BETTER CROPS W

The Pocket Book

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Better Crops WITH PLANT FOOD

January, 1930 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

VOLUME XIV NUMBER ONE

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Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY.

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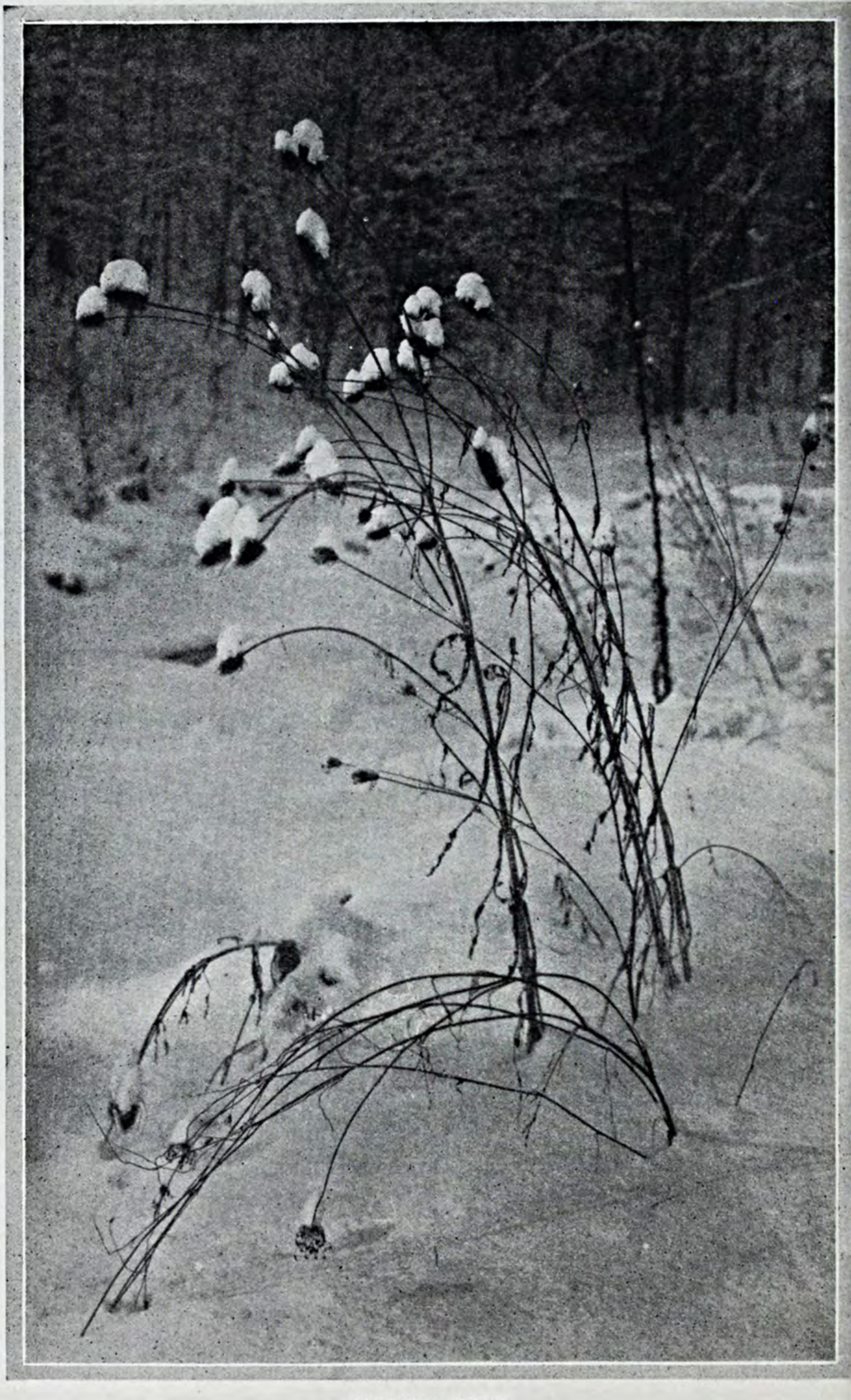

WINTER COTTON

Better Crops with PLANT FOOD

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Make the Best Better, says Jeff in—

Defenders Wanted

By Jeff McDermid

WHETHER you are living on Main street or along the open road, whether you are pulling teeth or pulling weeds, there are two subjects which must surely interest you profoundly. They are Youth and Agriculture.

These are common denominators in the mathematics of mankind. Without the former we should hold slim hopes for humanity's gradual improvement, and without the latter there would be no dishes to wash and our lives would end.

By this I do not mean that the one pertains solely to providence and the other to provisions. Indeed no, for youth is more than a quick pulse and agriculture is more than a food foundry.

The main premise is that both are elemental in the physical, social, and spiritual degrees together, and that we are not considering them for what they mean materially alone.

'Tis true, my friends, some youngsters don't know this and many farmers won't admit it, but that need not deter us from stating the case to the jury.

In doing so I wish to draw a parallel between these two things to show how they have much in common, and that we who are neither young nor farmers have a duty and a privilege to perform in relation to both. Most of us have sat on the side-lines lately and let the weary old world wag its head at youth and agriculture without stopping to ask ourselves what we knew personally about the question. We have taken our "pap" so long in pre-digested form that it is no wonder we have accepted anything as axioms.

Youth has been the subject of more poetry, good and bad, than anything else except romance itself. To choose any line from any of the millions of metrical tributes devoted to youth would be begging the question, but here is a tender writer of my fancy who gets a good start:

While the heart beats young! O, the splendor of the spring,
With all her dewy jewels on, is not so fair a thing!
Our bare feet in the meadows, and our fancies up among
The airy clouds of morning—while the heart beats young.

Lifting the harp of a Celtic bard, on the other hand, we find him and hundreds of others repeating the praise of agriculture in manifold measures. Singing of "life's sequestered scenes" this bonny bard unfolds the age-old message which romantic minds have flung forth repeatedly as the key-note of farming, thus:

Long may thy hardy sons of rustic toil
Be blest with health and peace and sweet content!
And, oh! may Heaven their simple lives prevent
From luxury's contagion, weak and vile!
Then, howe'er crowns and coronets be rent,
A virtuous populace may rise the while
And stand a wall of fire around their much loved Isle.

SO my first point is that youth and agriculture have been treated to much poetic license and had the incense of romance burned to cinders in their honer.

Ever since Adam was ejected from the Garden of Eden and began to lead a pastoral and a paternal life, while Eve did the cooking, we have faced the problem of youth and agriculture. It was simpler in Adam's day, perhaps, for he managed to use a crooked stick both for plowing and boy correcting—yet we recall that he had weeds in his onions and murder in his family.

The oldest books in the universe treat frequently on youth and husbandry. The eternal presence of youth and the basic need of victuals stirred the old dreamers to allegory and led the ancient philosophers to moralizing. Plato, Aristotle, and Confucius, David, writer of psalms, and Solomon, author of proverbs—each and all yield tidbits of wisdom concerning the progress of agriculture and the control of progeny.

Presumably, Solomon had so many sons that he required a special code for them, and we find him writing much after the modern fashion when he says: "A fool despiseth his father's instructions, but he that regardeth reproof is prudent. He that gathereth in summer is a wise son; but he that sleepeth in harvest is a son that causeth shame."

Agriculture was likewise a question mark of eternal proportions in the days of the patriarchs. It divided attention equally with child raising. In the same Book we may read many such passages as these:

"He destroyed their vines with hail, and their sycamore trees with frost. He gave up their cattle also to the hail, and their flocks to hot thunderbolts."

My second point in this parallel swings on this thought: that few groups of society have had so much unsolicited advice of a questionable kind as youth and agriculture.

This hunch comes from personal observation and from some reading in rather mellow volumes of a bygone era. Particularly noxious are such typical tomes as Horace Greeley's, What I Know About Agriculture, and Lindley Murray's Reader, de-

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A firm, compact seedbed is one of the essentials of success with alfalfa.

Alfalfa *and* Sand

By B. O. Hagerman

Agricultural Agent, Pennsylvania Railroad, Grand Rapids, Michigan

THE Keystone Demonstration Farm, sponsored by the Pennsylvania Railroad and located on Plainfield sand just north of Howard City, Michigan, is studying alfalfa. It is said that there are between nine and eleven million acres of sandy soil in Michigan upon which many of the lessons about alfalfa that we have learned by experience might apply, either wholly or in part.

The purpose in maintaining this farm is to demonstrate that it is possible to operate these sandy soils so that such farms can become the background for good homes with enough left over to properly feed and clothe the children and send them to school.

This alfalfa was fertilized with 0-16-30.

What now has become known as the Keystone Rotation, our cropping program, was first devised by my brother, D. L. Hagerman, deceased, and has been carried on in much the same way as it was originally planned. It is called the "Keystone" rotation for two reasons; first — because the Keystone is the insig-

This plot was fertilized with 0-16-16.

nia of the Pennsylvania Railroad, and second — because the Keystone is the emblem of safety and stability.

To the farmer engaged in cropping the lighter types of soils, we believe that this rotation may be everything implied by the Keystone, as it constantly has considered the two greatest problems which face the operator of sandy soil, first—conservation of soil moisture, and second—building up soil fertility while at the same time making a living.

The means that are used to accomplish this are the growth of legumes—alfalfa and sweet clover—with crops of second growth sweet clover to turn under as green manure. Crops of vetch and rye are planted in the fall to hold the fertility from leaching during the late fall and early spring and to furnish additional green manure and as much nitrogen as possible to turn back to the soil. In the organization of the farm, the rye and vetch are cash crops, with potatoes and beans used occasionally. Oats, corn for silage, and the legumes furnish the feeding basis for our herd of purebred and grade Guernseys.

Naturally the backbone of our feeding ration is alfalfa hay and this story will deal with some facts that our experience has taught us about growing this legume.

All of this sand soil, which originally grew giant pine forests, was too acid to grow the legumes when first cleared. We recognized the futility of trying to make a profitable farm out of a soil that was too sour to grow legumes, and so our first step in order to prepare for alfalfa was to lime the field sometime previous to the year when we expected to sow alfalfa. Since there is a dry marl bed about a mile and three quarters from the farm, this was used as the most readily available source of soil neutralizer. With the exception of one attempt at hydrated lime, the fields on the Demonstration Farm have been marled at from four to five cubic yards per acre.

A Firm Seedbed

The next essential in alfalfa growing is a compact, firm seedbed. In many of my illustrated talks, I show an aeroplane just "taking off" and say that while an aeroplane is not necessary to the profitable management of a sandy farm, often the owner may need one to keep up with his farm during some of our high wind storms. In fact, the blowy nature of sandy soil, particularly after its humus has been cropped out, is one of the facts that must be calculated on beforehand.

This plot received 0-16-0.

I use the aeroplane picture to illustrate the principle of sand land when it starts to blow. Like the aeroplane, the sand particles start to move slowly at first, and as soon as a sufficient amount of energy called momentum is established, the particles "take off" into the air. Rolling sand land with a flat surface roller makes an ideal "aviation field" for the sand particles. But if this same sand land is rolled with a cultipacker or some other form of corrugated roller at right angles to the prevailing winds instead of having the flat smooth surface, there are instead a series of ridges and gullies which very materially retard the moving particles and greatly reduce the shifting of the soil. Also due to the mechanical construction of this type of roller, it packs the soil to a much greater depth, which also aids in conserving moisture.

In addition to packing the seedbed well previous to seeding, the final act after seeding is to again run the cultipacker over the fields at right angles to the prevailing winds. This aids in preventing wind damage after the alfalfa is up, as well as firming the soil around the small seed, insuring a much speedier germination.

The ability of the alfalfa plant to add nitrogen to the soil depends upon

This plot received 0-16-8.

An 0-16-24 was the fertilizer used here.

whether or not it has nodules on its roots. Alfalfa will eventually, if it lives that long, add nodules to its roots, but it is a slow process and one that we cannot afford to use, because artificial inoculation is so cheap and is accomplished so easily.

Our experience with varieties of alfalfa to plant has convinced us that to resort to common alfalfa is a very dubious practice. It is true that common alfalfa occasionally under favorable conditions will come through with a good stand, but to avoid as many hazards as possible, we use only the more hardy varieties such as Hardigan, Grimm, or Ontario Variegated.

Worth the Expense

Getting an established stand of alfalfa ordinarily is expensive, but if successful the effort is well worth the expense. Under our system of management, our stands of alfalfa cost in the neighborhood of only about $11.65 per acre. The first year's hay crop usually pays the bill and we have the alfalfa left. It is because of these unwarranted hazards that would-be alfalfa farmers run that I write this story. Experience is the best teacher, to be sure, but we are wise if we do our learning from the other fellow's experience.

We have found from experience that if we have a limed soil and a good compact seedbed, we can sow our alfalfa with a spring sown crop of peas and oats and get a good stand if we have enough plant food of the right kind in the soil. This makes use of the spring moisture that falls, both to pack the ground and start the alfalfa. Taking the oats and peas off early as an emergency hay crop reduces the moisture hazard for the alfalfa, gives us a crop from the field that year, and lessens the actual cost of our alfalfa stand.

For some time, in our endeavor to build up the farm as an ordinary farmer would, we grew alfalfa with lime alone, but with not much success. Then later we tried using superphosphate alone. But the most interesting of our experiences up-to-date with the plant food requirements of alfalfa on our sandy soil is that it requires potash more than any other single element.

A recital of the four measured experiences that we have had will show how outstanding is the response of alfalfa to this plant food on sandy soil.

In the spring of 1928 we laid out five plots with check plots between. For convenience we will call these the North Plots as they are away at the north end of the farm. These five plots got a uniform application per acre of 525 pounds of 0-16-0, 0-16-8, 0-16-16, 0-16-24, and 0-16-30.

"POTASH PAYS!"

At the time of the Field Day on August 27, 1928, these strips treated with the last four mixtures, showed up much greener and much more vigorous than the others. However, there was a good stand on all of them including the check plots, and so we waited until the following spring to make any sweeping deductions. We did have some personal opinions and these opinions were such that since the remainder of the field had had no treatment, and the plants were showings signs of potash starvation, we decided to try another experiment. Consequently, in September the two words "POTASH PAYS" were sketched in letters 75 feet high and with a five-disk grain drill, the outlines were top-dressed with muriate of potash at the rate of 200 pounds per acre.

After the winter of 1928 and 1929 had cleared away, we found that the check plots and the strip that got superphosphate alone were much the worse for wear. There was very severe winter injury. It was only on the plots where more or less potash had been used that we had a profitable stand of alfalfa. The letters "Potash Pays," as well as the north plots showed very distinctly that potash was the limiting factor, especially in bringing alfalfa through the rigors of our winters. The letters showed up very distinctly; in fact, they made the rest of the field look so bad in comparison that we decided to top-dress the entire field with muriate of potash, which we did along the last of April at the rate of 200 pounds per acre.

The tool that we used for this was a two-wheeled lime sower, one end hole of which did not work well. This meant that every alternate round on the field, there was a considerable space not covered. At harvest time, these yellowish green serpentine lines were too apparent. They taught their own lesson.

Treatment			*Dry Weight Per Acre*		
Check (Average of the five check plots)			438.9	lbs.	***
525	lbs.	0-16-0	676.5	"	***
"	"	0-16-8	1,025.0	"	**
"	"	0-16-16	1,864.0	"	*
"	"	0-16-24	1,765.5	"	*
"	"	0-16-30	2,054.2	"	*

***—Very weedy, mostly mullens and June grass.

**—Some weeds.

*—Clean, clear hay.

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Left to right: (1) 400 lbs. muriate of potash; (2) 200 lbs. muriate of potash and 500 lbs. superphosphate; (3) 500 lbs. superphosphate; (4) check.

Getting "STRETCH"

By T. H. Blow

Springfield, Massachusetts

A. W. SAVAGE of Andover, Connecticut, has found out how to put the "stretch" into his alfalfa and at the same time get the long-lived stands which spell profit to the dairy farmer. The secret was potash. For every dollar invested in potash to feed his alfalfa, he received $3.93 in return. This was after all costs for harvesting and for fertilizer were deducted.

Mr. Savage had been able to get good catches of alfalfa on his farm, but they lacked the stretch necessary to give the tonnage which alfalfa has to give to make profits. After the first year the regularly spaced white spots which mean potash starvation would appear on the leaves. Then the leafhoppers would come in after the first crop and by sucking the juice from the plants would put the finishing touches on the stand. The alfalfa would die out rapidly and be replaced by grasses. This is a condition typical of too many alfalfa fields in New England.

In 1926 Mr. Sagave seeded alfalfa on a well-drained sandy loam which was limed liberally. The year before 14 tons of manure and 700 pounds of superphosphate per acre were used for corn so that the land was in supposedly good shape as regards fertility. In 1927 three one-tenth acre plots were used to demonstrate the value of superphosphate and potash as a top-dresser. Plot one received muriate of potash at the rate of 200 pounds per acre; plot 2, superphosphate at 500 pounds per acre; and plot 3 got the combination of potash and superphosphate at the same rates as in plots 1 and 2. The rest of the field served as an unfertilized check.

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GEORGIA
Experiment Station

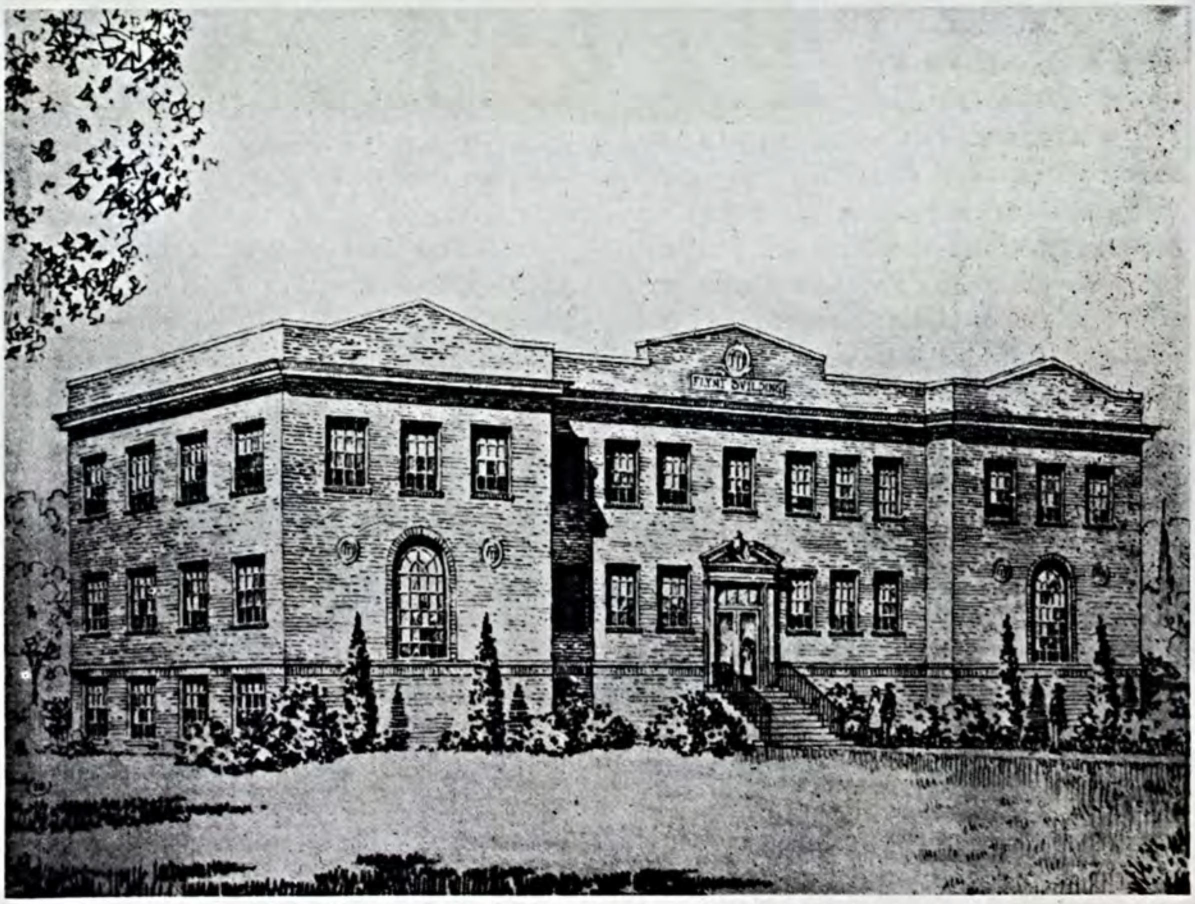
By C. A. Whittle

Editor, Georgia Experiment Station

THE Georgia Experiment Station, located at Experiment, Georgia, has been a potent factor in Georgia's agriculture for 40 years. To the already valuable equipment a new building, the Flynt building, has recently been added. This building is a model of up-to-date laboratories with library and office equipment for agricultural research.

The Georgia Experiment Station is situated about 100 miles from the State University and Agricultural College. While it is a branch of the State University system, it has a separate board of trustees, some members of whom are on both boards.

This Experiment Station is the State's institution for agricultural research and expends the Hatch, Adams, and Purnell funds provided by the federal government for this purpose. Unlike the members of the staffs of many other experiment stations, whose time and attention are often divided between research, teaching and extension work, the Georgia Station staff members devote their entire time to the institution's projects. The membership of the staff is composed of men and women with that type of training and experience which fits them especially for their specialized lines



The new headquarters of the Georgia Agricultural Experiment Station.

H. P. Stuckey, Director, has served the Georgia Experiment Station for more than twenty years.

of research. Already a number of these investigators have reached that satisfying and distinguished position of being the best authority on certain particular lines of their endeavor.

Director H. P. Stuckey, who has served this institution for 20 years, has possibly done more to promote agricultural research than any other one individual in the State. A research worker of note himself, he has taken the lead in southern horticulture and has consistently directed the policies of the institution along definite lines of fundamental research. Two books, Pecan Growing and Horticulture, now used as textbooks in southern agricultural colleges and vocational schools, are the results of much of his work and authorship. Under his direction the Georgia Station has more than doubled its capacity for service to the State's agriculture and the results of its work are being put into practice in every part of the State.

No attempt will be made here to detail the accomplishments of this research institution, but brief mention may be made of the fact that Georgia and other States have been saved vast sums of money through the discovery made at this station years ago of the fact that small grain seeded in the water furrow is practically insured against winter injury.

At this station some of the first comprehensive fertilizer experiments that proved of real value to farmers of Georgia were inaugurated.

In cooperation with the United States Department of Agriculture, the Georgia Station did the first work of importance on the fertilization of the peach in the South. This project covered not only the fertilizer responses of the peach, but also the effect of different fertilizers on the shipping quality of the fruit.

Formerly there were a number of commercial pear orchards in the South. They have been wiped out by blight. In studying this problem, the Georgia station developed the fact that a variety of pear which has been named "Pineapple pear" is resistant to the disease. Following this discovery, the State is making progress toward recovering its loss in pear production.

Here at the station a great deal of work has been done to improve the muscadine group of grapes, which includes the scuppernong variety, with crosses and selections. It was found that prepotent male vines gave desirable qualities to their offspring. One who visits the station will find clusters of muscadines growing on the vine where one muscadine grew before.

This station has taken a leading part in the study of plant diseases and in devising methods of combatting the diseases with immunity and sprays.

Turning from the past to what is now going on and is being achieved at the Georgia Experiment Station, we find that the agronomy department is developing a rustproof, high yielding strain of wheat from double crosses. A strain of high yielding oats also has been brought forward.

The former belief that plants absorb their nitrogen only in the form of nitrates has been disproved at the station where cotton plants have been provided with nitrogen in the form of ammonia and checked with plants provided with nitrogen in the form of nitrates. The outcome of the first year's study under carefully controlled condition shows that for the first two weeks the young cotton plants absorb nitrogen at the rate of 35 parts ammonia to 100 parts nitrates. A gradual change is noted until about 55 parts ammonia nitrogen to 100 parts nitrate is the ration when plants are six weeks old.

Studies are being made at the station as to the sources of nitrogen for cotton, nitrogen side-dressings, and rate of applying complete fertilizers, final results of which will soon be forthcoming.

In cooperation with the United States Department of Agriculture and the State College of Agriculture, a survey has been made of the length of staple of cotton grown in Georgia. Practically 80 per cent of the staple is ⅞ of an inch or shorter, whereas a demand exists for a staple an inch and more in length at a higher price.

A parallel cotton study is being made in the laboratories to determine the percentage of lint, length of staple, percentage of immature fiber, strength and drag, all of which are considered basic to correct cotton grading.

The station has expanded its study of soils and crops by establishing outlying fields of experimentation. With the development of this work eventually the station will have scientific data of practical value on the various leading soil types of the State.

At the Georgia Station the discovery was made that blossom-end rot of tomatoes is not an infectious disease and can be controlled by maintaining the proper degree of moisture in the soil. Valuable work also has been done in determining just how tomatoes resist the fusarium wilt. The control of the Sclerotium blight (sweet potato bed rot) in sweet potato beds by reducing the soil acidity and work on the stages of development and methods of control of several diseases of the pimiento pepper are accomplishments of the institution that are of economic value. A comparatively simple process of treating pimiento pepper seeds as they are removed from the fruit has a far-reaching influence on the suppression of certain seed-borne diseases.

The station is engaging many horticultural problems in which fertilizing and marketing peaches; varietal studies of pears; tests of different kinds of berries, muscadine grapes, onions, pecans, etc., are in progress.

The discovery that all commercial varieties of pecans can be divided into two distinct groups, and that one is largely dependent on the other for pollination, is an accomplishment of the Georgia Station. Further work on the flower and nut development of the pecan and the relation of weather and soil conditions to the summer drop bids fair to establish principles which can be employed in overcoming this trouble.

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Time *to* Budget

By C. B. Sherman

Washington, D. C.

FARM budgeting is one of the newest lines of work that has been launched by the United States Bureau of Agricultural Economics to aid in preventing over- and under-production. The general idea of budgets is not new in agriculture, but it is only recently that concise and practical methods for making and using farm budgets have been worked out and made available to farmers and their advisors.

A practical farmer keeps his accounts up-to-date.

A farm budget comprises a plan for the use of land, man labor, horse work, equipment, and other farm resources, and a plan for the system of farming for the coming year, which is based on a carefully worked-out estimate of how well a particular combination of crops, or combination of crops and livestock, will pay. It shows the number of acres of the different crops, the number of head of the different kinds of livestock, the expected crop and livestock production, the expected feed requirements, expected cash expenses, and expected receipts for the system contemplated.

"The ups and downs in agricultural production are partly the result of changes made by farmers in acreages of crops and numbers of livestock," points out J. B. Hutson, who, in co-operation with State workers has developed this plan and put it to work. "Such changes are often necessary, but too often they are overdone in some lines and underdone in others. Decisions are often based upon the prices at or immediately before planting or breeding time and upon the crop yields and livestock production of the preceding season, rather than upon the prospects for the time when the products will be ready to sell. The adaptation and application of the budget method, used in other business undertakings, is one way for farmers and their advisors to help to meet the situation, for this method uses carefully worked-out estimates as to yields, and prices that are likely to prevail at marketing time."

Individual farmers may, in many instances, need the aid of their farm advisors in drawing up their budget. In fact, this is the way the work has developed in Kentucky and North Dakota, where farm budget work has been tested. In each of these States a joint representative of the Bureau and the State College of Agriculture has used the budget method, for two years, when working out farm plans with individual farmers, in their follow-up and demonstration work that they based on previous research in farm management in those States. Regular routes among his farmers had been developed by the investigator.

Find Best System

The field man sits down with a farmer and works out a budget for a farm system similar to the one the farmer has been following. Then he suggests such changes as the records, experimental data, and the price situation indicate to be desirable and draws up a new budget for this changed system. Other changes may also be proposed and budgets may be worked out for these systems. All of these budgets are then compared and the system that seems to promise the best results and that is feasible under the individual circumstances and particular price situtian is chosen for use during the next year, and for as many years as existing conditions of labor, production, and marketing remain substantially the same. Kentucky, North Dakota, Kansas, Mississippi, North Carolina, Texas, and Virginia are some of the States in which organized projects are under way under which more or less farm budgeting work is done.

"The kinds of crop and livestock should usually remain the same for a period of years, but it is seldom possible or advisable to plan to grow the same acreage of each crop or keep the same number of each class of livestock each year," says Mr. Hutson. "If nothing else, variations in the number of livestock born, and crop failures of the previous year, will make this impossible in some cases and inadvisable in others. Then there are lines of production, like dairying or handling a breeding herd of beef cattle, that a farmer must grow into; they can not well be developed in a year. Furthermore, if a farmer or his advisor makes a study of the conditions that influence prices, he will usually be able to form more accurate judgments as to prices expected during the coming year, for at least some of the products, from those of the past year or from the average for a period of years. It follows that the plans for each year should be different, in at least some respects, from the plans for any other year.

"Then there are the changes in labor requirements that are brought about by new equipment, such as the combine, and the cotton sled, and changes in methods brought about by pests like the boll-weevil and the corn-borer. All such changes must be watched.

"Even after a plan for the coming year has been carefully decided upon adjustments in this plan may be advisable during the year. Less favorable production may be obtained in the case of some crops than was anticipated, and more favorable production may be obtained with other crops. Higher prices or lower prices may be obtained for some products than were anticipated.

"In cases in which the prices contemplated for the crops and livestock vary widely from year to year, or in which the information used as a basis for judgments as to prices is meager, it may be advisable to work out different budgets for the crops and livestock decided upon for the year, and to use different prices, each being based

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CHAMPIONS

By Charles D. Byrne

Editor, Oregon State Agricultural College

JUST about a year ago, a modest farm boy of 17 years crossed the Rockies from Harrisburg, Oregon, to capture the highest honors in the 4-H Club world, the Moses Club trophy. His name was Edgar Grimes.

A year has wrought some changes in the lad. The modesty, the perseverance, the thrift, the patience and the keen mind that won him the national honor are of course still evident; but a maturity of thought and a note of confidence gained through a year of club leadership and farm management have been added. The Edgar Grimes that entered Oregon State college as a freshman this fall is no longer a boy but a fine upstanding young man with a definite ambition and a will to realize it. Not that Edgar did not have the ambition a year ago—it was eight years ago at his first 4-H Club summer short course at State College that he determined to complete a four-year college course in agriculture. But the details of his ambition are well defined and a clear picture of his life work has been conceived in his own mind.

"After four years of college, I am going back on the farm," he said in a tone that rang with conviction. And his eyes brightened and some of the modest shyness disappeared as he told of his past year's work.

"I had to stay out of school a year to finish some of the club projects I had started. You see I have always been strong on livestock work but I

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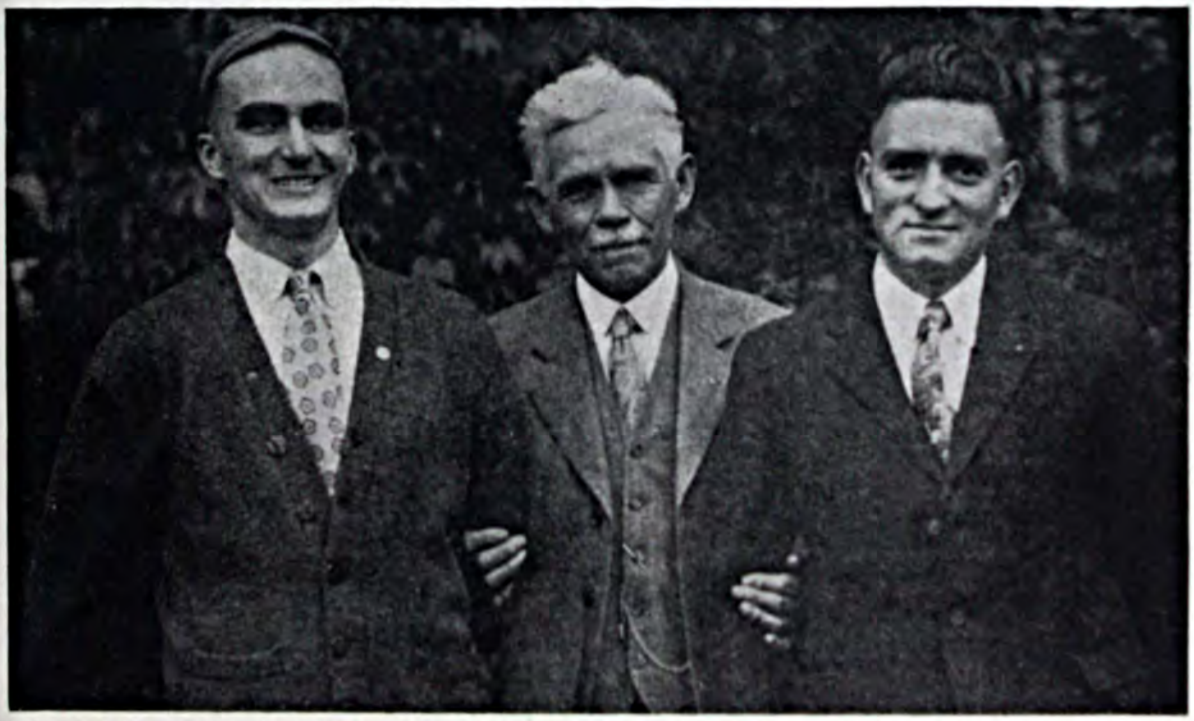

Edgar Grimes, national club champion 1928; Dean A. B. Cordley, Oregon State College; Alex Cruickshank, national club champion 1927.

Doctor Cordley of Oregon State College, one of the veteran deans of agriculture of the United States, is proudly displaying his two national champion 4-H club boys, both Oregonians. Edgar just entered college and is shown with his little green cap. Alex is a senior. It may be a long time before two national club champions in successive years are again enrolled in agriculture in the same school.

This crop of wheat was grown on land kept in a high state of fertility.

Keeping STEP

¶ Agriculture must recognize "Efficiency and Quality" as the watchwords of the day.

EVERY progressive farmer and every business establishment that serves agriculture, recognizes it to be a fundamental industry worthy of a much greater prosperity than it now enjoys. In recent years when one or the other of our major staple crops equals or exceeds the normal demand, returns to the growers become exceptionally unsatisfactory. In order to prevent thirty million producers from growing a surplus of a hundred or more commodities, or to create means of absorbing surplus production and yet not encourage re-occurrences of the condition, various types of agricultural relief have been proposed.

Through federal aid also, farmers have been encouraged to cooperate in the marketing of their products with a view to thus providing for them a greater return for their labors by minimizing the spread between price per unit received by the grower and the price paid by consumers. In the marketing of certain farm products, where the regular machinery for this purpose was not wholly efficient and where too much was not expected from cooperatively managed marketing organizations, they have proved more or less beneficial. However, it seems that too little recognition has been given to the fact that agriculture

A sickly crop resulted where the fertility of the soil had not been maintained.

with PROGRESS

By C. A. Le Clair

St. Louis, Missouri

has developed into its present position rather naturally and that to a considerable extent, farmers are responsible for the situation in which they now find themselves.

Farming, as it is done today, has evolved greatly since the pioneer agricultural days of the nation. Furthermore, in all probability, it is destined to continue to change in the years ahead. Originally, when lands were first farmed in this country, practically everything required by the family was produced on the place except medicines and dishes. The materials for constructing buildings and even much of cloth for clothing was home-made. A prosperous farmer in those days was, therefore, less dependent upon markets for cash to purchase a few special necessities.

As the frame or brick dwelling replaced the log cabin and a concrete highway took the place of the corduroy road, the same land that supported kerosene lamps and the horse and buggy, was expected to provide telephones, radios, electric lights, and automobiles. Instinctively, farmers found themselves striving to produce more bushels of grain, tons of hay, and pounds of milk for sale in order to get the funds to meet a new standard of living and correspondingly high taxes. As a result the per capita production of American farmers increased tremendously. This increased production per farmer was accomplished largely through the use of machinery and improved cultural methods.

Seeking a Balance

Ultimately, and especially of late years, our agricultural production began to somewhat exceed the normal demand. Originally 95 per cent of the population of this country was engaged in agriculture and the problem of surplus production was then unknown. Today 30 per cent of the nation's population is feeding itself as well as the remaining 70 per cent, and instead of rejoicing in seasons of bounteous harvest, to get a good crop is now considered almost a calamity.

However, most of the economists in the country believe that the pendulum has swung about as far as it will go with regard to the prevailing unfavorable agricultural conditions. They point out that the number of people now leaving the farm for cities is just about being balanced by the drift back to the farm from the cities, while our consuming urban population is steadily increasing.

On the other hand, they claim the per capita production of our farmers so far as the use of machinery can be of assistance to this end has practically reached its limits. Further it is apparent that our arable land resources offer rather limited opportunity for further development. In fact, there are already under way economic surveys which are designed to be the basis for permanently eliminating millions of acres of marginal lands from the possibility of inefficiently contributing to staple crop production in the future. Already lands unadapted to general farming are being restricted in some States to reforestation or grazing purposes.

Hence, everything considered, the problem of surplus production from this time forward promises to be less acute. This is considering the future outlook from the long viewpoint. However, with the experience of wheat, potato, and cotton growers fresh in the mind, farmers naturally are especially concerned about how to better assure their profits in 1930.

In this connection it should be realized that more under the control of the grower than any other thing, is his cost of production. Therefore, via the avenue of reduced production costs, will farmers now and hereafter most surely increase their returns. No business in this day of keen competition can count on a profit and get it by adding what is desired to any cost of production that may be obtained. This principle applies to the business of farming equally as in any other industry. In other words, farming, if it is to be more profitable today and tomorrow, must base its plans on sound economics.

I had the pleasure of attending recently, a dinner at which seven Missouri farmers were awarded the distinction of being Master Farmers. These men operated average sized farms and their individual specialties included the production of livestock, poultry, grain, and fruit. Among other things which caused these men to merit the honor of being called Master Farmers, was the fact that

When "rush" work comes, there is economy in having spare parts at hand for repair of equipment.

Big yields of high quality crops reduce production costs and increase the grower's returns.

each and every one of them was making money. Their net incomes varied from four to five figures for a year's work. All of them had bought and paid for their farms with money made while cultivating the land. One of them, the son of a minister, explained that when he started out to farm he was entirely devoid of the handicap of any financial assistance. As these men related their experiences, and how they had attained success, one could not help but be impressed with the simple fundamental reasons to which they gave credit for having succeeded. For example, all of them had helpful wives. They kept up with the latest farm practices. Every one of them maintained the fertility of his land beyond its original ability to yield. They employed nothing particularly startling or revolutionary in the way of equipment. In fact, it seemed that these successful farmers simply applied sound business principles to their operations.

Instead of blaming Wall Street for every farm problem, these men applied the same business principles which industry has found profitable with corresponding results on their own crossroads or main street.

Let's consider some of the principles which business men have found it pays to follow and which could, without doubt, be applied by farmers more generally. To begin with, industry prepares for every emergency in the way of providing ample equipment. A well-conducted business establishment usually keeps in stock a duplicate of every tool or machine part necessary to keep the wheels of its production plants continuously turning.

How can a farmer who wants to be assured of better returns for his labors, parallel this feature of industry's efficiency? By making up his mind this spring—today—that he will tune up the mower before haying time—see to it that enough extra guards are available in the tool shed to meet any ordinary emergency. If this precaution is taken with regard to the farmer's entire equipment, unnecessary and costly planting, cultivating, or harvesting delay can be avoided without adding a nickel to the ultimate cost of production.

Business protects its investments with adequate insurance. Contractors increase their insurance coverage as a structure grows. Farmers, on the other hand, rarely insure their buildings for more than the structure is worth to say nothing of its contents. Yet a mow full of new mown hay may represent the fruits and profits of the whole year and hence should be adequately insured.

Industry doesn't put its eggs all in one basket. Farmers should emulate this sound principle by practicing a wider diversification of crop and animal husbandry. To grow a rotation of corn, oats, wheat, and clover constitutes a good general cropping system to be sure, but it is capable of improvement. If, for example, in addition to the major staple crops a few acres of soybeans or barley are sown each spring, not only a greater variety of grain feeds will be available but protection against unfavorable growing conditions for any one crop is avoided.

Business keeps in repair its producing equipment and provides that its raw material supply is sufficient at all times. Everybody knows that as long as virgin lands were available, farmers of this country left depleted lands for new fields to deplete. Then the time came when no more new land in zones of adequate rainfall remained. Since then intensified cropping has continued and only the exceptional farmer has followed a system of adequate replacement of the fertility removed from the land by weather and crops.

Is it any wonder, therefore, that inferior wheat is today being delivered to the mills of this country? Is it surprising to have elevator men in the corn belt say that they can hardly buy number one corn any more? But this is not all! If our dairy cows could talk, many of them would order a six-foot mower attachment for their muzzles in order to be able to get enough grass of the kind that grows in the average pasture to fill the milk bucket.

We've got better seed today and more productive strains than ever before. The weather bureau tells us that there is no change in climate. Where then rests the difficulty in producing quality stuff? It is to be found in the insufficiency of our crop producing power plant—the soil. A few farmers who buy a great deal of feed have been able to maintain and increase the fertility of their acres but that is the slow and expensive way. Within the means of every farmer, there is a service they can afford to employ, which will stretch the size of their income without the need of moving their farm fences. This service is rendered by the commercial fertilizer industry. It gathers from the ends of the earth various plant food elements and makes these available in convenient form. The cost of commercial fertilizer fades to nothing when compared with the returns forthcoming in 90 days from the time an investment is made in them.

The Economy of Fertilization

Years ago, it was considered economical for farmers to grow legumes to gather fertilizer from the air. Today, it pays to raise these same crops for the feed they produce and the physical benefit they afford the land, but it is now more economical to buy nitrogen in a fertilizer sack.

Commercial fertilizers of the right kind, if properly used, are necessary not only to make thin land productive, but also to make the best land that lays out-of-doors yield bigger and better crops at a minimum expense to the grower.

Five dollars and a half to the acre invested in the proper fertilizer will hasten the maturity of corn from 10 to 20 days. It will yield one-fourth to one-half more and better quality grain. However, farmers should not let the eye be the judge when measuring their fertilizer profits. The crop from the fertilized ground and the rest of the field should be put over a scale. It takes better than one-fifth more corn to the acre to be measured by the eye and less than such an in-

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Question-box Meetings

By P. H. Stewart

Extension Agronomist, Nebraska Agricultural College

AGRONOMY extension workers in Nebraska are taking their cue from up-to-date authorities on pedagogy in carrying on a series of crops and soil meetings among farmers of the State. These events, called "Question-box" meetings for lack of a better name, are popular and after three years' trial seem to get better results than the ordinary meeting where the speaker attempts to do most of the talking with time allowed perhaps for a few questions.

Suppose that a meeting on legume crops is to be held in a community at which time the clovers and alfalfa are to be discussed as well as soil-building problems. Sometime before the meeting the Agronomy specialist and county agent should work out a set of questions which would serve as a foundation for the discussion. For instance, such questions as these might be prepared and a copy provided for each person at the meeting.

1. What is the best method of seeding alfalfa in this county?
2. Should we grow Grimm, Cossack, or northern common alfalfa?
3. Is yellow blossom sweet clover superior to the white blossom?
4. What are the main points to watch in seeding sweet clover?
5. What is the best way to build up run-down soils?
6. What commercial fertilizers can we profitably use on our local soil types?
7. What crop or crops follow alfalfa best?
8. Should this county grow a greater acreage of legume crops?

This list of questions may not seem long enough to make an entire pro-

An alfalfa field trip was organized to study winter-killing, alfalfa wilt, and varieties.

gram for a meeting. The chances are, however, that it is too long and, in a real live meeting, if the chairman knows how to start discussion and how to summarize the ideas, there will not be time for more than six or seven well-selected questions. More than one two-hour discussion has been held on six questions at Nebraska meetings and then folks were not talked out.

Experience has shown that there are several things to keep in mind in arranging for and in conducting question-box meetings. In the first place not all subject matter lines can be handled advantageously at this type of a meeting. The audience must have had some experience with the problems to be discussed. Obviously then, one cannot use this type of a meeting to present a subject matter phase which is entirely new and about which the audience knows little.

Discussions Should Be Lively

The ideal chairman for a question-box meeting is a fellow who can get folks in the audience to talk and yet hold a tight rein on the man who is too free with his comments, a part of which may be irrelevant. Usually the announcement that all talks will be limited to three minutes and that the speakers should stand up and speak so all can hear will add to the success of the meeting. Discussion on each point should not lag. Before moving on to a new question the chairman should summarize the ideas and develop if he can the fundamental principles underlying the practice or recommendation. A wide knowledge of farm practice and of experimental work will aid in doing this effectively.

There are several reasons why the question-box type of meeting is a particularly good one to use on many crop and soils problems.

In the first place it is human nature, possibly we should say human psychology, to enjoy taking part in events. The farmer who goes to a meeting only to hear a more or less cut and dried lecture is not likely to feel as satisfied as the fellow who has an opportunity to take the floor for a few minutes to tell of his own experiences or observations. If he talks or asks questions, it becomes his meeting and not the county agent's or specialist's. The conclusions are his and the suggestions being his, or at least being influenced by his remarks, are more likely to lead to action. And after all, the real purpose of our meetings is to get folks to adopt the recommended practices.

There are other advantages in the question-box meeting in addition to the increased interest and freedom of expression by all who have something to say. Have you ever gone to a meeting and listened for an hour to a speaker talk all around a subject yet not touch on the local phases in which the community was interested and about which they wished to hear? Yet the speaker, perhaps not knowing local conditions, missed the local point of interest or the local problems. If the farmers at a meeting take the floor for a part of the time, local problems and local practices are sure to be developed.

