequency of Application

When a high rate of return is desired, the first application may approximate 300 lbs. of an 8-16-16 fertilizer. If this stimulates the Dutch clover to a profitable point and fills in the July-August period satisfactorily, it may be repeated year after year. Where no Dutch clover responds to the minerals in this treatment, nitrogen alone should be used at least for a year or two thereafter. Where grass greatly exceeds the clover in the stand, a 1-1-1 ratio such as an 8-6-6 or a 7-6-6 may be used instead.

If no extra feed is needed in May

and June, the Dutch clover pasture may be treated with a phosphorus-potash mixture. One farmer in New Hampshire with a large area of Dutch clover pasture has satisfactorily met the needs of his herd by this treatment. The mixture used was 300 lbs. of superphosphate and 100 lbs. of muriate of potash per acre. Where the acreage is ample, this treatment should last two years before it is necessary to repeat the application.

The amounts of fertilizer mentioned may be scaled up or down depending on the pasture needs and the type and thickness of the stand.

Fortunate is the farmer who still has pastures that are good enough to be top-dressed. The trend is for pastures to deteriorate due to heavy grazing and to lack of attention to the principles of soil fertility such as are practiced on the tillage land. If there is no pasture area on the farm that is worth top-dressing, then it would be an excellent idea to establish one, either by reseeding some of the permanent pasture where feasible or by using a mowing field for pasture, and thereafter applying cheap fertilizers to augment the feed normally produced.

The Inquiring Mind

(*From page* 12)

science. He is also a "starred" member in *American Men of Science;* a fellow of the American Association for the Advancement of Science; and a member of the German and American Societies of Chemists; the National Geographic Society; American Society of Agronomy; American Soil Survey Association; American Peat Society; International Society of Soil Science; American Agricultural History Society; Minnesota Historic Society; Soils Commission; National Research Council; Swedish Peat Society; Sigma Xi and Alpha Zeta. He was vice-president of the American Chemical Society in 1907, and president of the Soil Survey Association in 1923.

Dr. Gortner has already been mentioned as a distinguished student of Dr. Alway's in the small classes at Nebraska Wesleyan University. From them also went forth other well-known chemists including Dr. W. D. Bonner, head of the Department of Chemistry of Utah; Associate Professor C. E. Vail of Colorado Agricultural College; Ellery Files, production manager of the Duratex Manufacturing Co., Newark, N. J.; and R. M. Pinckney, until recently with Dr. Alway in the Soils Division of the Minnesota Experiment Station.

Dr. Alway's early interest in soil studies was no doubt stimulated by the fact that when he was with the University of Nebraska the Santa Fe Railroad Company invited him to help in summer field investigations on dry soils in New Mexico and Arizona. While in Nebraska he also mapped out a program for the study of the soils of the state. It included tests of the effects of cultivation, by comparison of untilled native soils with those which had been worked and cropped. He was also a pioneer in the study of the movements of soil water.

His study of bleached flour in Nebraska in 1907 showed that it could with certainty be distinguished from an unbleached flour, and the kind of agent employed identified as nitrogen peroxide or halogen (chlorine or bromine). The quantity used might be estimated from the amount of certain reaction products remaining in the flour. From his research on that subject he concluded that the use of nitrogen peroxide in the quantities employed by the mills in Nebraska whitened the high-grade flour and

the bread made from it without affecting its composition, odor, taste, texture, or weight and without adding any substance in sufficient quantities to be injurious.

With Dr. W. L. Hadlock, while in Nebraska, Dr. Alway also analyzed samples from both the strongest and weakest bones from the hogs used in a feeding test, to determine whether any change in the composition of the bone ash accompanies the change in the percentage of mineral matter and in the strength of the bones. The result was that both lots of bones showed practically the same composition, thus indicating that the nature of the feed has no effect upon the relative proportions of the different constituents of the mineral matter of bones.

Problems Were Varied

When he began work in Minnesota, Dr. Alway found very different conditions existent in the soils of this state. Those of Nebraska were largely uniform in type, while those of Minnesota were of many different kinds. The great area of peat was a novelty to him and challenged his attention. Soon the Legislature made an appropriation for the special study of the peat and sandy areas in Anoka county, just north of Minneapolis, and the result of the research work done there attracted wide attention. Dr. Alway and his associates demonstrated there that by liming sandy soils the farmers could grow profitable crops of alfalfa. Then they prescribed cultivation methods and discovered marl beds in adjacent swamp lands as a source of needed lime. The result was that the dairy industry in Anoka county took on a new lease of life and became more wide-spread and profitable.