It is the exceptional agronomist, if he exists at all, who knows his State so well that he is able to answer all questions definitely for certain local conditions. Perhaps it is a sort of "buck passing" to have good successful farmers bring out the local practices that are most likely to succeed but nevertheless it is a safe and sound thing to do and the chairman who evaluates and recognizes local practices gains the respect of his audience. And should the meeting happen to be in a new or perhaps unusual part of the State so far as soil, climate, or latitude is concerned, the chairman himself may learn much from a question-box meeting.

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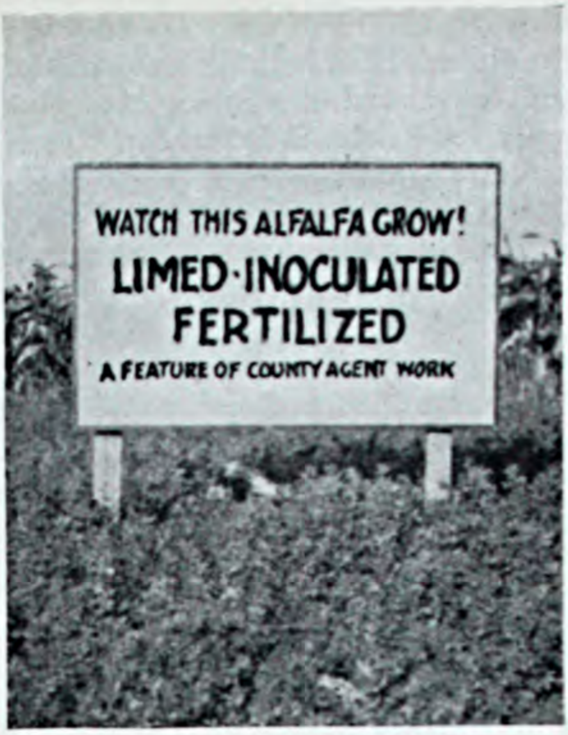
The Defeat *of* Old Man Winter



By Jerome J. Henry

Wisconsin College of Agriculture

WHEN alfalfa stands come out of the winter and spring up thickly and vigorously, there's a reason for the luxurious growth. Consequently, last spring when beautiful stands of alfalfa and clover practically covered the State of Wisconsin, investigators at the College of Agriculture, Madison, looked for the real reason which caused the surprising success of seedings, seedings which were unsurpassed by any that had been known in the State for a period of 21 years.

And these agronomists concluded that the reason summarizes itself into two main fundamentals—a good heavy coat of snow throughout the cold months to protect the stands, and a plentiful supply of plant foods available for plant growth.

The specialists at the Wisconsin College of Agriculture at once became anxious to have the great crop of legumes during the best year become an example of what can be accomplished with the clovers and alfalfa. L. F. Graber, agronomist, who has become known throughout the State as "Alfalfa" Graber, says that, although we cannot expect such a favorable season again for many years, we can do a great deal to assure equally successful crops by making other controllable conditions favorable to offset the rigors of dangerous winters.

Of the two fundamental reasons for the success of the great 1929 crop in the Badger State, one is controllable. Weather, of course, is beyond the control of crop producers, so they must resort to giving the alfalfa or clover crop the most favorable soil conditions possible. It is fortunate that when a sufficient amount of plant foods is available in the soil, winter-killing is much less apt to occur.

This has been shown in extensive fertilizer trials conducted at a branch station of the Wisconsin College of Agriculture at Hancock, Wisconsin, and also at the Georgia State College of Agriculture, Athens. A. R. Albert, soil specialist located at Hancock, sowed 30 plots of a standard alfalfa variety at the rate of 15 pounds per acre. The soil had been limed and continued to give a sweet reaction for a number of years following.

Surprising results ensued when applications of fertilizer were made on the plots. The check plots which did not receive treatment of any kind gave fairly good yields during the first year, but after that there was a great difference, and the third year practically nothing had withstood the winter on the untreated plots.

A different story was told on the plots which received treatments with the essential plant food elements. Even though some winter-killing took place where plots had been treated, it was often negligible and the result was always very favorable.

Several different combinations of fertilizers were employed in these trials. One was barnyard manure alone, and the others, various commercial mixtures in addition to manure. Superphosphate, potash, raw rock phosphate, and limate were all tried alone and in various combinations.

Studies of the total yield over a three-year period indicated that the yields of alfalfa generally followed the potash treatment. As potash applications increased, the yield increased. Applications above 300 pounds per acre of muriate of potash did not, however, increase the yield sufficiently to justify the cost.

In these experiments on sandy soils, potash seems to have been the backbone of the crop. More than any other fertilizer or combinations of fertilizers potash added stamina to the alfalfa and prevented winter-killing. The potash plots showed a minimum of winter-killing in comparison with the other plots.

On the sandy soils typical of the section where the experiments were run, it was discovered that applications of phosphates alone did not pay, but where phosphates were supplemented with potash or farm manure, the yield was increased sufficiently to be profitable. Potash supplementing phosphates gave better results than potash supplementing barnyard manure.

Deductions from these extensive trials led the experimenters to recommend applications of 300 pounds of muriate of potash and the same amount of 20 per cent superphosphate per acre. The potash applications may be reduced somewhat if barnyard manure is also applied.

Potash was also found to be the limiting factor in the production of all crops at the Coddington branch experiment station of the University of Wisconsin. The soil there is low and of a peaty nature.

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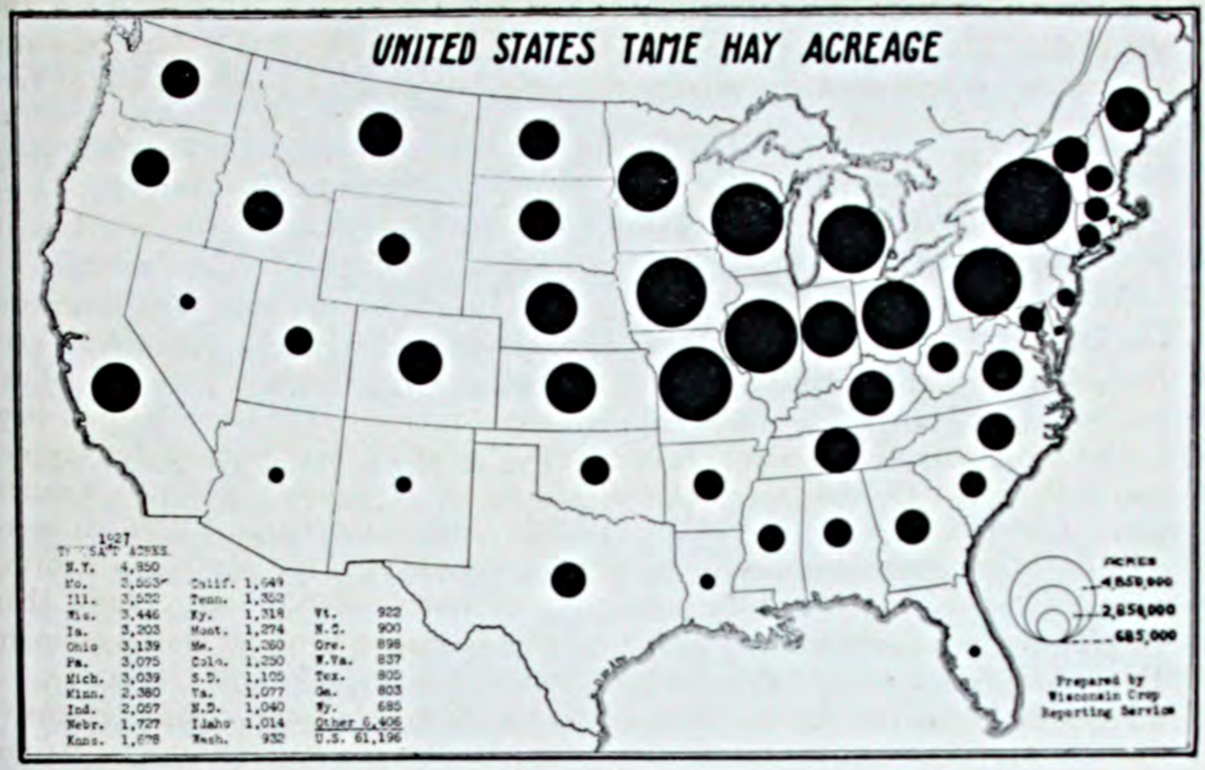
On sandy soils well treated with the necessary plant food elements, stands of alfalfa like this will come through a severe winter.



Tame Hay

¶ Fourteenth in this series

By Walter H. Ebling

Agricultural Statistician, Wisconsin

IN farm value, tame hay ranks third among the crops of the United States. It is exceeded only by corn and cotton. According to the 1929 estimates, the value of the entire United States hay crop is $1,349,000,000, and over 90 per cent of it is made up of tame hay.

This is within $77,000,000 of the total value of cotton and cotton seed; and corn, our most valuable farm crop, exceeds it by only about 50 per cent. The farm value of our hay is about three-fourths greater than the total farm value of all the wheat produced in the nation. In spite of the fact that the automobile and the tractor have displaced much animal power, the hay crop seems nevertheless to hold its important place in our agriculture.

A number of different kinds of hay are grown, and they are probably the most widely distributed of all farm crops in the country. Hay takes about 15 per cent of the crop acreage in the country as a whole. The wide differences between different sections of the country are usually due to geographic differences in the regions and to the type of agriculture which prevails. In the western United States there is less hay grown proportionately than in the East, there being less arable land. Much of the country is also relatively dry so that most of the tame hay crops do not grow well.

Alfalfa is an important hay crop throughout the West. This crop grows best on soil that is not acid and it seems to prefer regions of moderate rainfall. In the United States it finds its most favorable conditions in the western States. With the expansion of dairying in the United States, attempts have been made to introduce alfalfa more generally in all parts of the country, but 83 per cent of the acreage was still west of the Mississippi River in 1927.

The best hay region of the United States is found in the northern States from the Red River Valley eastward and generally north of the Ohio River and north of the corn belt proper. In this region, as a whole, hay is the most important crop; it exceeds all others in acreage and value. The climate in these States is relatively cool and accordingly less corn is produced than in the corn belt. In general the region is favorable to dairying and with its early summer rains and somewhat drier late summers it is also favorable to the growth and curing of hay crops. The soils in the main are better suited to the production of hay than to some of the other cultivated crops. Much of the land in this region is rolling and the cultivation of other crops is more difficult than the production of hay.

Crop Is Widely Distributed

In addition these northern States have the largest portion of the United States population and for that reason have a large requirement for milk. Because of its weight, market milk is usually not shipped great distances and for its production much hay is required. Hay also, because of its bulk and high rate freight requirements in proportion to its value, is not usually shipped great distances. Accordingly, the dairyman who produces milk for the local market finds it to his advantage to produce more hay and ship in grains when additional feed is required.

In the central group of States, hay ranks second, corn being first. The conditions here favor the production of more corn, but on the other hand the corn belt supports a very large livestock population which also requires much hay during the winter months. Since the inshipment of hay is expensive, most farmers produce what they require. In addition, the hay crops fit well into the corn belt rotations and like the northern States, much of the corn belt hay is of clover and timothy, though the northern Ohio Valley raises much timothy.

The southern States are commonly thought of as the cotton belt, which has a rather small hay acreage, corn and cotton taking up the largest portion of the crop land. Since cotton and corn form the basis of the agriculture in this region which is largely dependent on cash crops, the production of hay is generally less important. The livestock population, especially beef and dairy cattle, is small in this area and the percentage of farm tenancy is high. Usually, also, the farms are small and the operations are not sufficiently extensive to make possible the keeping of much livestock.

Another difficulty in hay production in the southern States is the fact that the northern grasses and clovers do not thrive especially well in the climate of this region and satisfactory substitute plants are not available. The large amount of summer rain also makes the curing of hay difficult in this region. The map showing the tame hay distribution for the United States brings out rather well the concentration of hay in the northern and northeastern States and the relative sparseness of it in the southern and western States. Since wild hay is not included, some allowance must be made for this crop in the Great Plains States.

In addition to the widespread importance of the hay crop, the production of hay seeds constitutes an additional item which should probably be credited to the hay crop. Clover seed is an important crop in a group of States lying east of the Mississippi

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What's Ahead?

***"The optimist the doughnut sees,
The pessimist the hole."***

¶ Number Three

By Frank George

A FEW men now living can recall the great public concern over the first billion bushel corn crop in the United States. That was in the year 1870. What could be done with such a large production? American farmers answered that question by increasing production to two billion bushels in the next 20 years. By 1910, corn acreage crossed the one hundred million mark, and the industry was close upon a three billion bushel schedule.

With equipment like this, a silo can be filled at the rate of 20 tons per hour.

For the last 25 years, the corn crop has fluctuated between two and one-half billion and three billion bushels, and in the last 20 years acreage has remained practically stationary at around one hundred million acres. Acreage and production have been held in leash the last 10 years in readjustment to post-war economic conditions, but the economists are agreed now that the industry is on a well-balanced supply and demand basis. Where do we go from here! Will a three billion bushel corn crop be sufficient to help produce the livestock products needed by a domestic population of one hundred and fifty million people by the year 1950?

The increasing use of machinery and the increase in the size of farms have been outstanding developments in the Corn Belt in recent years. Tracts of 160 acres are now regarded as small farms. There are innumerable instances where farmers have taken on an extra "eighty" of a quarter section in order to secure the economies of machine farming. The 650-acre tract is being regarded more favorably as a family size farm, and it is pointed out that for maximum efficiency, units of 1,000 to 2,500 acres are needed.

Livestock and dairy farms of 600 acres will be as common in the great American Corn Belt 20 years from now as are 300-acre farms today. These farms will be fully mechanized. They will be equipped with tractors, four-row planters and cultivators, corn pickers and corn shellers, corn binders and silo fillers. They will produce at low cost and sell at low cost in a domestic market which will have been increased by approximately thirty millions of consumers. The sale of corn-stalks and other residue for use in the manufacture of by-products will form no inconsiderable part of the farm income.

The American corn industry, like the wheat industry, has had a commercial history of less than 100 years. Corn growers 100 years ago were still using the wooden plows of their ancestors. A cast iron plow had been invented in the year 1797, but farmers would not use it because they said that cast iron poisoned the soil and ruined the crops. Farmers in New England were using fish to fertilize their corn fields, because experience had shown that by dropping a fish or two into each hill, yields could be secured three times the size of crops on ground not fertilized.

The method of using a fish for fertilizer was to dig small holes in the ground about four feet apart, put in a fish or two, drop in four or six kernels of corn, and cover them with a mattock or grub-hoe. According to an early chronicle of the Pilgrims "we manured our ground with herrings, or rather shads, which we have in great abundance and take with great ease at our doors. You may see in one township 100 acres together set with these fish, every acre taking 1,000 of them; and an acre thus dressed will produce and yield so much corn as three acres without fish."

Development Was Rapid

It had taken 200 years for farmers to abandon their wooden plows, but the gradual extension of settlements westward after the year 1825 when the Erie Canal was opened, and the planting of larger areas, forced men to lighten their labors, and by 1836 two factories in Pittsburgh were making 34,000 metal plows a year. Rapid improvements followed in the manufacture of harrows, cultivators, the horse-hoe, the grubber, drills, and

It is possible to cultivate from 40 to 60 acres of corn in a day with a tractor and a 4-row cultivator.

An ensilage harvester converts standing corn to ensilage in one operation. This new method leaves the field clean and delivers high-quality ensilage to the silo.

seed-sowers. The Patent Office was deluged with applications for patents on new farming equipment that would increase production per man.

Public men were amazed at this development in machine farming. Some of them said that it would result in an over-production of crops that would bankrupt the country's agriculture. Others declared that there was no need to worry on this account because men would soon exhaust their inventive genius. Charles L. Flint, writing in a United States Department of Agriculture report in 1872, declared that "a better knowledge of the strength of materials has enabled us to reduce the size of all the parts of farming tools, and so to avoid the clumsiness of the older style of implements, and, at the same time, to secure much more effective work.

"We have made some progress in the application of steam to the operation of plowing, and the wonderful performances of the steam-plow in the few instances where it has been tried, have indicated the possibilities of the future, and shown that the time is not far distant when we shall have it in our power to develop the resources of the great West to an extent and with an economy never yet imagined.

"The corn-sheller," he said, "has been brought to such perfection as to separate the corn from the ear with great rapidity, and with the application of little power. It has been adapted to horse-power also, and to different sections of the country, where different varieties of corn are raised, and to shell one or two ears at the same time. Its economy of time and labor is such as, upon large farms where the product is large, to pay for itself in a single year.

"As evidence that the mechanical genius of the country is not yet exhausted, but is as untiring as ever, it may be stated that the patents issued for improvements in agricultural implements and machinery for the year

1872 exceeded 1,000, of which 36 were for rakes, 160 for hay and grain harvesters and attachments, 177 for seed planters and drills, 30 for hay and straw cutters, 80 for cultivators, 73 for bee-hives, 90 for churns, 160 for plows and attachments."

There has scarcely been a time in American history when there has not been complaint of over-production in the corn industry. Nearly 300 years ago, in the Virginia Colony, corn production became so abundant that agents were sent to New England, Nova Scotia, the West Indies, and the Dutch settlements, to offer corn at 25 shillings a barrel, delivered. Hogs multiplied so rapidly that they were allowed to run at large, and many of them reverted to a half wild state. They became more plentiful than deer. By the end of the seventeenth century, hogs had become so numerous that it was generally impossible to tell how many belonged to a given owner. Shoats sold for four shillings apiece, and sows and barrows for eight shillings.

The Birth of Experiment Stations

Agricultural expansion on practically free lands was so rapid for more than 50 years following the opening of the Erie Canal that public men became alarmed at the approaching exhaustion of the supply of arable land in the public domain. Agitation was begun for a more intensive agriculture. This culminated in the Hatch Act in the year 1887, and the nation was launched on a program of growing two blades where one grew before. Twenty-six experiment stations were established in 1888, in addition to the 20 stations already in existence. The practical exhaustion of the supply of free land resulted in rapidly increasing farm land values in the Middle West, and this in turn forced farmers to seek larger yields per acre and to increase efficiency per man by the use of improved machinery. The greater power needed to pull the heavy machines was supplied at first by big teams; more recently, by tractors.

The United States always has been on a basis of relatively cheap food, and is likely to be on that basis for many years to come. Farmers have realized that in order to secure satisfactory returns for their work they must cut production costs to the bone. Costs have been kept down or reduced by efficient farmers, by the use of high yielding varieties, seed testing, and the right choice of equipment and sizes of teams. The two-row cultivator in the Corn Belt, for example, has been found to save about three-quarters of an hour of man labor per acre each time the corn is cultivated. The saving in man and horse labor on three cultivations amounts to about 70 cents per acre.

Farms with the lowest corn cost, however, do not always have the least labor per acre. Frequently the low cost is obtained by getting higher yields as a result of doing the needed work at just the right time, and through proper soil treatment, strain and virility of seed corn. It has been demonstrated that with a high grade tractor of 12 to 15 drawbar horsepower, a corn grower can prepare his land for planting at a rate practically twice as fast as with efficient team methods. One man with a two-horse team and riding cultivator can cover 8 to 10 acres a day. With a tractor and four-row cultivator he can cover 60 to 65 acres a day.

The horse-drawn picker was introduced 20 years ago, but the number sold during the last five years is almost double the previous rate of adoption. Its use is facilitated by the tractor, and it is estimated that approximately 40,000 mechanical corn pickers are now on farms. Most of the machines are of the one-row type, but two-row pickers are being introduced. The manufacturers of a newly-developed picker declare that the machine will pick clean and deliver into a wagon, from 400 to 600 bushels of corn a day.

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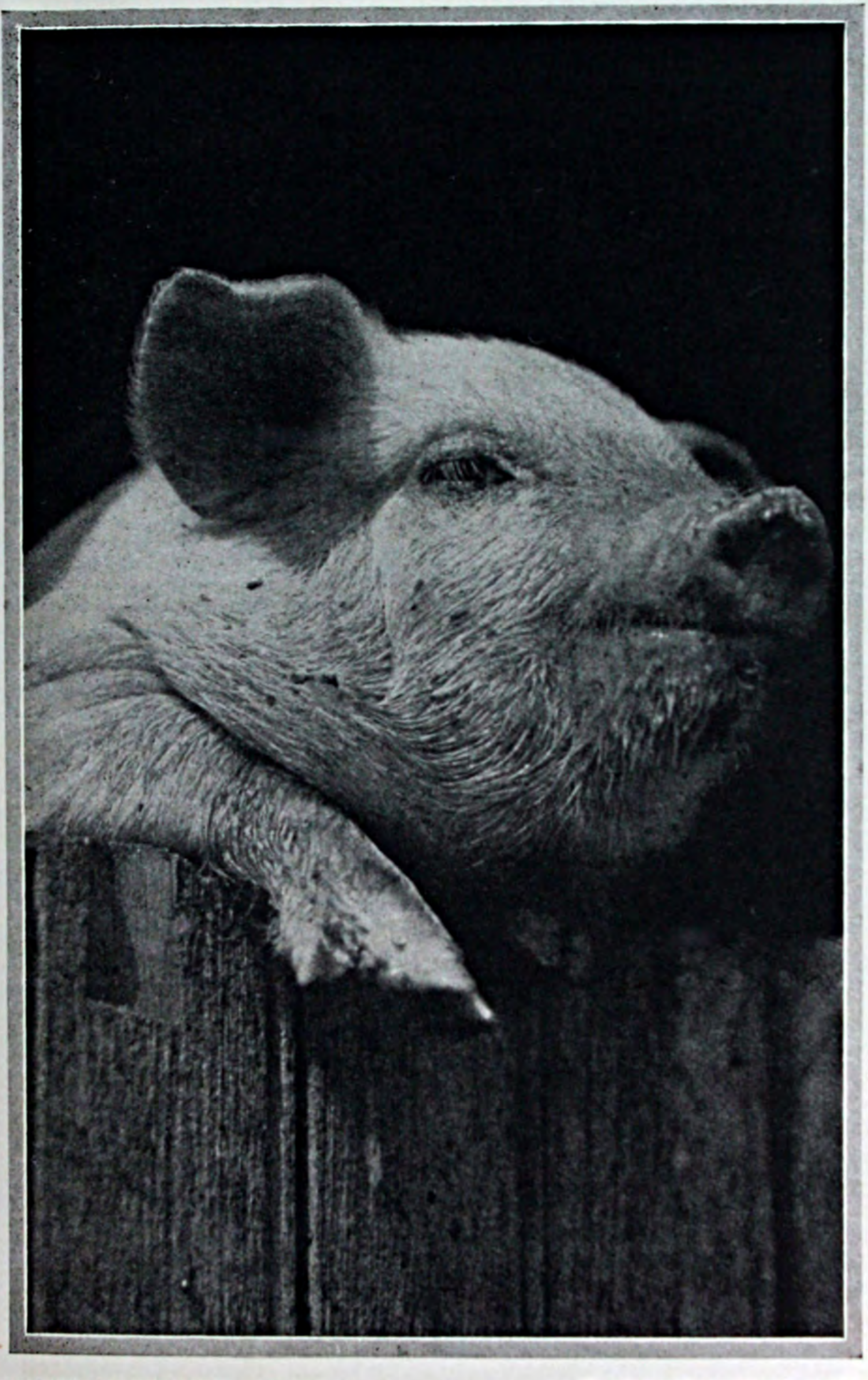
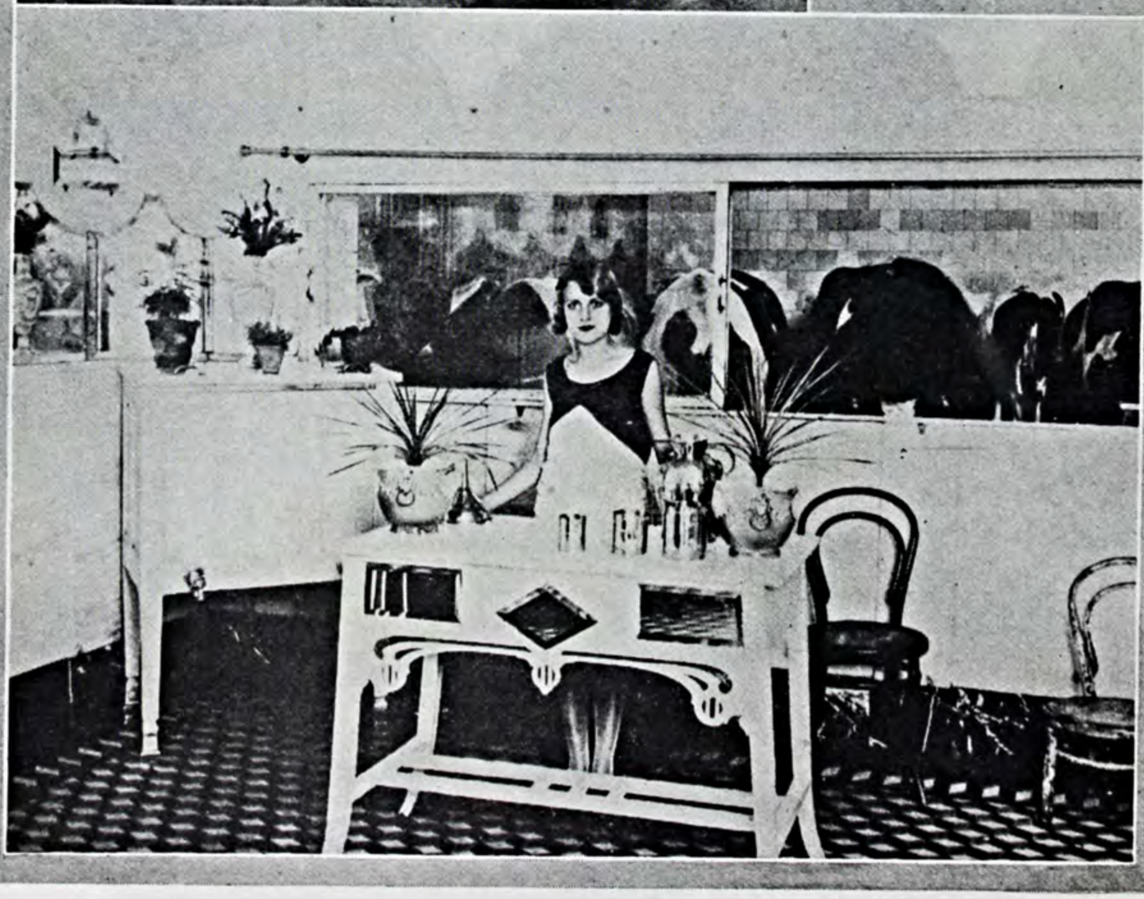


LOOKING THINGS OVER

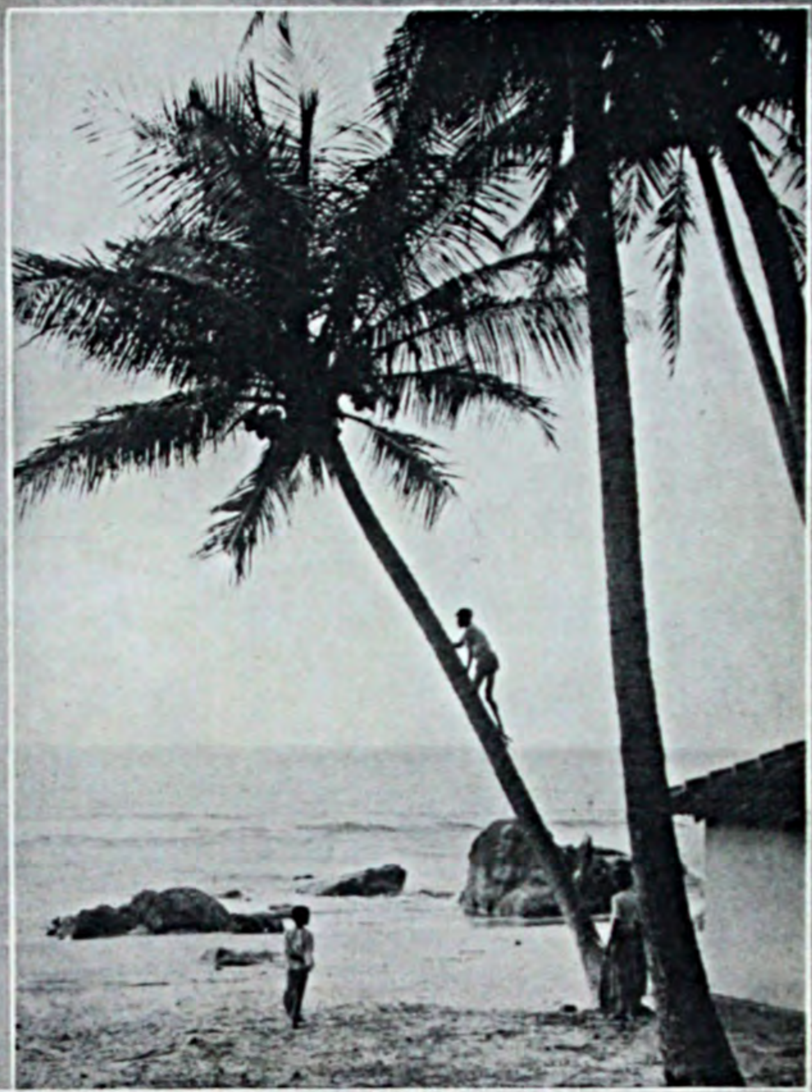
PICTORIAL

Left: This scene is of the grain market at Haifa, Palestine. Almost as much excitement sometimes prevails here as on the floor of one of our big grain exchanges.

Below: Spanish milk purchasers can see what they are getting here. This milk shop in Madrid goes the popular shops of Holland one better. A number of milk-producing cows are kept in a room adjoining the salesroom and in full sight of the customers who are thus convinced that they are getting the genuine article.

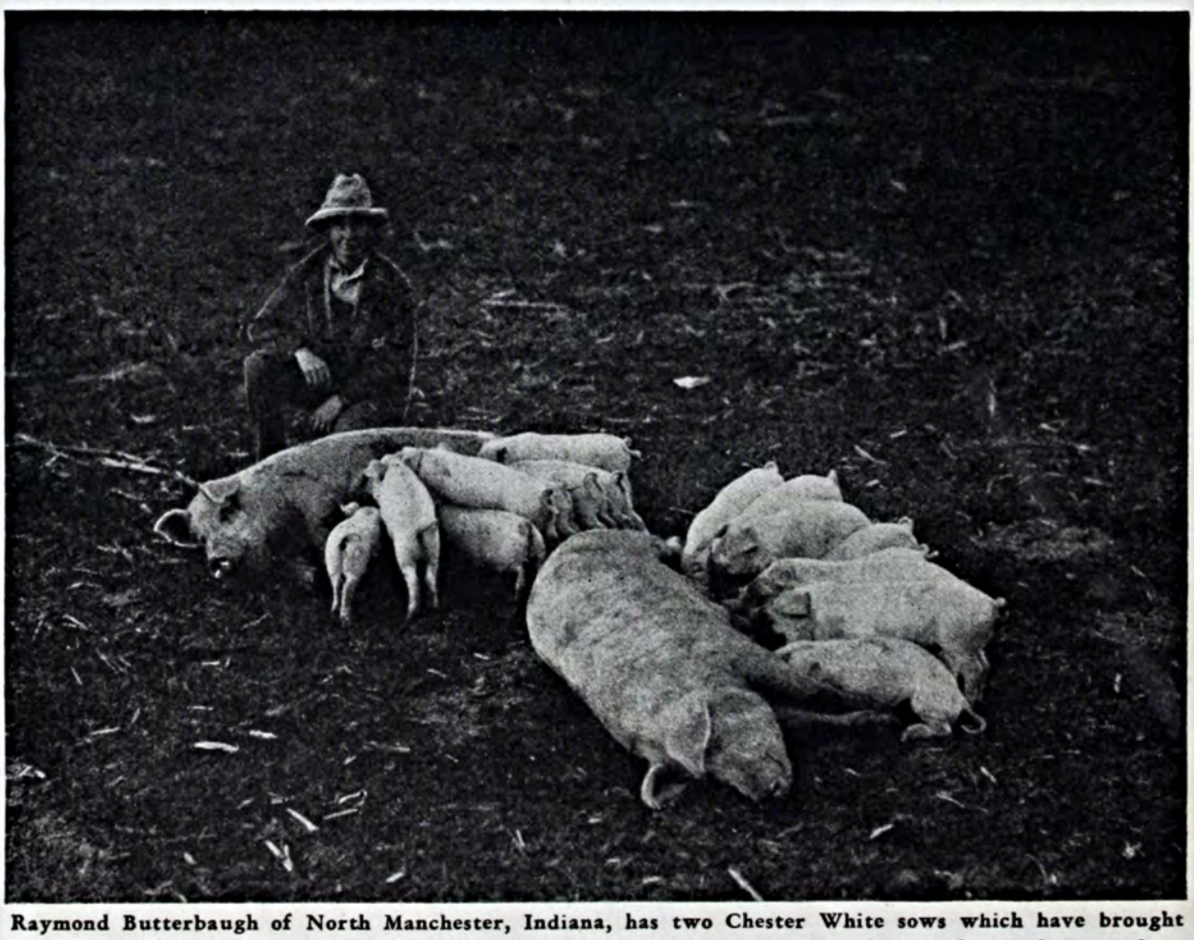


Right: Whenever a Ceylonese wants cocoanuts, he makes a monkey of himself and goes right up the tree to get them. This picture was taken at Mt. Lavinia, Ceylon.



Below: Chinese fishermen let cormorants do their catching. Strings around the necks of the birds prevent them from swallowing the fish they grab with their beaks. The man pulls up both bird and fish, takes possession of the fish, then releases the bird for more work. Here is a fisherman fishing with cormorants on the Grand Canal.

A. A. Goodman, county agent for San Miguel county, Colorado, stops to admire the pet of Mrs. Roy Stone. "Pigs is pigs," says Mrs. Stone, "but this little fellow is just a little more intelligent than the rest."



Raymond Butterbaugh of North Manchester, Indiana, has two Chester White sows which have brought him fame. One of them won a first prize at the 1928 State fair, and from their litters he won first, second, third, and other prizes this year.

A free library on wheels is supported by Cass county, Indiana. It travels twenty-five miles a day through the county, five days a week, and has been in operation for nine years serving the rural schools and farm homes.

This does not happen to be in Iowa—"Where the tall corn grows." It is, however, in the sister State, near Carrollton, Missouri, and shows a fine concrete road, winding like a ribbon through a veritable forest of corn.

Left: L. M. Vogler, Hope, Indiana, with the ten ears of corn that won him grand championship at the International Hay and Grain Show, Chicago, and the cup which he was awarded for the distinction. "Everything enters into the growing of show corn," said Mr. Vogler. "Good seed is the first requisite, then the soil, fertilizer, cultivation, and other factors enter in. I used a complete fertilizer on my plot of corn, the analysis being 4-24-12."

Below: Louis Withrow, Romney, Indiana, with two piles of corn from a fertilizer experiment. The corn at the left received an 0-28-12 fertilizer and averaged 70.8 bushels per acre. That at the right was unfertilized and averaged 47 bushels per acre. The field in which this corn was raised was fertile, and the main reason for such a difference in yield was caused by wet weather. The unfertilized did not get started quickly and was drowned out, while the fertilized corn shot up rapidly and was out of danger from wet weather in a short time.

The Editors Talk

The New Year

With the advent of a new calendar year the attention of all agriculturists is drawn to the prospects for the farmer in 1930. Statements are appearing everywhere, some of them made by conservative students of the situation who temper their remarks with a warning not to look for any boom, others made by men less well versed, who charge their remarks with false optimism.

One of the best guides to the national situation is the annual report of the Secretary of Agriculture. Any outlook must be based upon past experience. Therefore, Secretary Arthur M. Hyde's review of the past year in agriculture is important in considering what may be expected during 1930.

In the beginning of his report to the President, the Secretary of Agriculture says, "Widespread drought during the growing season of 1929 dried up pastures and reduced crop yields below those of any recent year. The losses in production, however, were so evenly distributed for the country as a whole that no large area had either very bountiful or very short crops. Moreover, from the standpoint of the producers, reduced yields seemed likely to be more than offset by price advances. It is probable that the total income from agricultural production for the 1929-30 crop year will equal, if it does not exceed, that of the 1928-29 season. . . .

"Growers planted a total acreage about equal to that of 1928. Yields were disappointing in practically all crops, except irrigated crops and some varieties of hay. The hay crops that turned out well made heavy growth before the drought became severe. All crops combined gave a yield per acre of 7.4 per cent below that of 1928 and 4.1 per cent below the average for the preceding 10 years. Lower than average yields were experienced in 29 States."

In order to have any clear conception of the situation, it is important to get a picture of the important key crops—corn, cotton, wheat, tobacco, potatoes, beef, sheep, hogs, and dairy products.

The corn crop with the exception of the year 1924 was the smallest since 1918. Wheat production was between four and five per cent less than the annual average for the previous five years, although the harvested acreage was about nine per cent larger. Although this season's wheat crop is considerably smaller than that of 1928, it may return the growers a larger income.

In 1928-29, the cotton producers received a lower price per pound, but for a larger crop. They received about the same amount of cash as in the previous year. Yields were greatly reduced by drought in Oklahoma and in much of Texas. The eastern part of the Cotton Belt had about an average yield.

The potato production was about 24 per cent less than in 1928. It seems probable that the reduced potato crop will bring the farmers considerable more money than the last year's heavier crop brought them. Should present prices prevail for the marketing season, the income from potatoes will be approximately 75 per cent greater than in 1928.

Tobacco production was above that in 1928 and above the average for the previous five years. The crop was planted on an acreage nearly six per cent greater than that of the previous year and yields were about the same. The quality of the crop was better while prices for most kinds are at least equal to those of last year.

The livestock industry in 1929 made further improvement. Certain branches of the industry showed losses but gross returns to livestock producers in the first eight months of the year were approximately $93,000,000.00 more than in the corresponding period of 1928. Gain in gross income was effective despite a decrease of over 1,000,000 head of meat animals slaughtered under federal inspection in the first eight months in the year as compared with 1928. The increased return from a reduced volume of sales was partly the result of higher average prices and partly of a higher average weight in the animals slaughtered.

In general, the position of the dairy industry has been favorable this past year, although not as markedly so as it was in 1928. Prices of butter, cheese, and other dairy products have not averaged as high as they did last year, largely because dairy production increased generally during the spring and summer months.

Poultry producers have received good prices for both poultry and eggs and their costs of production have not been unusually high.

Agricultural conditions in the United States continue gradually to improve. Farm incomes in the crop season 1928-29 averaged higher than those of any season since 1920-21, except 1925-26. The movement of population from the country to the town declined and the rate of depreciation in farm-land values declined also. This is evidence of improvement in basic conditions. However, further improvement will be necessary before the situation can be considered satisfactory.

On the demand side of the situation, there probably will not be any great change in the domestic demand. The year 1929 was a boom year in many lines of industry. It is not likely that production of manufactured products will be as great in 1930 as in 1929. Business for the year as a whole probably will be somewhat less active. This may mean slightly less purchasing power on the part of wage earners.

The foreign situation does not promise any great increase in demand for American farm products. However, the consumer purchasing power abroad will be as good as in the past year.

Agricultural conditions in the crop year 1929-30 were the best for any year since 1920-21 with the exception of 1925-26. That means that the agricultural situation is improved. This improvement seems likely to be continued in 1930.

The Fertilizer Situation

On the basis of improvement in our national agriculture, especially in the status of the growers of the chief fertilizer consuming crops, it is logical to expect improvement in the fertilizer situation. Even though the farm price of cotton is considerably less than a year ago, which is an adverse factor in the fertilizer outlook, yields of cotton in the eastern part of the Cotton Belt were greater than a year ago. Thus, the decrease in the value per acre for cotton has not been as great as the decrease in the price in many States, and in some of the important fertilizer States there is an increase in the value per acre. This increase in value per acre will tend to stimulate fertilizer consumption.

Tobacco production is greater than last year but tobacco prices are much the same as a year ago. The situation in the tobacco States as well has not changed materially.

The high price of potatoes combined with the small crop will probably result in greater gross income to potato producers. The situation in the potato territory is much better than last year.

In the Midwest, the upward trend of fertilizer consumption will undoubtedly continue. An increase in the percentage of plant food per ton will undoubtedly continue. This picture for the fertilizer industry indicates an improvement over last year.

Fertilizers for Fruits

For many years the fertilizer recommendations for fruits have been nitrogen only. This advice has been almost universal, from coast to coast and from the Canadian boundary to the Gulf. In fact, our neighbors in Canada have followed it as industriously as we have in this country.

Then doubts began to creep in as to whether this program was complete enough. Reports indicated that the results obtained with nitrogen alone were not always as profitable as was to be expected. Experimental work here and there showed that on some tree fruits possibly phosphates and potash were beneficial. Here and there farmers found the same thing.

It is not surprising, therefore, that an editorial has appeared in "Fruits and Gardens," the official organ of the American Pomological Society, which makes the following significant statement: "It is possible and probable that after we have all the facts before us, we will settle down into much the same program of fertilizing fruit trees as is followed with other crops."

The editorial writer points out that in the fruit industry as well as in others, there has been a tendency to go from one extreme to another. This was done with pruning and has since seemed to be the tendency as regards fertilizers. After reviewing the developments and some of the evidence, the writer states:

"Already we are beginning to get some tangible evidence that we have gone too far in assuming that nitrogen only is needed in the fruit industry. The excellent results from manure, a complete fertilizer, and the insistence of many growers that it is the best fertilizer is an indication. A short time ago the New Jersey Experiment Station issued a report stating that during recent years the growers who have been carrying away the leading prizes at New Jersey fruit shows are those that have been using a well-balanced fertilizer."

Of course, there is little doubt on most fruits that nitrogen is needed. The point of issue is whether over a long period of years nitrogen alone will give the most profitable results. The writer draws particular attention to the preliminary reports given on the results of experimental work conducted in Virginia. These experiments were started in 1919. In the most recent report, Professor F. W. Hoffman of the Horticultural Department of the Virginia Agricultural Experiment Station, states, "From the results secured in both the Blacksburg and Crozet orchards, an application of a fertilizer carrying nitrogen, phosphorus, and potassium is most likely the safest blanket recommendation to offer." Professor Hoffman points out, however, that different varieties respond differently to fertilizers.

Everybody interested in horticulture will watch with interest the results of various experiments that are under way.

Time to Budget

January is the time to make the farm inventory and plan the budget for the year. Agricultural economists throughout the country are calling attention to this fact with suggestions for simplifying what to many farmers seems almost a hopeless undertaking.

According to O. M. Fuller, farm economist of North Dakota, an inventory is a simple and accurate means of determining the financial success of the year's business. It is simply a matter of listing the value of all property at the beginning of the year for comparison with a similar inventory made at the end. By comparing the two, it is easy to see whether or not the business is ahead or behind. In listing the property, it is essential that nothing be overlooked, including both debts and money loaned or in the bank.

The time is past when it is only storekeepers and commercial concerns that take an inventory of their business for the year. Farming represents a considerably larger investment than the average commercial concern and the value of the yearly inventory is just as great.

Without the information gained through an inventory, a farmer may think he has lost money when he is actually ahead, or that he is ahead when he has actually lost. Likewise without the inventory it is impossible to properly make a working budget for the new year. An important phase of the farm business which the inventory brings out is the effect of good care on the value of farm property and the continued productiveness of the farm.

An article in this issue on farm budgeting is of particular interest at this time.

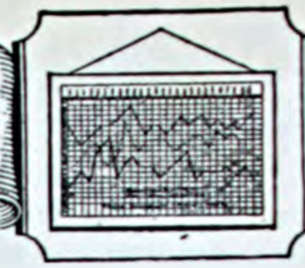
Soil Robbers

The fertility of the soil is the capital stock of the farmer. When that is gone his business is gone, except as he may resort to the use of commercial fertilizer. Nothing *in the world* responds more readily to fair treatment than the soil, but there is no reward for shiftlessness and inefficiency. The question of fertility is fundamental, and the conservation of it vastly more important than is realized by many.

There are two stages of crop production, first the destructive stage or mining of the plant food elements in the soil, and second the constructive stage—the realization of the need for replacing in the soil at least as much plant food as is normally removed by the crop grown. Too many American farmers are still in the destructive stage—in fact there are still agricultural leaders whose researches and teaching are still based on a definite chemical concept of soil fertility. Not until this concept is replaced by a more logical, a more natural concept—what the plant actually removes from the soil—will farmers cease to be soil robbers.

To maintain soil fertility at a high level of production costs money. This is natural. To maintain a savings account at any given level, large enough to return at normal interest a satisfactory income, requires a very definite initial investment. Once established, we cannot draw on it beyond a certain amount if a definite income is to be assured. If a larger income is desired, then the initial investment must be increased. And so it is with the soil. To maintain soil fertility at a high level of production, we must not take out more than we put in. It costs far less to maintain fertility than it does to restore it to a profitable productive level after it has been robbed by exhaustive farming practices.

AGRICULTURAL DEVELOPMENTS



By L. C. Farle

WEED KILLER PROVES TO BE FIRE HAZARD

Sodium chlorate is a successful weed killer, but, says R. H. Porter, a plant pathologist of Iowa State College, it is also a dangerous chemical. Even though it is efficient in killing the persistent Canada thistle, the College is reluctant to recommend it because it is inflammable and may catch fire in the field when the soil is good and dry. Wood or clothing or other organic matter when soaked with a solution of the chemical and then dried is a very dangerous fire hazard. Friction may set it afire. "A person walking through a field recently sprayed with sodium chlorate," says Mr. Porter, "may suddenly find himself surrounded by flames." An Iowa field which had been sprayed with 500 gallons to the acre recently caught fire spontaneously on a hot day. Tests indicate that calcium chlorate is nearly as effective as sodium chlorate and not nearly so inflammable.

NOSES OF THE TREES

Had Cyrano de Bergerac—he of the enormous nose and great imagination—known what science has just discovered about the fall coloring of the trees, he very well might have likened his craggy beak to a scarlet oak or a glowing gum tree. For the red of the autumn foliage, as is often true of the bulbous beezer, is the result of alcohol. The information on the cause of the warm leaf colors of the autumn woods comes from Samuel G. Hibben of the Westinghouse Lamp Company after long study of the effects of sunlight on plants and animals. It is a common belief that frost produces the color changes in leaves in the fall, but Mr. Hibben says that the activities of leaves slow down as they get old, and chemicals, among them alcohols, accumulate. The fall colors are the bloom of age.

ANESTHETIC USED ON COWS

Cows and most other animals have had a pretty hard time of it when troubled with serious diseases and derangements, or when injured. Even if the animals were brought through all right, it was often at the expense of a great deal of pain. Recently, however, a Vienna professor, Dr. Franz Denesch, demonstrated at the University of Pennsylvania a method for giving cows a local anesthetic, which he says is particularly effective in obstetric cases. The anesthetic is injected near the base of the tail, and in about two minutes the operation can be performed.

AMERICAN EXPERIMENT STATIONS COPIED IN EUROPE

Dr. Lipman, Director of the New Jersey Agricultural Experiment Station, recently back from Europe, reports that the European agricultural experiment stations and agricultural colleges are copying American methods, and showing a strong trend toward more practical work of more benefit to the farmer. At a German experiment station near Munich elaborate soil maps are being made of individual farms, towns and counties, and the plan is eventually to cover all of Bavaria. The maps show the various soil types, and the needs for lime and plant food. Doctor Lipman says the German farmers are finding the maps an invaluable aid in maintaining productivity on their farms.

ONION SECRET SOLVED

Why do red onions and yellow ones resist smudge rot better than the white ones? J. C. Walker, plant pathologist at the Wisconsin College of Agriculture, discovered this peculiarity and propounded the question to the onions. For some time they refused to answer. He got the assistance of K. P. Link, a chemist of the same institution, and after many tearful sessions with the strong and the weak onions they found the secret. For a long time scientists have known that some plants resisted disease better than others of their kind, but, so far as known, these Wisconsin men are the first to find an actual substance that is responsible for the resistive quality in a plant. The substance found in the red and yellow onions which was absent in the white ones is an acid which has been named protocatechuic.

The disease smudge rot is serious in many of the northern and eastern States. It attacks plants while they are growing and continues its damage during storage, especially if the onions have not been thoroughly dried. Onion-seedling growers have lost much profit because of smudge rot, but many of them are now cutting losses by putting the seedlings in an artificial dryer.

LESS COMMON ELEMENTS IMPORTANT

The parts played in crop production by some of the less common elements were emphasized recently by Dr. Oswald Schreiner, president of the Association of Official Chemists, in an address before that organization in Washington, D. C. In his opinion there is much important work to be done in searching for the uses of these elements in agriculture and in industry. Large areas of soil in this country, he says, are lacking in some of these rarer but none-the-less essential plant foods. In this connection, he called attention to the results recently obtained by the Department of Agriculture in the use of manganese on tomatoes in Florida, and to experiments in the Everglades which have shown extraordinary benefits to crops from the use of small quantities of copper as a fertilizer. He mentioned other convincing results from nutrition studies on citrus trees.

SWEET SPUDS MADE FAT WITH POTASH

Potash fertilizer will make the sweet potato change its shape, scientists at the New Jersey State College of Agriculture have found. Consumers like "sweets" shaped more like an egg than like a shoestring. Since about 15,000 Jersey acres are devoted to this crop each year, it was important to find some easy way to reduce the high percentage of "slims." Good results in producing the chunky ones were obtained when a fertilizer containing 3 per cent nitrogen, 8 per cent phosphoric acid, and 8 per cent potassium was used at the rate of 1,000 to 1,500 pounds to the acre. The reason potash produces this favorable chunky growth—and this is an important new fact—is that potassium is necessary "to allow the complete formation of protein and protein-like substances in the plant, substances which are necessary for continued cell division and growth of the plant. It is this rapid cell division, provided it takes place in the direction of the root's diameter, which makes the potato chunky."

Cooperative Consciousness

By Charles A. Lyndon

Lyndon, Alberta

(*Continued from last month*)

It takes more than mere volume, though, to make for success in cooperative enterprise, even granting that volume is a prime essential. The "co-op" that succeeds must show some practical advantage to its members; it must be able to instill an "esprit de corps" into those members in order to hold their loyalty; and it must meet business competition in a business manner. There is evidence to show that the Canadian Wheat Pools have not fallen down in these matters, while, on the other hand it must be admitted by pool opponents that the pools have gone a long step on the road to winning favor with the consumer, that important individual on the other end of the marketing job.

It has been said that more cooperative businesses fail because of poor or dishonest management and because of political entanglements than from any other causes. These western wheat growers' organizations seem to have avoided both of these pitfalls. No effort or expense has been spared to secure for the pools the very best executives in the various branches of the business. As a result, the organization contains a large number of men who received their training in the ranks of the large line grain corporations. As to the political feature, there seems to have been constant and vigorous effort by

The world's largest wheat elevator is owned by the Canadian wheat pool and is located at Port Arthur, Ontario.

the directorate in the right direction. In a region where Government is dominated by the agricultural population, as has been the case in the prairie provinces since the war period, it would be no difficult matter for the pools to become entangled with the rural party with which they are undeniably in sympathy, as a majority. It has only been through the conscientious effort of far-sighted men on the directorate that the pools have steered their own course and left politics to the politicians. The governments of the prairie provinces have stood ready to assist the pools wherever legislative action was necessary, but there has been no attempt to turn this into paternal supervision of the organizations. Anything that looked like such has been deftly avoided by the growers.

The Grain Trade, in keeping with their rights as business corporations opposed to the pool idea, have instilled a new note of vigor into the struggle for control of Canadian wheat. Not only have they united to fight the pools by propaganda, but each individual company has gone more vigorously than ever into the fray to win over the producer. This war has brought benefit to the grower, even financially, as we shall see.

Benefit Is Widespread

There is no denying the fact that grain companies had little to worry over in regard to producers prior to war years. The average farmer knew practically nothing of how his wheat was marketed. He was content to sell for what the companies considered the proper price. No doubt this led to abuses. Today we note several outstanding changes that have been wrought by the challenge of the pools. Pool policy necessarily depends upon grower interest being maintained. Directors and field-men, together with the system of interim payments, keep member interest alive throughout the year. The grain companies are now even entering the radio broadcasting field in an effort to keep before the public throughout the year. Where all were previously content to leave the farmer uninformed, they are now equally anxious to keep him informed. It requires no reading between the lines to find who is benefiting.

Two interesting details will serve to show how the farmer is receiving financial benefit through this wheat trade struggle. The pools have found that they are able to operate their country elevators at considerable profit. In 1927-28, they found that, after laying aside 6 per cent interest on elevator reserve deductions, 5 per cent for depreciation, payment of elevator operating expense, and a nucleus of a sinking fund, they were able to pay back to members a really substantial dividend from elevator earnings. Those members who paid the elevator 2½ cents a bushel to "special bin" their wheat received back as dividend, 3½ cents a bushel, and so made a clear profit of one cent per bushel on that transaction alone. Those who loaded to pool terminals over a loading platform, no elevator being available, paid three-fourths of a cent per bushel charges and were paid back two cents a bushel. The members who sold on a cash ticket basis paid 4½ cents and were paid back four cents, receiving the least dividend, but having, of course, the advantage of an immediate cash payment. These dividends mean a substantial cash benefit to western farmers, and indicate that someone has apparently been making considerable profit in the sphere of elevator operation alone. Action by the pool in announcing patronage dividends has already led one grain company to adopt the same policy, and this is one more instance where the pools have brought financial betterment to non-pool growers.

The flooding of elevators and transportation facilities by the wheat rush in fall months has become even more serious than previously since the advent of the combine and the farm truck. It was in the first real effort

(*Turn to page 59*)

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, Crops, Crop Diseases, and Insects. 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

"Field and Sand Culture Experiments on Fertilizing Asparagus" is the title of the new Bulletin 314, Maryland Agricultural Experiment Station. The use of commercial fertilizers to replace manure or as a supplement to manure is ably discussed by the authors, Thomas H. White and Victor R. Boswell. Briefly, the nine years' results reported show an annual increase of 35.99 per cent for 1,250 pounds per acre of a 7-3-5 fertilizer as against an increase of 28.00 per cent for 10 tons of manure. Regarding time of application of manure, spring application out-yielded summer application six out of nine years.

Another new Maryland bulletin, No. 311, "Fertilizer Studies and the Production of Sweet Potatoes," by Fred W. Geise, reports results of a five-year study of the influence on yields of nitrogen, phosphoric acid, and potash on sweet potatoes used separately and in combination. The mean relative increases over the mean of the check plots were for potash alone, 160.5; phosphorus - potash, 179.1; nitrogen - phosphorus - potash, 187.4; nitrogen-potash, 199.6 per cent, respectively. Plots treated with muriate of potash alone or in combination with nitrogen or nitrogen and phosphorus gave the largest return of any of the treated plots. Treatments without potash gave increases, but only about one-half as large as the plots containing potash.

"Fertilizer and Cottonseed Meal Analyses Report," Dept. of Conservation and Inspection, Little Rock, Arkansas, 1928-29, Dr. W. F. Manglesdorf and G. W. Roark.

"Report on Inspection of Commercial Fertilizers," Agr. Exp. Sta., New Haven, Conn., Bul. 308, Sept., 1929.

"A Fertilizer Study on the Brown Soil of the Red Praries," Agr. Exp. Sta., Stillwater, Okla., Bul. 188, July, 1929, H. F. Murphy.

"Fertility Studies on Kirkland Soil," Agr. Exp. Sta., Stillwater, Okla., Bul. 189, June, 1929, H. F. Murphy.

"Commercial Fertilizers in 1928-29 and Their Uses," Agr. Exp. Sta., College Station, Texas, Bul. 403, October, 1929.

Soils

"Soil Survey of The Chico Area, California," U.S.D.A. No. 4, Series 1925, E. B. Watson, T. W. Glassey, R. Earle Storie, and Stanley W. Cosby.

"Soil Survey of King City Area, California," U. S. D. A. No. 24, Series 1924, E. J. Carpenter, A. E. Kocher, and F. O. Youngs.

"Soil Survey of Iowa, Delaware County," Agr. Exp. Sta., Ames, Iowa, Report No. 56, May, 1929.

"Soil Survey of Iowa, Jones County," Agr. Exp. Sta., Ames, Iowa, Report No. 57, May, 1929.

"Soil Survey of Iowa, Fremont County," Agr. Exp. Sta., Ames, Iowa, Report No. 58, May, 1929.

"Soil Survey of Iowa, Cherokee County," Agr. Exp. Sta., Ames, Iowa, Report No. 59, May, 1929.

"Soil Survey of Middlesex County, Massachusetts," U. S. D. A., No. 26, Series, 1924, W. J. Latimer and M. O. Lanphear.

"Initial Soil Moisture and Crop Yield," Agr. Exp. Sta., Stillwater, Okla., Bul. 192, June, 1929, H. H. Finnell.

Heavy Plains Soil Moisture Problems," Agr. Exp. Sta., Stillwater, Okla., Bul. 193, June, 1929, H. H. Finnell.

Economics

In order to have an efficient marketing system for any commodity, all steps in the marketing process should be efficient. A new Minnesota bulletin, No. 251, "Economic Aspects of Local Elevator Organization," is a study of the proper business set-up of local elevators. The authors are Hutzel Metzger and H. Bruce Price. While there are many factors that affect the efficient organization of elevators, the volume of business is one of the most important. Elevators marketing less than 125,000 bushels of grain have substantially higher costs than those with a larger volume. Labor and management is the second important factor affecting costs. The amount of labor used is more important than the rate paid. Elevators marketing less than 100,000 bushels and doing an ordinary sideline business cannot afford to employ more than one regular man. Equipment, buildings and sidelines are other factors that affect the efficiency of the local elevator.

"Cost of Producing Crops on Irrigated Farms," Agr. Exp. Sta., Fort Collins, Colo., Bul. 353, September, 1929, R. T. Burdick and H. B. Pingrey.

"Outline of Colorado Tax Laws for Farmers and Ranchmen," Agr. Exp. Sta., Fort Collins, Colo., Bul. 355, October, 1929, G. S. Klemmedson and C. C. Gentry.

"Services of Rural Trade Centers in Distribution of Farm Supplies," Agr. Exp. Sta., University Farm, St. Paul, Minn., Bul. 249, October, 1928, H. Bruce Price and C. R. Hoffer.

"Ohio Agricultural Statistics for 1928," Agr. Exp. Sta., Wooster, Ohio, Bul. 442, September, 1929, Dept. of Rural Economics.

"Problems in Cooperation and Experiences of Farmers in Marketing Potatoes," U. S. D. A., Washington, D. C., Cir. No. 87, October, 1929, T. B. Manny.

Crops

In the new "Agricultural Program for North Carolina," extension circular No. 175, there is a concise and understandable discussion on the management of the major crops of the State. The program also considers in the same well-thought-out presentation the other agricultural problems of the commonwealth. In the discussion of soil management, there is this significant statement, "The fundamental need of most North Carolina soils is increased fertility. . . . Under present cropping systems, the original organic matter contained in most North Carolina soils has gradually been depleted and very little is being done to replace it." Logical steps for increasing fertility are then given.

"Alfalfa Production," California Agr. Ext. Serv., Cir. 35, October, 1929, B. A. Madson.

"Monthly Bulletin of the Department of Agriculture State of California," Sacramento, Calif., Vol. XVIII, No. 10, October, 1929.

"The Australian Saltbush," Colo., Exp. Sta., Fort Collins, Colo., Bul. 345, May, 1929, Wm. P. Headden.

"Variety Studies of Spinach," Agr. Exp. Sta., College Park, Md., Bul. 312, July, 1929, Fred W. Geise and H. B. Farley.

"The Production and Marketing of Strawberries on the Eastern Shore of Maryland," Agr. Exp. Sta., College Park, Md., Bul. 315, August, 1929, W. E. Whitehouse, W. J. Hart, and W. P. Walker.

"Seed Corn Selection and Germination Tests," Agr. Exp. Sta., University Farm, St. Paul, Minn., Spec. Bul. 125, July, 1929, H. K. Wilson and R. F. Crim.

"The Influence of Fallow on Yield and Protein Content of Wheat," Agr. Exp. Sta., Bozeman, Mont., Bul. 222, July, 1929, Edmund Burke and Reuben M. Pinckney.

Ohio Agricultural Experiment Station, Bimonthly Bulletin, 141, Wooster, Ohio, November-December, 1929.

"Fruiting Habit of the Cotton Plant," Agr. Exp. Sta., Clemson College, S. C., Bul. 261, October, 1929, T. S. Buie.

"Forest Planting in the Lake States," U. S. D. A., Washington, D. C., Bul. 1497, June, 1929, Joseph Kittredge, Jr.

"Breeding Hard Red Winter Wheats for Winter Hardiness and High Yield," U. S. D. A., Washington, D. C., Tech. Bul. 136, September, 1929, Karl S. Quisenberry and J. Allen Clark.

"Work of the Newlands Field Station, Nevada 1924-27," U. S. D. A., Washington, D. C., Cir. 69, September, 1929, E. W. Knight.

"Cigar-Tobacco Production in Pennsylvania," U. S. D. A., Washington, D. C., Farmers' Bul. 1580, July, 1929, Otto Olson.

"Varieties of Hard Red Winter Wheat," U. S. D. A., Washington, D. C., Farmers' Bul. 1585, June, 1929, J. Allen Clark and Karl S. Quisenberry.

"Reed Canary Grass," U. S. D. A., Washington, D. C., Farmers' Bul. 1602, August,

1929, *H. A. Schoth.*

"Planting and Care of Shelter Belts on the Northern Great Plains," U. S. D. A., Washington, D. C., Farmers' Bul. 1603, *August,* 1929, *Robert Wilson*

"Lettuce Growing," U. S. D. A., Washington, D. C., Farmers' Bul. 1609, *November,* 1929, *W. R. Beattie.*

"Department of Agriculture Immigration of Virginia," Bul. 264, *December,* 1929.

Insects

"A Progress Report on the Testing of Sulfonated Oxidation Products of Petroleum for their Insecticidal Properties," Agr. Exp. Sta., College Park, Md., Bul. 310, *June,* 1929, *John L. Hoerner.*

"Control of Tobacco Insects," N. C. State College of Agr. and Eng. and U. S. D. A., Raleigh, N. C., Ext. Cir. No. 174, *October,* 1929.

Diseases

A new bulletin, No. 268, on the "Control of Oat Smut by Seed Treatment," has been issued by the North Carolina Agricultural Experiment Station. The authors are S. G. Lehman and G. W. Fant. This should prove very welcome to the great number of growers who are looking for latest information on the control of this profit-stealing disease.

"The Preparation and Effectiveness of Basic Copper Sulphate as a Fungicide," Agr. Exp. Sta., Amherst, Mass., Bul. 254, *June,* 1929, *E. B. Holland, C. O. Dunbar, G. M. Gilligan, and W. L. Doran.*

"The Overwintering of the Tobacco Mosaic Virus," Agr. Exp. Sta., Madison, Wis., Bul. 95, *June,* 1929, *James Johnson and W. B. Ogden.*

Keeping Step With Progress

(*From page* 20)

crease will pay a handsome profit on the investment.

Four dollars worth of plant food to the acre is the best insurance policy that can be bought to assure a stand of clover or alfalfa. The fertilizer pays a premium on the investment when the grain nurse crop is harvested and an added return on the legume hay to follow. Crops do not belong to the Union. They will work without even getting hot, but they must be properly fed if the harvest is to be most bountiful. Fertilizer attachments to planters and seeders are available to provide proper distribution of commercial plant food with most convenience.

In order to fully cash in on quality crops, it is essential to grow them with quality plant foods. The fertilizer should always be applied with the proper equipment. It is not difficult to learn how to economically use commercial plant foods. One can quickly learn the way to balance rations for crops. Just as a cow tester learns how different individuals of the herd require different rations, so it is found that different fields need special fertilizer treatments. Every acre of soil in the country where a rainfall of 25 inches or more prevails will yield better if treated with phosphates. For clover and alfalfa, a mixture of phosphate and potash is usually the thing to apply. Corn, potatoes, and truck ordinarily respond best to a complete mixture.

Not a tenth of the farmers who could profit by the use of commercial plant food in the United States are now employing it. Of those who are using fertilizers, few apply an optimum amount for greatest returns, and the majority who are using commercial plant food are not applying half enough to the acre. American farmers are intelligent. They have accepted modern methods of culture, applied power to their farming operations, and they are now rapidly learning that by generously using commercial plant foods to grow quality crops at minimum cost, it is possible to further improve their position.

Tours and field meetings create and increase interest in alfalfa growing.

The Defeat of Old Man Winter

(*From page* 24)

The Wisconsin investigators point out that soil acidity, as is commonly supposed, is not the real cause of many legume failures, for legumes will often do well on acid soil if they have a plentiful supply of calcium. It is possible to have calcium without having a neutral or alkaline soil.

Soil specialists have been working for a number of years to find the real cause of soil acidity until just recently when scientists at the Wisconsin College of Agriculture found that alumino-silicic acid is perhaps the only inorganic compound responsible for soil acidity. This newly isolated acid under the trade-name "white rock" is used to pack horse hoofs which have become unnaturally dry. When lime is applied to the soil it reacts with this acid and forms a neutral calcium salt.

So it may be seen that the problems which arise in the production of legumes are indeed dependent upon each other, but fortunately there are some factors which can be controlled or influenced. Still more fortunate is the fact that by bettering one condition others often are improved. For example, fertilization with potash increases yields and at the same time gives the plants greater resistance against unfavorable winters; and the correction of soil acidity leads to the greater effectiveness of other fertilizer applications.

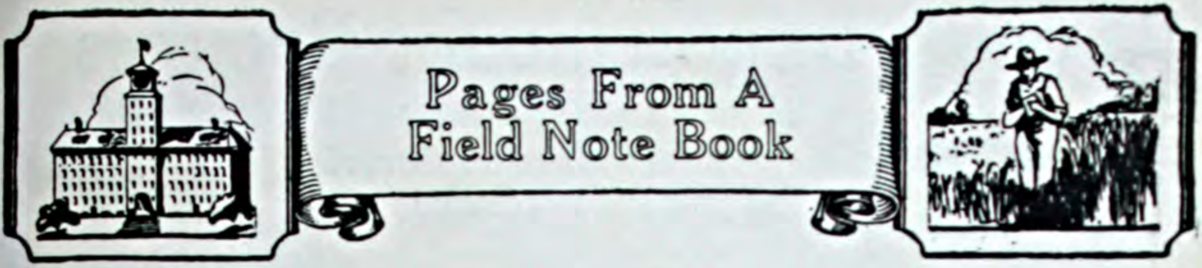
In commenting upon the extremely favorable winter due to heavy snows in Wisconsin and the Midwest last year, Mr. Graber issues a warning that it may be another score of years before such a winter is experienced again.

But there need be no alarm over winter-killing, because much of it may be prevented by fortifying the soil with applications of fertilizers, particularly potash on soils which have a tendency to be sandy or peaty or wherever analyses show a need for it.

NO BARGAIN

Wife—"I see by this paper that in certain parts of India a wife can be bought for two dollars. Isn't that perfectly awful?"

Husband—"Well, I don't know! A good wife would be worth that."



The Value of Legumes

By F. E. Charles

Kansas State Agricultural College

BENEFICIAL results through the use of the legumes—alfalfa, sweet clover, and soybeans—when used in rotation with other common crops, have been demonstrated in experiments recently conducted at the Kansas agricultural experiment station by Dr. M. C. Sewell. The tests were made to study the legumes with special attention to the amount of nitrogen fixed by each and their effect on the yield of corn in a rotation consisting of corn, oats, and wheat.

When alfalfa or sweet clover was allowed to grow but a single year in a rotation, the yield of corn was increased more than 25 bushels per acre. This rotation without the legume yielded 68.4 bushels an acre. When alfalfa was used in the rotation the corn yield was increased to 93.9 bushels an acre.

On a plot in which sweet clover was added to the corn, oats, and wheat rotation, the corn yield was 94.7 bushels an acre. Without the sweet clover, the yield was 68.4 bushels. The alfalfa and sweet clover were allowed to stand for only one growing season and were plowed up the following spring.

In another series of tests when soybeans and sweet clover were allowed to grow but one year in the rotation, the corn yield was increased about 25 bushels an acre. On this series of plots where the rotation of corn, oats, and wheat was used without a legume, the yield of corn was 61 bushels an acre compared to the corn, oats, and wheat rotation followed by sweet clover which yielded 85.2 bushels. Soybeans used in the same rotation increased the yield to 86.2 bushels per acre.

Since both series increased the yield about 25 bushels an acre the difference in total yield between the two series was probably due to a difference in the soil itself, Doctor Sewell pointed out. The rotation used in these experiments (corn, oats, and wheat) was used as representative of any common crop rotation.

Fertile soil, a farmer who knows how to maintain that fertility, and cows are three important factors in making agriculture prosperous.

Potash Important for Potatoes

Prevents Diseases; Increased Production Surprisingly Large; Use of Potash Profitable

(Reprinted from the September, 1929, issue of the North Central Quarterly, official publication of the North Central School of Agriculture and Experiment Station of the University of Minnesota, Grand Rapids, Minnesota.)

THAT large and profitable returns from application of potash fertilizer for potatoes can be expected is not news to those who have followed the research work at the North Central Experiment Station. The large returns from applications of potash fertilizers have been apparent year after year and have been reported in our Station bulletins and the public press.

The cause for the marked increase of yields, however, has been attributed to the supplying a necessary plant food element. Results this year indicate that this is not the sole reason for this increase. That potash also checks or prevents disease is sufficiently apparent to be conclusive. On plots where no potash was applied wilt killed from 10 to 50 per cent of the potato vines, while on the plots where potash was applied the plants have little or no infection and the production of tubers show differences of more than 200 per cent in favor of the plots where potash was added at the rate of 200 pounds or more per acre. An application of even 115 pounds of muriate of potash per acre was quite effective in checking the wilt.

Trials with farm manures and commercial fertilizers have been under way since 1915. The old phosphate manure projects to determine the effect of phosphate fertilizer upon different crops in the rotation when applied with and without stable manure showed over a four-year period (1915-1918) that the phosphate applications were not profitable either in the form of acid phosphate or raw rock phosphate. On the other hand, the increase in yields from applications of stable manure was surprisingly large. The average yearly increase for four years from applications of 1,000 pounds of raw rock phosphate was only 12.8 bushels per acre for potatoes, one bushel for oats, and 80 pounds for clover and timothy hay. The increase due to applications of acid phosphate at the rate of 360 pounds was 11.6 bushels per acre for potatoes, 1.2 bushels for oats, and 40 pounds for hay. On the other hand 10 tons of stable manure gave a four-year average increase as follows: 94.8 bushels potatoes, 7.3 bushels oats, and 860 pounds hay.

Peat as a Fertilizer

At the same time another project was carried on to determine the benefits from applications of raw peat upon the different crops in the rotation. Results for a five-year period indicated that peat in the raw form is not an efficient fertilizer. The average yearly increase was 3.4 bushels of potatoes from an application of 10 tons of peat per acre, 10.4 bushels from 20 tons, and 22.4 bushels from 40 tons per acre. That is, the increased potato yield was less than a bushel for each ton of peat applied.

On oats the raw peat gave larger increases but not sufficiently so to be profitable. The increases in the case of oats range from 2.8 bushels per acre from a 10-ton application of peat to 4.8 bushels from a 40-ton application. That is a return of from ⅛ to ⅓ bushels of oats for each ton of raw peat applied. For hay, the increase was only from 15 to 30 pounds for each ton of raw peat applied. What then is it that was supplied through applications of manure that showed such marked benefit to the different crops in the rotation?

To determine this, the old phosphate project was modified by adding nitrogen fertilizer on some plots and potash on others in addition to the phosphate and peat. Where nitrogen fertilizer was added either alone or with phosphate, but little increase in the yield was apparent. However, where potash fertilizers were added the increase in every case was surprisingly large. These applications gave such striking results that they were repeated the following year (1921) and a more comprehensive project for trials with commercial fertilizers was begun.

This project consisted of 60 plots in two series. The south series received nitrogen and phosphate both alone and in combination. The north series received the same applications of nitrogen and phosphate and in addition 230 pounds per acre of muriate of potash. Treatments with complete fertilizers, including nitrogen, phosphate and potash, were also made at different rates from 300 to 1,200 pounds per acre.

Results from these treatments over a period of six years showed a small but definite increase on all crops from the application of nitrogen. The application of phosphates increased the yield of oats, but gave no increase on potatoes and hay except when applied in combination with potash.

The applications of potash give marked increases on all crops in the rotation. Muriate of potash applied at the rate of 230 pounds per acre gave a yearly average increase over an eight-year period of 78.2 bushels of potatoes, 3.4 bushels of oats, and 1,200 pounds of hay per acre. The application was made once in the rotation, that is, once each three years. The applications preceded potatoes, so that the effect on the grain and hay was residual. Since the 230 pounds of muriate of potash costs approximately $8.00, there was a return from each dollar invested of about 10 bushels of potatoes, one-half bushel of oats, and 150 pounds of hay. The actual profits from the investment, of course, are determined by the market price of potatoes, oats and hay.

These results indicate, however, that potash fertilizer may be profitably used on the silt and sandy loam soils of this district when the supply of farm manure is limited.

Putting Pep Into Asparagus

By E. R. Lancashire

Extension Specialist, Ohio State University

THE methods used in putting pep into asparagus plantings depend somewhat upon the age of the beds. The quality and the yield of the tender succulent spears are largely determined by the growth of the fern-like tops. Vigorous top growth assures the right result.

A new planting of asparagus roots, preferably one year old, should be made as early in the spring as possible, so that the top growth will have the advantage of a long season the first year. To insure quick growth the soil should be light, well drained, and far better supplied with organic matter than most soils are. In fact, it is best to delay operations a year or more if necessary to secure the much needed organic matter supply. A crop of soybeans, sweet clover, or cowpeas turned under green will go a long way toward insuring a peppy asparagus planting. These green manures should be reinforced by the fall application of 30 to 40 tons of barnyard manure previous to setting out an asparagus bed.

Just before setting the roots, a heavy application of fertilizer should be applied broadcast and worked into the soil. One thousand pounds or more of a 2-12-6 or a 4-12-4 would be very good for the asparagus crop at this time. The nitrogen should be readily available and the potash should be of the muriate form. The chlorin in the muriate form of potash is thought to be valuable. Three applications of nitrogen can be made during the season to good advantage. Some soluble, readily available form is best. Making these two or three weeks apart will be helpful in preventing unnecessary loss of nitrogen. A hundred pounds per acre each time applied along the rows just before a rain will insure rapid, continued top growth, as well as conservation of the materials used.

After the tops are killed by frost the first year, they should be harrowed down and worked into the beds. A heavy application of manure should be worked in at the same time. Operations will then be completed for the first season.

To insure a quick growth the second season, the beds should be fertilized with 1,000 pounds or more per acre of a 2-12-6 or a 4-12-4. This can be worked into the soil with the early cultivations. The second fall the beds should be treated exactly as they were at the end of the first season.

Treatment in the third and succeeding years of the asparagus bed's existence consists of applying the chemical fertilizers about five or six days before the end of the cutting season. The tops and the barnyard manure applications are handled just as during the first two years.

Experiments show that it does not pay to cut asparagus for more than three weeks during the third season. Increasing the length of the cutting period gradually will usually give the best returns in succeeding yields and in increased quality resulting from better early root development. In sections of the country where the growing season is extra long, the harvesting is often begun during the second season, but this is not advisable in the majority of cases.

Ira Waters—Potatoes

By A. E. Wilkinson

Professor of Vegetable Gardening, Connecticut Agricultural College

WHAT do you think of a grower who obtains a yield of potatoes over two and one-half times the average for his State? With many growers in Connecticut, in fact almost all, the average is about 120 to 125 bushels per acre. Mr. Waters produced 327.4 bushels per acre during the year 1929, and 1929 happens to be one of the driest years that we have had for some time. This yield is only seven bushels higher than Mr. Waters obtained in 1928. During 1928 he produced 320.6 bushels per acre and 1928 was one of the wettest years we had experienced for some time. From this it does not seem to matter with Mr. Waters whether it rains or whether it does not rain. He gets the spuds.

Mr. Waters claims there are two outstanding points that give him these high yields. The first is that he uses an abundance of excellent fertilizer. Mr. Waters has gone back to an old formula, the 4-8-10, not particularly that he needs 10 per cent potash but he likes to have plenty in the soil. He also uses a reasonable amount of castor pomace with his 2,500 pounds of the complete fertilizer. He then has enough fertilizing material to supply the plant needs throughout the season.

The other point which Mr. Waters claims is the reason for his high yield is due to the fact that he controls plant pests. Aphids or lice, potato beetles, both the flea beetle and the Colorado type, leaf hoppers or blight, are all the same to him. He uses a power duster, applying plenty of dust and giving complete coverage at all times.

I agree with Mr. Waters that these two things are important, but I do not believe that they are the sole points that give him approximately 119 barrels per acre. As I see it, the points are as follows:

First, Mr. Waters loves potato raising. He not only likes to grow potatoes, but likes to be in touch with men who are exceptional growers in other sections of his State or nearby States. He reads all the literature available on the subject. He talks with College Specialists, County Farm Bureau Agents, editors or writers for agricultural papers, fertilizer dealers, spray and dust dealers, implement dealers, and any others that come in contact with potato raising. It is easily understood that Mr. Waters is not then just an average potato grower. He is one of the better, more progressive type, head and shoulders above the average.

Second, he buys the best certified seed, not because it is certified, but because the man back of the certified seed is an honest, reliable, painstaking certified seed grower.

Third, he prepares his land thoroughly, deeply, and finely and this is done early in the year; if on sod, it is fall plowed. Plowing takes place in late March, and the potatoes are planted in May. The potatoes are cut to large size pieces, having at least one strong eye. They are put in the ground with a planter 12 to 13 inches between pieces and three feet between rows. The pieces are approximately three inches deep.

This is how the yield of 327.4 bushels of potatoes per acre looked on the ground at Ira Water's farm, New Milford, Connecticut.

Fourth, the potatoes are supplied with a liberal application of plant food known as fertilizer. Mr. Waters broadcasts one-half ton of castor pomace on each acre. In the planter 1,000 pounds per acre of 4-8-10 are used. When the potato plants come above ground, 1,500 pounds of 4-8-10 are broadcast and worked in. He is thus assured of enough plant food to carry the crop throughout the season.

Fifth, the potatoes are kept clean by frequent cultivation. Mr. Waters and his men have gone over the potatoes this year nine times with a cultivator. He does not believe in deep cultivation but in shallow cultivation and low hills.

Sixth, Mr. Waters believes thoroughly in controlling pests. He uses dust. During the present year he made 10 applications of Bordeaux dust and 12 applications of other dust, making 22 times he dusted over his fields. He drove away the flea beetles with the Bordeaux and killed the aphis with nicotine dust. He kept the leaf hoppers on the move by using Bordeaux and nicotine, and it was most necessary to do these things in the present year. Of course he does four rows at one time with a good power duster.

Mr. Waters believes in advertising. Also he believes in helping his fellowmen, particularly his neighbors. As an advertiser he has four signs on his farm, two on the right side of the road and two on the left side. The first one states:

Ira Waters, Market Gardener
32 Years Experience
Yours for a Square Deal

And a little further on is another sign which states:

Ira Waters—Potatoes
"Watch How We Grow Them"

He thus tells the world what he is about and is willing for them to see. In fact, he is not ashamed of his potatoes, and his neighbors are very proud of him.

On October 1, he invited all of his neighbors and anyone else interested to gather at his farm and see the potatoes dug, weighed, and measured. A large number of people took advantage of this opportunity.

Mr. Waters had an acre of potatoes dug and his modern engine type digger was throwing out the potatoes on an additional acre. The potatoes laid thick in the row and were of good size, in spite of the dry weather. About two o'clock in the afternoon each grower was given a printed card:

IRA WATERS' FIELD DAY

No. of Bushels..................

Name.......... Address..........

Each one was requested to guess on how heavy a yield would be found when the potatoes were gathered. In order to make it interesting, three prizes were offered. The crowd scrambled for the cards. The potatoes were picked up and weighed, and it was found that 327.4 bushels per acre was the total yield. On examining the cards, two growers had guessed 325 and one had guessed 330. The prizes were given to these three men.

As an added attraction a picking-up contest was staged, 13 men entering this contest. Rows 100 feet long were measured and the contestants were started together at one end. In just exactly 3 minutes and 25 seconds from the start Ira Waters' son Albert came in first having picked up 131 pounds of potatoes. William Roraback was seven seconds back of Albert picking up his 132 pounds in 3 minutes and 32 seconds. In exactly four minutes, William McKay of North Danbury came in. He had approximately the same number of potatoes as the others in pounds. Of course there is always someone to be first and someone to be last and T. Anderson was the last one in requiring over five minutes to pick up his potatoes. He had just a few more pounds to pick up but was very slow. As a consolation, he was given a lollypop. Suitable prizes were awarded to the others.

What's Ahead?

(From page 30)

John A. Hopkins, Jr., of the Iowa Agricultural Experiment Station, in a report of the results of a recent survey of farms in Iowa county, declares that "on the typical Iowa county farm of 160 acres with about 100 acres in crops, it should be possible, if the more effective sizes of machines are used, to get along with five horses. On a farm of this size a tractor in addition to the horses is generally of doubtful economy unless the farmer can use a general purpose, cultivating tractor and displace some of the horses. The four or five-horse team is needed for the greater amount of the usual crop growing operations. The addition of a tractor even to a team of four horses would give the farm a power supply equal to eight or nine horses. This is decidedly more than is needed and involves an unnecessary expense.

"A quarter section in this farming area is essentially a one-man farm. It would, therefore, be poor economy to maintain sources of power sufficient to keep two men employed. Where a tractor is kept on a small farm, the number of horses will usually be kept down to four, since this is the size of the team used on most of the operations except plowing and sometimes discing. But reducing the number of horses to four decreases the effectiveness of the outfit in plowing and perhaps discing. Also there is an advantage in having an extra horse during the rest of the year to change about, or in case one horse is incapacitated for a while.

"On farms of somewhat larger size, a tractor generally becomes an economy. For a 240-acre farm with about 150 acres in crops, five horses and a tractor may be expected to furnish sufficient power. This provides an effective team of horses for any ordinary farm operation, and an auxiliary source of power for use in the rush season when preparation of the soil for crops demands the use of two outfits. The addition of a sixth horse may be convenient during the corn cultivating season since it permits the operation of two two-row cultivators of the three-horse type. If a second two-row cultivator may be pulled by the tractor, the number of horses on the 240-acre farm can usually be kept down to five."

I recently asked a farm management man who is regarded as one of the best informed experts in this country in this field as to what he would do if he were to go into farming in the Corn Belt. He said that he would undertake a 160 to 240-acre farm at a cost of around $200 an acre, and expect to secure a labor income of about $2,000 above operation expenses and 5 per cent on his capital investment. "That $2,000," he said, "would be equivalent to a salary of $4,000 in city employment." He pointed out, however, that the $2,000 labor income is from 50 per cent to 100 per cent more than the common average at the present time.

AMERICAN HONEY ON HIGH STANDARD

The methods of handling honey in the United States have been developed to the same high sanitary standard as that followed by the bees themselves, says the United States Department of Agriculture, which adds that buyers are now doubly assured of getting clean honey. The department adds that because of the high sugar content organisms injurious to human health will not multiply in it. This is one product in which the farmer's livestock works with him to keep it sanitary.

Tame Hay

(*From page 26*)

river and north of the Ohio river, with considerable production in a few States west of the Mississippi river, such as Minnesota, Iowa, and Oregon. Clover seed production varies much from year to year depending upon the manner in which the clovers survive the winter. The two most important clover seeds are alsike and medium red clover. The alsike clover seed is made from the first cutting of the crop, whereas the red clover seed is taken from the second cutting.

Timothy seed production is distributed in a region including the principal area of clover seed production, but the greatest concentration is found just west of the main clover seed regions. Iowa is the leading timothy seed State, producing over one-third of the nation's output in recent years. Missouri usually ranks second and Illinois third.

Sweet clover seed is produced more largely in the western States, South Dakota being the leader, with North Dakota and Minnesota usually ranking second. Nebraska is also an important sweet clover seed State. The alfalfa seed area lies still farther west, there being no important seed production east of the Mississippi river. Utah, Arizona, Idaho, Nebraska are usually the leading producers of alfalfa seed.

Question-box Meetings

(*From page 22*)

Our modern educators tell us that it is sound teaching to go from the known to the unknown. This is done in the question-box meeting. Farmers tell of their experiences and conclusions based on things they have done and seen. The chairman of such a meeting can often lead from the "How" of doing things to the "Why" or underlying principles. With these principles in mind each farmer can then study out the practices which apply best to his own conditions. In other words the act of doing the thing is tied up in the science of doing it. Try a question-box meeting and see for yourself what the results will be.

Champions

(*From page 15*)

realized last year that I had to do something to raise more feed, especially during the dry summer months. There we were, with about 25 good dairy cows facing the usual Oregon summer drought. A green forage crop looked like the best bet. I took it on as a club project—about six acres of oats and cow peas. We fed it freely during the latter part of June, July, and early August and the results were quite amazing. Where our herd would always drop down to an average of about 20 pounds of milk a day, this summer they maintained a production of about 35 pounds a day."

Of course Edgar's green forage club project was just a part of the excellent farm management scheme on the 500-acre Grimes farm located in the picturesque Willamette valley. The livestock on the farm includes 50 cattle, 100 sheep, and some real pigs, while the 200 acres in crops are given over to wheat, barley, oats, hay, and a little corn for silage. The mention of corn caused Edgar to smile because he had a little experience with corn this summer in his club work. Apparently, he had decided that it was taking too many acres to fill their 10 by 30 silo, so he set out to remedy the situation.

"Oregon, you know, is not primarily a corn State," he said, "but I felt that we could improve our silage yields. I first got some good seed—a yellow dent that matured well in our locality and at the same time gave a better growth than our own variety. We prepared a good seedbed and drilled in the usual eight acres for the silo. This fall we were surprised when it took only about half the piece to fill the silo. We had the remainder to feed green to the dairy herd during the fall drought."

Then the modesty of the national champion again asserted itself. "Of course we had an awfully good season so I guess the weather deserves most of the credit."

Since winning the Moses trophy a year ago, Edgar has more than doubled his club accomplishments. His record a year ago listed the completion of 31 projects, 178 exhibits at fairs, prizes in cash and merchandise amounting to $2,722. He had served as leader of eight clubs with every one of the 64 members completing their work 100 per cent. His eight years of club work had resulted in the accumulation of $2,000 worth of purebred animals.

In a single year since winning the title of national club champion, he has completed 16 more club projects, made 197 exhibits and won prizes amounting to $1,500. He has been local leader for 14 clubs in his county with 116 boys and girls enrolled. The valuation of his own livestock has increased from $2,000 to $4,000. His winnings at the county fairs, state fair, and the Pacific International will more than pay his first year at college. Is it any wonder he was too busy to attend school?

But now he is wearing the little green cap—just one of the much-abused freshmen among the big student body on the Oregon State college campus.

Time to Budget

(*From page* 14)

upon a particular set of prices within the range of probability. That is, the expenses, receipts, and net returns that will probably result from a given combination of crops and livestock with different prices may be worked out.

"Two kinds of price changes are of particular significance to farmers. First, there are price trends or long-time upward or downward movements of prices. These long-time upward and downward movements are usually different for different products. For example, in South Dakota for the five-year period, 1921 to 1925, corn increased in price over the five-year period from 1911 to 1915, 8 per cent; wheat increased 20 per cent; potatoes 18 per cent; hogs 18 per cent; and beef cattle 5 per cent; whereas the price of barley decreased 20 per cent and that of oats decreased 14 per cent. Similar changes in price are continually taking place in most farming sections both for products sold and for expense items.

"Other price changes of interest to farmers are price cycles. The prices of many farm products tend to move upward for a period of years and then downward for a more or less similar length of time. For example, hog prices usually tend upward from 1½ to 2½ years and then downward for about the same length of time. For most other species of livestock the upward and downward movements are for longer periods. There appears to be a tendency for beef-cattle prices to go up from six to nine years and then down for a somewhat similar length of time. In the case of horses the upward and downward price movements tend to extend over periods of 10 to 15 years. The most important factor in determining the length of these upward and downward movements is the length of time required to expand or contract materially any particular enterprise after unusually high or unusually low prices are reached.

"In addition to price trends and cycles, the farmers should realize that the amounts of crops and livestock held over from one year to the next vary and have an influence on the prices of the following year, and that the amounts of different products that will be taken at given prices vary with industrial activity and related factors. As a result of these and other factors, farmers are continually facing new price situations."

After the budget is ready an inventory is taken: the expenses and receipts are kept during the year in the course of keeping farm accounts; and at the end of the year the returns actually obtained are compared with those contemplated in the budget. If a budget has been made for a period of years, it may also be included in the comparisons.

Based on Inventory

Budget-making months in most parts of the country are December, January, February, and March, for then farmers usually have time to think, devise plans, and meet with their advisors. After the crops are harvested, the farmers can take stock, review the results of the past season, and compare the results actually obtained with those expected when the budgets were made. Then they are ready to make budgets for the coming year.

"Safer conclusions will be reached and larger profits will result from the farming operations if the facts considered are thus carefully organized and if judgments are completely formed and recorded and if the comparisons between enterprises and systems are carefully worked out," reminds Mr. Hutson, and he also points out that it is not to be expected that results actually obtained will coincide exactly with budget estimates. "Close approximation will exist only when the price requirements and yields used in making the budget are close to those that actually prevail throughout the production and marketing season. But as the farmer is obliged to take probable future developments into consideration in making his plans, whether he wishes to or not, it is certainly better for him to do it with the best information available than to rely on guesswork."

"The budget enables a farmer to establish a good balance among his field-crop and livestock operations; to know in advance how much seed, fertilizer, and other supplies he will probably want; to forecast the feed requirements of his livestock; to estimate the amount of cash he should keep on hand for farm operations; and to adjust his living expenses, payments, or investments to his probable net returns. Familiarity with the results of the past is a great aid, but the results of the past should be interpreted in the light of conditions expected in the future."

This is what is attempted in making farm budgets. Sample budgets, sample forms for making budgets, detailed instructions for making them, and lists of sources of price and production information, have now been made available in bulletin form to farmers and their leaders. The method of procedure to be followed in making a budget will vary with the system of farming being considered, but the means are now at hand for those who wish to use them.

Cooperative Consciousness

(From page 44)

ever made to meet this situation that the Alberta Pool announced in 1928 that it would pay its members a bonus on every bushel of wheat they would store on their farms. A premium of one cent a bushel on all wheat farm-stored until December 15, and a further one cent on all stored until January is this year being paid in this endeavor to create a more orderly distribution of the wheat load during the fall and winter months. It used to be that the farmer who was late in getting threshed and getting his grain to the elevator suffered for his tardiness through the lower returns that came as soon as the elevators were filled. Now the pool member makes capital of this one-time loss.