Study of the peat soils showed drainage to be the first essential step in reclamation. Burning of such soils, sometimes done, might prove an extremely dangerous procedure. Use of heavy rollers was found highly beneficial and action of tractors also helped to compact peat soils. A coating of sand or clay was found to materially lessen the danger of summer frosts. Then, too, it was proved that the success of reclamation largely depended upon the application of potash or phosphate, or both together, and in some cases of nitrogen as well as lime. Stable manure, which furnishes nitrogen as well as potash and phosphate, was valuable on peat soils, but usually could be more profitably applied to mineral soils.

Applications of mineral soil or straw also improved peat land. The use of peat litter in stables was advised. Tamarack and spruce were found growing on most of the peat land, but the trees usually were too dwarfed to furnish merchantable timber. Where merchantable timber was found on bogs, it was advised that proper forest management should be practiced, without applying the entire program of reclamation.

Determined Plant Needs

Dr. Alway further determined that the unproductivity of the high, grass and sedge-covered bogs of northwestern Minnesota is due to a lack of available phosphate, and that when phosphate is not applied, flax alone, of all crops tried, has given satisfactory yields. Liming was found prerequisite to the growing of alfalfa on the older soils of the southern counties of the state, and farmers were advised that as high yields can be secured after proper liming as on the younger soils of the West. On limed land inoculation was prescribed. The use of artificial cultures proved as effective as heavy applications of soil from an established field of alfalfa or sweet clover; but on unlimed land the soil transfer methods proved far more effective, in the case of the first seeding of alfalfa.

On sandy soils, top-dressed with soil from an established alfalfa or sweet clover field, alfalfa could be grown without applying lime; but as a general rule liming increased the yields more or less even on satisfactorily in-

oculated land. In Dr. Alway's opinion, however, the increase actually due to liming, independent of its influence on inoculation, may be too small to be profitable, and during a drought the beneficial effect might be entirely masked. He made the striking remark that, "Liming experiments in which the current pure-culture methods of inoculation are relied upon, are likely to lead to very erroneous conclusions as to the economy of liming sandy soils for alfalfa."

Another of Dr. Alway's interesting conclusions is that the determination of the sulphur content of alfalfa provides a means of detecting the localities and even the particular farms where sulphur fertilizers are most likely to prove valuable. He also advises that on a large proportion of those soils in the west-central part of Minnesota upon which grain has long been grown without the application of manure, the use of superphosphate may be found highly profitable with wheat and clover on the fields which do not receive an application of manure every 3 to 5 years.

Recently he has been directing his attention to the erosion problem with the result that remedial and preventive measures are now in progress.

While Dr. Alway is an indefatigable worker, he is too, a most genial, humorous host and an inspiring conversationalist. The chief pleasure and joy of his life, apart from his work, is centered in his most interesting family. He is a churchman, being a member of the University Baptist Church, just across University Avenue from the Main Campus of the University of Minnesota.

Still Searching

Secluded in his basement den, he has delved deeply into agricultural literature and thought and dreamed of that "something" chemists hope to discover; but we fear his work has been his only recreation. He has no fads or hobbies, nor do we hear that he engages in any kind of play. That is to be deplored, for as the years pass, vital forces lessen and an all-work program must inevitably wreck one's physique. He is highly regarded by all of the members of the staff of the University, and we are sure that they and his hosts of farmer friends would like to see him, from now on, put on the brakes, "slow up" a bit, and seek relaxation and recuperation, that his admirable services may be prolonged.

It would, indeed, be well for all closely confined and overworked research men to remember Dryden's advice:

"Better to hunt in fields for health unbought
Than fee the doctor for a nauseous draught;
The wise for cure on exercise depend,
God never made his work for man to mend."

"Go to Grass"

(*From page* 4)

seepage and torrent waters into harsh and sticky clays, quick to bake and burn dry, or even swept clean to the bed-rock of barreness.

Tests on a gently sloping field in Missouri gave such a startling glimpse of the graphic effect of erosion on cultivated land compared to bluegrass sod that it bears re-emphasis. The problem was to estimate how many years it would take at the current rate of run-off to remove seven inches of topsoil, and with it, the most vital soil elements. On a plot cultivated four inches in the spring and summer fallowed, the seven-inch layer would be gone in 24 years. On a plot seeded to bluegrass well-established, the

same amount of topsoil removal would take more than 3,000 years.

If such community evils occur in the form of pests, the interest of public welfare demands that private will be submerged to the general good. Erosion knows no land boundary of title or deed. Once started, it leaps its greedy path across entire townships, slower than fire or flood, but just as destructive in the end. But private rights under the constitution prevent or delay proper safeguards taken by the public authority to halt erosion.

Some of the submarginal areas thus denuded of original value may best be salvaged for the future use of the nation by withdrawal through State or Federal agencies. There yet remain, however, many millions of acres of damaged land or land headed for ruin which may yet be saved by educational processes, perhaps reinforced by the natural back-to-grass effect of adjustment programs now made more appealing than through mere lessons or demonstrations. If the Government pays a man to rest his rented acres from some cash crop and he seeds it down, he unconsciously takes part in a worthy and economic enterprise. Man seldom fails to plant his land to something, and his energy is boundless. But good use may be put to that effort by a process of "going to grass."