Other Achievements

Pooling farmers take pride in two other achievements which have been credited to their organization. One is the development of the western trade route through the Vancouver port. The western ports were on the verge of stagnation because the bulk of farm produce was being each year crowded through the narrow channels of the Great Lakes in the annual race to the seaboard. The grain trade through the Lakes was well established and hard to alter. The older companies found it to their advantage to use their already developed eastern route rather than build up a new one in the west. The pools had no such magnet to draw them eastward. Their problem was to find the most economical means of maintaining a steady flow of wheat to the world markets. Their efforts seem to have led to a revival of trade on the Canadian west coast that has all the earmarks of permanence.

The second achievement referred to is one that forms a bone of contention, but is one that is worth mentioning, if only because it has brought out diverging opinions. The fact remains that since the inception of the pools, Winnipeg grain futures have maintained an above-par relation to the Chicago quotations, a thing unusual before this endeavor of the growers became a reality. There is considerable discussion about this point even today, with market men delving into the comparative grades of the two points and digging deep into old market lists in the endeavor to find the "raison d'etre"; to the lay mind, though, it still appears that the pool claim has more than a little justification.

Another word remains to be said on achievement. These pools are dedicated to the job of marketing the prairie wheat more efficiently than had been done in the past. There is no way of proving mathematically that this has been done, but the figures of marketing costs for the three agencies seem to indicate that they are, at least, keeping their goal in mind. Last year it cost the Central Selling Agency 2¾ cents a bushel to market the crop. To this had to be added, in Alberta, nine-twentieths (9/20) of a cent per bushel (the cost of Alberta Pool operation); in Saskatchewan, one-half cent a bushel, and in Manitoba, one cent per bushel.

The Psychological Effect

These are the high lights of Pool endeavor from the business point of view. The second phase, we mentioned earlier, was in the effect the effort had on western agriculture. Those who talk with the majority of pool members must admit there has been a decided and beneficial effect on the outlook of farmers in general. A sort of class pride, based on rather evident achievement in working together, has developed, and, in developing, has brightened the outlook on life of rural Canada. Canadian agriculture in 1923 was in the depths of despair. This new farmer enterprise has been a real type of farm relief, applied by agriculture itself, and invigorating the whole structure of the farm industry. Even non-pool producers, by the scores, will tell you the pools have been an indirect benefit even to them. Cooperation has destroyed any roots of an inferiority complex that may have been coming to life in the western farming areas. Farmers are "finding" themselves in their efforts to compete with other forms of business.

It would be foolish to say that the cooperative movement was "the" cause of the come-back of Western Canada's wheat area, because other forces have done their share. The pools, though, were the tonic force that was needed to instill into producers that confidence that was necessary for the rehabilitation of the wheat belt.

In 1924 the pools handled 81 million bushels of wheat; in 1927 they marketed 215 million bushels. This is really only forceful evidence of strength when we add that the men who started as pool members at the start are, in the main, still pool enthusiasts. They are coming back now to sign up for the second series of pool contract. It is safe to assert that there will be few desertions from pool ranks when the new contracts are all in. The members have become conscious of the power of cooperative effort and there is little tendency to drift away from the organization.

Getting Stretch

(*From page 9*)

Weights were not taken in 1928 but observations showed some gain for the two plots getting the potash. In August 1928 the top-dressing treatments were repeated, but the potash on plot 1 was increased to 400 pounds per acre. Records of yields were taken on June 5 and on August 13, 1929, with the following results:

Plot	*Fertilizer*	*Tons Hay Per Acre*
1	Potash	3.95
2	Phosphorus	2.58
3	Phos.-Potash	2.82
4	Unfertilized	2.25

The yeields show that potash was the limiting factor on this alfalfa. The yields, however, do not give the credit they should to the different treatments. The plot having potash alone was practically straight alfalfa; the plot with the combination was largely alfalfa; while the check and the phosphorus plots had a large percentage of grasses. These two plots also were covered with plants which showed the potash starvation on the leaves while the potash plots showed none of this trouble. At the end of the season the potash plot had practically a 100 per cent stand while the other plots had stands which were uneven, yellowish, thin, and lacking in vigor.

This work does not mean that alfalfa does not need phosphorus. It merely shows that the results obtained at the Storrs, Connecticut, Experiment Station, where they found that on land which previously had been liberally supplied with superphosphate, potash was the plant food which would increase yields and prolong the life of the alfalfa and is applicable to conditions found on the dairy farms in the State.

Georgia

(From page 12)

A new field of research being started is in by-products. Dehydrating peaches, preventing rancidity in pecans, utilizing pimiento pepper waste as poultry feed and as a source of vegetable coloring matter are important phases of this work.

One of the great problems of pork production of the South is soft pork. For several years this station has been working on the problem and has accurate information as to what kinds of feed soften the pork and lard and the hardening feeds which must be used to offset the softening feed.

An interesting development of this project occurred the past year. Tests were made of hard and soft lard in making biscuits and pastries. The taste test made with a large number of people who did not know in which samples soft lard was used resulted in a large majority in favor of biscuits and pastries containing the soft lard.

Three years ago infectious abortion was prevalent in the herd at this station. Now there is no appearance of it and there has been no sign of it for two years. Proper sanitation, quarantine, and tests with the agglutination method brought this about and demonstrated that this serious trouble can be easily and simply controlled.

Georgia needs good permanent pastures as a first requisite to a large livestock development. Some work has been done by the Georgia Station in cooperation with the agricultural department of the Central of Georgia railroad that indicates that combinations of carpet grass, lespedeza, and dallis grass bring returns of $12 to $19 per acre. This station is active in an attempt to organize a Southwide cooperative series of experiments for testing southern pasture grasses.

With the new building, increased funds, and many interesting research problems to attack, the Georgia Experiment Station appears to have reached the greatest period of usefulness in its history.

Alfalfa and Sand

(From page 8)

In July, 1929, at the time of the first cutting of the alfalfa, these North Plots were cut separately and the yields weighed. The table on page eight gives the results in terms of dry hay per acre:

These results were so outstanding in showing the potash deficiency of our sandy soil that this last spring, the spring of 1929, we laid out some more plots at the south end of the farm to be seeded to alfalfa, the purpose being to determine what amounts of straight muriate of potash produced most economically the largest tonnage of hay. The application of potash ranged from 100 to 400 pounds per acre.

The alfalfa was seeded with oats and after the oats had been cut and although the farm was at grip with the worst drought since 1894, the stand of alfalfa was unshaken. Even in the stubble it was easy to see that any amount of potash produced greener and more vigorous plants than on the check plots which received no potash.

Next year's cutting should begin to tell the story, but we expect to leave the plots for four years, taking and recording the yields by years. We hope in the end to be able to add something more to the all too meagre knowledge of growing alfalfa on sandy soil, and to be of assistance to others interested in the management of sandy soils.

Defenders Wanted

(*From page* 4)

signed to assist young persons to think with propriety. Of course, I know that Horace told young farmers to go west and grow up with the country, and Murray hung more moss on the motto, "Virtue is Its Own Reward." I am at a loss to decide which type of adviser is more culpable. Greeley probably never did a lick of hard farming in his life. Lindley Murray must of course have been youthful at one time in his dusty career, but it is awfully hard to realize it.

After due cogitating on this knotty point at issue, I come out of a coma to declare that experience alone does not fit a person to advise youth or agriculture. Although Greeley advised minus much real farm experience, I can find plenty of soil-bred folks whose stuff is equally counterfeit. Likewise, a fellow must retain something besides his birth-mark and a diploma in order to keep in trim for advising the youngsters. At any rate, we all agree that free advice is something that youth and agriculture "have had nothing else but."

Now I arrive at plank No. 3, which is full of slivers, although fitting nicely into my parallel picture. Slander and assault are the charges I prefer to make at this juncture. Come with me into a Pullman smoking compartment, or stop a moment in some club room or hotel lobby. The theme opens in the usual way. Somebody mentions the high cost of living. Nobody names expensive dinners, deferred payments, or de luxe trains, but they shift their chatter to the producer's end and dismiss it with a shrug or a sneer.

The pedler with the diamonds remarks that farmers are all inefficient grouches and will never learn to organize "like big biz." The real estate man whose reclamation land boom busted takes an equally purplish viewpoint and says the cards are all stacked against agriculture, and that there is no chance for renters or young beginners to make a grub-stake or get out of debt behind the plow.

The complacent banker purses his lips and gestures hopelessly with his twenty-five-cent perfecto, murmuring about foreclosures and citing chattels. The case is soon over and a verdict returned without bringing in the poor "accused."

Bring on your corporation farming! There's no comfort here for the rural philosopher nor anybody desirous of defending the truth,—not even a stray economist, nor his more discerning brother, the sociologist.

And again, many a farmers' convention has given rise to the trumpetings of a few extremists whose loud bellows and fractious miens have awed their milder brethren to silence and captured the saffron-hued open spaces in the gullible press.

Meanwhile the calloused chaps who were making a middling success of mowing and milking stayed at home and saved words and expenses.

Defense, praise, and hope have been too long taboo in respect to agriculture. It's just the same way toward youth, and you know it!

Only last month somebody told me that a party of ribald collegians chartered a car to travel in Babylonian style to a certain football game. "Oh, that's only a common thing" is the cry dolorous; and the refrain ends with references to hip flasks and a mirth-mad race to delirious disaster.

But did you ever stop to think that there are a thousand times as many robins and bluebirds busy singing and nest building as there are buzzards and carrion crows fluttering around a feast of filth?

And so it goes on forever! Youth and agriculture bear the blame and suffer the slight while only an occasional hopeful soul attempts to marshal facts to their justice and support.

We've had polemics and panegyrics,

platitudes and persiflage, all kinds of stuffed reality and buncombe sincerity—making a miserable picture of farming and a nasty vision of youth. We have sat under it in church and slept under it in college, and the journals of the fourth estate have gotten a hot-box in their super-heated whirling around the ancient story. We have had tiresome reports and bothersome committee resolutions, all keen for scandal and sob stuff, until I hate to enter a farm school or open an agricultural paper, for fear some ghoul will shake a rheumy spectre of farm dissolution in my face. The next similarity between youth and agriculture is quite the reverse of disparagement, but akin to sophistry. Exploitation has run rampant with all classes of people and special privilege that desired to utilize the latent power and sympathy of agriculture and youth.

Beginning with the homestead laws and taking in all the relief acts and loan systems that have been passed or postponed by state and federal governments, we cannot escape the fact that the desire for mass votes to perpetuate a party's power had more weight than statecraft in the outcome. I am not forgetting the earnest rural spokesmen who set fire to the prairies and awakened the bucolic consciousness. Yet practical politics served its own ends withal, and no class of society has received more electoral time attention than farmers. If a bright farm leader hatched out an idea, the professional office seekers began counting chickens right away.

In spite of oft repeated lamentations about its woeful public neglect, agriculture in reality has received more "succor" by statute than any class except bankers. The farmers had the votes and the bankers had the dollars.

Now regard the plight of youth. Its schools have been invaded by all manner of cranks and wire pullers. Enough pestiferous essay contests and Demosthenian demonstrations have been foisted on our patient pedagogues to make them sick of their jobs. Youthful prodigies have been carted all over this broad land to appear before the footlights to fatten somebody's bank account. Even the Sunday school and dear old Santa Claus, the orphans' plight and the empty stocking have opened streams of crocodile tears and pried shekels from the most hard boiled bachelors.

Now out of this murk of alternating praise and persecution that youth and agriculture have undergone, wise observers find one grim truth staring them stolidly in the face.

Just one simple and poignant statement tells the story, namely: that it is harder to be a good youth and a good farmer under such inherited and acquired conditions.

WHEN most of the speaking and writing world insists that youth must study Freud rather than the Bible and hastens to place pitfalls and allurements on every hand, maybe we ought to credit the American Boy of 1930 with as much sanity and resistance as Abraham Lincoln and his borrowed speller. When every magazine rack flaunts sex and crime and when we make it cute and fashionable to outwit courts and cops, then perhaps a youngster who persists in being a clean citizen deserves honor for running the gauntlet unscathed.

When land values soar and farm equipment and upkeep costs put a higher earning tax upon our acreage, then there is no room for the coward or the ill-prepared operator. Certainly it is harder to be a good farmer on old-time standards. Furthermore, when farmers themselves in convention assembled repeat the alarms and forebodings and weep about the dearth of young folks at home and the advancing age of their horses, it surely makes tough sledding for starters in the game who want a chunk of extended credit.

If farm folks and their friends were

as zealous of public opinion and confidence as bankers and brokers, then things would be much simpler and easier for agricultural progress. Nobody wants to pet a dog that has been abused to the point of mange and blisters.

Looking at it in a material way, both youth and agriculture have indeed enjoyed better education and handier equipment in these modern times than the kids and rubes realized in the past.

We have also provided them with chances to organize. Precious little good that does if the rest of the world is not equally organized—not to resist them—but to assist them.

So often when farmers organize, an outsider steps in and upsets the dope with private ideas of reform. Or some watchful and jealous privileged class steals the brake from their band wagon while the music plays cooperative anthems. Many a youthful society or movement has been wrecked by some doddering old-timer.

Positive good cheer and helpful hope are two of the things needed by youth and agriculture just now. Negative minds won't mend the situation. We must have more of the "do" and less of the "don't." We need more leaders and sympathizers who shout "Come on" instead of "Get along there!"

Sympathy, example, and optimism! I name the three vials we should have in our medicine chest would we presume to doctor the ailments of youth or agriculture. I do not include money lending or free advice, and I believe that organization should come from within.

I need not touch greatly on the first for it is self-evident. Its danger zone lies on the border line of paternalism, and where is there a lusty youth or a husky farmer who will not damn paternalism with his last breath? Sympathy does not mean patronizing, and this is where some of the service clubs and boy-helping brigades have taken a tumble

Good memories ought to help all of us to sympathize with youth, but of course not all of us can visualize former days in field and furrow. Yet the bulk of us had grandsires that busted the sod.

Example, precept, or whatever you choose to call it, comes next. Good youth do not always copy honest parents, but firm, sane, and cheerful parental care cheats the bootlegger nine times out of ten.

Business houses that are neat, orderly, well-accounted, and up-to-date cannot help throwing a vast influence outward into the surrounding countryside. Towns that have hospitals, good churches, modern paving, and excellent service are almost without exception found catering to a discriminating group of farmers. A village that goes to seed will not make a "volunteer crop" of its adjacent ruralities.

OPTIMISM comes last. It is worn thin with overwork in the dictionary, like cooperation. I dare not describe or prescribe methods of its application to boys and farmers. Yet it is powerful and potent, and I have just returned from a joint congress of youth and agriculture in Chicago where its mystic spell charged everything with life and animation.

Facing the New Year with all the glorious things brought to us by the Four Leaf Clover emblem and its mighty army of members and leaders, and doubly clinched and riveted by the Smith-Hughes movement in education, who can relinquish optimism at this pregnant hour?

This means that the rising generation will be more of a blessing to youth and a godsend to agriculture than any who have traveled this way during the life of our nation.

Be a defender, but don't be on the defensive! You won't have to if you take the motto of youth and agriculture—"Make the Best Better."

A Few Whinnies

A TWISTER

A city visitor, from one of the windswept states, gazed intently at the spiral fire escape that wound its way down the rear of a thirty-story building.

"Gosh," he exclaimed. "That must have been a danged long ladder before the cyclone hit it."

Customer: "Are those eggs strictly fresh?"

Grocer (to boy helper): "George, are those eggs cool enough to sell yet?"

Boss—"Ye're late this morning, Rastus!"

Rastus—"Well, sah, when Ah looked in de glass dis mornin' Ah couldn't see meself there, so Ah thought Ah'd gone to work. It was only some time afterwards dat Ah discovered dat de glass had dropping out ob de frame!"

"Did the children behave when you bathed them?" asked the mistress of the new French nurse.

"All but ze biggest boy—and, mirableu!—how he fight and kick an nearly tear ze face off me before I could get him in."

"Which biggest boy—we've only one boy, and he's only two years old?"

"Eet is no him at all, I mean. 'Tis a boy who wears glasses and has ze curly hair."

"Boy! Boy! That's not a boy! That's my husband!"—*The Ink Spot.*

WHOSE?

An old farmer and his wife were driving along a country road through hilly country; the team, when they would come to a hill, would settle into the collar and pull at a steady stride.

The farmer's wife spoke to her husband and said, "Hiram, I have just been thinking, watching this team settle in the collar and pull steadily along, how wonderful it would be if we could go along through life that way."

"Maria," he said, "Possibly we could, if we were like this team with only one tongue between us."

A southern woman stopped a darkey on the street the other day and said: "Mose, I'm sorry to hear your wife got a divorce and has left you."

Mose: "Yessum, she's done gone back to Alabama."

Southern Woman: "Who's going to do my washing now?"

Mose: "Don't yo' fret, missus, I's co'ting again, an' Ah sho co'ts fast."—*Montgomery Times.*

WAITING

The man was playing alone. Two boys kept following him around the course. At the ninth hole, he turned to the boys and said: "You'll never learn to play watching me."

"We're not watching you," said one of the boys. "We're going fishing as soon as you dig up some more worms."—*Tackle.*

Better Crops WITH PLANT FOOD

February 1930 10 Cer

The Pocket Book of Agriculture


TIMKEN BEARING
EQUIPPED

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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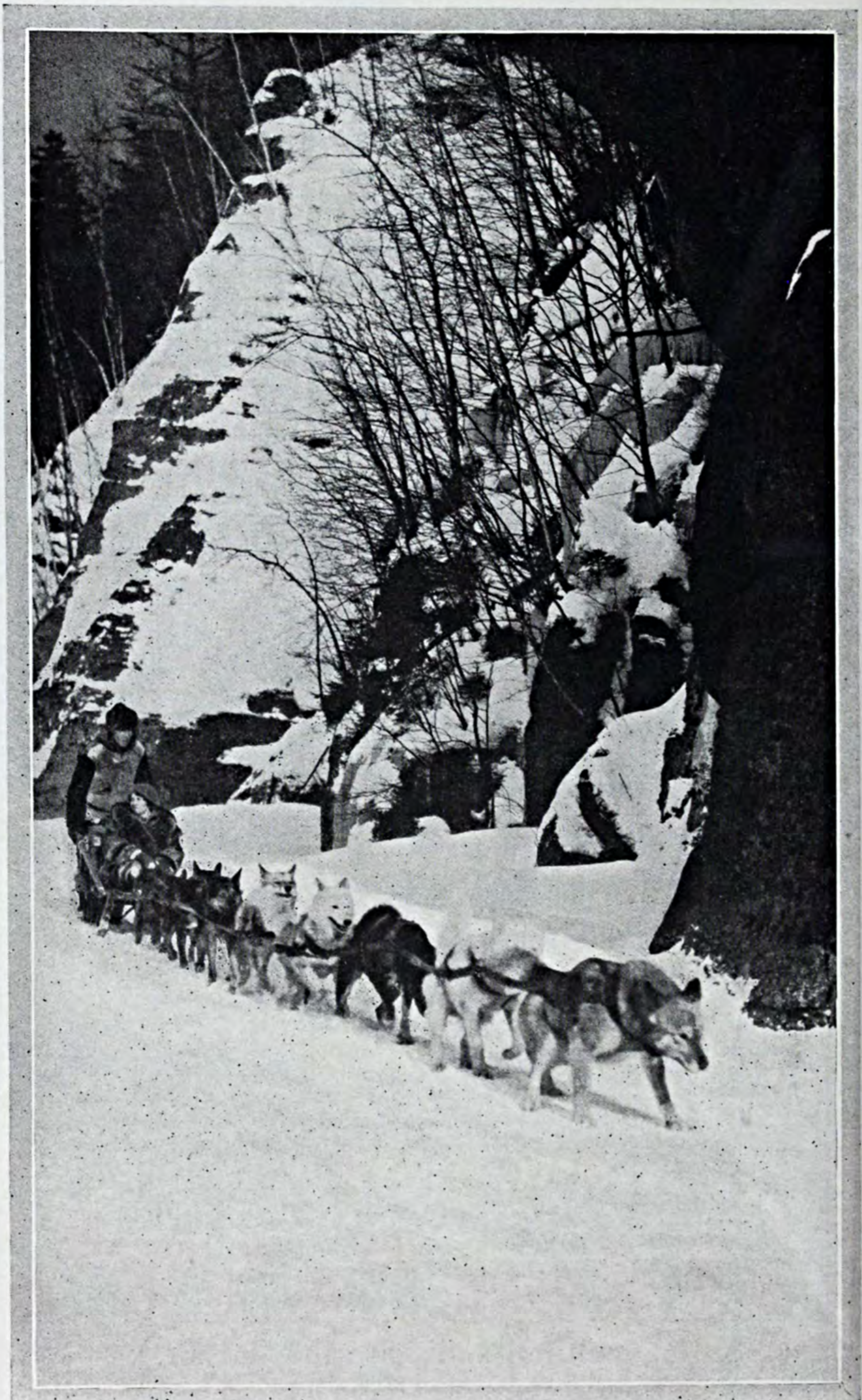

A SUNDAY AFTERNOON RIDE IN THE NORTH COUNTRY

Better Crops with PLANT FOOD

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This month Jeff wonders what—

Health Is—?

By Jeff McDermid

IN these weeks of red noses and chest protectors, I begin with two famous maxims: "Health is wealth," and "Prevention beats cure."

Just two more old "wheezes," says you! But if they are old wheezes, so are bronchitis and asthma, says I!

And so all at once and without warning, we plunge into the popular subject of bodily welfare, without involving you in the commission grabbing phases of risk, longevity, twenty-payments, and deferred benefits. Be of good cheer, I have no policy whatever!

In medieval times they blamed the Lord and divers demons for all their mysterious plagues. I do not find very much difference between Hebrew altar sacrifice to ward off Heavenly wrath and the rites of frightened savages to propitiate some malignant spirit.

Indeed, we don't have to go back that far to see traces of this helpless attitude toward disease. You and I can remember the little camphor bags hung around our necks to keep us from the grippe. Still other memories cling to me as tight as the mustard plasters which were cemented on my sternum or glued upon my scapula. Prevention was truly punishment in those good old golden days.

I can recall sitting wrapped in bed quilts near the stove, with my feet in a basin of hot water and horse liniment, a woolen sock tied around my throat, a batch of bitters at my elbow, and a fever thermometer in my mouth betimes. When Mother thought I showed evidences of illness she gave me no time to recuperate by the auto-suggestion method. Her own legendary remedies had to get in their deadly work before the neighbors went after the doctor. Bad roads, slow horses, and slower fees made some of the physicians tardy. As far as I was then concerned, they might have staid in their smelly sanctums for another month.

I met their gaze of gloomy wisdom with fright and foreboding. They seldom visited us unless they came too late or brought us a new relation. Their medicine satchels clinked and were cluttered with vicious vials and nasty nostrums, I imagined. I can see one of them now, folding up little pink paper powders and trying to get my mind into worse channels by taking about our school. The doctor's grasp on my wrist gave me acrid visions of hothouse flowers and solemn music.

Strange to say, those honest old doctors, who loved humanity, in spite of my complex did not advocate reform in household habits. They allowed the basement walls to be banked high with cow manure without a protest. They saw Father seal up the windows in the fall and said nothing contrariwise. They let us keep up a roaring fire in the base-burner and have drafts in the corners. They asked no questions about mice in the well. A cow with garget meant nothing to them.

BUT why berate them for it? Doctors must cater to the generation in which they live and try to cash in on. Certainly our generation regarded life as a succession of hard knocks, salt pork and sausage, night caps and feather beds. I sometimes wonder if they really applied the adage about prevention beating cures. They were grim and godly folk in the presence of sickness. They were mighty capable hands at suffering, but extremely squeamish on sanitation.

Conversely, if those old-time doctors never "called" us for domestic shortcomings, we seldom called them until the last ditch. Nobody ever thought of seeking a doctor for an overhauling such as we give our Fords every spring. A doctor's job was to play the back field defensive. No wonder that the jovial old joke-smiths coupled the pill shooter with the undertaker. Yet doctors have their good points, too.

HIPPOCRATES, father of medicine and the forerunner of all surgeons, shifted the public gaze from demons as the cause of sickness to harmful elements in the atmosphere. He sought to burn out the miasmas from the air by fires. For a long spell this hoax of corruption in the atmosphere became the dominant doctrine. It was upset by Pasteur when he looked at the process of fermentation through a microscope. Then came Koch who first grew pure cultures of germ life and afterward isolated the tuberculosis organism. From these first steps mankind learned how to pick out those people who were unconsciously spreading the germs of disease.

In going over my homeopathic history, I am obliged to concede that college professors have accomplished more than we usually admit. The cell theory of life was developed by Professor Schwann of Louvain University. Marvels of modern surgery date from discoveries by Professor Lister of Glasgow college. The diphtheria serum was evolved by Professor Emil von Behring of Halle. Professor Walter Reed of George Washington University provided a practical means of ridding the hemisphere of yellow fever. Drs. Banting

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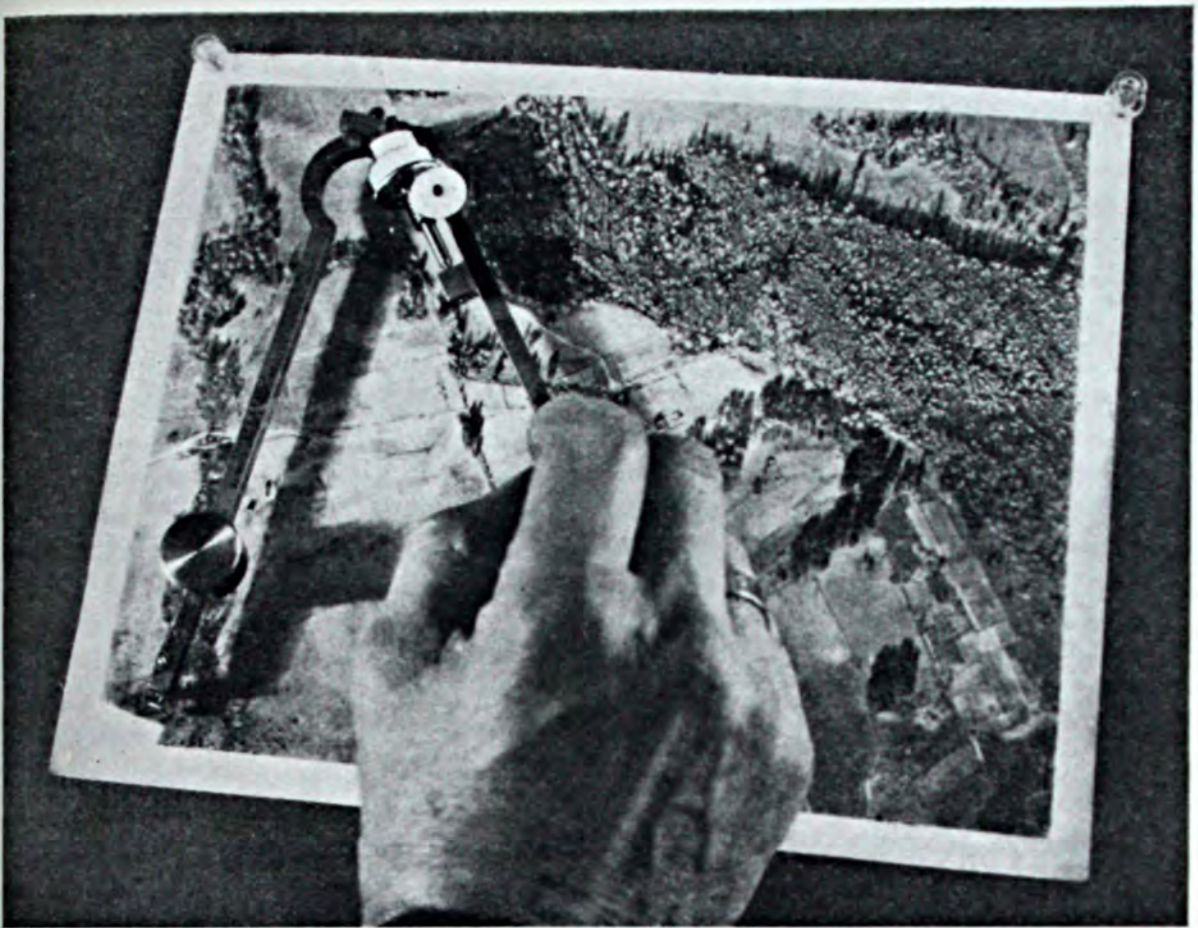


The latest device for estimating crops is the planemeter. This instrument measures irregular areas in photographs so as to give accurate statistics from the airplane photographs of the growing crops.

Accurate Data

By U. V. Wilcox

Washington, D. C.

THE special need before making the crop reports, so important for the setting of prices, is accurate information as to plantings and areas devoted to various crops.

Beginning with planting, data are gathered and reports made as to the condition and acreage of each of the principal agricultural products. As the crops progress, the prospects are reflected in monthly condition reports upon each growing item. At harvest time, the yields per acre are ascertained. A system of checks and balances is employed to prevent possible error through inaccuracies or personal bias. More recently mechanical devices for measuring crop acreages have been designed so as to still further minimize the chance of error.

Airplane photography is now being used. Flying above the farms airmen are able to photograph the fields of crops at the rate of a mile a minute. The photographs are seven by nine inches each and cover an area of approximately one square mile. Knowing the height at which the photograph is taken, the focal length of the camera, and the size of the picture, a simple mathematical process converts the areas in the photographs into actual areas.

(Turn to page 57)

Statler Farms

By E. R. Lancashire

Extension Specialist, Ohio State University

THREE important problems of successful potato production have been settled as far as the Statler Potato Farms, Miami county, Ohio, are concerned. Spraying, if correctly done, has proved highly profitable. The real value of grading, sizing, and packing potatoes has been demonstrated. And last, but not least, the analysis of fertilizer best suited to the needs of this particular soil has been found.

About three years ago Walter Schemmel, manager of the Statler Potato Farms, came into my office. At that time potatoes were a new venture on the Statler Farms. After getting what Schemmel called the inside dope on the potato game, a start was made which resulted in valuable information concerning the growing of potatoes on this particular farm.

On that day three years ago, Schemmel wanted to know exactly how well it paid to spray potatoes for insect and disease control. The answer this year was 105 bushels per acre. The question of grading potatoes came up for discussion. The answer was that a $215 potato grader, electrically operated, paid for itself the first season and left a handsome profit besides. Then the problem of fertilizing this fertile, Miami county, clay loam soil was investigated. The answer to just how well fertilizer would pay was found to be 133 bushels per acre. The details of the method Schemmel used to obtain these answers are well worth anyone's investigation.

Schemmel was first advised to sell the old sprayer and purchase a modern and efficient power outfit which could and would deliver 400 pounds of pres-

Farmers meet at the Statler Farms to talk over successful potato production.


A high-priced grader paid for itself the first season.

sure. He finally selected a six-row sprayer which would deliver more than 12 gallons per minute to the spray boom. This boom had three nozzles to the row, one above the row and one on each side. They were on separate leads that were adjustable to different width rows and to different sized plants. The boom was so fastened on the sprayer that it could be easily raised or lowered.

The vines which were left unsprayed died completely several weeks before those which were protected and the yield difference between the two was 105 bushels per acre. The field was 25 acres in area. A second field of the same size was also sprayed, and so on the 50 acres the correct use of a sprayer and the necessary spray materials resulted in a total gain of 5,250 bushels of potatoes. Figured at $1.50 per bushel the farm price paid this year for table stock potatoes, the deal netted the Statler Potato Farms so much money that it is now no longer a question of whether it pays to spray.

The real problem now is how many times can potatoes be sprayed during a single season. Already they are making arrangements with county agent O. D. Sands to test this problem next year. The scheme is to plant enough potatoes next year so that a man can be hired to do nothing else but run the sprayer. The tendency is to forget this important job when it comes every other week or so. Men are sometimes made that way and so Schemmel figures to overcome his natural handicap before the season begins by laying out in advance a definite working plan from which he will have no excuse to diverge. The plan calls for the complete spraying of every acre once each week, beginning the day the plants are big enough to mark the rows and ending after the vines are completely dead.

A good spraying job protects the vines against most foliage diseases. The most serious loss comes from the leafhopper, and it is against this insect that most of the work is directed. The flea-beetle is another troublesome insect. Early blight is present on this farm but late blight does not occur seriously. Tipburn causes damage in the extremely hot periods. Spraying with bordeaux will control leafhoppers, early and late blight, tipburn, and it will repel flea-beetles.

Experiment with Spraying

The materials used on the Statler Farms for the spraying of potatoes are extra fine hydrated lime, copper sulfate, and water. A good, fresh, superfine, hydrated lime was just as satisfactory as a stone lime and it was much easier to use. Stock solutions of both the blue vitriol (copper sulfate) and lime were prepared to facilitate the spraying operation. These were located near the water supply for convenience in filling the sprayer.

The stock solution of blue vitriol was prepared by first filling a 50-gallon barrel with water. Fifty pounds of the chemical were weighed into a burlap sack and this sack was sus-

Six per cent potash in the fertilizer used made a yield difference of 133 bushels per acre.

pended near the top of the water in the barrel. The chemical dissolves in a few hours if this is done.

The fine, hydrated lime was also made into a stock solution. Seventy-five pounds of the lime were dissolved or rather suspended in fifty gallons of water.

To fill the sprayer tank the operator first started the water running into it and then added eight gallons of the hydrated lime stock solution. The solution needs stirring just before this is done. The engine was then turned on and the agitator started before the eight gallons of blue vitriol stock solution was added. It was found that the agitation is needed as soon as the lime and copper are both in the tank. The tank was then filled to the 100-gallon mark.

The nozzles on the spray boom were arranged so that there was maximum coverage of both sides of the leaves. This was best obtained by directing the spray down at an angle instead of up under the leaves. The cones of spray from the three nozzles are directed to a central point, all coming together. This gives a whirling motion to the spray, covering both the upper and the lower surfaces of the leaves. The upper nozzles will be directly over the plant, while the side nozzles are directed down at an angle so that the outside tips of the leaves are thoroughly sprayed.

For the first spray the side nozzles were twelve inches from the row and eight inches above the soil. The side nozzles and boom were raised as the plants increased in size. When the vines covered the ground, the side nozzles were almost directly over the row next to the one being sprayed, and so directed that the lower part of the spray cone covered a little more than half of the row.

When the plants were first sprayed, about 75 gallons of bordeaux were applied to each acre. As the season advanced and the plants grew larger, this amount was increased until the last few sprays were made at the rate of 150 gallons per acre. The faster the sprayer is moved over the field, the less spray materials will be applied per acre.

When flea or potato beetles were present in numbers, 4 pounds of calcium arsenate were added to each 100 gallons of bordeaux mixture. When potato aphids were damaging the crop, 1½ pints of 40 per cent nicotine sulfate were added to 100 gallons of bordeaux.

The grading of potatoes as investigated by Schemmel revealed that better prices were obtained for the well-graded table stock. All tubers which were undersized failed to pass over the endless screen of the new potato grader. The inspectors standing on either side of the sorting table over which the sized potatoes had to pass were instructed to remove all sunburned, cut, bruised, diseased, or otherwise damaged tubers.

The booking system of the Statler Farms gives the figures in plain, cold cash. A high-priced grader was fully paid for the first season and the profits were again astounding. When the potato farmer is in the business in a commercial way, the grader is one piece of special equipment which he cannot get along without. Such a grader separates the potatoes into firsts, seconds, and culls.

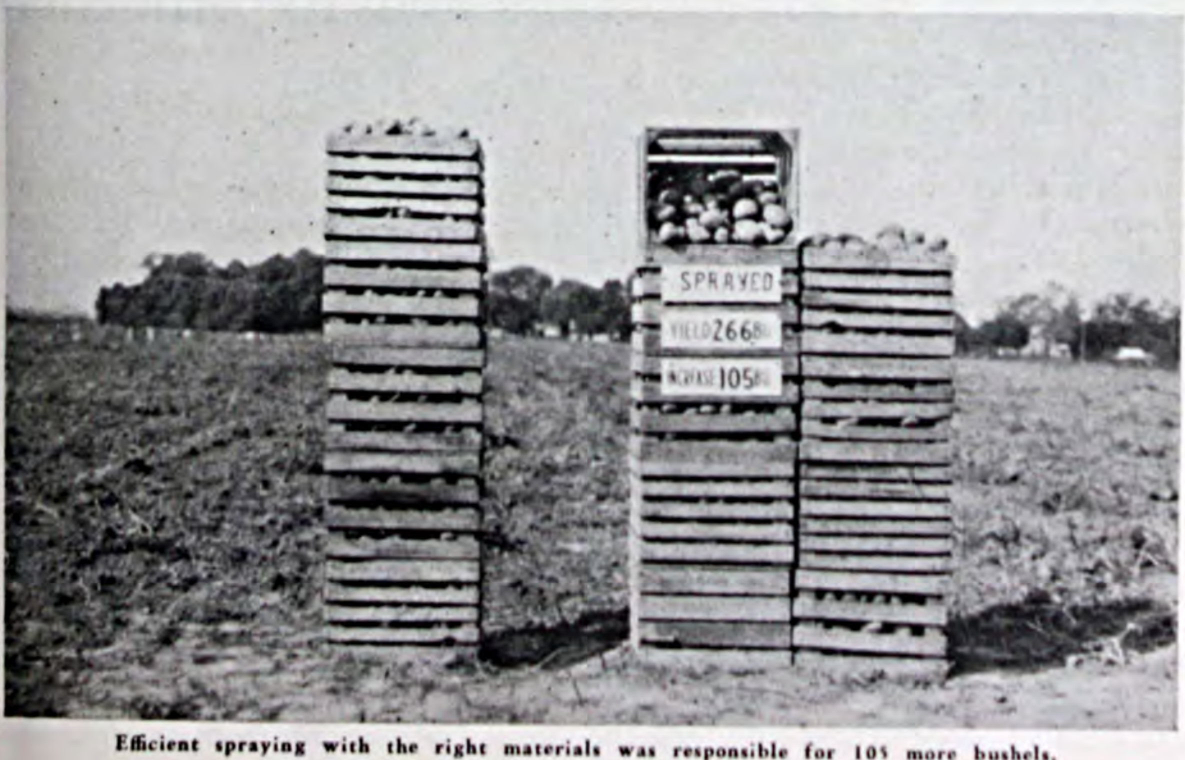
The 1⅞ inch opening is used for round tuber varieties such as the rural and the 1¾ inch screen is used for the long type tubers like the Early Ohio. All tubers which fall through these screens and are caught by the 1½ inch second screen are graded as No. 2 potatoes. All potatoes which fall through the 1½ inch screen are culls. Extra large tubers also are picked off the grading table by the men watching it. There perhaps was a time when potatoes could be sold without at least sizing them, but it is now ancient history. Every grower might as well begin now to grade, size, and pack the potato crop in as neat and clean a way as possible, for at their very best the potatoes could not be any too attractive.

Find Potash Pays

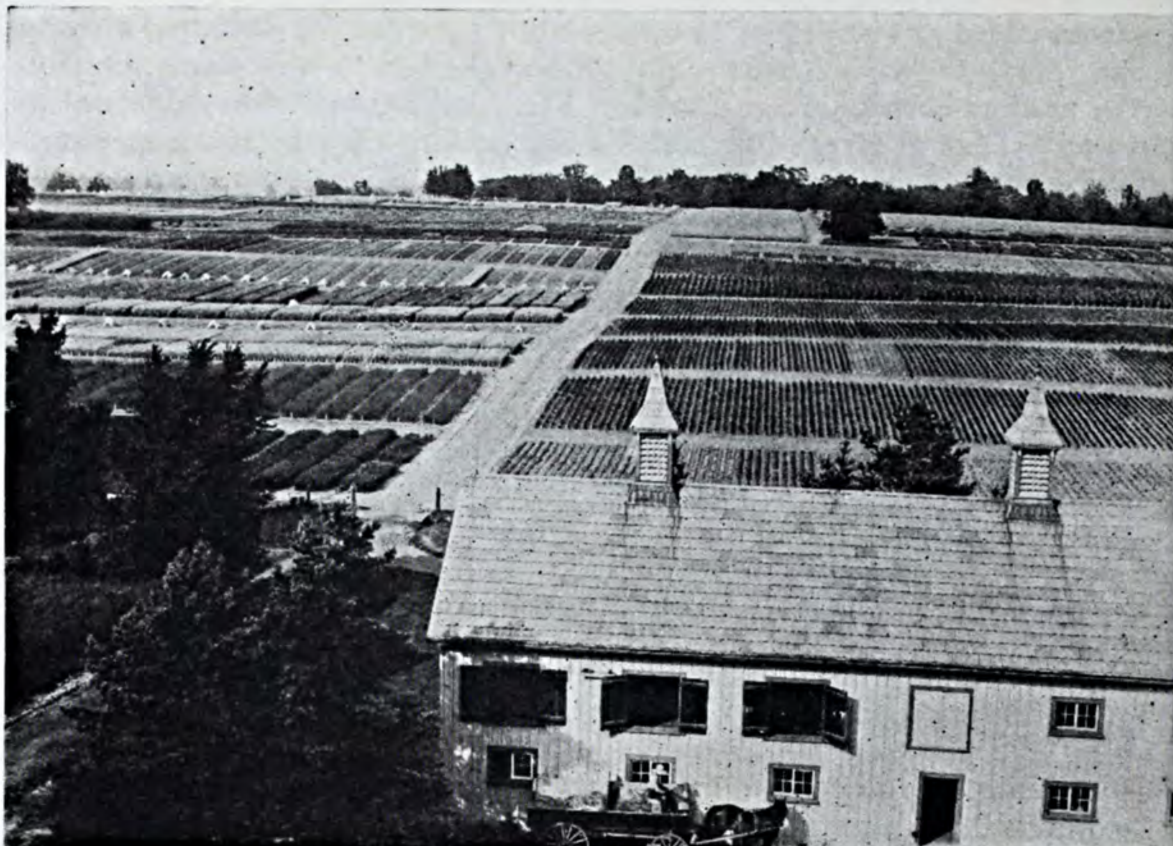
Schemmel's experience with the fertilizer situation is perhaps the most interesting of all. Scientists have always stated that potatoes needed potash. Schemmel wanted to check them up so he planted several rows of potatoes with a 4-10-0 and several other plots with a 4-10-6. These fertilizer treatments were made at the rate of 2,100 pounds per acre. His answer was startling. A yield difference of 133 bushels per acre was recorded under the strictest kind of observation.

These unusual yield differences in favor of the completely balanced fertilizer were noticeable for several weeks in advance of the final check up

(*Turn to page 58*)



Efficient spraying with the right materials was responsible for 105 more bushels.



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

ONTARIO

A Story of the Agricultural College and Experimental Farm

By
G. I. Christie

THE Ontario Agricultural College and Experimental Farm, established in 1874, has given over a half-century of service to agriculture. The history of the growth and development of this institution is closely linked with the development of the agricultural industry in the Province, for the college has tried always to anticipate the needs of agriculture and to meet them as far as it has been possible.

Fifty years ago, the activities of the college were carried on wholly within a single main building, the original two-story, stone farmhouse, which slightly altered, comprised classrooms, laboratories, library, reading room, museum and administrative office. Today in size of grounds and numbers of buildings, it is, next to the University of Toronto and McGill University, the largest educational institution in the Dominion of Canada.

Twenty-two main buildings, comprising laboratories, lecture rooms, library, gymnasium, dormitories, dining hall, and a fine memorial hall, are at present used for the major activities of the institution. Besides these, there are over a score of small buildings made up of shops, storehouses, residences, barns, etc.

The college farm, gardens, orchards, experimental plots, and campus comprise an area of over 800 acres.

With this splendid growth in buildings and equipment there has been also a parallel growth in the personnel of the teaching and administrative staff. At the opening of the college in May 1874, four men represented the whole staff of the newly established school. Today the staff required for the administrative, teaching, research, and extension activities of the college includes a list of more than 100 members.

First established as the "Ontario School of Agriculture and Experimental Farm," the new institution made good progress from the start. Much of what was accomplished during those early years was due to the patience, tact, and sound judgment of the first principal, William Johnston, M. A.

During the five years he directed its destiny, he laid a permanent foundation for the ultimate growth and expansion of the new school, and was finally rewarded by seeing it elevated to the status of a college and affiliated with the University of Toronto. Consequently in the year 1880, following an act of the Legislature, the Ontario School of Agriculture became the Ontario Agricultural College and Experimental Farm, which name has remained ever since.

In January 1903, through the interest and generosity of Sir William Macdonald, Macdonald Institute and Macdonald Hall were established at the college for the training of young women in the different branches of home economics and equipping teachers in nature study and manual training. This addition to the college made possible a further expansion of its training and facilities, to serve the needs of hundreds of young women on the farms and elsewhere in the Province.

There have been six presidents of the Ontario Agricultural College during its half century of existence. Principal Johnston, previously mentioned, held office from 1875 until 1879. President James Mills succeeded as the second director and was at the college from 1879 until 1904. Following

Macdonald Hall, residence for girls at the Ontario Agricultural College.

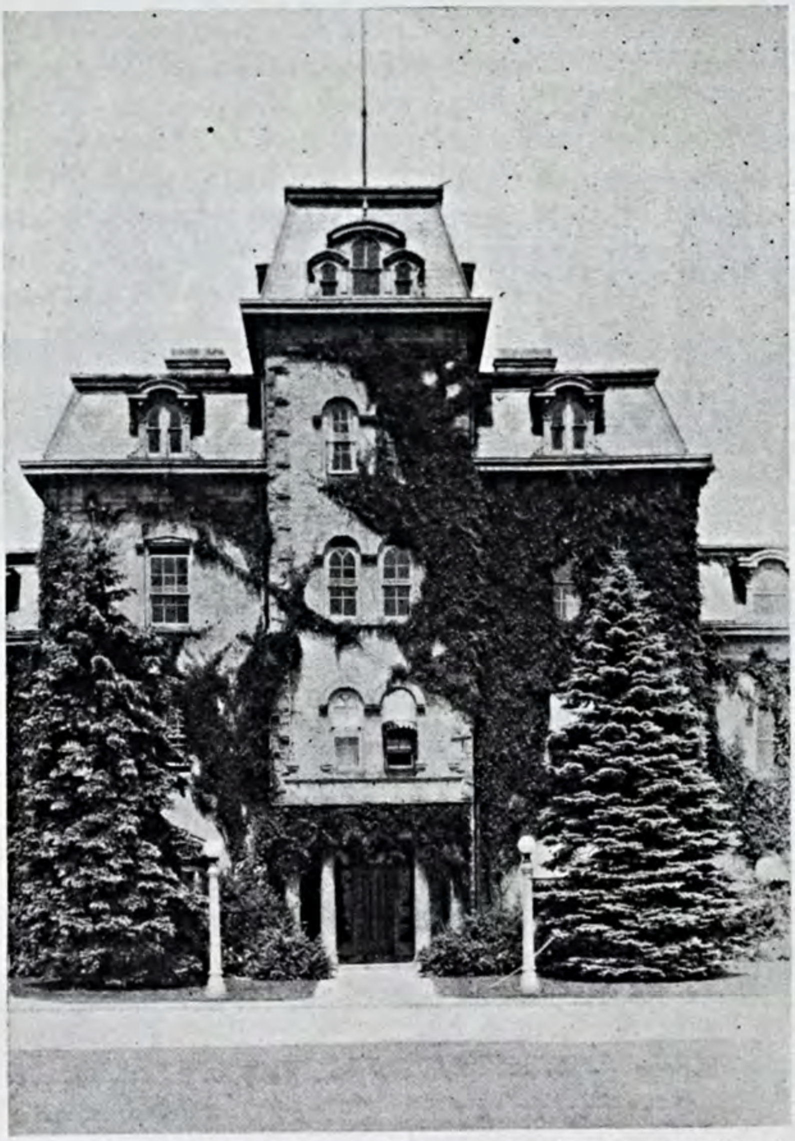
Dr. Mill's resignation, G. C. Creelman was appointed to the position as President, which office he held until 1920. In this latter year, on resignation of Dr. Creelman, Dr. J. B. Reynolds became president and directed the policy of the college until his retirement in June 1928. Following this, Dr. G. I. Christie, former Director of the Purdue Experiment Station, Indiana, was appointed.

The institution as originally established, was primarily for the teaching of agricultural science. As a result, high standards for its students have always been maintained and graduates of the college, wherever they may be, have upheld the best traditions of their Alma Mater. In this connection it is worthy of note that graduates of the Ontario Agricultural College have become directors of experiment stations and presidents of colleges and other educational institutions both in Canada and in other countries.

Although the thorough training of students in agricultural science has always been the first objective of the staff of the institution, experimental and research work have not been neglected.

Some of the earliest work done was in connection with field crops. Two years after the college was established there were 40 experimental plots. By 1889 there were 464 plots covering an area of 58 acres, while today over 80 acres are devoted to experiments with field crops.

The important and valuable contributions from the many years' work in crop experiments, plant selections, and plant breeding have been the new strains and varieties of crops introduced into the agriculture of the Province. Among the many varieties originated at the college, it will be necessary to mention only a few which are of greater importance.



The entrance to the main building at the Ontario Agricultural College.

No barley in Ontario is so extensively or so satisfactorily grown on a variety of soils as that known as O. A. C. No. 21. This variety represents more than 75 per cent of the entire barley crop of Canada and is grown on 90 per cent of the Barley land in Ontario. It is also widely grown in at least three States of the United States. Tests have shown it to be one of the best malting barleys grown.

As a result of a cross between the Dawson's Golden Chaff and Bulgarian varieties, there came into existence the favorably known O. A. C. 104 variety of winter wheat. This variety has earned for itself a splendid reputation in Ontario and is further recognized in the State of Michigan where the Michigan Crop Investment Association has accepted it as the best winter wheat that can be grown in the State.

In varieties of oats originated at the College, O.A.C. No. 144 is noted for its strength of straw, resistance against smut, and its ability to produce well on lands of low fertility.

Dr. G. I. Christie, president of the Ontario Agricultural College.

The variety of soybeans, O.A.C. No. 211, is the only variety of soybeans eligible for registration in Canada. This variety is the result of a selection from the variety Habaro imported direct from Japan. Of all the varieties of soybeans grown on the college plots, none has been as satisfactory for Ontario conditions as the O.A.C. No. 211. This variety has given the best yields of both grain and fodder and is medium early in maturity.

Among other varieties of crops originated and developed at the college are included, Siberian millet O. A.C. No. 92, spring wheat, O.A.C. No. 85, and mangels O.A.C. No. 2.

In the introduction and distribution of these new varieties to the farmers of Ontario, the Agricultural and Experimental Union fostered at the college has played a major part. One of the chief objects of this organization, established in 1886 and originally made up largely of alumni of the college, is to establish throughout Ontario extensive cultivation of a few of the best varieties of farm crops.

Hundreds of named varieties of grains have been carefully tested at the Ontario Agricultural College for five years and upwards, and only those varieties which have made high records and show promise of excellence are used for cooperative experiments. Something of the extent of such cooperative experiments is to be gleaned from a consideration of the figures given for the growth in the number of experimenters in the Union. During the first 10-year period there were 693 experimenters. During the last 10-year period 23,836 farmers carried out cooperative experimental work. For the whole 50 years since the Union was first organized, 116,160 farmers have conducted experiments through the Union under the direct supervision of the agronomy department of the college.

Just what this work has meant to

the total increased value of agricultural production in this country is difficult to say, but the college agronomists have estimated that the introduction of O.A.C. No. 21 variety of barley alone, has increased the value of this crop in Ontario by more than $30,000,000.

Next to the experimental work on crops conducted by the agronomy department, comes the extensive experimental work on soils and fertilizers carried out under the direction of the department of chemistry.

Begin Soil Surveys

In 1914, soil survey work was begun in Ontario and has been carried on ever since. Based on the preliminary soil survey of southwestern Ontario, permanent soil experimental fields have been located in Welland, Norfolk, and Wellington counties. The oldest soil fertility plots have been under experiment for 14 years, while the most recent plot at Norfolk has been under experiment for nine years.

At the Welland plot where the soil is a poorly drained heavy clay, acid in reaction, lime and superphosphate have given most excellent results on the crops studied. Superphosphate, has been demonstrated to be a much better source of phosphorus than is rock phosphate, on this soil type.

The Norfolk plot is on a light, porous sand, low in organic matter, neutral in reaction, and subject to blowing or drifting. On this field, it has been demonstrated that there is a special need for potash in fairly large amounts for most crops, particularly for legumes.

Rock phosphate appears to be equal to, if not better than superphosphate as a source of phosphorus on this sandy soil. Lime has not given any appreciable results.

While these permanent soil fertility plots have thrown much light on the problems peculiar to the type of soils on which they are located, it has been necessary to carry on an extensive program of cooperative fertilizer experiments placed on farms in all parts of the Province. In this way, it has been possible to obtain information on a large number of soil types in many different districts, where climatic and other factors make for differences in farming practice.

Hundreds of these experiments have been conducted during the past few years resulting in a much increased and more profitable use of commercial fertilizers in Ontario.

Detailed soil surveys have been made of several counties and one of the direct results of this work has been the remarkable development of flue-cured tobacco production in Norfolk and Elgin counties. Previous to the commencement of the survey in Norfolk, although a few acres of the crop had been grown in the county, it was not generally known that there was any considerable area of land suitable for bright leaf tobacco culture. Comparative studies of the soils in Essex county, where flue-cured tobacco had been successfully grown for over 15 years, and the soils in Norfolk county which were of the same general character, revealed the suitability of the latter for the culture of this profitable crop. Since then the development of flue-tobacco culture in Norfolk and the adjoining county of Elgin, has been most remarkable.

Expand Soil Program

A big program of expansion in soil survey investigations has been instituted and as further surveys are completed, undoubtedly new crop adaptations for certain soil types will be discovered, as well as better cultural methods for the crops now grown on many of the soil types.

Field and laboratory studies of predominant soil profiles are being conducted at the college. The regional or standard profile is of the podsol type and in some soils the horizon of accumulation is so well developed as

(*Turn to page* 60)

More *and* Better Apples

By B. E. Maynard

San Jose, California

G. A. Mosebar and one of his well-fertilized apple trees.

APPLE growers in the main producing sections of the Pacific Coast region have been able to successfully stay in the business because of the quality of their product and effective marketing methods. High production per acre is desirable, but maintaining a high quality of fruit is vitally important, offering as it does such a weighty competitive advantage in the present-day marketing of fruit. It is no wonder that apple growers are so keenly interested in a fertilizer program which will help them to attain fruit of the best color, flavor, and keeping qualities, as well as regular and heavy production.

The application of only nitrogen-carrying fertilizers has been popular because of easily observed effects, such as increased growth of the tree. Whether or not the effects of nitrogen alone have been desirable is open to question. It is certain, however, that more attention must be directed to tree vigor, continuous production, and the points which go to make up high quality fruit, rather than to merely casual observation on tree growth and fruit production with no special regard to quality.

Only time is required to demonstrate that any fertilizer program emphasizing the use of only one plant food to the exclusion of the others is unsound. Continued absorption of relatively large amounts of nitrogen will cause an unbalanced nutrition, and at the same time no provision is made for the continual exhaustion of the soil's supply of phosphorus and potash.

Permanent tree vigor and the maintenance of high quality of fruit can only be assured by giving to the apple tree a reasonable balance of all plant foods. The conviction is becoming stronger among growers that the use of high grade fertilizers supplying a complete plant food offers the most economical way to steady production of high quality fruit.

Recent investigations at experimental stations in England have proven that a brown, shriveled condition of the foliage of apple trees, known as leaf scorch, can be well controlled by the use of potash. The experiments indicated that the chief factor producing leaf scorch was too little available potash in the soil in comparison to the amount of nitrogen, and that the condition was a symptom of defective nutrition. High nitrogen and low potash in the ma-

Terminal Growth (Winesap). Left: fertilized two years, 5-6-8 and 3-10-10. Right: unfertilized.

nuring encouraged leaf scorch, while high potash and low nitrogen usually produced a thrifty tree, free from scorching.

Some very significant figures on apple production are available from the East Malling Research Station in England, comparing a fertilizer treatment practically devoid of potash with a fertilizer treatment supplying liberal amounts of potash.

VARIETY	LANES' PRINCE ALBERT	LORD DERBY	RIVAL
Total returns per acre for the three-year period 1925-1926-1927:			
With potash	$823.21	$711.76	$1337.16
Without potash	599.76	395.52	664.32
Total gain from potash	223.45	316.24	672.84

The manurial treatment of the plot was the same for a number of years previous to the spring of 1923. In March 1923, one-half of the plot received 2½ cwts. of sulphate of potash; in 1924 no potash treatment was given; but in March 1925, sulphate of potash was applied at the rate of 4 cwts. to the same half of the field, and since then has been continued each spring. Aside from the potash treatment, the manuring of the two plots has been the same, and since 1923 has consisted of materials supplying chiefly nitrogen and phosphoric acid.

The statement is made in the English report that the health and productiveness of fruit trees depend greatly on proper nutrition, or the supply of the three fertilizing ingredients in the right proportions to suit the particular conditions. While no general formula can be laid down to suit all conditions, there is sufficient evidence to show that the nitrogen and potash ratio in the manuring is important.

Mr. G. A. Mosebar, prominent apple grower in the Yakima valley of Washington, has had remarkable success in building up unproductive apple orchards through the use of complete fertilizers containing sufficient potash. On one tract of mixed Jonathan-Winesap trees, which averaged 300 packed boxes per acre in 1925 and 1926, Mr. Mosebar has

Comparison fruit spurs on 3-year-old wood (Winesap). Complete fertilizer applied two years, 5-6-8 and 3-10-10.

raised the production to over 800 packed boxes per acre. This yield was maintained in 1929, despite the fact that 54 filler trees per acre were pulled out, leaving only 54 trees of Winesaps per acre upon which to take records. The records of yield and fertilizer treatment of this tract follow.

YEAR	FERTILIZER TREATMENT	YIELD PACKED BOXES PER ACRE
1925	No Fertilizer	300
1926	No Fertilizer	300
1927	5-6-8 (15 lb. per tree)	640
1928	3-10-10 (20 lb. per tree)	845*
1929	5-6-8 (20 lb. per tree)	822

*Worms bad, 1,355 loose boxes.

Important Note—In 1929 there were 54 filler trees pulled out, so that the records are for 54 trees per acre whereas in 1928 the records were on 108 trees per acre.

On another tract of mixed Jonathan-Winesap trees, Mr. Mosebar obtained a very interesting record. Starting in 1925, an application of complete fertilizer was made in May. This was too late in the year to have much effect, and a poor crop of 230 packed boxes was obtained. During the next two years, although no fertilizer was applied, the 1925 application effected yields of 702 packed boxes in 1926 and 538 packed boxes in 1927. In the case of this tract also, filler trees (40 per acre) were pulled out in 1929, leaving 40 trees upon which to take records. Nevertheless, a yield of 600 packed boxes per acre was obtained. A more complete story of this tract is shown in the tabulation below.

Terminal Growth (Delicious). Left: fertilized two years, 5-6-8 and 3-10-10. Right: unfertilized.

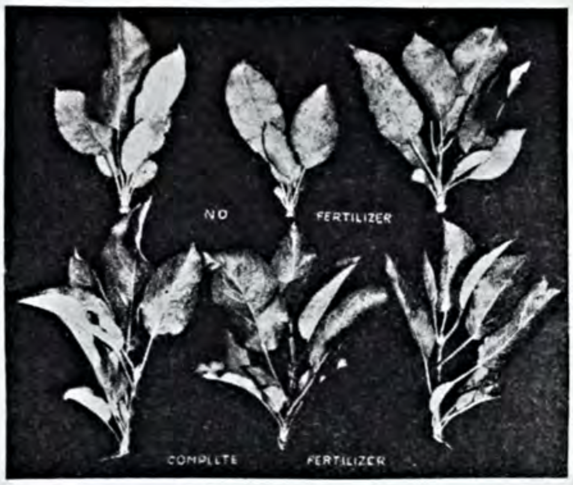
Comparison fruit spurs on 2-year-old wood (Winesap). Complete fertilizer applied two years, 5-6-8 and 3-10-10.

YEAR	FERTILIZER TREATMENT	YIELD PACKED BOXES PER ACRE
1925	3-10-10 (20 lb. per tree applied in May)	230
1926	No Fertilizer	702
1927	No Fertilizer	538
1928	3-10-10 (20 lb. per tree)	877
1929	5-6-8 (15 lb. per tree)	600

Important Note—In 1929 the Jonathan fillers were pulled out, leaving 40 trees per acre, whereas in 1928 there were 80 trees per acre.

Also note ineffectiveness of first application made in May, but the benefit of this application the following year when no fertilizer was applied.

Mr. Mosebar acquired another tract of 15 acres of Winesap apples in 1928. The orchard was in very poor



Comparison of fruit spurs borne on Delicious apple trees. (Complete fertilizer applied two years, 5-6-8 and 3-10-10 analyses.) Above: on 2-year-old wood. Below: on 3-year-old wood.

condition. It was never short of water, so this could not be ascribed as a limiting factor. The yield of fruit for three years preceding 1928 was not over 300 packed boxes per acre. After two years of treatment with complete fertilizer the yield has increased to 1,105 packed boxes per acre, and there is an excellent set of fruit buds for another 1,000-box crop in 1930. The comeback of this depleted orchard has been favorably commented upon by many of the best growers in the Yakima valley, who consider it a fine example of orchard improvement through the use of complete fertilizers supplying sufficient amounts of the plant foods nitrogen, phosphorus, and potash. Below is a tabulated summary of fertilizer applications and apple yields on this tract.

YEAR	FERTILIZER TREATMENT	YIELD PACKED BOXES PER ACRE
1925	No Fertilizer	300*
1926	No Fertilizer	300*
1927	No Fertilizer	300*
1928	5-6-8 (20 lb. per tree in spring)	425
1929	5-6-8 (15 lb. per tree)	1,105

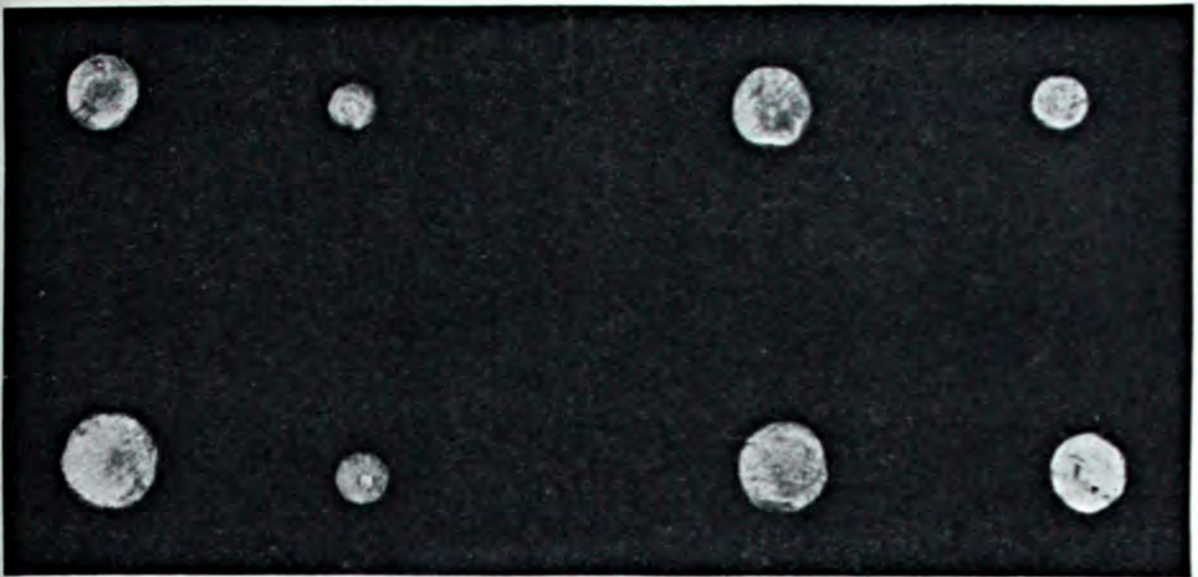
*Estimated.

In commenting upon his 1928 crop, Mr. Mosebar stated: "The quality of this year's fruit was better than normal for this section, showing good sizes and color. There is a decided improvement in the condition of the trees; the fruit spurs are considerably improved as compared with unfertilized trees in adjoining orchards and are well set with healthy, plump bloom buds. I am satisfied that I will get another good crop next year. I have found that where I fertilize my trees with a fertilizer high in potash and phosphorus, I can raise better and more fruit, and it is not necessary for me to thin as much as formerly. My wood growth also is better. I have used fertilizers high in nitrogen, but my own experience has convinced me that my best returns have come from the use of those high in potash and phosphorus.

Mr. Mosebar's expectation of a good crop in 1929 was fulfilled, and his records are a proof that the great advantage of steady production may be expected from the use of complete fertilizer.

Mr. Reed's Experience

The late Wm. L. Reed of Sebastopol, California, who for some years had been observing with considerable concern the deterioration that had been taking place in his apple orchard, finally came to the conclusion that it was not a diseased condition, but lack of plant food that was causing all the trouble. To prove the correctness of



Wood growth diameters on apple trees; note differences in sizes and ages between unfertilized and fertilized. Left to right, top row—unfertilized trees: Delicious, 3-year-old wood, 2-year-old wood; Winesap, 3-year-old wood, 2-year-old wood. Bottom row—trees fertilized for two years with 5-6-8 and 3-10-10: Delicious, 2-year-old wood, 1-year-old wood; Winesap, 2-year-old wood, 1-year-old wood.

his diagnosis, he ordered one ton of commercial fertilizer analyzing 4 per cent nitrogen, 10 per cent phosphoric acid, and 10 per cent potash (4-10-10). This he applied to a block of King apples in the fall of 1923.

To his satisfaction, this application began to show results the following spring, the fertilized trees in 1924 (which should have been the off year) producing a crop of 400 lbs. per tree against nothing from those untreated. He also noted that die-back in the fertilized trees was checked, the foliage was a deeper green with larger leaf, and fruit spurs and fruit buds were better filled out and plumper than ever before. The apples also were larger, of better color, and finer flavor than usual, and were noticeably free from water core.

So encouraged was Mr. Reed by this progress that in the winter of 1924-5 all his King trees received an application of 10 lbs. of a fertilizer containing 21 per cent phosphoric acid and 21 per cent potash (0-21-21) and 30 lbs. of chicken manure as a source of nitrogen. Owing to heavy rains at blossoming time in 1925, the trees set a very light crop of fruit, but made a much better showing than other King orchards in the neighborhood that had received chicken manure only.

In the fall of 1925 Mr. Reed gave all his King apple trees 35 lbs. of a fertilizer containing 10 per cent phosphoric acid and 12 per cent potash. No nitrogen was applied that year. In describing the results from this treatment, Mr. Reed stated that one very noticeable effect in the summer of 1926 was the refusal of the trees to shed their fruit, whereas in former years this summer drop would

An unfertilized tree under same cultural conditions as fertilized trees, (1928). In 1929 this tree was in the same condition and had a very light crop. (Compare with tree on page 15.)

take fully one-half the crop. He further noted that although the quality of his King apples had improved greatly the preceding season, that year—1926—it was still better, especially in color, the red and yellow markings being particularly fine. Another marked improvement which he noted was the almost complete elimination of water core, which that year was so small as to be negligible. This seems to show that water core can be reduced to a minimum, if not entirely wiped out, by the proper use of fertilizers.

Notwithstanding that the crop in 1926 was very heavy, fully 30 per cent greater than any crop these trees ever had produced, the sizes were excellent. The trees were also completely free from die-back and put out a good healthy growth of new wood, firm in texture and well rounded, quite different from the soft spongy and immature wood they were producing before Mr. Reed began the use of potash.

Mr. Reed began fertilizing his Rome Beauty apples in the fall of 1924, by applying an 0-10-12 fertilizer at the rate of 20 lbs. per tree. No nitrogen in any form was applied. In 1925 Mr. Reed noticed a slight improvement in the general condition of the trees, showing that the fertilizer was taking effect. In the fall of 1925 each tree was given 17 lbs. of an 0-21-21 fertilizer. In addition, to supply nitrogen, one ton of chicken manure was applied per acre.

In the first week of May 1926, while the Rome Beauties were in full bloom, this section was drenched by an 8-inch rainfall which practically wiped out the crop in the entire district. A few orchards carried a very light sprinkling of fruit; others, none at all. Mr. Reed, commenting on this, stated that his trees receiving the 0-21-21 fertilizer suffered relatively little. They set a good crop and matured from 60 per cent to 70 per cent of a normal crop. On September 10, 1926, an examination of these trees showed that the apples were of excellent color, large in size, and of exceptionally fine quality. The general condition of these trees was much improved, showing an abundant growth of well-developed new wood, with every indication that they would bear heavily in 1927. This forecast was fully lived up to, as they bore heavily in 1927, and again in 1928. A report received, dated July 31, 1929, stated that the 1929 Rome Beauty crop would be the largest ever harvested on this place.

The results obtained by Mr. Reed from the use of phosphates and potash on his Gravenstein apples were, if anything, more marked than on other varieties. In the fall of 1924 he applied 10 lbs. of an 0-21-21 and in addition to this 30 lbs. of chicken manure to all his Gravenstein apple trees 33 years old. On 60 of those trees he doubled the application of 0-21-21, giving them 20 lbs. per tree, but did not increase the chicken manure. This test he stated proved to be one of the wisest moves he ever made. In 1925, owing to heavy rains followed by frost at blossom time, his Gravensteins set a light crop—all except the 60 trees on which he had made the double application of 0-21-21. These trees set a 100 per cent crop, giving him proportionately 10 times as much fruit as the trees that received only 10 lbs. each of this fertilizer.

Mr. Reed's Statement

In commenting on this he stated: "If I ever had any doubts about the value of phosphate and potash as fertilizers, the profit I got from those 60 trees by making the extra application proved to me conclusively how much the right plant food in the right quantity counts."

In 1926, following an application in the fall of 1925 of 17 lbs. per tree of the same 0-21-21, and for nitrogen

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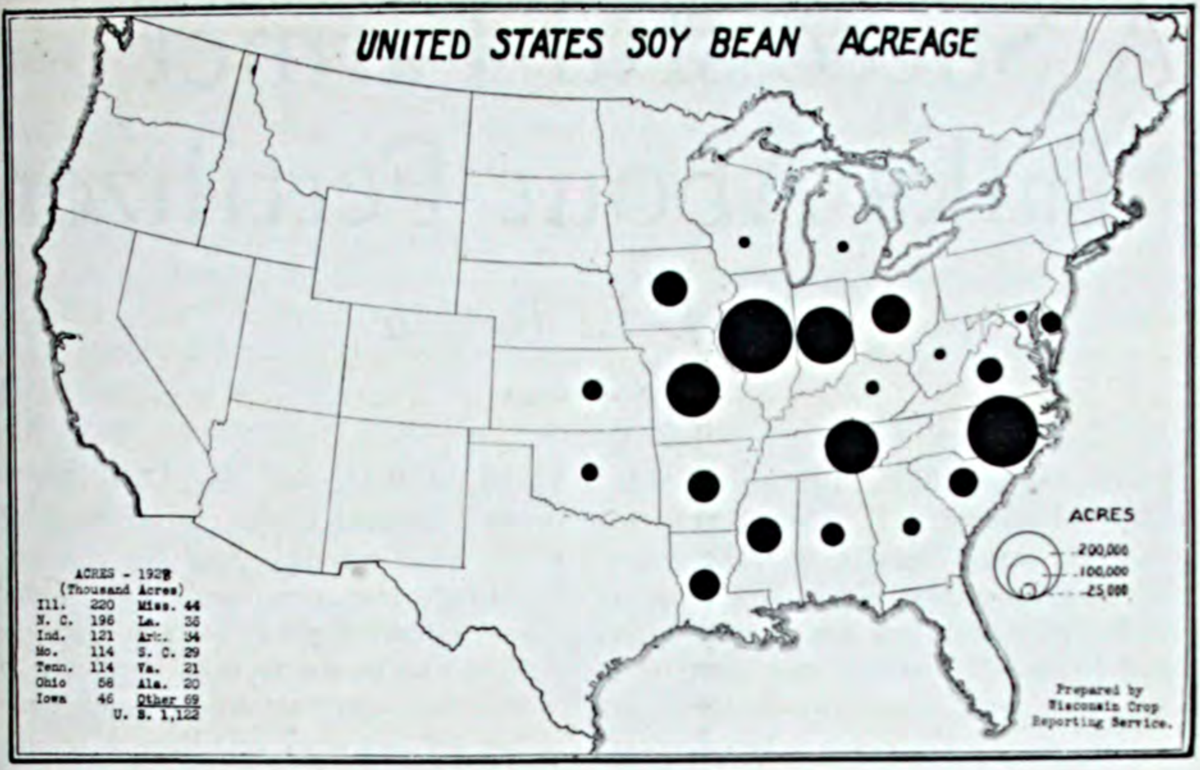

Soybeans

Fifteenth in this series

By Walter H. Ebling

Agricultural Statistician, Wisconsin

BORROWED from the Orient where it has been grown for a very long time the soybean is a legume which has recently come into widespread use. Old records show that it was an important food plant in China as far back as 5,000 years ago. Since that time it has always been extensively cultivated in that country, as well as Japan and Korea. It is the most important leguminous crop in these Asiatic countries, and it is widely used by them as a food plant and as a source of oil, as well as for livestock feed and fertilizer.

This crop reached Europe about the close of the eighteenth century, but for more than 100 years it gained little headway. It is said to have reached the United States shortly after 1800, but was little heard of until about 20 years ago. Since that time it has come into rather widespread use, particularly in the southeastern United States and in the Corn Belt.

There are a vast number of varieties of soybeans, only about 20 of them being commercially important. With the large number of varieties available, a wide choice exists, which makes it possible to find soybean types suitable to a great variety of climatical and soil conditions. In general, the climatical requirements of the crop are similar to those of corn, but by careful selection of varieties it has been possible to grow them somewhat farther north. The soybean is generally somewhat less sensitive to cold than the other legumes. In addition, it seems to thrive on a wide variety of soils, which adds much to its adaptability.

(*Turn to page* 58)

A Successful Farmer Talks About Fertilizer

By J. L. Baskin

Atlanta, Georgia

J. R. MARABLE, forty-five year old farmer of Oconee county, Georgia, says, "You can make your cotton crop just as big as you want it to be, provided you use plenty of a well-balanced fertilizer and then protect your crop from the boll-weevil.

"Of course there are other factors that help make bumper crops, such as a thick stand and the planting of a good variety. I plant two varieties of cotton — Piedmont Cleveland which pulls from seven-eighths to one inch, and Coker's 884 which pulls one and one-eighth inches. For the latter I receive a premium of approximately two cents per pound. Next year I expect to plant my entire farm to Coker's 884, because it will make me more money and I can sell my seed for a premium. By planting only one variety the matter of keeping my seed pure will be made easy."

Clad in suitable work clothes, including boots, and wearing a broad brim felt hat, Mr. Marable seated himself comfortably on a Crabgrass-covered terrace one day last fall and told his story beginning with his early boyhood.

"I love old Georgia and particularly Oconee county. It was only 10 miles from here that I was born. My father had 84 acres of as good land as this I am now farming, but somehow we just couldn't succeed. It's all plain to me now. We were trying to wrest a living from an unproductive soil without the aid of fertilizer. We spent long hours planting and cultivating 50 acres of cotton only to make from 10 to 14 bales per year. We didn't succeed because our plans, or lack of plans, were wrong. And let me say right here that this very thing is the cause of more farm failures in Georgia than is due to the lack of hard work.

"In those days we didn't know how to use the power of fertilizer as we do today. We used then an abundance of long hours of hard labor and only 100 to 200 pounds of 8-2-2 (PNK). I still use plenty of hard work, for I have never known anything else. I would not be happy without it.

"A farmer who is making less than half a bale per acre is simply not using his head. The time is past (if it ever existed) when a farmer can blame bad crops year after year on the weather. The time has also passed when hard work alone will make a cotton crop here in Georgia.

Learned in North Carolina

"I really didn't learn how to farm until I moved to Cleveland county, North Carolina, and by-the-way, Cleveland countv is one of the South's greatest cotton growing counties, producing from 50,000 to 60,000 bales per year. That's no snobbish amount of cotton for a county of its size.

"Up in Cleveland county they use plenty of fertilizer and they make the cotton. They don't have much boll-weevil like we do in Georgia. The price of their land is high compared to values in Oconee county. When I would go out to look over farms, I wanted to buy there, but my boyhood love for Georgia would keep passing through my mind. So I decided to return to my native State. The only thing I feared in returning to Georgia was one of the smallest items that goes into the un-making of a cotton crop—the boll-weevil. I have now learned how to make a crop in spite of this billion dollar bandit.

"The reason I couldn't make good cotton before I went to North Carolina was because I did not know the power of fertilizer. I thought it too expensive to use enough. Now I know up to 1,000 pounds per acre that the more you use the more cash you will have in the fall.

"Here's my plan of making a bale of cotton per acre. It has worked for me and it will work on any Piedmont farm. Plant a thick stand early if possible. Don't let the hoe-hands cut out too much—keep it thick. Put under the crop 600 pounds of 12-4-4. When the cotton is chopped out and begins squaring, side-dress with a mixture of 75 pounds of sulphate of ammonia, or 100 pounds of nitrate of soda, and 50 to 75 pounds of muriate of potash. I have found out from field tests that 50 extra pounds of muriate of potash mixed and applied with nitrogen, is worth $15.00 per acre. But all of your work and fertilizer is lost unless you poison the weevil.

"Mix one gallon of Black Strap molasses, one pound of calcium arsenate and one gallon of water; the liberal quantity of molasses catches the hopper which is another serious cotton pest. Apply this mixture with a mop to the bud of growing plants, once in June and once in July. When the cotton is big enough, dust with calcium arsenate every week continuing through August and do not get discouraged

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J. R. Marable in his field of cotton that yielded a bale per acre and was fertilized with 600 lbs. 12-4-4 at planting time and side-dressed with a mixture of 50 lbs. muriate of potash and 100 lbs. nitrate of soda.

In the early spring, when even the most fertile land is cold and its available plant food meagre, it pays to give corn a good start with fertilizer.

Feeding King Corn

By C. A. Le Clair

St. Louis, Missouri

THE corn crop of the United States annually contributes more to the income of farmers than does any other major crop. It has arrived at this position almost solely by reason of its value for animal feeding. As a human food, corn has as yet not been made the most of, except in a few rather limited sections of this country, this is in spite of the fact that maize was one of the main staple foods of native Americans.

The first settlers of America quickly learned to adopt many of the foods they discovered in the new world. For example, the potato promptly became a part of their daily diet. Later, potatoes were introduced in the old world and in due time there too, they were accepted as a worthy food. Over a large part of the globe today it would be considered unthinkable to dispense with the Irish potato.

Since corn belongs to the family of plants known as the grasses, which group of crops contributes the bulk of the food of the human race, it is indeed strange that it has not so far been accepted in proportion to its dietary worth. Man, the world over, has been accustomed to getting the bulk of his carbohydrates from either wheat or rice. As an example of how slow humanity sometimes reacts to the taste of new foods, it is on record that pop-corn balls, when first introduced by confectioners of London, went begging, even though they were offered gratis as samples of a new confection. In our country, cornbread and corn cakes, good as they are, constitute an important part of the daily diet only in our southern States.

Nevertheless, since corn contains about all the nutrients necessary to make a full meal for a man, it is destined for greater popularity. Dietitians and chemists recognizing this fact have put their heads together and are inventing ways to transform the food of corn into delicious products which the modern man cannot resist. In other words, corn in disguise is at present rapidly being made popular as a human food all over the world. This quite recent accomplishment is destined to increase the demand for this grain. An idea of the strides which already have been made in converting corn into new uses is indicated by the following statistics.

There is now manufactured from each year's corn crop of this country more than:

800 million pounds of corn syrup — used for preserving and making candy; 600 million pounds of corn starch—used for baking and confections; 230 million pounds of corn sugar—used for baking purposes; 625 million pounds of corn gluten feed—for animal feeding; 90 million pounds of corn oil—used for salads; 90 million pounds of corn oil cake—for animal feeding.

People, too, are learning how to eat more fresh and canned corn. The acreage planted to sweet corn for canning purposes in the United States has increased considerably in the past decade.

In addition corn is being employed more widely in manufacturing a number of products useful in the arts and industry. For example, corn dextrine now comprises the adhesive material of our postage stamps and serves admirably in this capacity. Likewise, from the 35,000,000 tons of corncobs produced annually in the United States, science has already found ways of making insulating material similar to cork, wax, dyes, and insulating material for electrical appliances. With the exception of the use of corn-cobs for making pipes which has developed

Note the big, ear-bearing stalks from a fertilized hill of corn grown far north of the corn belt at the left in contrast to the sickly unfertilized hill at the right.

quite an industry, the practical production of most of these other corn by-products is as yet in its infancy.

Also in the embryo stage of development is the utilization of the cornstalks not yet needed for ensilage. At present in two great corn belt States much progress is being made in an experimental way in working out economical ways of harvesting the dry corn-stalks, after the ears have been snapped, for use in manufacturing wall board, paper and artificial silk.

Just when farmers will cash in on the full value now known to exist in every acre of the corn they grow cannot yet be stated. However, it is hoped that each year in the next decade will see their returns from this great crop increase materially.

Is Adaptable Crop

There isn't a staple crop grown in America that lends itself more to the will of man than does corn. By selection and breeding, virtual miracles have been evolved. In the State of Wisconsin, which was once considered outside of the corn belt, agronomists of the experiment station have developed a strain of corn which will germinate at low temperatures. Today thousands of acres of this frost-resistant corn contributes to the State's remarkable production of grain and ensilage.

In Missouri a strain of corn has been developed which, in addition to its ability to produce a satisfactory yield of grain per acre, provides cobs of a size and texture ideally adapted for the making of the famous Missouri meerschaum pipe. The corn-cob pipe industry provides farmers with considerable additional revenue.

As the result of the world-famous discoveries of the Illinois Agricultural Experiment Station that marked changes in the composition of corn can be effected by breeding, it is now established that there are almost unlimited possibilities of molding the great crop to fit present and future requirements of the nation. At this station, for example, the protein analysis of corn has been increased more than double the normal content and other selections evolved a strain of corn which had more than seven times as much oil content as the lowest oil content variety known.

Finally, strains of corn producing one ear or two ears respectively per stalk, have been developed. But even more startling is the fact that the agronomists have demonstrated that they can determine the place of the ears on the stalk. To meet the needs of the grower, varieties with ears as low as ¾ of a foot or as high as 10 feet from the ground have been brought into existence.

Through the improvement of the composition and yielding capacity of this greatest of American crops, by practicing better methods of cultivation, more liberal fertilization and disease control, Illinois farmers alone have increased the value of their corn crop at the rate of $20,000,000 per year during the past decade. Yet only a beginning has been made in this and other States toward cashing in on the possibilities of maize.

Hence, a new era for King Corn is at hand. But discounting the future, it is inconsistent that the corn crop which today leads the field as a source of revenue for American farmers, should be treated far less generously than most other staple crops. For instance, farmers are using millions of tons of commercial fertilizer with profit in growing cotton, potatoes, and wheat, but strangely, the amount of commercial plant food as yet applied to corn, amounts to only a few hundred thousand tons.

It has long been a common practice of farmers in the corn belt to fertilize their wheat, apply any farm manure available to clover and grass, and let corn get its food from the residues left by the crops that preceded it in the rotation. In other words, corn has been required to sit at second table, so to speak, and garner its

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What's Ahead?

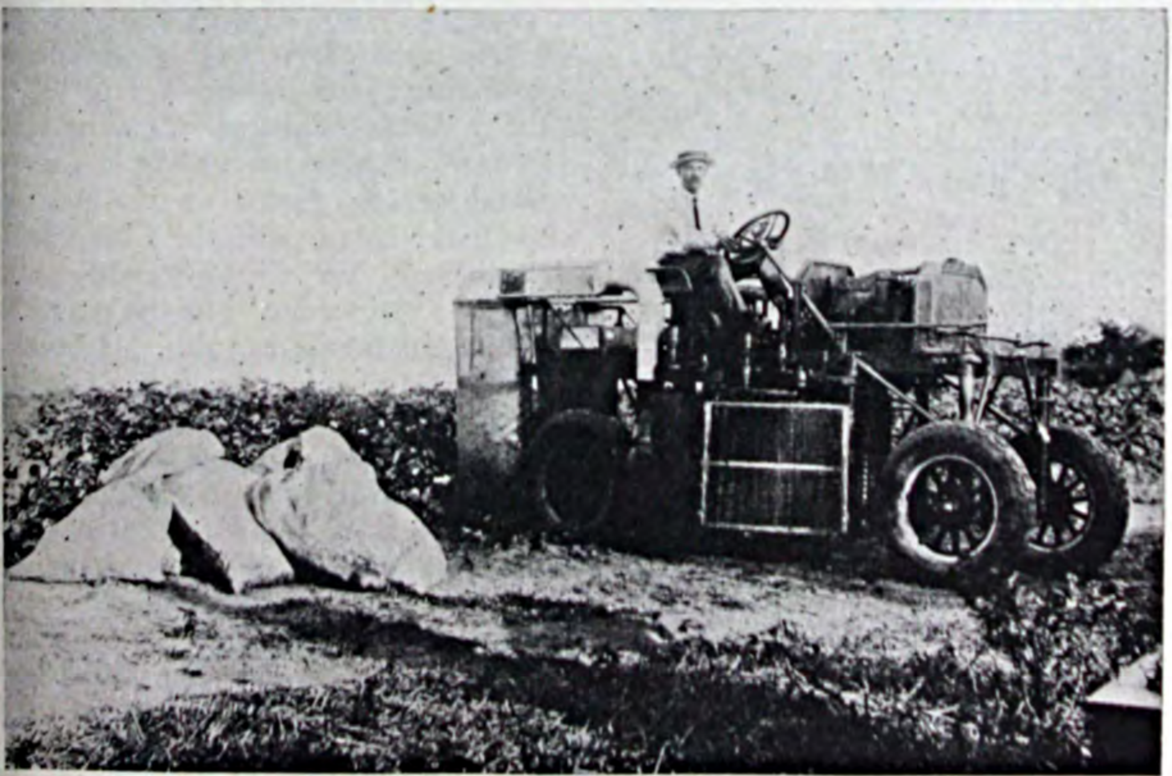
"Say not thou what is the cause that the former days were better than these? For thou dost not inquire wisely concerning this."—Eccl. 7:10

¶ Number Four

By Frank George

THE Cotton Empire of the Southwest! The signs are unmistakable. Within 20 years, American cotton production will reach 20,000,000 bales annually, of which approximately 10,000,000 bales will be grown in Texas and Oklahoma. This crop will be grown at a profit, not by virtue of high prices for the staple, but by reason of low unit cost of production. Use of machine power in both production and harvesting to replace expensive man labor will produce this result.

The record shows that in the last 10 years farmers have invariably expanded acreage when cotton brought more than 16 cents a pound, with the net result that the cotton area during this period has been increased approximately 10,000,000 acres. Approximately 6,000,000 acres of the increase have been in Texas alone where large-scale farming under modern machine methods has proved to be practicable. There is an additional 10,000,000 acres of potential cotton lands in Texas which will go into cotton as rapidly as is justified by an increased world demand for cotton.



This mechanical finger or spindle type machine automatically picks and sacks the cotton.

A 20,000,000-bale crop now would cause disaster to the cotton growing industry, but a 20,000,000-bale crop 20 years hence will only meet normal world requirements at that time. Even a 15,000,000-bale crop in 1929 put many growers in the red and was on the borderline between profit and loss over a vast area of the belt. "Nothing but a crop failure in Texas in 1929," says the Federal Farm Board, "prevented a total yield of 16,000,000 bales in the belt, which is more American cotton than the world will take at a fair price."

The Federal Farm Board is cautioning cotton growers against any increase in the cotton acreage at this time, and in fact is urging a reduction in acreage with the recommendation that growers plant cotton only on land that has produced at least one-third of a bale per acre on the average of the last five years. "If southern farmers," says the Board, "should raise their own food and feed, and raise in addition the food that southern city people eat, so far as climate and soil will permit, there would be small danger of any cotton surplus or of an unprofitable price."

Eleven hundred cotton growers reported to the United States Department of Agriculture costs of producing cotton ranging from 7 cents to 52 cents per pound of lint of the 1928 crop. Growers who produced one-third of a bale per acre showed an average production cost of 16 cents per pound of lint. Those farmers who had yields of 100 pounds and less per acre had costs considerably higher than 20 cents per pound. The average yield of lint cotton in 1928 was about 153 pounds per acre according to the Crop Reporting Board, and the December 1 farm price of cotton that year was 18 cents a pound.

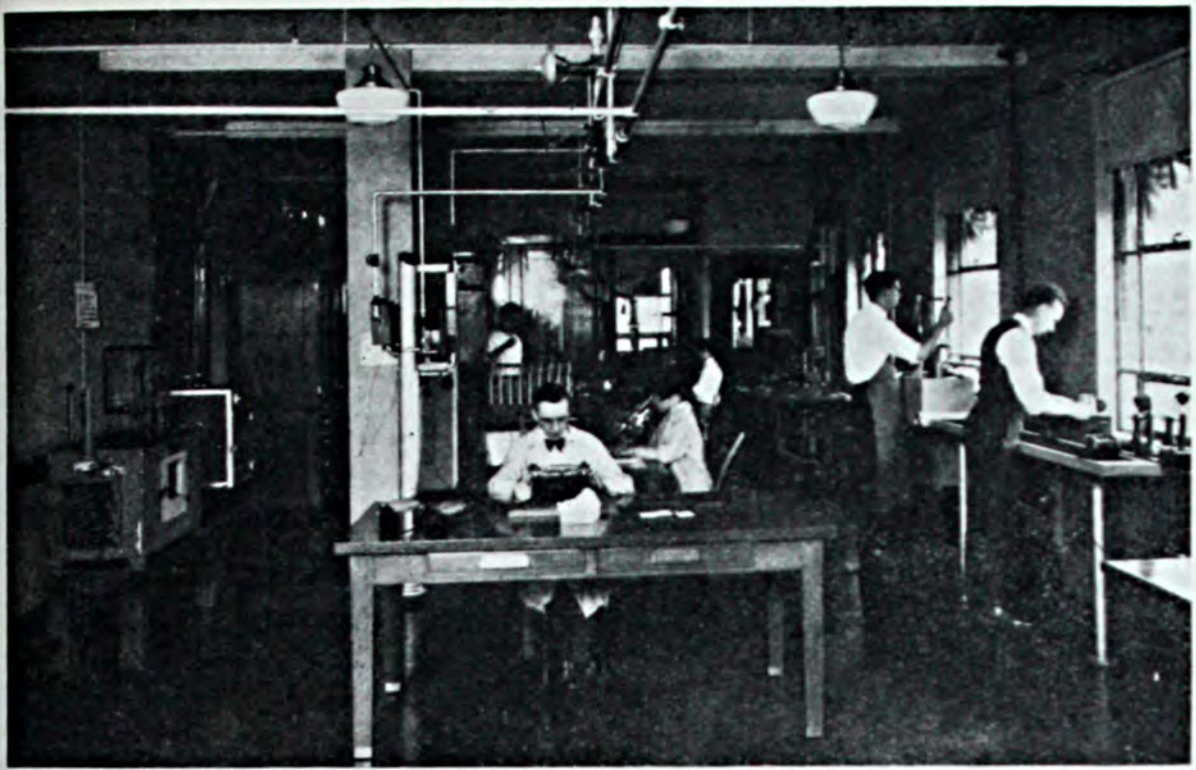
While acreage has been expanded greatly in Texas and Oklahoma in recent years, and cotton acreage has increased moderately in a number of other States, there has been a marked decrease in acreage in Georgia and South Carolina where cotton has been grown commercially for more than 100 years. Many growers in these two States have found it impossible to compete with the low-cost, large-scale production methods of the West. Since 1920 the cotton area in Georgia has decreased from approximately 5,000,000 acres to less than 4,000,000 acres in 1929, and the area in South Carolina from 3,000,000 acres to 2,000,000 acres.