MY honest friends, the dairymen, however, take this theory with a barrel of salt. All they can see in the grass revival is mush and milk for them and much more milk for the rest of the farmers. They have bad dreams of five-cent cheese and ten-cent butterfat. They have visions of Kansas cows knee deep in clover and Arizona heifers begging to be pailed. In thus drawing hard on an overworked imagination, the dairymen forget the old attitude they held toward the easy-going graziers, or their own trials and tribulations with alfalfa and mixed seedings. They also forget the absence of silos in remote ranges and the higher prices for pork and beef.

My own dairymen used to say that the lazy beef raisers did not get their living from the honest sweat of their brows, but merely sat around while the grass stooled out into sirloins. Grieved by the inertia of the beef and sheep herders, the milk producers with registered surplus kine for sale tried hard to convert their erring Western brethren by running demonstration trains or inviting scouts to enter the

promised land to study the diversified way peculiar to dairy regions.

Meanwhile, some dairymen were probably as guilty of overworking themselves and families as the beef or sheep grazier was of taking things comparatively easy. The dairyman, as a matter of fact, did *not* depend on pastures, although he might often have done so with better systems of management. He often used cultivated crops and seeded grain to the limit, often on land subject to erosion. He often thereby bent the backs of his family, destroyed his land, and burned out his cows with heavy protein-stuffing methods. He often rushed his cows to watery pastures in April and cussed the white grubs and the slim picking in July. If competition forces the milk farmer to do nothing more valuable than to improve his native pastures and study the seeding

and fertilizing of mixed plant meadows, it will have done him and the nation a lasting favor.

Undirected and unaided pastures are like a waif of the farm plant family, fed sparingly on left-overs and then expected to perform miracles. Worn-out and abandoned meadows, or wastelands invaded by hardy weed-like growth, form no small part of the so-called pastures of this proud agricultural empire. Farmers will commonly invest borrowed sums on glorified wonderberries and magnified oats, and hardly give a thought or spend a farthing on seed renewal and fertilizer for pastures, expecting to obtain the rich, ripe succulence and vitamins of June-time without any measure of return. Pastures have been taken for granted in this country whereas in England and Germany the science of grass management, like the conservation of forests, has been a prime objective in agrarian life.

A FIRM, compact seed-bed, with light covering, careful nursing of the weak sprouts, level terracing on hilly slopes, clipping of weeds, and judicious initial grazing are paramount steps in establishing a new permanent pasture.

Owing to the common indifference exhibited toward pastures, comparatively little experimental data have been accumulated to show the proper rate of application of fertilizing elements on a paying basis. Here and there plot tests have been run, but nothing really extensive enough to indicate the wide-spread returns which could be realized. But during the next few seasons, if I am not mistaken, we shall witness a series of major trials in this regard by practical farmers and county agents. Too little thought has been given to chemical restoration of soils devoted to pasture growth, and it is a topic worthy the attention of associations such as herd improvement units, now spending more time in balancing barn rations than in fitting the natural soil laboratory for the best of all nutrients—good pasture.

It is also imperative that expensive preparation be not wasted on extremely weak soils in these pasture tests. It is not fair to use the poorest areas of the farm for pasture and then expect fertilizer and reseeding to render high returns. Calcium, phosphorous, and potassium must be put on before the greatest response can be obtained from the great green-promoting element, nitrogen. Legumes or manure, when available in quantities, may prove to be the most economical nitrogen source. Only local trial and error prove the proper management, and hence any technical exposition is out of place. But one sure thing stands out in using fertilizer—the interloping weed crop will be much reduced, if not eliminated.

THERE are little tricks about pasture management. One of these relates to shade-tree location. Pastures with a grove or clump of trees on a hillside or hilltop bring about a wider distribution of the manure elements than pastures having willow trees lining a creek or pond. It is hardly vital to analyze the reason. Gravity should be used to spread the nutrients from manure into the grass roots rather than to let it seep and wash away down stream.

Up in our humid sections forest growth is the climax of vegetative life. Here trampling and close grazing together with compact turf and sunlight reaching to the crowns of the plants aid them to resist the encroaching brush and threatening trees. Used to storing reserves of plant food in subterranean parts, the humid grasses withstand fairly continuous grazing, if not pushed too far.

On the contrary, down in the semi-arid areas of this wide land, grasses of a kind common to that clime seem to be paramount over shrub and tree growth. Yet they do not possess the fighting habits of the humid grasses because they have been so long the

conquerors themselves. Here the reverse is true of heavy grazing. It may despoil a pasture in one season.