Many observers believe that the original cotton States must increasingly turn to the production of other farm commodities because of their disadvantages in climatic and topographic conditions in cotton production in competition with natural conditions in the Southwest. As New England was forced to give up corn production in competition with more favorable production conditions in the Midwest, and to turn to dairying as a chief enterprise, so the southeastern States, more than half a century later are being forced by economic conditions and the march of progress to give way to the West.

Production Increases

One hundred years ago when cotton production was confined largely to the uplands of South Carolina and Georgia, it was believed that cotton could not be grown on the prairies and river bottoms of the Gulf Plain. Experience proved otherwise, and production increased rapidly after the year 1830 in the central gulf States. Before 1840 planters were moving into Arkansas, Louisiana, and Texas. By 1850 New Orleans became the world's leading cotton export market.

The world demand for cotton, together with the rapidity with which the soil was exhausted under current methods of cultivation made it necessary for planters to be continually on the move. Few fertilizers were used on cotton prior to 1860. Peruvian guano was introduced about 1840 and was first tried on cotton in Hancock



Tests of cotton for color, strength of fibre, weights of yarn, and length of fibre are made in this government laboratory.

county, Georgia, in 1846. The fertilizer gave good results and its use increased rapidly. The opening of potash salt beds in Germany, and the discovery of phosphate deposits in Tennessee, Florida, and South Carolina led to the extensive use of artificial manures.

Cotton growers had solved their problems of soil productivity by means of better cultural practices only to be confronted a few decades later with the devastation of the boll-weevil whose depredations spread rapidly in the eastern, moister regions of the cotton belt. Reduced yields in these areas resulted in increased acreages in the drier regions in the West. The westward movement brought the cotton industry into a region of comparatively cheap and very level land upon which machine methods could be introduced with a lowering of production costs and satisfactory net returns, even where yields were relatively low and methods of gathering the crop were not such as to produce the highest quality.

The so-called Hoover Committee on Recent Economic Changes in the United States last fall reported on this westward movement of the cotton belt as follows:

"The formerly submarginal lands of the Texas Panhandle and nearby Oklahoma, and the level coastal plain farther south which had yielded a sparse return as cattle range, were cut up into cotton farms. Moderate-sized tractors and appropriate tillage implements took the place of the mule and 8-inch plow. Cotton was gathered by swifter and 'dirtier' methods, and the product was cleaned by a special apparatus which was promptly added to the standard gin equipment. In extreme conditions of late crop or short labor supply, this section even makes extensive use of the cotton 'sled' which strips the cotton bolls, opened and unopened, at a single operation.

"The general mechanization movement has spread itself in varying degrees over the whole South, and old methods have been discarded or modified in a variety of ways. Mechanical cotton choppers of several types have been introduced. Some cotton is being 'checked in' according to the long-established custom for corn, so

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Tennessee Potatoes

By C. E. Brehm

Assistant Director, Tennessee Agricultural Extension Service

IN northeastern Tennessee, the Cumberland mountains spread out in a broad plateau, comprising an area of approximately 5,000 square miles. This area is known as the Cumberland Plateau. The elevation ranges from 1,400 to 1,800 feet above sea level, and the annual rainfall varies from 52 to 59.07 inches. On account of the high elevation the nights are cooler than in any other farming area in the South.

Much of the plateau is too rough for cultivation and is covered with forest growth. That which is tillable, and there is a considerable portion of it farmed, comprises some very desirable farm land. Cool nights, abundant rainfall, and a sandy loam soil, easily cultivated, make it especially well adapted to the production of late or main crop Irish potatoes. In fact, the soil and climatic characteristics make it the best late potato producing area south of Pennsylvania, Michigan, Minnesota, Colorado, and other important northern producing areas.

For marketing potatoes to advantage, in competition with other heavy producing sections, this region is exceptionally well located. Potatoes can be planted the latter part of April, or in May, and are ready for digging the latter part of August, September, or early October.

With the Green Mountain, if the potatoes are not dug when mature, there is little danger of sprouting in the ground. This is the time there is the least competition with early potatoes from the southern States, and it is before the crop from the heavy northern producing areas is ready to be dug. Up until the middle of August, the season of early potatoes, the movement is largely north. From the last of August to the middle of September, after New Jersey and Long Island stop digging, there is a period of several weeks when potatoes are not moving either way, north or south. Cumberland Plateau potatoes can be put on the market at this time.

After the middle of September, the movement is south from heavy northern shipping points until the early crop is ready in the South. The southern States do not produce enough late potatoes to supply consuming demands from September to June, so that competition even during these months is favorable to this area in lower freight delivery costs than is possible with the more northern competitor.

Begin to Fertilize

Ever since settlers first moved into this area, potatoes have been grown for a home supply, and in more recent years, a small surplus to sell on nearby markets. It was not a common practice to use fertilizer. When fertilizer was used it was limited to a small amount, 200 to 300 pounds per acre, and this usually only superphosphate. In spite of lack of fertilizer, it was observed that if the season was favored with adequate rainfall, the yields would be fairly large and the quality good. Cumberland Plateau potatoes enjoyed a superior reputation for quality in all nearby markets. However, varieties were badly mixed, the potatoes poorly graded, many of them scabby, sacked in uneven weight

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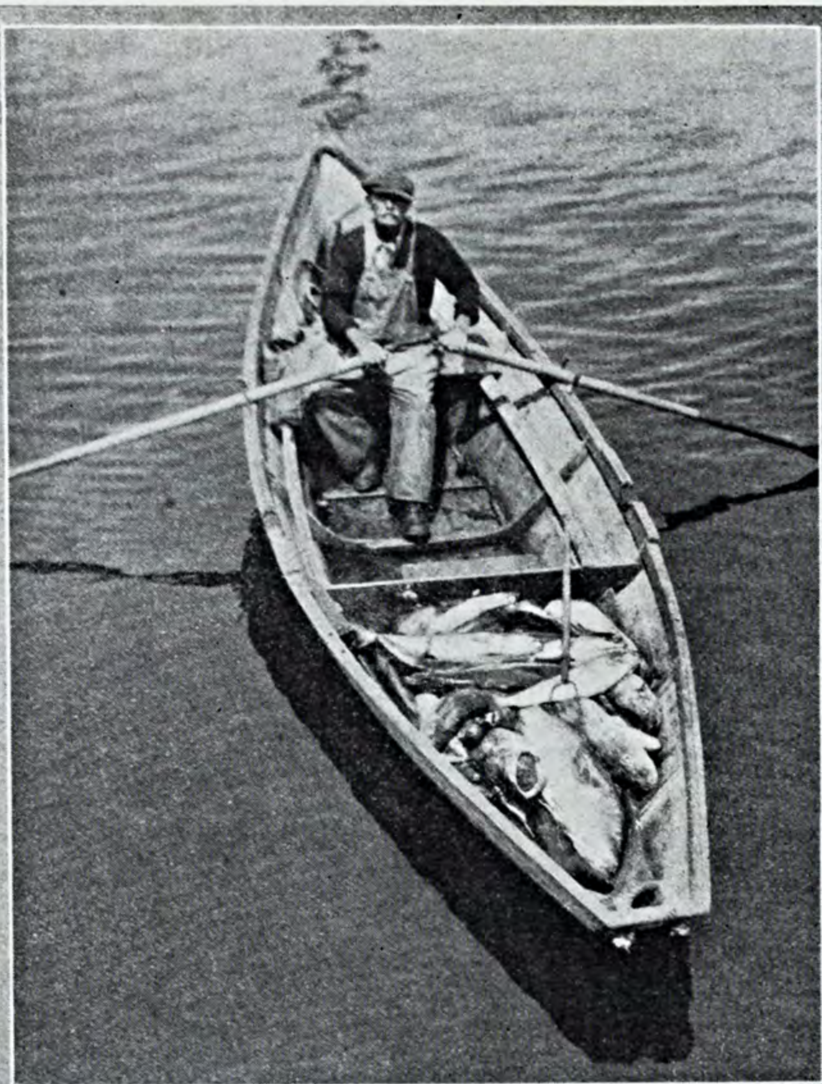
A FARMER OF THE SEA

PICTORIAL



FARME

Farming the sea for food
calls for the sort of seamar
clipper famous the world
industry are Scandinavians,
in any sort of weather, and

Traps, or pounds as they
30 feet of water, from one-
planted in the ocean's botto
tending from the surface of
The poles are set in a line
right angles to the shore.
pocket or trap about 70 f
the coast approach the line o
In so doing they are divert
into the pocket from which
Once or twice a day the
the pocket nets. All sorts
half-pound porgie to the h
pounds each. On the Pacif
tuna, and a splendid fish i

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trap. Small sharks, sting
which are caught by the hu
thrown back into the sea.
oil, and use as food. Bl
trout), flounders, goodies, p
herring family are the pr

After the traps are lift
run is made to shore, whe
packed for shipment to th
from April to December, u
cut away the nets and

THE SEA

an adventurous enterprise which daring that made the American st of the men engaged in this stomed to battling with the sea crowd it would be hard to find.

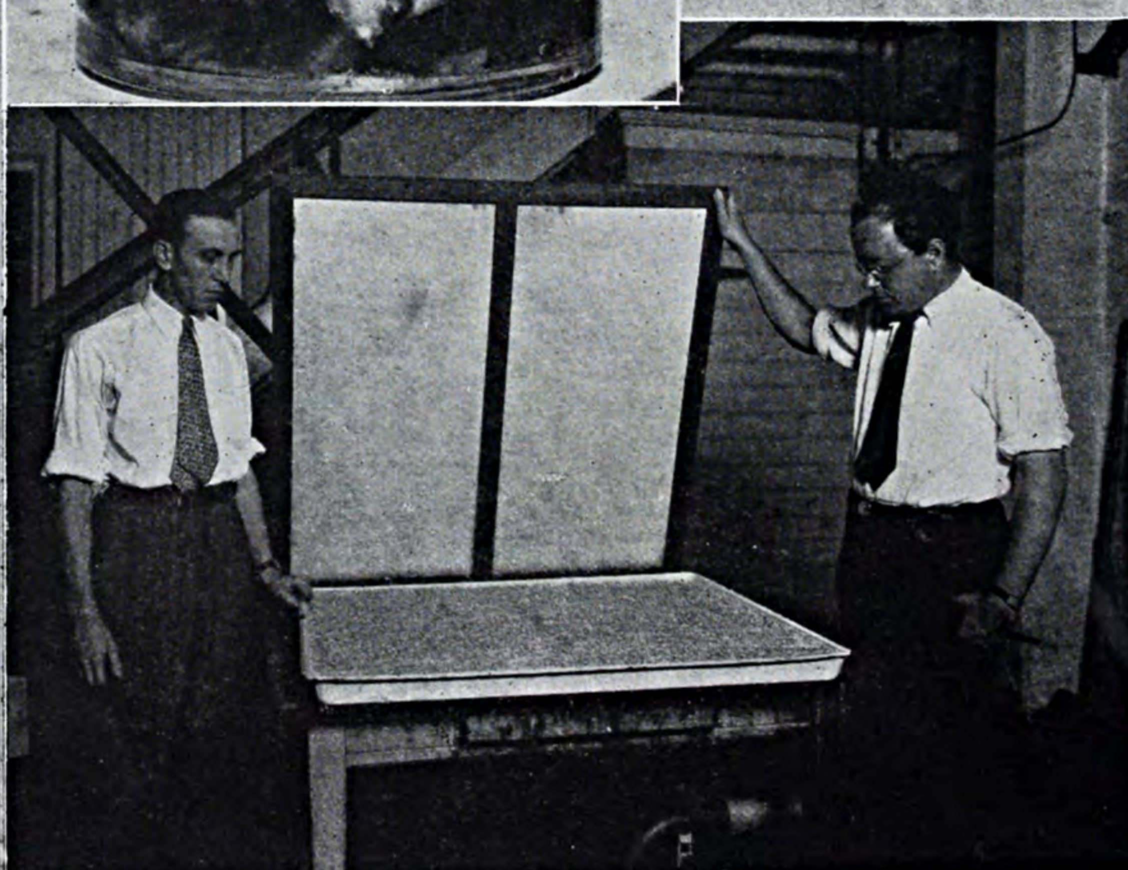
only called, are located in about ne mile offshore. Tall poles are om these the nets are hung, ex- within a few feet of the bottom. able locations, which line is at center of this line of nets is a e. Fish swimming up or down follow it in an effort to get by. funnel net which carries them no escape.

run out to these traps and lift s of fish are caught, from the mackerel weighing 300 or 400 the horse mackerel is known as

the average day's haul from a tes, and other non-edible fish, re sorted out from the haul and rks are preserved for their hide, akfish (otherwise known as sea nitos, and other members of the arieties caught off New Jersey. mptied into the boats, a quick h are sorted, cleaned, iced, and cities. The traps are operated y winter gales should happen to break them down with ice.

Left: In a study of damage to wood, workers at the U. S. D. A. placed a tiny piece of fungus on this block of spruce and in nine months the block was badly rotted throughout and had produced a toadstool bearing billions of spores. The Forest Service says that an amount of wood equal to two-thirds of our annual forest growth is destroyed by decaying of wood in service.

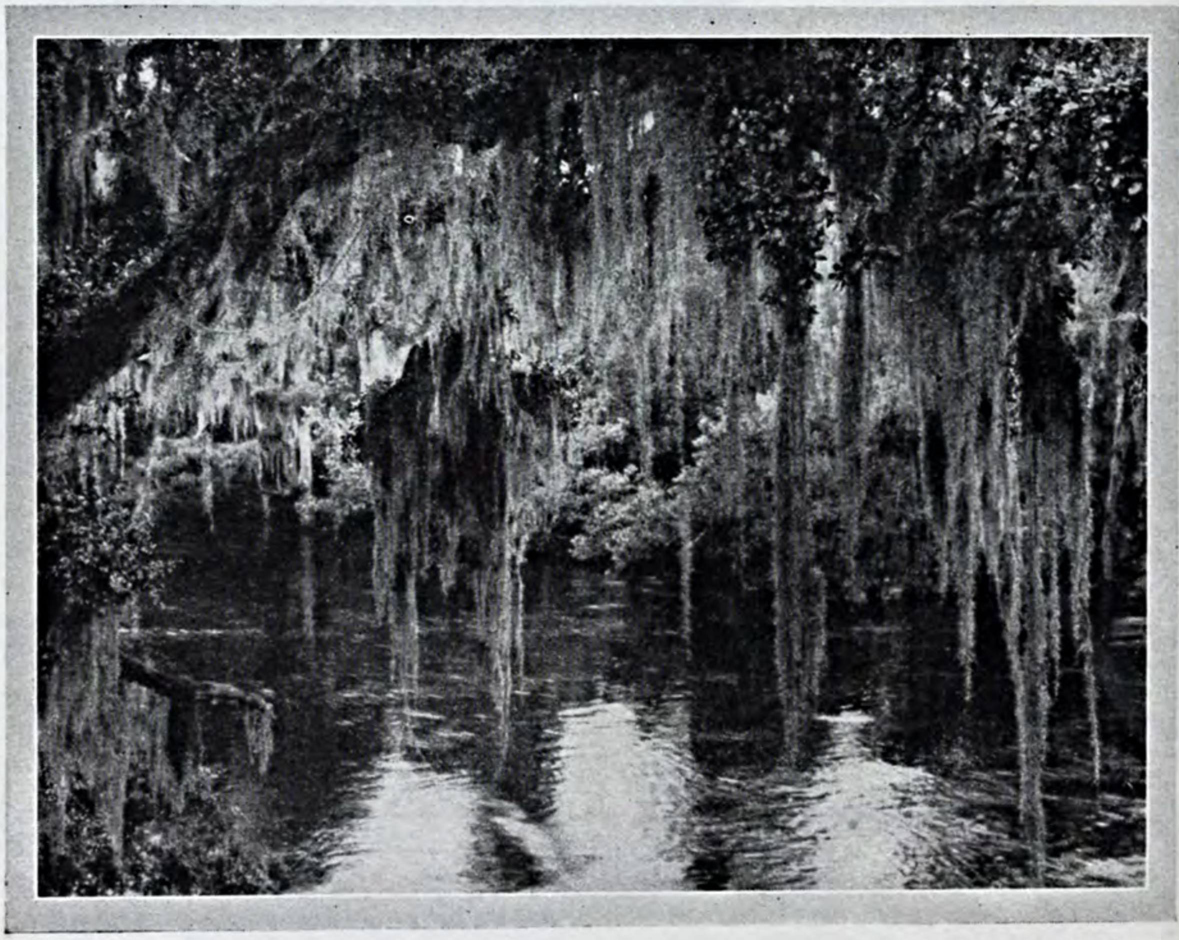
Below: H. T. Herrick and Orville E. May of the U. S. D. A. have uncovered some interesting and valuable information regarding molds, considered by most of us as bothersome spoilers of food, leather, cloth, wood, etc. Searching for tartaric acid, a chemical entering largely into commerce, they found that the molds produced gluconic acid, which in some forms enters into the treatment of certain human ailments. They are continuing their search for the production of tartaric acid by molds.



Right: This product of the famous woodcarving school at Warmbrunn, Silesia, serves to direct the traveler to a poultry farm on the outskirts of the city, where live specimens advertise their own products in happy chorus.

Below: Below is pictured the donkey express of the Holy City, which makes two trips daily through the city bringing pasteurized milk to babies of all creeds as part of the elaborate infant welfare work being carried on by Hadasseh, the American Women's Zionist Organization in Jerusalem. Nathan Strauss, veteran philanthropist who was the pioneer pasteurized milk advocate in the United States, has been active in the infant welfare work of the Hadasseh and has personally established several pasteurized milk stations in Palestine in connection with the Zionist Organization's "Drop of Milk" health campaign.

February in the North.



February in the South.

The Editors Talk

The Agricultural Outlook

The Annual Outlook Report was issued on January 26 by the Bureau of Agricultural Economics of the Department of Agriculture, in cooperation with representatives of Agricultural Colleges and Extension Services of forty-five States and the Federal Farm Board. For the immediate outlook caution is strongly urged, but the long-time outlook is more encouraging. A warning is given to farmers against the over-production of many crops. They are cautioned to adjust their expenditures carefully if a normal income is to be maintained.

The report states that the domestic market for farm products will probably not be as good this year as it was last. The reason for this is in part due to the industrial decline. Therefore, the immediate argricultural outlook is for an income from farm products not much, if any, in excess of the income from farm products in 1929. Crop yields were somewhat below the average in 1929, so it is expected that yields in 1930, if anything, will be somewhat larger, which will tend to reduce prices. It is possible, however, that improvement in business conditions later in the year may tend to offset the influence of increased output.

The report states definitely:

> "With the purchasing power of consumers in 1930 somewhat reduced below 1929, farmers need to follow a rather conservative production policy. This is a year when it is particularly desirable for each farmer to estimate his probable income in view of the price outlook for each of his products and to plan his production expenditures accordingly."

The report then goes on to discuss the long-time outlook. It states:

> "No material change from recent levels of total farm income seems in prospect in the next five years. However, the long-time tendency for prices of agricultural products to advance in relation to prices of non-agricultural products will probably continue."

The report gives warnings regarding the acreage of certain crops and discusses particularly corn, cotton, and potatoes. It is pointed out that the acreage and production of cotton during recent years have been at comparatively high levels, therefore, it seems certain that any increase at present would be unwise. The same applies to the acreage of potatoes. Wheat prices are unlikely to change, though farmers in the United States must expect to continue to meet keen competition in the export markets. While this outlook report is not in any way pessimistic, it does definitely show the need for careful planning in the acreages of the chief crops.

Again we come back to the old problem of adjustment. The practical problem is how to adjust production to consumption. At present undoubtedly it must be largely an individual adjustment and these outlook reports should be a great aid to leaders in agriculture in helping to solve this very practical problem.

Minerals in Pastures

It has been definitely shown that if the mineral content of pastures is poor, there is a definite correlation between this deficiency and certain diseases of animals. Experimental work on this point has been conducted in various countries, and the results now have been gathered together in one volume by J. D. Orr of the Rowett Research Institute, Aberdeen.

The elements discussed in this book are particularly: calcium, phosphorus, sodium, potassium, and chlorine, iodine, manganese, iron, magnesium, sulphur, silicon, fluorine, boron, and copper. It is shown that the deficiency or unbalanced ratio of these elements in pastures is closely associated with certain diseases of animals. Good pastures contain significantly larger amounts of many of these elements than do poorer pastures. Different factors affect the mineral content of pastures, as for instance the species of plants, the seasonal variation and stage of gowth, climatic conditions, the type of soil, and particularly the use of lime and fertilizers.

> "The fertilizers increase the mineral content of the pasture, the increase being most marked in poor soils. The increase is due partly to the fact that the individual plants are enriched and partly to the fact that the fertilizers promote the growth and spread of species of plants which are naturally richer in minerals."

The common deficiency diseases of grazing animals in different countries are discussed particularly as they occur in Europe, Africa, Australia, America and in Asia. While the literature on such diseases in America is not apparently very extensive, as a general result of this investigation, the point can undoubtedly be emphasized that there is a very definite tie-up between the health and productivity of grazing animals and the normal mineral content in the pasture. This whole problem should receive much more attention than it has in our national research program.

Statistics

More and more statistics of all sorts are being circulated. Probably it is more difficult for the average person to read statistical material than any other type of publicity. The psychologist could probably tell us why this is. At a rough guess we are probably more poetically than mathematically-minded. One does not have to go far to find plenty of young men and women who will try their hand at a piece of poetry, but one has to go much further to find the same number who will knowingly and willingly tackle the calculus for instance, unless they have to.

Yet, after all, a dry looking curve or set of figures more often than not represents human interest, the fact that many people have changed their minds. The curve, therefore, has a vital human relationship. For instance, in the fertilizer field we may come across a curve showing that more nitrogen is now being used in fertilizers than was the case twenty years ago, or more phosporic acid, or more potash. This means that out of our six and one-half million farmers, a very definite number have gone through the process first of thinking that they need more nitrogen, phosphates, and potash, and after that, that they have definitely made up their minds they do and they have then bought and paid for more of these elements. All sorts of speculations then arise as to why they did this. What persuaded them to do it? And so if we go back of the uninteresting looking wavy line that makes the average statistician's curve, we run into a field of human interest.

Similar instances could be shown in many other fields. Curves, graphs, and tables of figures represent vital changes in human interest. The man versed in the arts of publicity writes up the human interest features. The man versed in figures writes up the end product, often a dry and uninteresting looking line, one end a bit higher than the other, or a set of figures.

If the reader can only see this human interest behind the statistician's curves and figures, it will be much more interesting reading. On the other hand, if our modern and learned statisticians and economists can also see this human interest and manage to get a little of it into their interpretations, along with the facts, then probably their reading public will tend slowly but ultimately to put statistics and economics in the same class of reading as they now put the lighter human interest literature.

At least this is a subject worth thinking over, if all our statistical effort is to have its proper influence on social life.

High Crop Yields Important

Farm management studies made by the University of Illinois show that the greatest single factor influencing farm income is high crop yields. Thirty-five high income farmers made over $3,000 more net income from the year's business than was made by the thirty-five low income farmers. The native soil, climate, size of farm, equipment, and market opportunities were about the same for all farms.

Over $800 of the difference in net income between the high-profit and the low-profit farms was traceable to the higher crop yields on the high income farms. The high-profit farms grew about 10 bushels more corn per acre and 4 or 5 bushels more oats and wheat per acre. Proper fertilization should give increases as large or larger than these.

Since high crop yields have a major influence on high farm income, the practices which make for good crop yields, including the right kind of a fertilizer program, should receive careful study by all farmers interested in greater returns from farming.

This Farming Business

We recently visited a Polish farmer on Long Island, New York, whose report on his farming activities emphasizes more than ever the fact that successful farming today must need be most carefully planned and conducted. This farmer is renting thirty-three acres of land, paying $1,000 rent. He is growing twenty acres of potatoes, two acres of cauliflower, one and one-half acre of brussels sprouts, three acres of corn; and the rest is waste land.

His cash expenses for rent, fertilizer, seed, and spray materials come to approximately $2,800, or as he put it in his own words, "I have to take in $2,800 before I see a cent."

People can talk about agriculture being a mode of life and that financial returns are unimportant, but certainly in the case of this farmer, as with millions of others, farming is purely a business proposition, and the market price of farm produce an exceedingly important factor.

The Wheat from the Chaff

Very feelingly, Sir John Russell writes in the Journal of the Ministry of Agriculture this month regarding keeping up with the scientific literature:

> "In the nature of things the scientific agriculturists of the Empire are widely scattered; many of them are remote from libraries and laboratories and cannot keep in touch with modern investigations elsewhere. Even workers in large, well-equipped institutions, provided with good library facilities, find this difficult . . ."

How many thousands of workers in this country would voice an accord with this difficulty?

And it is getting worse. As the writer goes on to point out, agricultural science is now being developed in a larger number of countries. Nationalism has revived the use of other languages for scientific work. Before the war practically all the important work in agricultural science was published in six languages—English, French, German, Italian, Dutch, and Scandinavian. Very generously, Sir John Russell goes on to say that most of the agricultural workers could read at any rate the first three or four of these languages, so it was possible to keep in touch with all that was going on. But today, Rothamsted, in common with many other institutions, receives journals on agricultural science in more than twenty languages.

> "Although scientific workers have from time to time threatened to learn no more languages the journals continue to appear. The quality of the work is unequal: some is poor, especially when, as happens in places, men are appointed to agricultural colleges solely on the score of nationalism and not of efficiency; but some is good, some very good, and all must be examined."

So it is becoming more and more impossible for the agricultural expert to keep up with the enormous mass of literature himself. The only solution to the problem is for someone to do it for him. This is becoming an increasingly complex job in every country. In America it is well taken care of by the Experiment Station Record, without which every research worker would be in a maze of doubt and complexities.

The British have gone at the problem on a comprehensive basis by the formation of a Soils Bureau established at Rothamsted on May 1, 1929, the staff of which will abstract all the literature on soils and circulate it to all workers throughout the British Empire. The problem of languages is very largely solved by the employment of Miss H. Scherbatoff, a Russian lady "with a thorough knowledge of some six or seven languages and a good working knowledge of several others." The duty of this Soils Bureau is to maintain an index of the researches being carried out in different parts of the British Empire and as far as possible in foreign countries and to collect information from all sources. Its next duty is to distribute this information about soils to officials and advisory officers. The information distributed includes data on fertilizers. The index of research on soils and fertilizers is now well in hand.

All such agencies working on this problem of indexing, digesting, and making available the results of such work are helping to clarify the problem for every research worker on soils and fertilizers.

The potatoes on the left were top-dressed with 150 pounds of nitrate of soda and 1,000 pounds of 4-8-4.

Tennessee Potatoes

(From page 30)

bags in poor condition, and all together not in such market condition that dealers in distant markets would buy them. Shipments to distant markets only resulted in poor prices, which discouraged production above local market requirements.

In 1923, some of the leading farmers in this section recognized the need of a money crop and appealed to the Extension Service of the University of Tennessee for help in establishing a crop in this area that would bring in some money. Until this time farmers depended largely, if not altogether, on cross-ties and lumber for a cash income. The Extension Service mapped out a systematic program for the production of Irish potatoes on a commercial scale through County Agent R. L. Lyons.

This program included standardization on the Green Mountain variety exclusively, the planting of certified seed grown in the North, treating seed before planting for scab, cutting the seed, fertilization, spraying, cultivation, grading and cooperative marketing. In brief, the program included teaching growers every phase of commercial potato production by demonstration from choice of variety to loading in the car.

During the first year 217 acres were planted in accordance with the program outlined. Six cars were shipped to distant markets, four going to Birmingham, Alabama. The last car shipped to Birmingham sold for 10c a cwt. higher than the Idaho white, which usually commands top prices. The commercial production of irish potatoes is now well established on the Cumberland Plateau.

The several hundred acres have increased to many thousands. Nearly 100 cars were shipped to southern markets during the 1929 season, besides many thousands of bushels trucked to nearby markets. The quality and grade is as good as can be found anywhere, and the potatoes sell at the top of southern markets. Those sold through the cooperative marketing association in 1929 netted $1.55 per bushel for U. S. No. 1's.

During the seven years County Agent Lyons has been working with farmers, teaching them how to grow quality potatoes at the cheapest cost, contrast demonstrations have been conducted on practically every phase of potato production. The results from these contrasting demonstrations have been carefully compared and yields weighed and checked.

Of all these demonstrations, none has been more interesting than that showing the influence of fertilizers on the yield. At the time this project was first undertaken, it was not a commonplace practice to use fertilizer. What fertilizer was used was chiefly 16 per cent superphosphate, or low grade mixed fertilizer like 2-8-2, because it was cheap in price. It was only with considerable difficulty at the outset that many growers were prevailed upon to use fertilizer and then only in small amounts, 200 to 300 pounds per acre. The common idea was that this amount was all that was necessary for any crop. Of course, lack of money, which is more apparent in this section than many other farming areas in the United States, had a great influence in the hesitancy in the investment of money in fertilizers.

A very significant demonstration was carried on by a father and son, on the same farm under similar conditions. The father used 300 pounds of 16 per cent superphosphate on an acre of potatoes. The yield was 45 bushels and of these 22 bushels graded U. S. No. 1's. The son used 1,600 pounds 4-8-4 per acre and supplemented this with a top-dressing of 150 pounds nitrate of soda. The yield was 240 bushels, of which 220 bushels graded U. S. No. 1's.

Another demonstration of 600 pounds superphosphate per acre produced 60 bushels, of which 48 bushels graded U. S. No. 1's. The same application of superphosphate per acre supplemented with a top-dressing of 150 pounds nitrate of soda produced 87 bushels, and 62 bushels graded U. S. No. 1's. A mixture of 2-8-2 fertilizer, applied at the rate of 600 pounds per acre produced 110 bushels and 90 bushels graded U. S. No. 1's. The same application of 2-8-2 supplemented with 150 pounds nitrate of soda produced 135 bushels, and 120 bushels graded U. S. No. 1's.

A mixture of 4-8-4 fertilizer applied at the rate of 600 pounds per acre produced a yield of 160 bushels, of which 140 bushels graded U. S. No. 1's. This application supplemented with a top-dressing of 150 pounds nitrate of soda gave a yield of 180 bushels, and 165 bushels graded U. S. No. 1's.

The application of 1,000 pounds, per acre of a 4-8-4 fertilizer gave a yield of 221½ bushels; 1,000 pounds per acre 4-10-6 gave a yield of 232⅝ bushels; 1,000 pounds per acre of 4-10-8 gave a yield of 227¾ bushels; 1,200 pounds per acre of 4-10-8 gave a yield of 234 bushels; 1,500 pounds of 4-10-8 per acre supplemented with a top-dressing of 160 pounds nitrate of soda gave a yield of 264 bushels.

It is true these demonstrations were not carried on with the precision that is followed on an experiment station and, therefore, the contrast is not as accurate as otherwise might be the case. However, these demonstrations and others of similar nature were conducted over a series of years by good potato growers on soils that were practically the same in fertility and character. They do indicate that increasing the amount of a complete fertilizer, and especially the amount of potash in it, has a big influence on increasing the yield. Fields on which a top-dressing of nitrate of soda was used seemed to withstand severe attacks of the leafhopper and did not seem to blight so badly.

At least these are the lessons Cumberland Plateau potato growers have gotten from demonstrations and experience with fertilizers. At the present time the better growers are using 1,000 pounds and more of complete fertilizer per acre and are using a much higher grade of goods, 4-10-6 and 4-10-8. The trend is decidedly toward the higher analysis mixtures.

Foreign and International Agriculture

Czechoslovakia

By Otakar Horak

Iowa State College, Ames, Iowa

A COUNTRY somewhat larger than the State of Illinois, Czechoslovakia considers agriculture by far the most important of her industries. Being located far from all seaports, and consequently not being able to readily adjust her imports of foodstuffs, the country is ever striving to become self-sufficient in food production.

Just how far the people have advanced in that direction can be shown best by the intensity of the agricultural production. According to Dr. V. Brdlik, in World Agriculture, Vol. 4, in the per capita production of sugar and alcohol, Czechoslovakia holds the first place in the world. In per capita production of barley and potatoes she is second; in beer third; in wheat and rye fourth. In swine production she holds the fifth place; in oats and cattle sixth; and in sheep seventh place.

A steady increase in production of grain per acre has been going on particularly since 1920. Data compiled by Dr. A. Prokes and published in the Annals of American Academy, March, 1929, show that the production of winter wheat per acre increased 52 per cent between 1920 and 1928; that of spring wheat 48 per cent; of rye 65; barley 54; oats 58; potatoes 59; and sugar beets 21 per cent. The number of livestock also increased markedly; horses 25 per cent, between 1920 and 1925; cattle seven per cent; and hogs 24 per cent.

Of all the area of the Republic nearly one-half is in cultivated crops and less than five per cent is unproductive. The unproductive land in the Bohemian provinces includes the land under buildings, roads, and quarries. The proportion of cultivated land to the total is nearly three times larger than that in the United States; the proportion of the forested area more than three times larger; and the area devoted to meadows and pastures about twice as large. The proportion of the area classified as water and unproductive land is 13 times larger in the United States than in Czechoslovakia. In spite of her intensive farming the country is one of the most highly forested countries in Europe.

The Republic is a country of small farms. Nearly half of all farming land is in farms of 12 to 50 acres in size. Fourteen per cent of the land is cultivated in farms of 5 to 12 acres in size.

Farmers live in villages and towns, located mostly, not more than two miles apart. Individual settlements are connected with a dense net of hard-surfaced roads. Along the roads one can see the rows of fruit trees, mostly plums or apples, planted along both sides of the road. The custom of planting fruit trees along the roads, and also along the banks of the creeks, has two advantages. In the first place, it provides a certain income from the fruit. Second, it gives a certain amount of charm and variety to the landscape and breaks the monotony of the white road. The danger of spreading harmful insects protected by trees is fully offset by the protection given to birds which destroy the insect.

The fields are located around the towns or villages, each farmer owning several, often more than a dozen fields, appearing in the form of narrow strips. The division of land into small lots dates back to many generations. When the population and the number of families in the villages increased with each succeeding generation, the only way of making a living on the farm was to divide the existing cultivated land into smaller lots, and to offset the decrease in area of individual farms by increasing the intensity and improving farm methods.

At present, there is a growing tendency to use power machinery for cultivation of land, especially in the regions which are, or soon will be affected by the present program of electrification of farming districts. In these regions each community conducts a survey of all its area and divides it into a small number of fields so arranged that each farmer gets only a small number of fields, from two to four, in the form best fitted for efficient cultivation.

The secret of successful farming, as a Czech farmer sees it, is not in high specialization, or in an exclusive cultivation of crops which bring the highest returns on the market. According to his ideas, it is in the best possible coordination of all phases of his diversified farming. There is no unused land on his farm. He maintains the fertility of his soil by a systematic application of barn manure and of commercial fertilizers. In 1928 the yield of wheat per acre in Czechoslovakia was 25.8 bushels, in the United States 15.6 bushels. The yield of rye per acre in Czechoslovakia was 25.7 bushels, in the United States 12.1 bushels.

The farmer grows a large variety of crops and practices a crop rotation

(*Turn to page* 48)

A typical village in central Moravia: upper left, a school; right, the village store with a group of boys sitting nearby; lower left, the gymnasium in which the members of the national gymnastic organization, "Sokol," take their regular exercise; right, the village chapel. All of the trees are fruit trees.

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, Crops, Crop Diseases, and Insects. 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

Fifteen years' data on fertilizer rotation experiments with cotton, corn, oats, and hay at the Pee Dee Station, South Carolina, are presented in Bulletin 262 of the South Carolina Agricultural Experiment Station. Farmers and agricultural workers in the South should find much of interest and value in the information set forth by the authors, T. S. Buie, R. E. Currin, E. D. Kyzer, and J. D. Warner.

The need of liming becomes increasingly important in proportion to the length of time any soil has been cropped. In Extension Bulletin 92, "Liming Materials," of the Ohio State University, M. V. Bailey, the author, discusses liming in all its various relations to soils and crops. His conclusions briefly are that lime should be regarded as a supplement to liberal applications of manures and fertilizers and not as a substitute for either or both. He states further that fertilizers invariably give largest returns on soils receiving an adequate supply of lime.

"Cotton Fertilizer Experiments in the Salt River Valley," Agr. Exp. Sta., Tucson, Ariz., Bul. 129, Sept. 15, 1929, George H. Serviss and R S. Hawkins.

"Report of Analyses of Commercial Fertilizers," Louisiana Department of Agriculture and Immigration, Baton Rouge, La., Fertilizer Report, Season 1928-1929, Harry D. Wilson, Commissioner.

"Inspection of Fertilizers," Agr. Exp. Sta., Kingston, R. I., Annual Fertilizer Circular, September, 1929, W. L. Adams and J. Eric Blaney.

"Analyses of Commercial Fertilizers," S. C. Agr. Exp. Sta., Clemson College, S. C., Bul. 259, Aug., 1929, R. N. Brackett and D. H. Henry.

"The Role of Magnesium in the Aging of Plants," Vt. Agr. Exp. Sta., Burlington, Vt., Bul. 296, June, 1929, B. F. Lutman and N. L. Walbridge.

"Commercial Fertilizers," Vt. Agr. Exp. Sta., Burlington, Vt., Bul. 301, Aug., 1929, L. S. Walker and E. F. Boyce.

Soils

Studies on water-soluble phosphorus in field soils in Michigan are reported in Technical Bulletin No. 101, of the Michigan State College. The data presented by the author, C. H. Spurway, were obtained by means of a microchemical phosphorus test developed by himself. This test is considered one of the most rapid for determination of water-soluble phosphorus in soils. Its value has been thoroughly demonstrated on numerous soil test plots. A definite relation of crop yields to the amount of water-soluble phosphorus in soils on these plots was found to exist.

"The So-called 'Build-up' and 'Break-down' of Soil Zeolites As Influenced by Reaction," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 28, Sept. 15, 1929, P. S. Burgess.

"Causes and Effects of Soil Heaving," Mich. Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 192, July, 1929, M. M. McCool and G. J. Bouyoucos.

"The Utilization of Moisture on Heavy Soils of the Southern Great Plains," Okla. Agr. Exp. Sta., Stillwater, Okla., Bul. 190, June, 1929, H. H. Finnell.

"Alteration of Muscovite and Biotite in the Soil," U. S. D. A., Washington, D. C., Tech. Bul. 128, July, 1929, I. A. Denison, Wm. H. Fry, and P. L. Gile.

"Soil Survey of Bradley County, Arkansas," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 7, Series 1925, E. B. Deeter, W. J. Latimer, and C. E. Born.

"Soil Survey of Nevada County, Arkansas," U. S. D. A., Bur. Chem. & Soils, Washington, D. C., Bul. 8, Series 1925, W. I. Watkins, M. J. Edwards, C. E. Born, U. S. D. A., and A H. Meyer, Ark., Agr. Exp. Sta.

"Soil Survey Auburn Area, California," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 15, Series 1924, Stanley W. Cosby, E. B. Watson, and W. G. Harper.

"Soil Survey of King City Area, California," U. S. D. A., Bur. of Chem. and Soils, Washington, D. C., Bul. 24, Series 1924, E. J. Carpenter, A. E. Kocher, and F. O. Youngs.

"Soil Survey of Quitman County," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 1, Series 1926, R. E. Devereaux and Earl D. Fowler.

"Soil Survey Chattahoochee County, Georgia," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 4, Series 1924, E. W. Knobel, J. W. Moon, S. W. Phillips and A. T. Sweet.

"Soil Survey of the Soda-Springs-Bancroft Area, Idaho," U. S. D. A., Bur. of Chem. & Soils, Bul. 6, Series 1925, F. O. Youngs, A. J. Kern, and E. N. Poulson.

"Douglas County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rpt. No. 43, July, 1929, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Coles County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rpt. No. 44, Aug., 1929, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Soil Survey of Howard County, Iowa," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 5, Series 1925, C. L. Orrben, and A. L. Gray.

"Soil Survey St. Marys County, Maryland," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 35, Series 1923, S. O. Perkins.

"Soil Survey of Middlesex County, Massachusetts," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 26, Series 1924, W. J. Latimer and M. O. Lanphear.

"Soil Survey Berkshire County, Massachusetts," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 39, Series 1923, W. J. Latimer and M. O. Lanphear.

"Soil Survey of Roscommon County, Michigan," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 27, Series 1924, J. O. Veatch, L. R. Schoenmann and J. W. Moon.

"Soil Survey of Alpena County, Michigan," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 28, Series 1924, Robert Wildermuth, J. W. Moon, L. R. Schoenmann, and J. O. Veatch.

"Soil Survey of Webster County, Nebraska," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 44, Series 1923, Louis A. Wolfanger, and R. D. Wood.

"Soil Survey of Columbia County, New York," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 45, Series 1923, H. G. Lewis, and D. F. Kinsman.

"Soil Survey of Herkimer County Area, New York," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 46, Series 1923, H. G. Lewis, E. F. Brookins, F. B. Howe, and D. F. Kinsman.

"Soil Survey of Linn County, Oregon," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 25, Series 1924, A. E. Kocher, E. J. Carpenter, W. G. Harper, E. F. Torgerson, and R. E. Stephenson.

"Soil Survey Lycoming County, Pennsylvania," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 32, Series 1923, E. H. Stevens, B. H. Hendrickson, C. B. Manifold, C. G. Degen, and Austin L. Patrick.

"Soil Survey Wichita County, Texas," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 19, Series 1924, William T. Carter, W. W. Strike, H. V. Geib, and E. H. Templin.

"Soil Survey Henderson County, Texas," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 38, Series 1923, H. W. Hawker, and R. E. Devereaux.

"Soil Survey of Sheboygan County, Wisconsin," U. S. D. A., Bur. of Chem. & Soils, Washington, D. C., Bul. 18, Series 1924, W. J. Geib, A. C. Anderson, W. H. Pierre, A. H. Meyer, G. D. Scarseth, and Robert Bartholomew.

Crops

Among the crop bulletins, two of outstanding spring interest are Bulletin 444, "The Strawberry in Ohio," by J. S. Shoemaker of the Ohio Agricultural Experiment Station, and Circular 120, "The Family Vegetable Garden," by W. B. Nissley and J. M. Huffington of the Pennsylvania State College. The first mentioned bulletin is complete in information for the successful growing of strawberries under conditions similar to those found in Ohio. The second bulletin has even wider application of useful knowledge on the small vegetable garden common in so many urban as well as rural districts.

"I. Irrigation Experiments with Peaches in California; II. Canning Quality of Irrigated Peaches," Agr. Exp. Sta., Berkeley, Calif., Bul. 479, Nov., 1929, A. H. Hendrickson, F. J. Veihmeyer, and P. F. Nichols.

"Plum Growing in California," Agr. Ext. Serv., Berkeley, Calif., Cir. 34, Oct., 1929, F. W. Allen.

"Alfalfa Varieties and Seed Supply," Agr. Ext. Serv., Berkeley, Calif., Cir. 38, Dec., 1929, B. A. Madson.

"Monthly Bulletin of the Department of Agriculture State of California," Department

of Agriculture, Sacramento, Calif., Vol. XVIII, No. 11, Nov., 1929.

"Illini Soybeans," Agr. Exp. Sta., Urbana, Ill., Bul. 335, Aug., 1929, C. M. Woodworth.

"Pruning Suggestions for Indiana Apple Orchards," Purdue Univ., Dept. of Agr. Ext., Lafayette, Ind., Ext. Bul. 160, May, 1929, C. L. Burkholder and Monroe McCown.

"Wheat Production in Kansas," Agr. Exp. Sta., Manhattan, Kans., Bul. 248, July, 1929, S. C. Salmon and R. I. Throckmorton.

"Forty-First Annual Report of the Agr. Exp. Sta. of the Univ. of Kentucky for the Year 1928," Part I., Agr. Exp. Sta., Lexington, Ky.

"The Quarterly Bulletin, Agr. Exp. Sta., Michigan State College," Agr. Exp. Sta., East Lansing, Mich., Vol. XII, No. 2, Nov., 1929.

"Forest Planter's Handbook, Michigan 4-H Forest Rangers," Michigan State College of Agr. and Applied Science, Ext. Division, Club Bul. 19, Apr., 1929, R. F. Kroodsma.

"American Potato Journal," Potato Assoc. of Amer., East Lansing, Mich., Vol. VI, No. 11, Nov., 1929.

"American Potato Journal," Potato Assoc. of Amer., East Lansing, Mich., Vol. VI, No. 12, Dec., 1929.

"Growing Barley for Grain," Univ. of Missouri, Columbia, Missouri, Leaflet 27, July, 1929, C. A. Helm.

"Catch Crops," Univ. of Missouri, Columbia, Missouri, Leaflet 29, July, 1929, C. A. Helm.

"The Management of Permanent Pastures in Missouri," Univ. of Missouri, Columbia, Missouri, Leaflet 30, July, 1929, C. A. Helm.

"Growing Oats in Missouri," Univ. of Missouri, Columbia, Missouri, Leaflet 28, July, 1929, C. A. Helm.

"Crimson Clover, Kudzu, Beggarweed, and Dalea," Univ. of Missouri, Columbia, Missouri, Leaflet 31, July, 1929, C. A. Helm.

"Canada Field Peas," Univ. of Missouri, Columbia, Missouri, Leaflet 32, July, 1929, C. A. Helm.

"Growing Cowpeas," Univ. of Missouri, Columbia, Missouri, Leaflet 33, July, 1929, C. A. Helm.

"Rape for Pasture," Univ. of Missouri, Columbia, Missouri, Leaflet 34, July, 1929, C. A. Helm.

"Growing Vetch," Univ. of Missouri, Columbia, Missouri, Leaflet 35, July, 1929, C. A. Helm.

"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1928," Univ. of Nevada, Reno, Nev.

"The Pennsylvania Agricultural Experiment Station, 42nd Annual Report," Agr. Exp. Sta., State College, Penn., Bul. 243, July, 1929.

"Containers for Plant Growing," Agr. Exp. Sta., State College, Penn., Bul. 244, Aug., 1929, J. E. Knott and C. D. Jeffries.

"Forty-First Annual Report 1928 of the Texas Agricultural Experiment Station," Agr. Exp. Sta., College Sta., Brazos County, Tex.

"Collection and Preservation of Plant Material for Use in the Study of Agriculture," U. S. D. A., Farmers' Bul. 586, July, 1929, H. B. Derr and C. H. Lane.

"Culture of Citrus Fruits in the Gulf States," U. S. D. A. Farmers' Bul. 1343, E. D. Vosbury and T. Ralph Robinson.

"Currants and Gooseberries," U. S. D. A., Farmers' Bul. 1398, Geo. M. Darrow and S. B. Detwiler.

"Transplanting Trees and Shrubs," U. S. D. A., Farmers' Bul. 1591, Furman Lloyd Mulford.

"The Production of Johnson Grass for Hay and Pasturage," U. S. D. A., Farmers' Bul. 1597, H. N. Vinall and M. A. Crosby.

"Soybean Hay and Seed Production," U. S. D. A., Farmers' Bul. 1605, W. J. Morse.

"Timber Growing and Logging Practice in the Central Hardwood Region," U. S. D. A., Department Bul. 1491, C. R. Tillotson and W. B. Greeley.

"Report of the Chief of the Bureau of Plant Industry," U. S. D. A., Wash., D. C.

"Irrigated Crop Rotations in Southern Montana," U. S. D. A., Technical Bul. 144, Oct., 1929, Stephen H. Hastings and Dan Hansen.

"Cacti," U. S. D. A., Cir. No. 66, David Griffiths and Charles Henry Thompson.

"The Application of Statistical Methods to Seed Testing," U. S. D. A., Cir. 79, Oct., 1929, G. N. Collins.

"Improve the Soil with Winter Cover Crops," U. S. D. A., Ext. Serv., Cir. 100, Sept., 1929, T. S. Buie.

"Cooperative Extension Work 1927," U. S. D. A., Ext. Serv.

"Report on the Agricultural Experiment Stations, 1928," U. S. D. A., E. W. Allen, W. H. Beal, and H. M. Steece.

"Annual Report of the Western Washington Experimental Station, for the Fiscal Year Ending Mar. 31, 1929," Western Wash. Exp. Sta., Puyallup, Wash., No. 14-W, New Series.

"Better Seed Corn," Agr. Exp. Sta., Morgantown, W. Va., Cir. 51, Aug., 1929, R. L. Garber and M. M. Hoover.

"Varieties of Fruits for West Virginia," Agr. Exp. Sta., Morgantown, W. Va., Bul. 222, Mar., 1929, H. E. Knowlton.

"Yield and Composition of Pasture Grass," Agr. Exp. Sta., Burlington, Vt., Bul 295, June, 1929, H. B. Ellenberger, J. A. Newlander, and C. H. Jones.

"Studies in Tolerance of New England Forest Trees," Agr. Exp. Sta., Burlington, Vt., Bul. 298, June, 1929, Geo. P. Burns.

"Forty-Second Annual Report 1928-29," Agr. Exp. Sta., Burlington, Vt., Bul. 302, Aug., 1929, J. L. Hills.

Economics

Mistakes are often made in the use

and securing of credit. A new bulletin, No. 480, by Charles H. West of the California College of Agriculture, entitled "The Use, Value, and Cost of Credit in Agriculture," outlines many of the factors which should be considered by farmers in obtaining credit that will best serve the purpose for which it was obtained. The author points out that most farm loans are made for a period of one to five years, with the result that farmers, unlike men in other old and well-established businesses, are continually renewing their mortgage credit. This is often a costly procedure and does not enable the farmer to obtain the best rates possible. Data is also given showing the extent to which agricultural credit is used and the changes which have occurred in its cost.

"Marketing Georgia Peaches," Ga. Exp. Sta., Experiment, Ga., Bul. 155, May, 1929, R. M. Middleton.

"Systems of Farming for the Purchase Region of Kentucky," Ky. Agr. Exp. Sta., Lexington, Ky., Bul. 292, February, 1929.

"Statistical Handbook of New Jersey Agriculture," N. J. Dept. of Agr., Trenton, N. J., Cir. 166, June, 1929.

"Farmers' Produce Market in Ohio," Ohio Agr. Exp. Sta., Wooster, Ohio, Bul. 443, Nov., 1929, Chas. W. Hauck.

"Trends of Tax Levies in Oregon with Emphasis upon Rural and City Real Properties," Ore. Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 257, Nov., 1929.

"Economic Trends of the Vegetable Industry," Pa. Dept. of Agr., Harrisburg, Pa., Gen. Bul. 483, October 1, 1929, R. B. Donaldson and D. M. James.

"Agricultural Maps," U. S. D. A., Washington, D. C., No. 1101, O. E. Baker.

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Czechoslovakia

(From page 44)

spreading over a long period of years. He grows grain for feeding his livestock, and also for bread for his family. He keeps cattle for feeding, and also for milk production. He keeps hogs and poultry. He has an orchard which provides an income from early summer till fall. Some farms raise rabbits for furs; many keep bees. The country produces over 3,000,000 pounds of honey annually.

Though Czechoslovakia is a small country, the distance from its westernmost to its easternmost points is as far as the distance from New York to Chicago. The type of regions varies considerably, due partly to its geographical location, partly to the elevation above sea level. The soils of the country have been classified as four

Country folks enjoy Sunday afternoon in the woods. Gymnastic exhibitions, stage plays, and musical numbers are presented for entertainment.

main types:

1. Sugar beet regions—fertile lowlands of less than 1,150 feet elevation.
2. Cereal regions—between 1,150 and 1,500 feet elevation. These regions occupy the largest area.
3. The region of cereals and potatoes—between 1,500 and 2,100 feet elevation.
4. The region of forage crops and pastures—above 2,100 feet elevation.

Only a few places in the high mountains do not have any vegetation. Some of the agricultural districts grow special crops known for their outstanding quality. Some of them grow special quality of hops, others barley, others onions, some fruits, and some tobacco. Particularly well known are vegetable districts near Brno, and near Olomouc, in Moravia.

One of the aims of the Czechoslovakian agriculture is to convert the farm produce into commodities of higher value. The annual field harvest amounts to 40,000,000 tons, but only about 10 per cent of it is shipped for any long distance. One-fourth of it is used by the industrial plants within the farming districts, 60 per cent is fed to domestic animals, 4 per cent is used for sowing, and 3 per cent is consumed by the producers.

The sugar industry is the most important agricultural industry, and this small country holds third place among the sugar-producing countries of the world. In the season of 1928-29 the estimated production was 1,153,000 short tons of raw sugar. The first beet sugar factory was established in 1810. In the fifties and sixties of the last century, the industry became flourishing due to the new discoveries and inventions made at that time, and through the growth of cooperation and of agricultural press. At present there are a number of experiment farms for the purpose of testing and improving seed. The Research Institute for the Sugar Industry at Praha is one of the best equipped of its kind in the world.

From one-half to two-thirds of the total output of sugar production is exported. The principal channel of export is the port of Hamburg. Next in importance are exports to Austria, Italy, Germany, United Kingdom, France, and Roumania.

The progress made in this industry in the last 40 years is shown by the increasing amount of sugar obtained from beets. An average for the period 1888-1892 was 11.5 pounds of sugar from 100 pounds of beets. An average for 1893-1897 was 15.4 per cent, for 1908-1912 it was 16.1 per cent, and for the period 1918-1922 it was 16.9 per cent.

Sugar beets benefit the other crops by the fact that they require intensive cultivation of soil, and that the lime carbonate used in the process of extraction of sugar can be also utilized as a fertilizer. Both barn manure and chemical fertilizers are used in growing sugar beets.

The waste material of sugar industry is utilized on the farm. The leaves and stalks and the exhausted pulp are fermented in silos and used as a main feed for cattle in winter. It is estimated that this waste material from an acre of sugar beets contains as much food value as an acre of clover. This in turn makes possible the raising of a large number of cattle, and obtaining a considerable amount of barn manure for fertilizing purposes.

Distilleries are another important branch of the agricultural industry. There are two kinds of distilleries. Agricultural distilleries manufacture alcohol from potatoes. Their total output is 45,000 gallons per season. The waste material is utilized by feeding to cattle. Since this practice is recognized as beneficial to local farming, the government protects such establishments by special subsidies, intended to equalize the difference between the cost of the two types of manufacture, agricultural and commercial. The commercial distilleries make alcohol mostly from molasses at a lower cost than the plants of the first mentioned type.

According to data given by Dr. V. Brdlik, the agricultural industry in Czechoslovakia is represented by the following number of various types of establishments:

171 sugar mills with a capacity over one million tons of raw sugar.

600 breweries with a capacity of 350 million gallons of beer.

1,032 distilleries with a capacity of 32 million gallons of alcohol.

153 starch factories.

13 yeast factories.

300 plants manufacturing 400,000 tons of malt.

380 canning factories for fruit and vegetables, manufacturing 50,000 tons of fruit into jam.

800 dairies.

10,000 flour mills capable of grinding all the grain consumed in the country.

50 factories for the manufacture of chicory and other coffee substitutes.

Czechoslovakia, as a relatively small inland country, aims to encourage her agriculture to such an extent as to become self-sufficient in the production of her main foodstuffs. She aims to export only highly refined products which contain mostly ethereal elements, such products being represented by sugar and alcohol. Highly developed agricultural industry not only makes the most economical use of agricultural produce, but it also gives employment to large numbers of the non-agricultural population of the country.

What's Ahead?

(*From page 29*)

that it can be cross cultivated. Mechanical cotton pickers of both the suction and the spindle type have been aggressively experimented with for some years, and it seems probable that commercially practicable machines will, within a few years at least, be available and economically feasible on at least the high-grade types of cotton.

"What has happened in the cotton industry seems to reveal cotton-growing resources so abundant under modern methods of cultivation and harvesting as to put us in a position to continue our predominance among the world's sources of supply for many years to come. It has already forced the abandonment of a very considerable acreage in the eastern part of the cotton belt, and challenged much of the district east of middle Texas to revise their methods and recast farm organization if they are to survive in competition with the new-born western cotton belt. This new cotton region presents striking examples of tractor cultivation and mechanical harvesting on moderate-priced land with mile-long or half-mile rows, and a 160- to 320-acre family farm in lieu of the 10-acre patch, planted, chopped by hand, and hand-picked by the immemorial methods of the old cotton belt."

Recent reports are that there is increasing interest in tractor farming in all parts of the South. Latest estimates place the number of tractors in Texas at approximately 30,000 as compared with less than 10,000 ten years ago, and county agents in Arkansas report that there is more interest in tractor farming in that State than there has been in anything since the coming of the boll-weevil. Arkansas in 1928 is reported to have had nearly 6,000 tractors; Georgia, 7,000; Virginia 12,500, and South Carolina 5,000. The all-purpose tractor, with four-row cotton planter and two to six-row cultivators, makes it possible for one man to handle 200 acres of cotton up to picking time.

There is greater interest now than ever before in mechanical pickers because the lack of mechanical harvesting methods is regarded as the sole limiting factor in lowering production costs. Experiments have been made for more than 50 years to develop a mechanical cotton picker, and the experimenters always have been on the verge of solution of this problem. The contest now has practically narrowed down to the suction type of picker which is operated on the principle of the vacuum cleaner, the steel-finger type which automatically picks and sacks the cotton, and the cotton stripper which is adapted after the so-called cotton "sled" that strips bolls and cotton from the plants.

A recent survey in Texas showed that one man with a tractor can handle the field operations of at least twice as many acres of cotton as he can with the usual team of four horses. In the Corpus Christi area, for example, one man planted, on an average, 14.3 acres with a two-row planter drawn by four horses, and 35.7 acres with a four-row planter drawn by a tractor; in cultivating, one man covered, on an average, 15.4 acres with a two-row horse-drawn outfit, and 43.5 acres with a four-row tractor-drawn outfit.

In a report of the results of this survey, Dr. L. P. Gabbard of the Texas Experiment Station declares:

"These large-scale, low-cost methods are destined to affect very decidedly the economic welfare of the cotton industry and particularly in those areas where such methods are applicable. Throughout its history, cotton has been characterized and handicapped by an unusually high labor requirement. These new developments in a greater application of power and machinery should do much to remedy the situation. In short, they mean a more efficient utilization of both labor and land. They mean a greater volume of production per man and consequently a better chance of a larger net income. Thus the purchasing power, or economic status, of the individual farmer will have been materially improved. A more efficient use of land, or a greater net profit per acre, will have its direct effect on increasing the purchasing power of the area, and an indirect effect of facilitating the development of vast untilled areas, thus adding to the entire wealth of the community and the State."

Happily, the common habit the last 10 years of "waking" agriculture, as the professional mourners heaved sighs and mumbled something about the "good old days," has given way to the joyfulness in a kind of re-birth. Far from being dead, agriculture seems to be very much alive and to be building for the future in a way that has no precedent. With a commercial history of only 100 years, American agriculture is still in a formative stage with its chief glories yet to be achieved. No, the old days—of 5-cent cotton, or 25-cent corn, and 50-cent wheat; of hand, ox, and horse labor—were not by a long shot better than these.

Boost Corn Yields

BENTON county, Indiana, has been recognized for several years as a corn producing area of the first rank. Considerable credit for the high yields the past four years must go to L. E. Husted, county agent.

In 1929 Mr. Husted had several demonstration plots to discover the true value of commercial plant food for producing corn economically. The average yield where fertilizers were not used was 56.2 bushels per acre. A commercial fertilizer, with a 2-12-6 formula at the rate of 125 pounds an acre, was used and the average yield for six fields was increased 8.4 bushels per acre.

It should be said here that these demonstrations were under actual farm conditions and fairly reliable. There were various soil types and a diversity of farming methods.

The fertilized corn excelled in maturity, quality, and was of a higher grade. Where phosporic acid was left out of the demonstrations, the corn was rather slow in maturing and carried a considerable moisture content. A difference of from 7 to 10 days in maturity was seen where phosphoric acid was used. In years of late springs, this one element would probably mean the difference between soft, unmarketable and ripe, mature corn.

Potash increased the quality. The nitrogen seemed to give the corn a boost when rather young, but did not materially increase or decrease the yields.—*H. Q. Holt, Remington, Ind.*

Feeding King Corn

(*From page 26*)

sustenance from the left-over plant foods applied to other crops. It is not surprising, therefore, that the average yield of corn for the United States is at present short of 28 bushels to the acre, when through proper nourishment of the crop, four times this yield per acre is possible.

Farmers who have learned to grow corn with commercial fertilizer, enjoy increased yields ranging from 10 to more than 50 bushels to the acre, from an application of as little as a sack of complete fertilizer to the acre. Translated into dollars and cents, this means that fertilizing corn may return $5.00 for every dollar invested in commercial plant food.

Because corn belongs to a class of crops which have a relatively short growing season, and hence needs an abundant supply of readily available plant food, it responds markedly to generous fertilization. It requires full nourishment at every stage of growth for best results. The fact that even the most fertile lands, unless they are specially treated, rarely have a high concentration of plant food available in the early spring explains why so many corn fields look sickly especially in cold, wet seasons.

Warmth and air are necessary for the activity of the bacteria which liberates plant food. Land may be ever so fertile and have a big bank account of reserve fertility to meet the demands of grass or other less rapidly growing crops and still furnish an inadequate amount of food for corn which demands sight draft remittance of its food requirements as soon as it puts leaves to the sun.

How commercial fertilizer increases corn yields, therefore, is easy to understand. In the northern fringe of the corn belt, fertilizers supply the available plant food needed to supplement that which is liberated from the reserve supply of essential elements locked up in the soil. Thus, every well-fed, thrifty field of corn reflects its healthy environment by exhibiting a rich, dark-green, luxuriant, foliage. When not fertilized, especially in cold, wet weather, the crop shows its starved condition by a spindly, sickly, yellow appearance.

The use of commercial fertilizers, on account of their almost complete solubility, enables the crop to make a quick start and an uninterrupted growth which is necessary for maximum high quality yields. Hence, the most successful farmers are now employing commercial fertilizers to give their corn a running start in the spring and help keep it growing continuously, just as efficient poultrymen illuminate their hen houses in the short-day winter months to keep their hens laying. Well-fed corn is able to get ahead of weeds, and cultivation can be more promptly done. Consequently, growers are able to "lay the crops by" in advance of the busy haying season which is a matter of no little importance from the standpoint of labor cost.

Just as wonders have been accomplished by corn breeders in molding the crop to the needs of man, science has demonstrated how even more remarkable are the results that can be secured by attention to the nourishment supplied the crop. Through the selection of a complete fertilizer with the proper balance of nitrogen, phosphoric acid, and potash, the maturity of corn can be materially hastened in some instances as much as from one to three weeks. This is an advantage of immeasureable value particularly in unfavorable seasons.

Frost-resistance

Another remarkable effect of commercial fertilizers in extending the profitable production of the crop in northern States is the prevention of injury by frost. Professor A. R. Albert, of the Wisconsin Experiment Station at Hancock, has observed, "Corn fertilized in the hills or drills will survive a temperature slightly below freezing, while the unfertilized corn beside it may be badly injured." The reason for this is the advanced maturity and greater concentration of cell sap of the crop when grown on generously fertilized soil, which enables it to escape damage by early and late season frost.

As explained at the outset, even the best varieties of corn that have been developed cannot perform unless they get a square meal every day during the growing season. On most soils, it requires only an investment of 50c per acre per month to bring the crop to maturity. This is a very small fraction of the total cost of growing corn. It is absurd, therefore, in the face of results returned, for any corn grower to attempt to raise the crop without investing at least two dollars per acre for commercial plant food as quality crop insurance.

There isn't an acre of corn belt soil no matter how fertile, that can supply enough available phosphoric acid to enable corn to yield a maximum crop. Agricultural authorities, realizing this fact, have been urging farmers to apply superphosphate to mineral soils. However, more modern knowledge of plant nutrition has demonstrated that the applied superphosphate, though it helps much to increase yields and consequent profits, cannot respond to the fullest extent if the other essential plant food elements, nitrogen and potash, are also lacking in available form.

Conditions in Appanoose county, Iowa, illustrate the practicability of using complete fertilizers for corn instead of superphosphate only. Where field after field of corn was only 18 inches high by July 20, phosphated corn averaged about a foot higher. Yet Paul Strickler of Centerville, and many of his neighbors on the same soil type, had corn six feet high and in tassel on the same date, as a result of applying $1.50 worth of complete commercial fertilizer per acre. Mr. Strickler stated:

"There wasn't better corn in the State of Iowa than mine and the cost of the plant food that made it was a mere trifle compared with the returns I secured. I have learned that if you want bumper yields of corn, feed it a complete ration. You can phosphate corn for $1.25 per acre and get a fair crop, but it pays to spend two bits more and provide the available nitrogen to enable the stalks to grow abundant foliage which is the starch factory of the plant, and the potash supplied enables the crop to come through in fine shape especially in dry seasons."

Incidentally, Mr. Strickler's observations are borne out by scientific tests made at the Ohio and other agricultural experiment stations.

It costs the average corn belt farmer about 60c a bushel to grow the crop. This cost is represented by the value of the use of the land upon which it is grown to the extent of nearly 40 per cent, cultivation nearly 35 per cent, harvesting about 15 per cent, machinery 15 per cent, and all other costs 5 per cent. No matter, therefore, how generously used, the acre cost of fertilizing corn is relatively small as compared with the total expense of raising the crop. Where this item is neglected, profits cannot be a maximum. Contrasted with the average bushel cost of corn above mentioned, is the accomplishment of at least one grower farming several thousand acres, who, by up-to-date methods of culture and generous fertilization, grew his 1928 crop at a cost of less than 25c per bushel. Applying commercial fertilizer is the most effective and economical way to increase yields.

Again, the average cost of corn silage in the silo as figured by the Iowa State College of Agriculture for Iowa farms in 1927 was $3.34 per ton. The range of costs was found to vary from $1.10 to $6.09 per ton, depending upon yield obtained per acre. Thousands of dairy farmers have found that as little as a dollar's worth of commercial fertilizer applied per acre cuts their ensilage cost to 1/5 of what untreated land produces. Thus, commercial plant food by providing big yields of quality corn puts real profit in the crop North, East, South, and West.

Yield Insurance

Way up on the fringe of the corn belt at Green Bay, Wisconsin, Jacobson Brothers, have obtained yields of corn, year in and year out, of better than 100 bushels to the acre. They have had corn in some years as high as six feet tall by the 4th of July in that far north country. It is not uncommon for them to market their crop largely for seed which brings frequently as much as $6.50 per bushel. How do they get such results? Their system is simple. Good seed, proper rotation and cultivation, and the use of commercial fertilizer to supplement the native fertility of their land so that their crops never lack a full meal, constitute their farm practice.

Thus, by providing a quick start, more rapid, continuous growth, and resistance to injury of the crop by freezing, the use of fertilizer has enabled the successful growth of corn, requiring 100 days to mature, in sections where the normal growing season is not over 120 days duration.

Northern farmers, especially, find in the use of commercial fertilizer, the safest and most inexpensive crop insurance available to them. Most important of all, however, is the fact that through proper use of commercial plant foods they have been able to materially increase the variety of crops which can be successfully grown on their farms. Without losing the advantage of a climate adapted to the best growth of such cool weather crops as potatoes, peas, and small grains, northern farmers by using fertilizer are now able to successfully raise such warmer climate crops as corn. In other words, through the aid of the fertilizer industry the successful culture of ensilage and ear corn for feeding purposes has been made possible on hundreds of thousands of acres where formerly, nature unassisted, it failed.

Extends Dairy Industry

With the stretching of the corn belt went an extension of the livestock and dairy industry, long held as the most wholesome and permanent type of agriculture. The annual acreage devoted to the culture of corn in the great dairy State of Wisconsin, for instance, is constantly increasing. Fully a fifth as many acres are already planted to corn in the Badger State as are grown in our premier corn belt State and the average yield to the acre in Wisconsin is equal to that of any of the great corn States and surpasses the average yield of many of them.

Inexperience in how to select and properly apply fertilizer for best results with corn has more than anything else been responsible for the relatively slow rate farmers have been making use of this means of increasing their profits from this crop. In parts of the Southwest where hot, dry winds sometimes prevail in mid and late summer, farmers observed that corn fertilized in the hill or drill row with commercial fertilizer, at times yielded no better, if as good as their unfertilized corn. Thus, they naturally concluded that fertilizer was the reason for their corn "firing."

This was just another case of conclusions drawn from false premises. The facts were, as has since been discovered, that fertilized corn grown on land in poor tilth, because of its ranker growth of foliage, did suffer more than untreated corn grown on the same type of soil when moisture became the limiting factor. Such apparent unfavorable results were and have since been found to be no fault of the plant food applied, but to the circumstances under which it was expected to function. A noted soil fertility authority has lately pointed out that the so-called "firing" of corn in dry weather is caused by nitrogen starvation, for the effect can be counteracted if this plant food element is supplied in abundance.

Approved methods of corn fertilization worked out at the Missouri Agricultural Experiment Station have conclusively demonstrated how commercial plant foods can be employed on such lands, even in exceptionally dry seasons, with good results. Prior to 1925 in Missouri Experiment Station tests, the increases from commercial fertilizers on corn rarely had been more than 6 to 8 bushels to the acre. Then a rotation including rye, seeded to sweet clover, with the latter crop plowed under for corn, was followed. Immediately the returns from the fertilizer applied to the corn, increased to as much as 25 bushels gain in yield to the acre. The additional nitrogen supplied by the sweet clover, as well as the improvement in the physical condition of the soil it effected, removed limiting factors that formerly counteracted the action of the fertilizer.

In other words, although fertilizers alone can improve the tilth and moisture-holding capacity of land through the larger crop residues their use provides, on rather worn lands it is best to speed up the soil building process by growing in the rotation sod crops which furnish the conditions necessary to make larger quantities of commercial fertilizers properly function. The better the physical condition of land, the more surely will fertilizers applied yield to the utmost, is a truth now established. Fertilizer not only serves to make poor land yield a good crop but good land yield a better crop.

Applying the Fertilizer

Where the idea originated is not known, but it is a fact that up to only a few years ago hill or drill fertilization of corn was thought to encourage the crop to limit its root growth to the immediate vicinity of the applied plant food. Repeated investigations not only revealed that this was not the case, but also showed that on the contrary such applications actually stimulated the root growth. Hence the method of applying commercial fertilizers with an attachment to the corn planter at the time of seeding is now recommended by authorities and is increasing in popularity.

The amount of fertilizer that can be applied safely in this manner, because of the limited opportunity of distribution, however, rarely exceeds a sack to the acre. This amount is scarcely enough to yield the greatest return. Consequently the method of applying several hundred pounds of fertilizer to the acre broadcast before planting and the remainder with the corn planter attachment is now becoming the approved way of distributing the plant food.

Even perhaps more important than the method of application, is the analysis of the commercial fertilizer used. It is now generally conceded that practically on all types of soils complete fertilizers are best for corn. A complete fertilizer is one containing all three of the essential plant food elements, nitrogen, phosphoric acid, and potash. It is to select an analysis best suited to one's particular soil conditions that demands attention. Nevertheless, due consideration of a few simple conditions offer all the guidance needed to get good results.

All soils of the country adapted to corn raising are deficient in available phosphoric acid. Corn fertilizers therefore, should contain from 10 to 15 per cent of phosphoric acid.

Few soils have an abundant supply of nitrogen, but some black lands such as muck or peat soils have a fair amount of this element. Likewise, dairy and stock men who are able to manure their corn ground with 8 to 10 loads of farm manure at least once in 4 to 6 years do not need to use a fertilizer for corn containing over 3 per cent of nitrogen. On the lighter soils and where little or no farm manure is available, however, the nitrogen analysis of corn fertilizer should be from 4 to 5 per cent.

On the other hand, most peat and muck soils respond to potash fertilization. A fertilizer with a high ratio of potash to the other plant food elements it contains, therefore, pays best on soils of this type. In the case of mineral soils, the amount of potash in the fertilizer that pays best depends upon the inherent productive capacity of the land and whether or not farm manure is available. Ordinarily an analysis containing from 4 to 8 per cent of potash gives excellent returns on typical corn belt land.

Of course, there are many variations of soil conditions between the general classifications just described. It is wisest, therefore, to apply a complete fertilizer containing an excess of the various elements which experience indicates are likely to be deficient. The residues of such a generous treatment are rarely wasted investments, for succeeding crops of the rotation will make use of them to advantage.

Corn growers who practise the modern methods of culture can reduce by half the present average cost of producing this great crop, for a generous use of complete fertilizers makes possible big yields of the most productive strains of corn. And in view of the unquestioned increasing demand for the crop in the light of the new uses to which it is being put, there is a new era of prosperity in store for those who scientifically cultivate King Corn.

A Successful Farmer

(*From page* 23)

f it rains and washes the poison off. It is all the more reason why you should poison again.

"But all this talk doesn't give you the story. Here it is in short. In 1928 I worked seven plows, planted 120 acres of cotton, and made 110 bales. This year, 1929, I have run seven plows, and have planted 175 acres of cotton, and am safe in saying that I'll pick 125 bales in spite of the August drought. You can make cotton every year by proper fertilizing and poisoning.

"Now don't get the idea I am just a cotton farmer, although that's where I make my money. I will this year make 1,000 bushels of corn. I have threshed 312 bushels of oats, 96 bushels of wheat and, have plenty of hay saved to feed my work stock and milch cows. I raised my own meat and have a garden that well supplies my table. Yes, I forgot to tell you my fertilizer bill this year is over $3,000, but it is the best help I ever tried. I wouldn't — I couldn't, farm without fertilizer."

Accurate Data

(*From page* 5)

Another method employed, and still bearing the brunt of the data gathering, is the linear measurement of fields with the use of the so-called road-meter attached to the speedometer gearing of an automobile. This device is a combination of nine speedometers in one, each meter representing a specific crop. At the beginning of the wheat field, say, the operator pushes in the wheat button and there is automatically registered the number of linear feet in the field along the road.

Then may come corn or cotton. The right button is pushed in and the previous button automatically disengages itself. At the end of the run each meter gives the operator the total measurement of all the fields of that crop and the combined total in turn is checked against the total shown on a meter that registers the entire distance run. Records over the same run year after year give the percentage of change in the plantings of the various crops, which percentage is applied to an entire county.

This device is used on automobiles for measuring feet and miles of crops. The operator simply pushes the right crop button.

Soybeans

(*From page* 21)

While the soybean is largely used as a food crop in the Orient, it is primarily a source of stock feed and oil in the United States. American farmers use it as a forage crop; some of it is cut for hay; much of it is grazed, particularly by hogs; and some is used as a silage crop, usually with corn. Soybean hay is rather coarse and not as easy to cure as some of our other hays. It is usually cut about the time when the pods are forming, and while it ranks below our clover and alfalfa hays, it is relished by livestock. Its use as a hay crop is frequently of an emergency nature, the soybeans being grown when clovers fail and an annual plant providing a high protein feed is needed.

The oil industry using soybean seed is one of considerable promise. This began in the United States about 1910 on the Pacific coast, where oil was manufactured from soybeans imported from the Orient. In about 1915 this industry was established in North Carolina, and since then an extensive soybean oil industry has developed in the Corn Belt. Morse reports that from 28 to 31 gallons of oil are produced per ton. The oil cake, which is a by-product of the oil industry, is used as a stock feed and sometimes as a fertilizer. Soybean oil is rather widely used in the industries, and also to some extent it enters into food products. Like other leguminous crops the soybean is frequently used as a green manure crop and relied upon by some farmers for maintaining soil condition and fertility.

In a relatively short time the soybean crop has become one of considerable importance. The United States Census of 1910 reported only 2,000 acres of soybeans, whereas crop estimates for 1928 placed the United States acreage, excluding that for hay at 1,222,000 acres with a farm value of $29,282,000. The distribution of this acreage is shown on the map.

At the present time Illinois is the leading soybean State, growing about 220,000 acres annually. North Carolina ranked second in 1928 with 196,000 acres. Much of the United States acreage is in the Corn Belt, where the crop seems to do especially well. Of the 1,222,000 acres grown for purposes other than hay in 1928, it is estimated that 651,000 acres, or about 58 per cent, were used for the harvesting of beans, the balance going for other uses. The hay acreage is not included in this total.

As the United States has increased domestic production of soybeans, our imports of soybeans and soybean oil have decreased. In 1923 we imported nearly 42,000,000 pounds of beans and oil from abroad, exporting less than 1,500,000 pounds during the same year. In 1927 our imports were less than 15,000,000 pounds and our exports nearly 5,500,000. Thus our net imports of these products declined from over 40,000,000 pounds in 1923 to less than 10,000,000 in 1928.

Statler Farms

(*From page* 9)

of the yield. The potash starvation symptoms began to appear early in the season. The vines took on that characteristic bronzed and bluish green appearance which is now associated with the shortage of potash in the potato plants.

The potato plants which received the balanced fertilizer were taller, more vigorous, and stockier, and in general much better equipped to produce a bumper crop than the plants which were denied the element potash

As far as the Statler Farms are concerned, the question of what kind of fertilizer to use is definitely answered. It will be a 4-10-6. Further tests are being planned to settle the question of the amounts needed per acre.

This question of the balanced and the unbalanced fertilizer was further investigated by planting some of the plots without any kind of fertilizer other than the natural fertilizer elements available in the soil. The field on which these tests were conducted produces fine crops of legumes. It had been in alfalfa for several years just previous to the planting of the potato crop of last year.

Some 60 of Miami County's leading potato growers were on hand to see the results of these several demonstrations. They noted that the plots without any fertilizer at all only produced 183 bushels per acre and that the balanced fertilizer (4-10-6) produced 283 bushels. The yields of the 4-10-0 and the no-fertilizer plots were both about 100 bushels short of the balanced fertilizer treated plots. Such proof of the value of the right kind of fertilizer and the failure of the wrong kind of fertilizer should make every potato grower test out the analysis of the goods he is using on his own farm for it is next to impossible for anyone to say exactly how much and what kind of fertilizer will give the very best results for any particular farm.

More and Better Apples

(*From page* 20)

one ton of chicken manure per acre, to his Gravensteins, 15,000 lug boxes of salable apples were picked and delivered from 650 trees, while in the same year there was a general complaint in this district that the Gravenstein apples were below par. Those who handled and sampled his crop testified that their flavor and keeping quality were unexcelled. Also, in spite of this crop being the heaviest ever produced from an equal number of trees in this district, they promised another heavy crop in 1927, which expectation was fully lived up to. In 1928 these trees outdid themselves, as the production excelled even that of 1926.

Putting it in dollars and cents, the value of the apple crop of the Reed orchard has increased from $7,800 in 1923 to $14,000 in 1928, in spite of the fact that prices to California apple growers have been low for several years.

It is very evident therefore, that apple growers should carefully consider the supply of plant food ingredients available to their trees. Of the three chief elements in plant food—nitrogen, phosphorus, and potassium—no one is all-important. As they work not independently, but interdependently, all must be present in forms that the tree can readily draw upon. Normal nutrition of the tree is assured only when a plentiful supply of each is available at critical periods of growth and production.

Potash, being more heavily drawn upon in the production of apples than either nitrogen or phosphoric acid, must be considered as a plant food ingredient of major importance. Therefore apple growers should be sure that their fertilizer application includes from 100 to 400 lbs. of actual potash, (K_2O) per acre, according to the age and size of the trees to be treated. Where conditions are favorable, potash will pay well in maintaining the trees in vigorous health and regular production of apples of the finest quality.

Ontario

(*From page* 14)

to form almost a true hardpan. This layer in most Ontario soils contains a larger percentage of colloidal matter than any other layer in the profile. In the majority of profiles the layer of accumulation also shows a higher content of nitrogen than the second or leached layer. Studies of the reaction of common soil profiles show in general, that the second or "leached" horizon is more acid than the other layers of the profile. The pH values determined by the quinhydrone electrode, are for the most part, higher than those reported for similar soils in United States. The parent material, in practically all cases, is highly calcareous.

Foremost among the many investigations being carried on in other departments is that in poultry husbandry. The poultry department has developed a special ration for laying hens which has become widely used and has done much to place the poultry industry on a profitable basis.

In poultry flock improvement, 200 poultry breeding stations carrying 18,000 hens have been operated during the past six years, while each year 800 to 900 pedigreed breeding males from high production stock have been furnished by the college to farmers all over the Province.

Extensive studies in poultry nutrition are being conducted with a view to determine the effect of animal proteins on egg production and the hatchability of eggs. Experiments with cod liver oil as a supplement to the proteins indicate that it may in a large part serve as a substitute for sunshine.

One of the most important contributions from the college in recent times has come from the department of entomology in the research work done in connection with the European corn borer. This borer, which has caused a loss to the farmers of the Province of many millions of dollars in the past few years, has now been satisfactorily brought under control through methods worked out by this department.

The method control of the apple maggot, which consists of spraying the trees with arsenate of lead in water as soon as the flies appear, was discovered and worked out by the department of entomology.

The departments of entomology and botany in cooperation with the fruit growers of the Province have instituted a spray service to orchardists, which in the case of supervised orchards, has increased the production of clean, high-grade fruit 100 per cent. During 1928, the service was extended to 1[illegible] counties with 800 orchards.

Research, conducted by the department of agriculture at the college, resulted in the discovery of the "Water Formalin Solution" for sterilizing diseased super combs which is now widely used by apiarists throughout Ontario. Through registration of l apiaries, the grading of honey and ;amination of diseased comb honey, ıe department has been able to make rect contact with the beekeepers of ıe Province, and bring about a more ıiform, much improved product, in ›th local and export markets.

In the department of agricultural :onomics, studies of farm labor, vestock and grain farming, marketg, and other factors affecting the rmer's income have been made and mely bulletins, press articles, and rculars have been distributed to ·lp the farmer improve his farm orınization and get larger farm reırns.

To enumerate the many projects under way in the several other departments of the college is not possible here. The research and experimental work at the college is growing rapidly to take care of the problems that are urgently needing attention. The generous financial support from the Provincial Legislature is insuring the continuation and expansion of this branch of the college activities on a scope that is bound to maintain the position of the institution as one of the premier agricultural colleges and experiment stations on the American continent.

Health Is—?

(*From page* 4)

ıd MacLeod of Toronto University scovered insulin, the specific for abetes.

It may be a long trail from these assy scientists to those old blood tters and dopesters of our youthful collection, but somehow I cannot ·lp giving the country practitioners :aps of credit for using much optiism and harmless colored water. ›th seemed to do the nervous inılids much good, and at much less pense to themselves and their fami·s than arises today when "psychomethings" are so eagerly sought.

I have also researched hard and dis›vered anon that two of my oldne enemies on the Road to Wellılle—quinine and ipecac—were first ıund by Indians. From fever and ıinine, dysentery and ipecac, good ›rd deliver us! Yet I have had all ur and am still able to navigate.

Hence it seems from this deduction at our good old aunts adopted the ied-herb tea habit from their ›original neighbors. In this cate›ry likewise I am a specialist from tter experience. Balm, catnip, ›rmwood, and horehound; your reign was perpetual among the pioneers.

Spring in the days of home-made medicines was no relief from winter's bondage. But the spoon-fed contents of sticky bottles have largely given way to the sensible viewpoint that the best tonic at the vernal equinox is pure food in ample variety and some outdoor exercise. I practice what I preach. No molasses and sulphur has been used in my home for twenty-five years. As the Battle Creek slogan says, "There's a reason."

THE doctrine that only the physically fit are able to survive must have originally gained credence from the many horrid methods used to make folks well. Be that as it may, we find ample proof that life expectancy has gained many spans in the last few centuries. Men used to live hard and short. Now they live long at a somewhat softer pace.

Parents in Europe, at the time Columbus blundered into the American zone, had many more children than they have today. This was presumably because the average term of life was 18 years in those brave old days. Each family had to start more individuals on the walk of life than now obtains because so few of them lived long enough to be worth much.

Going along a little further, we learn that about the time when Napoleon wanted more soldiers the average life of a human being in France was 35 years. For children who survived the first year in the era of our Civil War the life expectancy was about 44 years. The folks who juggle health statistics for us state that at present the nation enjoys an average life expectancy of between 55 and 60 years.

Kansas gets the palm, 'tis said, for the highest average length of life. My own State is thought to be "just medium" in the scale. But methinks one year in Minnesconsin is worth two or three in the prairie provinces or even a "cycle in Cathay." But I am wandering from the subject of prevention to that of propaganda. But before leaving this by-path, let me say that I have a British friend from New Zealand who boasts a degree of health protection there which gives them 64 years of life expectancy. If he keeps reminding me of it a few more times I fear he won't attain the national batting average.

I UNDERSTAND that New York City was first to establish a public health bureau. Ellis Island was bad enough, goodness knows, but conditions right in the city did not educate foreigners to combine sanitation with liberty and equality. Science and preventive medicine stepped into the picture and turned the balance from loss and death to gain and life. Because the rest of the nation followed New York in styles, stocks, and finance, it was an easy matter to extend the health bureau plan further and further toward the "unwashed west."

But public health protection does not sum itself up by merely thinking of doctors, laboratories, medicines, and Mendel's law. The cooks had to un dergo a reforming process likewis Possibly not all of them have reache the desired goal as yet, which mak us choose some restaurants in prefer ence to others; but on the whole, ou ideas on eatables have changed from standard of filling qualities to one o genuine nutrition.

Certain social agencies and move ments promoting human welfare hav contributed a vivid part in the dram of health progress. Dosing and doc toring, germ discovering and vacc nating would do little for a com munity with low earning power, lon confining factory hours, and trac hazards. The so-called "nosey" soci workers have vanquished many of th foes to health lurking in odd corne of the underpaid and overworke world.

MUCH as we gibe at the plumb and steamfitter, he has indee contributed something to humanit besides big bills and a mess in th kitchen. Likewise, the haphazar well-digger with his mystic witch rod of yore has given place to me who know that pure water suppli mean something more than boring long hole and sticking a pipe into i That relation of ours, the patien dairyman, has altered from a pitche pouring vendor of streptococci to vigilant bottler of a product that a tracts grown men as well as pulin infants. In fact, he is getting so goo commercially that the popfizzler an the butcher begin to feel the pow of his competition. His distan cousin, the buttermaker, has learn not to chew tobacco in office hour because he knows that personal sanit tion does him more good in his scr with the substitutes than act of Con gress.

The grocer need no longer worr about the cat getting into the be barrel or the mice nibbling the mac roni. He is also protected from th long-armed hanger-on who spre erms when he filched crackers from ne open box. Part of this emancipa- on from danger is emblazoned on ackaged merchandise in the govern- ent's magna carta of the commis- ry—"June 30, 1906."

Granting that the wider use of accines, serums, and antitoxins has riven some of the worst maladies like phoid fever, scarlet fever, and diph- eria completely out of the ring, r case is never finished until we ave met and talked with the pro- ssional objectors. To be a non-con- rmist is sometimes a sensible thing hen all the world has run amuck cept ourselves. I have wholesome spect for the gentleman of decided ntrary opinions, and he who rails "inspectors" and "regulations" may ten really have some justice on his de.

Many folks tell me that this public alth propaganda is all foolishness cause all it does is to save children they can grow up, be an expense to society, and then die of something entirely different than what was intended. They point out that women can't nurse their babies any more, and that women aren't as husky as their mothers because they must go to hospitals at maternity time. But in my State the infant death rate has declined in 20 years from 106 per 1,000 of children under one year old down to 64 per 1,000. Deaths at partruition or resulting from natal disturbances have likewise greatly declined. The superstitious old midwife and her clumsy notions have been sort of "inspected" and "regulated" out of existence.

The grim reaper still whets his scythe and sweeps in among us, 'tis true. But in saving a healthy child and keeping his body clean and vigorous, you save lives all along the line and make life more abundant and purposeful. This means that in due time our oldest inhabitants will have something to ponder on in their senility besides chilblains, rheumatism, and a mis-spent life.

Meddling with "personal privilege" is the brunt of the wedge shoved into the argument by most of the conscientious objectors, and it fits any handy topic from health protection to the Volstead law. I suppose they wish to cling to discarded customs and fetishes, now known to be adverse to bodily health. Just to be firm in their personal privilege, I recommend that they go back to the days of open dish milk peddling, bulk butter, patent medicines, and red flannel underwear. They would no doubt find that a vast amount of public opinion has been behind all these innovations that they claim to resist.

Personal hygiene is just as much a part of patriotism and defense of country as tax paying, and a lot more pleasant. Education by good public health agencies is doing a lot to raise the morale and lower the liability.

I may not like to see a red card tucked up on my own door, but it's comforting to know that a supply of the same cards are ready when the neighbor's family starts to spread something catchy besides jazz music.

HEALTH is what? It is just what it means to you in terms of ambition and desire. Carried to a further point, there is apt to be little ambition or desire left without health. Health is the "vitamin of motives" that is worth just as much to each of us as we apply it to serve particular ends.

If it is desired to enable one to earn more money, then health is wealth.

If it is wanted to make one taste the spice of life and enjoyment, then health is pleasure.

If it is sought to prepare one for efficient work for the work's sake, then health is industry.

If it is hoped for to stimulate the brain and clear the mind, then it is intelligence.

If it is held valuable to keep u from accidents and physical blund ers, then it is insurance.

If it is valued as a means to sav car-fare, auto expense, or doctor' bills, then it is Scotch thrift.

Perhaps if it is wanted in a nic balance between them all, then I de clare it to be that veritable Blue bird of Happiness, whose nest w hope to see hanging in our own vin and fig tree.

AND happily, in my journey around among the workada folks of the field and furrow, I fin them talking more of true happines in terms of vital health than they ar of tariff or farm relief. Somehow economists to the contrary, the prize red cheeks and glowing eye above the dirt farming dollars tha seem so slow to accumulate.

It's strange, after all, that we didn' appreciate that fact before our inter views. Almost any sage in the chim ney corner could have told us tha health is the real Golconda.

And yet, somehow, many of u have gone on believing that farmer have changed their ideals since th auto and radio invaded their bucoli contentment; only to find out afte all that human life is still the mos treasured thing between the soil of th field and the ashes of the countr churchyard.

We may then count as farcical an worthless all those attempts to char and graph the upward and downwar cycle of agricultural economics, un less we make allowance for the satis fying zest that comes to a health farmer after partaking of a soun night's rest and a rousing good break fast.

Talk despair to a hungry, un healthy man and you have him as disciple; but it takes more than wrat and arithmetic to unsettle the min of a man with good blood and a soun stomach.

Wishing the same to you and man of them, I sign off until March.

YOU CAN'T FOOL 'EM

Two colored gentlemen were engaged in conversation when one of them became persistently annoyed by a large fly.