There is yet another piece of pasture robbery worthy of recital. Fat-stock men and milkers often are guilty of it. By stable or dry-lot management with little open range, except in periods of feed scarcity, the pasture is filched of its nutrients for the sake of the corn and grain crops, which get the manure.

GRASS freshly chewed and digested contains the sun-enrichened vitamins so often absent in cured forage, devoid of carotene. Although certain mineral deficiencies occasionally perplex the man depending on native pastures so that the herds get thin and fail to reproduce normally, it is generally true that nothing under the sun beats the mysterious elements found in the lush season.

If man would spend less time doctoring around with synthetic substitutes for native grasses in his husbandry, I am certain the fatness and the pigmentation of our lowly herds would exceed any produced by artificial means. By almost every token we can find to spur us on toward kinder consideration of our farm welfare, no single thing is more sure to bring reward and satisfaction than careful and timely attention to pastures.

There are still two further points to note in considering the need for pasture provisions. First, the technical advances of our times, the improved machinery and fertilizers, and the finding of newer strains of adaptable plants, all point to a wider difference in the cost of operating the more desirable and the less desirable farm lands. The less desirable areas may be expected to retire for the time and be conserved, we trust, for a possible future need.

The multiplied power of man to get returns per acre is the second point. Relatively fewer farm operators and possibly relatively less acres of good land are now required per capita than in pioneer days. Here again a process of retirement appears inevitable. Such extra acres also may in due time be sadly needed. They must be conserved for the coming generation. Science will find new ways to use them.

Meanwhile, what better way can be found to keep the top-soil intact and the physical and chemical values reserved than to maintain excellent turf? Some, to be sure, will call for forests and others for recreational use; but by and large the conservation of permanent pasture sod is the surest way to put land into title and trust estate against the day ahead when its wealth and resources may be tapped for cultivated crops or grain.

ON the whole, then, we may forget the taunts of "hayseedism" and the jibes of "going to grass." Our brave forefathers trekked across weary mileage to seek what in their day were precious and priceless values—water, timber, and grass. Some of us care little for water, either for sanitation or refreshment, and in many seasons it is mighty scarce. Our timber supply has followed the sad fading trail of the pigeon and the buffalo, a victim of listless national policies and narrow greed. Here and there we still have grass, such as it is, perhaps a little spindling betimes and scattered, but sticking with us to the last ditch. We may yet mend our ways and seize the chance to conserve that foundation-value of the earth, even if all else has been squandered.

So here's all the power of chemistry, chlorophyll, photosynthesis, and horse sense! May they be yours for 1935 to produce such pastures and meadows the like of which no man hath seen on your quarter-section since the Government yielded the deed. It's better for the flocks to graze than for you to grub anyhow!

CURIOSITY

The church service was proceeding successfully when a woman in the gallery got so interested that she leaned out too far and fell over the railing. Her dress caught in a chandelier, and she was suspended in mid-air. The minister noticed her undignified position and thundered at the congregation:

"Any person who turns around will be struck stone blind."

A man, whose curiosity was getting the better of him, turned to his companion and said, "I'm going to risk one eye."

Collector (at door): "At this time of the year we provide a free dinner for the poor and needy."

Harassed Householder: "Thanks very much. I'll just get my hat and coat and come along at once."

LOOKED DANGEROUS

Bing: "What do you mean kicking my dog? He don't even bite."

Bang: "Yes, but he raised his leg, and I thought he was going to kick me."

"Are you secretly married to her?"

"No, she knows it."

Lady of the House: "Why don't you get a job? Don't you know a rolling stone gathers no moss?"

Tramp: "Madam, not to evade your question at all, but merely to obtain information, may I ask of what practical utility is moss to a man in my condition?"

Old Maid: "Has the canary had its bath yet?"

Servant: "Yes, ma'am. You can come in now."

IT DEPENDS

Fred—"Her niece is rather good looking."

Ted—"Don't say Knees is, say Knees are."

Ikey: "Oy, Oy, I'm dying. Send for a priest quick."

Abie: "Vat, Ikey, you don't want a priest—you want a rabbi."

Ikey: "I should give the rabbi the smallpox—send for the priest."

"That child doesn't get his temper from me."

Husband: "No, there's none of yours missing."

CURIOSITY

The butcher was rather surprised when a slim young woman entered the shop and asked for twenty-five pounds of beef. All the same, he cut off the joint and put it on the scales.

"Will you take it with you, or shall I send it to your house?" he asked.

"Oh," she murmured, blushing prettily, "I don't want to buy it. You see, the doctor said I had lost twenty-five pounds, and I wanted to see what it looked like in a lump."

Before marriage a man declares he will be master of his home or know the reason why. After marriage he knows the reason why.