"Sam, what kind of a fly am dis?"

"That am a hoss-fly!"

"Whut am a hoss-fly?"

"A hoss-fly am a fly what buzzes 'round cows an' hosses an' jackasses."

"See here, you ain't makin' out to call me no jackass?"

"No, I ain't makin' out to call you no jackass, but you can't fool a hoss-fly."

"Dear miss," wrote a particular mother to the teacher, "don't whip our Tommy. He isn't used to it. We never hit him at home except in self-defence."—*Better Health.*

Missouri paper—At Mrs. Alfred Miller's sale last Friday, Jersey cows sold for over $100.00 each. Her husband was killed in an auto wreck last election day, and her neighbors showed their appreciation by making everything bring a good price.

A DIPLOMAT

"Why don't you buy something at my table?" demanded the girl at the charity fair.

"Because I only buy from the homely girls," said the man. "They have a harder time making sales."

The girl was not offended, and the man worked the game right down the line.—*Exchange.*

HURRY CALL

Singer—"And for Bonnie Annie Laurie I'd Lay Me Down and Die."

Listener (rising)—"Is Miss Laurie in the audience?"

Two children were arguing.

John: "It is."

Elizabeth: "It isn't."

John: "I tell you it is, because Mummy says it is, and if Mummy says it is, it is, even if it isn't."—*Tit-Bits* (London).

---

300 PER CENT HOME

Wanted—To sell or trade my brick residence, 2214 Fairview Road. Reason—need more rooms; had one child when moved in; now got four; good place.—*Raleigh Evening Times.*

Sky: "I hear you and your wife had some words."

Hy: "I still have mine. I didn't get a chance to use them."

NEXT BEST THING

Nervous Musician: "Madam, your cat has kept us awake two nights with its serenade."

Mrs. Nextdoor (tartly): "What do you want me to do, shoot the cat?"

Nervous Musician: "No, madam, but couldn't you have him tuned?"

—*Spokane Ad Bulletin.*

"That is a skyscraper," announced the guide.

Old Lady: "Oh, I'd love to see it work."

What English Scientists found out about POTASH *for* APPLES

TO determine the effects of potash in apple production a series of experiments was conducted in England at the East Malling Research Station with three varieties of apples. In these tests over a period of three years, apples fertilized with nitrogen and phosphoric acid but no potash were compared with apples fertilized with nitrogen, phosphoric acid and 400 pounds of sulphate of potash per acre.

The average annual gain from the use of potash was $134.72 per acre. The sulphate of potash considerably reduced leaf scorch . . . greatly improved the size and color of the leaves . . . increased yields . . . and producd higher quality apples of larger size that brought a better market price.

If you are dissatisfied with the yield of your orchard and the quality of your fruit try using a complete fertilizer high in potash. IT PAYS!

Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY.

of Amsterdam, Holland

19 West 44th Street New York City

Extra **POTASH** POTASH PAYS NV POTASH EXPORT MY ON ALL CROPS TRADE MARK REG. **PAYS** *Extra Cash*

"Extra potash pays extra cash" is a slogan wherever extra potash is used.

Printed in U. S. A.

Better Crops WITH PLANT FOOD

March 1930 10 Cents

Spring Fertilizer Number

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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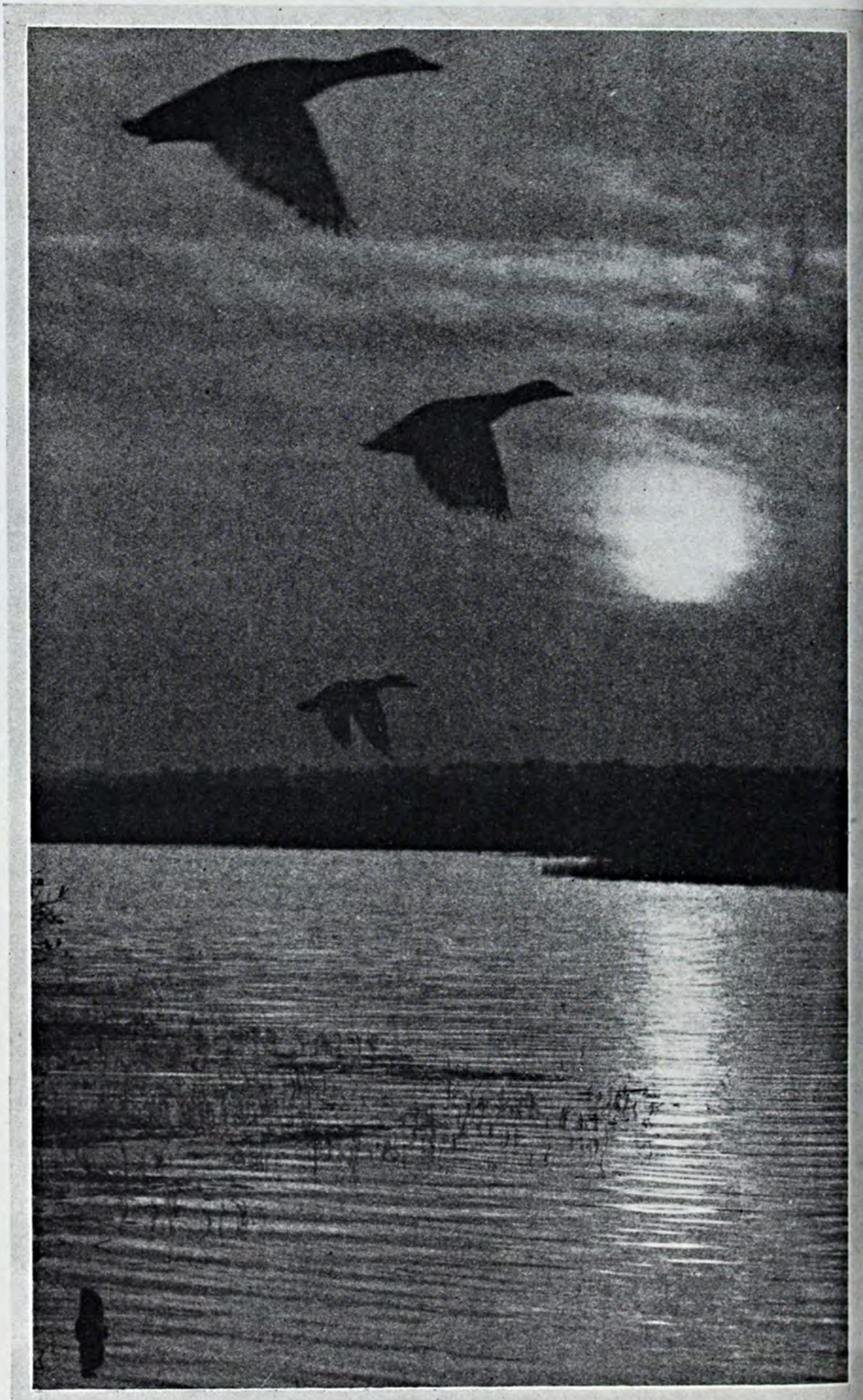

GOING NORTH—ONE OF THE FIRST SIGNS OF SPRING

Better Crops with PLANT FOOD

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Jeff is for and against—

Non-conformists

By Jeff McDermid

AS the stone-cutter carves "Hic Jacet, the Hick" on the monument of farm progress we might as well pause and get the viewpoint of the protesting ninority, who refuse to bury their ancient opinions in the grave of the obsolete ayseed. To a candid reviewer there is no treason whatever in mellow retropect.

Gomorrah somehow must have appealed to Lot's wife, but she met a briny ate because she seemed to be a non-conformist. If worst comes to worst in my ase, I pray it may be limestone—for the land's sake.

What has happened to the farmer of he Midwest who used to trim his eard on national holidays and who aintained a small herd of cattle artly for sentimental reasons? What as happened to this uncompromising eoman whose father fared overland a prairie schooner, and who believed hat nine o'clock of any evening was e proper time for winding the mantle timepiece and barring the homestead doors?

The selfsame national spasm for standardization, modernization, and efficiency which has forced all the once happy small-town merchants into lunch clubs and chambers of commerce is driving the old-time, bucolic, turkey-in-the-straw style of farmer from the smiling countryside.

Behold! the rural Renaissance! The most powerful public agencies of education and communication are devoted to its creed. What can the stubborn non-conformists do to dodge the steam roller if they deny the new cult of the cultivator? Their futile resistance sets them in the spotlight as horrible, decadent, archaic examples of the shiftless era of tillage.

If a few remnants of the passing order manage somehow to make pecuniary profits at the plow, that fact is relegated to the attic, while those who "join up" and "come across" in the accepted fashion have their successes displayed on the front porch of publicity. The cow that is fed at a profit by a Mid-Victorian farmer in a shabby frame barn minus stanchions and a silo seldom gets the blue ribbon. The man who fails to mention the vitamin content of the milk his herd produces is advised by science to take a course in high power advertising or else quit dairying.

THE farmer's vocabulary is limited, we hear, unless he speaks of amino acids, the metabolism element of minerals in rations, and the values of foods and feeds in terms of fat-soluble A and water-soluble B. He must assume his own enhanced responsibility as an expert technician, and at the same time be held under ignoble suspicion as a frequent contributing factor to malnutrition, beriberi, ptomaine poisoning, trichina, hookworm, and rickets!

"Hic Jacet, the Hick" is the legend graven on the monument of progress. We all helped put it there. Perhaps few of us would erase it, even if the letters *could* be removed from the resistant granite.

Nowadays the farmer is a gentleman in the latest meaning of the word. Do not confuse him with the awkward rube who eked out an existence in the days of ear-muffs and husking bees. Some of them still "eke" no doubt, but they do it to the tune of "Singing in the Rain" via radio! Alfalfa today is a legume, not a mark of hirsute paternal majesty. The Gillette has got many a goat, and even the female of the rural species awaits her turn at the barber shop. Appearances count, says the converted countryman; whereupon, veneered with outward culture at least, he attends the chamber of commerce banquet, and is there extolled and defended—and too often paternalized and then whipsawed into political cordwood!

WOE to the conscientious objector in agriculture who persists in growing whiskers or wearing overalls to meeting, or who feebly inveighs against lip-sticks, cement roads, and consolidated schools!

There is no use in his trying to prove by the album of his New England ancestors that they were gentlefolk in spite of linsey-woolsey, hickory shirts, and Greeley whiskers. His forebears were frumps and his cause is lost!

Under the spell of the rural vocabulary that must be adopted for the sake of caste and commerce, our poor stuttering objector gives way aghast. Herein lies the reason why the stage comedian of today seldom makes a hit with the Si Plunket brand of monologue. He is presenting a type which many of us are trying hard to live down.

Verily, the cracker barrel congress lives chiefly in the imagination of the "colyum" conductor, and even that versatile genius must search old files for local color. The founders of farming used a simple language, filled with dynamic idioms and redolent of the soil. The modern accepted agriculturist is taught to use terms which are semi-scientific or pseudocultured. It is all right to be trite and dull these days if you avoid the "Hey Rube" phraseology.

Sad to say, however, the rural Renaissance has all but smothered rus-

(*Turn to page* 61)

POTASH

By Otto I. Bergh

Superintendent North Central School and Station,
University of Minnesota, Grand Rapids, Minnesota

"JIM" HILL, the "Empire Builder," was intensely interested in the agriculture of the great Northwest. Back in the eighties and early nineties of the past century, he was introducing into that territory, on a gigantic scale, the best blooded cattle, swine, and sheep imported from abroad in order to develop a broader and better balanced industry. It was therefore not at all surprising, when the phosphate deposits in Montana were discovered some 20 years later, that this keen visioned man should launch a soil fertility project of a magnitude far beyond that usually attempted by State and Federal departments of agriculture.

The results from these soil fertility trial fields throughout the vast territory served by the Great Northern Railway revealed many soil areas deficient in phosphorus. Several of these are in Minnesota. The most outstanding, perhaps, is a belt extending from the Red Lakes to Lake Traverse and beyond, paralleling the upper beaches of the extinct glacial lake, Aggassiz.

Following closely upon the investigations by the Great Northern Railway Company and to supplement and confirm the results, the Division of Soils of the University of Minnesota laid down long-time phosphate projects at each of the six Minnesota Experiment Stations located as follows: St. Paul (Central); Morris (West Central); Crookston (Northwest); Grand Rapids (North Central); Duluth (Northeast); Waseca (Southeast). These projects included applications of phosphates in the form of both raw rock and superphosphate, used in combination with farm manures as well as alone. The treatments

The experimental field on August 15, 1929. The potato plants in the center plot (left) receiving no potash are completely wilted and withered. Plants on adjacent plots treated with potash are still growing vigorously.


Otto I. Bergh, Superintendent, North Central School and Station.

were alike at all stations. The crops grown and rotations adopted, were those suited to the general type of farming in each district.

You may ask, "What have phosphate trials to do with 'Potash,' the subject of this story?" Possibly nothing at any of the stations except the one at Grand Rapids. Here these trials came to be, as it were, a stepping stone for further research, particularly with potash.

The project laid down at Grand Rapids had six treatments including the check plot, as follows:

1. No treatment.
2. Rock phosphate, 2,000 lbs. per acre.
3. Rock phosphate, plus 10 tons of stable manure.
4. Stable manure alone.
5. Stable manure plus superphosphate, 360 lbs. per acre.
6. Superphosphate alone.

All of these treatments were repeated three times making 18 one-tenth acre plots to a series. There were three series to accommodate a rotation of potatoes, oats, and hay (clover and timothy). The superphosphate and manure were applied once in the rotation preceding the potato crop. The raw rock phosphate was put on in 1914 and none thereafter.

The area selected for the project is well drained, having a definite and fairly uniform slope toward the north. The soil is a silt or fine sandy loam. The land formerly bore a heavy stand of white pine, and hardwood timber, including some oak. This timber had been cut and the land cleared some 15 years previously. It had been cropped to oats, potatoes, and clover, and occasionally had received applications of stable manure.

The soil was in a fair state of fertility, as indicated by the yields from the check plots. During the first six years, 1915-20, these check plots produced an average yield of 130.2 bushels of potatoes per acre. Those that received raw rock phosphate at the rate of a ton per acre in 1914 yielded 146.1 bushels. Those receiving 360 pounds of superphosphate each third year yielded 146.4 bushels. The plots with stable manure plus raw rock phosphate produced 224.7 bushels; manure with superphosphate, 235.9 bushels; and manure alone, 229.6 bushels per acre.

Why the Benefit from Manure?

The benefit to the potato crop from stable manure was so great that the first year's results were doubted. It was therefore determined to weigh the potato crop from each row separately, so that the yield from each tenth-acre plot would be a composite from 11 weighings and the yield for each treatment would represent the average of 33 weighings for as many rows. Through these individual weighings, it was discovered that the outer rows of the raw rock and superphosphate plots adjacent to those receiving stable manure were favorably affected by the manure treatment and that there was little or no benefit from the application of either raw rock or superphosphate. The oats and hay crops, however, did show definite and favorable effects from both phosphate treatments, but much less so than from stable manure.

Why, we asked, is the potato crop so greatly benefited by stable manure as to almost double the yield? Is it the addition of organic matter resulting in better aeration of the soil; the conservation of moistures; the stimulation of bacterial action and more uniform soil temperatures; or is it because of the addition of some plant food element that the soil lacks?

To answer the question as to organic matter, a project was laid down to compare applications of raw peat with stable manure. This project included six treatments as follows: no treatment; stable manure 5 and 20 tons per acre; and raw peat 10, 20, and 40 tons per acre. The crops and rotation were the same as in the phosphate and manure project. Aside from this, since the soil showed a lime requirement of from two and three tons per acre, lime was applied on the north half of all plots in all three series of both the peat and the phosphate projects. This liming showed no benefit to either the potato or oat crops, but was perceptible in a slightly more vigorous growth of the clover in the hay crop. The lime treatment also occasioned a tendency to scab on potatoes under the heavy manure treatment.

The average yields of potatoes, oats, and hay over a nine-year period 1915-23 are shown in the following table:

	Potatoes		Oats		Hay	
	Yield	Increase	Yield	Increase	Yield	Increase
Treatment	Bu.	Bu.	Bu.	Bu.	Lbs.	Lbs.
Check	108.6	....	37.4	...	2600	....
5 Tons Manure	177.4	68.8	41.94	4.54	3400	800
20 Tons Manure	252.2	143.6	44.60	7.20	4320	1720
10 Tons Peat	113.7	5.1	38.68	1.28	2900	300
20 " "	119.7	11.1	40.04	2.64	2880	280
40 " "	124.8	16.2	41.40	4.00	3020	420

Potash made the difference.
Irish Cobblers—Yields from two 4-rod rows. Left—fertilized with N, 200 lbs., P, 360 lbs. Right—fertilized with same plus 230 lbs. of potash.

These yields show that 20 tons of manure per acre increased the yield of potatoes from 108.1 bushels to 252.2 bushels, an increase of over 133 per cent. Twenty tons of raw peat increased the yield only 11.1 bushels, or about 10 per cent over that for the check plot. For oats, 5 tons of manure were more effective than 40 tons of raw peat, and were almost twice as effective for hay. It is clear, therefore, that the benefit from the manure cannot be attributed to the addition of organic matter, though some benefit did apparently result therefrom.

Potash Starvation Signs

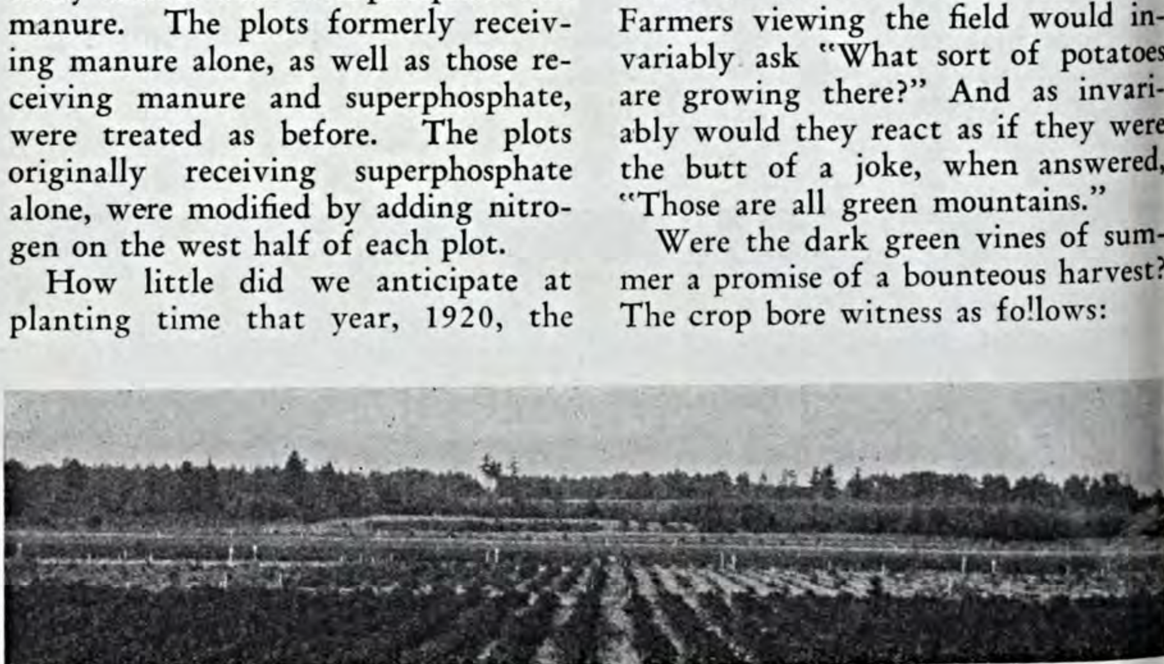
The original phosphate-manure project begun in 1914 was therefore modified in 1920 by the addition of a mixed nitrogen fertilizer, equivalent to 200 pounds of ammonium sulphate per acre, on the east half of each of the three check plots. The rock phosphate plots received 320 pounds muriate of potash plus 360 pounds of superphosphate per acre, and on the west half of these plots was added a mixed nitrogen fertilizer equivalent to 200 pounds of ammonium sulphate. Superphosphate and manure were applied on the plots originally treated with rock phosphate and manure. The plots formerly receiving manure alone, as well as those receiving manure and superphosphate, were treated as before. The plots originally receiving superphosphate alone, were modified by adding nitrogen on the west half of each plot.

How little did we anticipate at planting time that year, 1920, the surprising story that those potatoes would tell. Hardly had blossom time arrived when the foliage of the plants on the plots receiving neither manure nor potash commenced to show a deeper green. Later the leaves began to buckle and warp. The vines appeared contracted and stubby. As the season progressed, the leaves turned still darker green, some finally changing to a metallic bronze. The buckling in many cases had developed into a curl. The change was most marked on the plots that had been given nitrogen. The tuber set, however, appeared normal with a particularly heavy set under the hills on the nitrogen plots.

The Yields Tell Story

The vines on the manure and potash plots, on the other hand, were spreading; the leaves were open and of a limpid green with a suggestion of yellow and orange, as though beginning to ripen. However, these plants continued to mature slowly, and were still green when those on the plots receiving neither manure nor potash had turned brown and sear. During the late summer, the appearance of the field suggested a barred scarf with bands of different shades of green. Farmers viewing the field would invariably ask "What sort of potatoes are growing there?" And as invariably would they react as if they were the butt of a joke, when answered, "Those are all green mountains."

Were the dark green vines of summer a promise of a bounteous harvest? The crop bore witness as follows:



General view of portion of fertilizer plots, showing (1) Right-center—plots receiving no potash, (2) Center-center—plots receiving ½ N-P-K), and (3) Foreground—plots treated with muriate of potash at 230 lbs. or more per acre.

Plot No.	Treatment	Ave. Yield Two Years Total Bu.	Total Increase or Decrease over Check Bu.	Yield Marketable U. S. No. 1 Bu.	Increase or Decrease over Marketable Bu.
1a-7a-13a	O	113.40	....	64.70	....
1-7-13	N	116.90	3.5	65.40	0.8
2a-8a-14a	P-K	170.80	57.4	138.90	74.3
2b-8b-14b	N-P-K	213.40	100.0	171.60	106.9
3-9-15	M-P	214.80	101.4	174.80	110.1
4-10-16	M	223.70	110.3	186.10	121.4
5-11-17	M-P	228.90	115.5	189.00	124.3
6a-12a-18a	P	109.30	−4.1*	64.50	−0.2*
6b-12b-18b	N-P	128.60	15.2	76.20	11.6

*Decrease per acre as compared with the plot receiving no treatment.

These results indicate:

1. No definite benefit to the potato crop either from the nitrogen or phosphate fertilizers, where these were used alone.

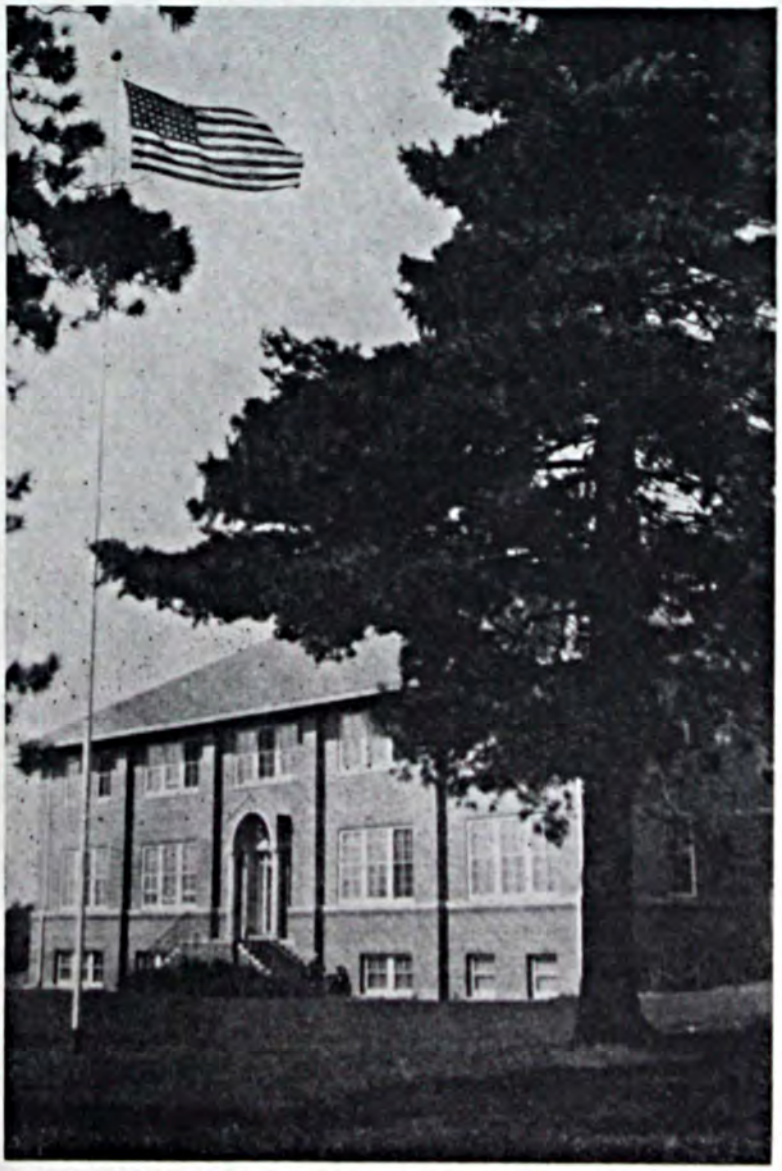
2. A slight increase when nitrogen and phosphate were combined.

3. Large increases from muriate of potash as well as from stable manure.

4. Potash in combination with phosphate gave an increase of 57.4 bushels per acre in the total crop and 74.3 bushels in marketable tubers (U. S. grade No. 1), indicating a marked increase in the size of the tubers.

5. The complete fertilizer mixture, containing nitrogen as well as phosphate and potash, increased the total yield 100 bushels, and the yield of marketable tubers 106.9 bushels, 95.3 bushels more than the increase from nitrogen and phosphate without the potash.

6. An increase of 42.6 bushels total yield and 32.3 bushels of marketable tubers resulted from the addition of nitrogen, when combined with both phosphate and potash, as against an increase of only 3.5 bushels in the total yield and 0.8 bushels of marketable tubers when the nitrogen ferti-



The Administration Building, Agricultural School and Experiment Station, Grand Rapids, Minnesota.

lizer was applied alone.

Soil experts, as well as many a farmer, have expressed astonishment at the large increase of potatoes resulting from the applications of stable manure. In explanation we have called their attention to a concrete manure storage and have told them of its origin as follows:

While standing in the shade of these pines one warm sunny day in July 1915 and looking down on that field yonder that for several years had been rented by the station for meadow and fall pasture, I saw small, green patches of tall grass distributed quite uniformly over the field, possibly a dozen or more to the acre. They were rough, triangular, or diamond-shaped areas, two to three feet long. They aroused my curiosity. I walked into the field. The grass was sparse and short except for those miniature green islands. Why these luxuriant spots? Were they caused by the droppings from the cattle pastured here last fall? In the sparse grass the chips were easily found. Only occasionally was one found surrounded by luxuriant grass. Most of them were not. Decidedly! It was not the droppings, but urine that caused this luxuriant growth.

Until then, the manure from the dairy barns had been dumped down the hillside winter after winter, a 1,000 tons per year. The best of it never reached the fields. Possibly 70 per cent of the potash and half the nitrogen were lost. Hence, that 1,000-ton storage, the reason why a ton of manure spread on the fields at this station is "legal tender" for 7 to 14 bushels of potatoes.

Not only was the concrete storage resorted to in order to conserve the potash and the nitrogen in the manure, but peat was liberally used in the gutters as an absorbent. The quantity of straw available for that purpose was limited and besides, peat was found to be more satisfactory and efficient.

Actual tests show that 100 pounds of dry peat will absorb and retain from 10 to 13 gallons more liquid than the same weight of straw. It is also more easily handled and the spreader distributes it more evenly on the field. Preparing peat for barn litter is fully discussed in Minnesota Experiment Station Bulletin No. 212, pages 52-55.

Other Projects

Building on the results from previous trials, other projects were laid down. These had in view the following purposes:

1. To determine the influence of potash when used in combination with stable manure upon the yields of potatoes, oats, and hay, grown in a three-year rotation.
2. To note the effect upon truck and garden crops from a complete fertilizer high in potash, used at different rates, both alone and in combination with stable manure.
3. To compare the effect of nitrogen, phosphates, potash, wood ashes, and lime, applied alone and in combination on a permanent meadow and pasture of mixed grasses and legumes.
4. To note the effect of various fertilizers on different crops grown on low-lime peat land.
5. To set up a commercial project arranged to bring out as strikingly as possible the effect of potash, that previous projects had shown to be such an important ingredient in farm manure and in mineral mixtures.

The Effect of Potash

Since this last project particularly stresses Potash, the subject of this story, we shall here confine our discussion to it; though the other projects revealed facts equally as interesting and important.

This project comprises three series to accommodate a rotation of potatoes, oats, and hay. Each series consists of 20 plots in 10 pairs. The north plot of each pair receives the same treatment as the south plot and

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SHE LIKES THE TASTE OF FERTILIZED PASTURE.

Left: This picture shows how poorly the cattle grazed the unfertilized pasture on the Brandon State School farm, July 26, 1929.

Below: This shows the closely grazed pasture of the plot receiving complete fertilizer on the same farm, same date.

Profits *from* Fertilized Pastures

By Dr. E. Van Alstine

Extension Agronomist, Vermont

APPROXIMATELY 65 per cent of the farm income in Rutland county, Vermont, is from the sale of livestock products and of this, 65 per cent comes from the sale of dairy products and dairy cattle. Economic dairying is possible only where there is plenty of hay and other roughage feeds for winter and abundant pastures for summer feeding.

As between winter roughage and summer pastures, the latter requires less labor and supplies the cheaper feed. Moreover, the condition of Rutland county pastures is such that the cost of improvement is likely to bring as great financial returns as the same expenditure for the production of winter roughage. In many cases the need for summer feed is more urgent and the returns for the cost of improvement will be proportionately greater.

The acreage of pasture in Rutland county is quite sufficient. In fact for every 100 acres of farm land there are 44 acres of open pasture. However, the treatment this pasture has received in the past has been such that it is now depleted and so poor that it requires an average of 2.7 acres and a great deal of barn feeding during most of the summer to support one cow between the spring and fall months.

Thirty of these forty-four acres of open pasture cannot be plowed and must be improved by top-dressing or eventually abandoned. The remaining 14 acres may be improved by plowing, but in many cases top-dressing will be a more economical method. Proper improvement of the best pastures will give more and better summer feed than is now available, and many acres of rough open pasture can be turned over to forestry. The result will be better summer feed, less labor for dairy cows, and greater profits to the dairyman.

During 1929 fertilizer was applied to 22 farms in Rutland county. Typical test areas were 8 by 12 rods and consisted of 6 plots of 1/10 acre each, treated as follows:

Plot 1—Check, untreated.

Plot 2—P-superphosphate (16 per cent), 600 lbs. per acre.

Plot 3—LP-lime two tons per acre and superphosphate.

Plot 4—LPK-lime, superphosphate, and 100 lbs. muriate of potash.

Plot 5—LPKN-lime, superphosphate, muriate of potash, and 320 lbs. per acre of nitrate of soda (15½ per cent N.).

Plot 6—L-lime two tons per acre.

Fertilizer ingredients were applied at a uniform rate wherever used, the plot with complete fertilizer receiving approximately the equivalent of 1,200 pounds of a 4-8-4 mixture or 1,000 pounds of a 5-10-5 mixture. All treatments were made in the spring of 1929.

The cost of superphosphate was $6.00 per acre; of muriate of potash $2.50 per acre; and of nitrate of soda $9.60 per acre. The cost of lime was so variable, and the benefits from its use are extended over so long a period, that an estimate of its cost and of the value of returns from its use have not been attempted.

Yields were computed from clippings made during the season from areas one foot by nine feet in size included within fenced areas. The samples so collected were oven-dried, weighed, and five per cent added to make the weights correspond more nearly to weights of grass cured as for hay. The weights have been calculated to pounds per acre and reported in Table 1. Only those considered reliable are averaged.

Using only nine fields for further consideration, observation shows that there is quite evidently no benefit from lime the first year as an average of the fields. This holds true where lime is compared with no treatment, and where lime and superphosphate are compared with superphosphate alone. For this reason the check and the limed plots have been averaged together, as have also the superphosphate and the superphosphate lime plots. It should not be concluded that there will be no return from lime. Similar work carried on by experiment stations in New England has shown that lime used as pasture top-dressing gives a decidedly profitable return when considered over a five-year period, although it seldom gives a benefit the first year.

In addition to the two averages showing yields with no treatment and the yields with superphosphate, it is possible to average nine plots receiving potash and nine other plots receiving nitrogen. Such averages show increases from the different treatments as indicated in Table 2. This table also shows the costs of the increases secured for each treatment.

The costs may seem excessive if they are thought of in terms of hay, but H. B. Ellenberger, in a recent bulletin on Vermont pastures, reports analyses of dried pasture grasses which show that they are more properly compared with wheat bran or alfalfa hay as regards both digestible protein and feeding value.

TABLE 1.

POUNDS PER ACRE OF HAY-CURED GRASS FROM SAMPLED PLOTS.

		Treatment					
	Cooperator	O	L	P	LP	LPK	LPKN
1.	D. J. Barnes	1255	1445	1591	2174	3305	3238
2.	A. D. Barnard	1310	1221	2632	1972	2162	2812
3.	G. A. Davis	1916	2106	2095	3507	2723	4134
4.	F. N. Mason	1826	2622	2061	2318	3092	4011
5.	L. A. Drown	2560	1512	3406	3462	4335	4750
6.	H. B. Savery	1288	1176		1199	1109	2936
7.	H. N. Dundon		1277	1905	1950	2219	3305
8.	C. J. Fox		1883		2610	2632	3227
9.	W. S. Tuttle	1087			1418	3104	3618

TABLE 2.

PASTURE TREATMENT, INCREASES, AND COSTS

Treatment	Increase in yield per acre for the treatment. Pounds	Cost of treatment per acre.	Cost of increase per ton.
600 lbs. Superphosphate	600	$6.00	$20.00
600 lbs. Superphosphate 100 " Muriate of potash ...	1146	8.50	14.83
600 lbs. Superphosphate 100 " Muriate of Potash 320 " Nitrate of Soda	1963	18.10	18.44

It may be calculated from this table that the increase from potash used after superphosphate cost $9.16 per ton; the increase from nitrogen used after superphosphate and potash cost $23.50 per ton as compared with a cost of $20.00 for superphosphate alone.

The superphosphate was used in amounts expected to last three years, therefore its cost would be somewhat lower for each season provided it should last as expected. With nitrogen the cost of increase would be lower and more economically obtained if less nitrogen had been used or if it had been distributed in two or more applications during the year.

It is planned to increase the amount of potash to 200 pounds per acre after the second year so as to determine the increase that may be secured with larger amounts, as well as to see what effect it will have on the cost.

Observations during the year showed that on the very light sandy soils no perceptible benefit was obtained with any treatments that did not include nitrogen. On good sandy loam soils, potash nearly always gave a perceptible increase in the stand of clover and frequently phosphoric acid did. On all types of soil, nitrogen gave a rapid early growth and not only made it possible but necessary to begin pas-

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H. Safford's fertilized pasture at Wallingford, Vermont, where $14.55 spent for fertilizer gave 1,694 pounds more milk per acre.

Fertilizers Improve Kentucky Tobacco

By E. E. Pittman

Elizabethtown, Kentucky

FIGURES secured from demonstrations in several counties of Kentucky during the 1929 growing season can be turned into profits by Kentucky tobacco farmers during 1930. These demonstrations were carried on in cooperation with prominent tobacco growers. Thus the plant food needs of tobacco were studied under many and varied conditions.

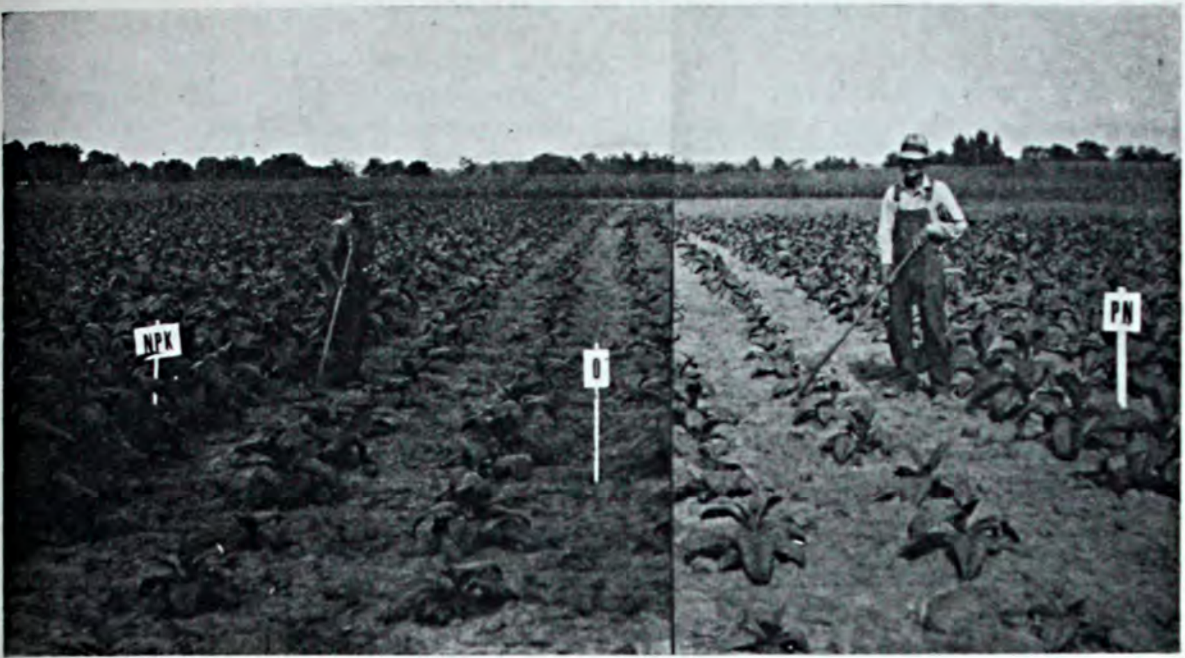
The method of conducting these demonstrations was to use four analyses of fertilizers: 3-8-0, 3-8-6, 3-8-12, and 3-8-24. These were carefully built up so that the drills would deliver the same amount of each one on an acre. The same amount of each one of these fertilizer analyses was put on each of similar plots and always some plots were left on which no fertilizer was used. These were called the "no treatment" or "check" plots because the tobacco grown on them without fertilizer was a check by which the profit of the different combinations could be gauged.

In planning these analyses, the purpose was to supply in each one enough nitrogen and phosphorus to give the plants their fill of these two elements, and to vary the amount of potash available to the plant. Then the plant growth was to be watched, particularly the thinness and oiliness or shade of green of the leaves. Any differences, if possible, were to be correlated with the appearance of the leaves after curing, as it long has been believed that available plant food has much to do with the color, the size of leaf, and the aroma of smoking tobacco.

It should be remembered that in a fertilizer analysis such as 3-8-24, the first figure, 3, means that there are 3 pounds of nitrogen in each 100 pounds of material, the second number, or 8, means that there are 8 pounds of phosphoric acid in each 100 pounds of material, while the last figure, 24, means that there are 24 pounds of potash in each 100 pounds of the goods.

Warren county, Kentucky—Tobacco hung in the field for partial curing.

The method of measuring the quality of leaf produced by the various plant food combinations was to put the grade right over the auction floor and let the buyers "say it with bids." All conditions in each field were kept the same — same kind and age of plants, same kind of plowing and cultivation, all plots harvested at the same



Left: 400 pounds of 3-8-12 produced 1,830 pounds of tobacco leaf worth $223.46 per acre. Right: 400 pounds of 3-8-0 produced only 1,700 pounds worth $191.59 per acre.—Western Teachers' College, Bowling Green, Kentucky.

time and given the same conditions of storage.

The tobacco produced by each plot was kept separate and then at stripping time, it was divided into different grades and even the small lots of the various grades were put right over the auction floor. It will be seen that the price of each grade was determined by the tobacco buyers, whose vast experience in buying leaf day after day has taught them to detect quality in tobacco leaf at the first glance. The average price secured for the grades produced by each plot is used as the average price of the tobacco grown on that plot.

The first four demonstrations reported are on *burley* tobacco, the last is with *dark*.

T. H. Devore, a prominent tobacco grower of Owen county, Kentucky, grew his tobacco on a nine-year-old bluegrass sod. On the Devore farm, no fertilizer produced 720 pounds of leaf worth $204.70 per acre. Two hundred and fifty pounds of 3-8-0 fertilizer produced 1,180 pounds of tobacco worth $349.50 per acre. Both the 3-8-6 and 3-8-12 raised the yield when compared to the 3-8-0, but the highest yield came from 250 pounds of 3-8-24, which made 1,600 pounds of the highest priced tobacco on the entire plots, being worth at the rate of $464.70 per acre.

On the Lindsay Hough farm in Bourbon county, the tobacco was planted on ground that had been in bluegrass for the last 11 years. On this farm the fertilizer combinations were put on at the rate of 250 pounds per acre. On the untreated soil, the yield was 1,150 pounds of tobacco per acre with a value of $361.40. The yield was only slightly increased by 250 pounds of 3-8-0 which brought it up to 1,180 pounds of leaf per acre worth $393. The 3-8-6 swelled the yield again to 1,210 pounds of tobacco worth $398.60, but when the potash content was pushed up to 12 per cent, the highest value per acre was reached. Two hundred and fifty pounds per acre of 3-8-12 produced at the rate of 1,380 pounds of tobacco with an acre value of $414.70.

R. M. Blackerby in Lincoln county, Kentucky, put his tobacco on a field that had been in alfalfa for the last three years. Each year since 1926, he had given this alfalfa field an application of 250 pounds of superphosphate per acre.

On the Blackerby farm, 500 pounds of fertilizer per acre were used on each of the plots. No fertilizer at all produced 997½ pounds of cured tobacco with an acre value of $170.37. Five hundred of 3-8-0 put the yield up by 160 pounds or 1,157½ pounds. The tobacco on this plot was of poorer quality, however, and brought $189.59. The highest yielding plot of the entire series was the 3-8-24 on which 500 pounds of fertilizer yielded 1,425 pounds of leaf which was worth $268.75. The tobacco on this plot was worth $98.38 more per acre than the "no treatment."

George Midden in Harrison county planted his tobacco on ground that had been in bluegrass during the last three years, getting no other fertilizer treatment than three tons of ground limestone in 1928. In all of the plots on the Midden farm, 750 pounds per acre of the four analyses mentioned were put on. The tobacco was sold at the Growers' Tobacco Warehouse at Cynthiana, Kentucky.

Bluegrass sod without fertilizer produced 510 pounds of tobacco worth $140.40 per acre. When 750 pounds of 3-8-0 were put on, the yield went up 300 pounds, or 810 pounds per acre, with an acre value of $226.98. The 3-8-6 and 3-8-12 produced a very marked increase, but the highest return per acre was on the plot that got 750 pounds of 3-8-24. On this area, the tobacco produced at the rate of 870 pounds per acre and of such quality that it was worth $267.96 per acre.

Auction floor prices obtained for the tobacco from the Midden plots are more eloquent than words as to what fertilizer in general and potash in particular did to increase the quality of the lots grown. All prices are net. The check plot averaged $27.35 per hundred; the 3-8-0 plot averaged $28.02 per hundred; the 3-8-6, $28.65; the 3-8-12, $29.51 net; while the 3-8-24 brought the most or $30.75 per hundred weight.

It will be observed that on the four *burley* tobacco demonstrations reported, a 3-8-24 brought the largest gross acre return on three. However, the 3-8-12 gave the grower the largest net profit.

Tests with Dark Tobacco

In a fertilizer demonstration on *dark* tobacco carried on in cooperation with the Agricultural Department of the Western Kentucky State Normal School, the plots were on a clay loam soil that had been growing alfalfa since 1926. No fertilizer had been applied to the alfalfa.

On the Ogden College farm, 400 pounds of each of the fertilizer analyses were applied. No fertilizer at all produced 1,320 pounds of dark tobacco worth $135.70 per acre; 400 pounds of 3-8-0 produced 1,700 pounds of tobacco worth $191.59; while 400 pounds of 3-8-12 made 1,830 pounds of tobacco leaf worth $223.46 per acre. Additional potash

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The tobacco at the left had 750 pounds of 3-8-12 per acre; that at the right had no fertilizer. (Burley tobacco, bluegrass sod, farm of George Midden, Cynthiana, Kentucky.)

The 1,358 pounds of cotton per acre (left) were grown with 800 pounds 8-4-4 plus 100 pounds nitrate of soda and 128 pounds of muriate of potash. The 875 pounds per acre (right) received no extra potash. (Farm of Z. V. Pate, Laurinburg, North Carolina.)

Top-dressing Cotton

By H. J. Maddux

Atlanta, Georgia

THERE are still some people who are wondering about the use of extra potash in fertilizing cotton and about the use of a nitrogen-potash top-dresser for the crop, but not so the farmers who have actually used extra potash.

This is a relatively new proposition. My father didn't use any extra potash on his cotton and he made good crops. Yes, but he might have made better crops. This new idea may be a good one.

Let's see what Georgia's master cotton growers, Jim Kelley of Tennille and Paul Burson of Monroe, are doing. Mr. Burson made only 161 bales on 135 acres in 1929 and won the State Contest prize with 5,283 pounds of lint on 5 acres. He used the equivalent of 1,000 pounds of a 10-7-9 (PNK) per acre on red to gray soils for most of his crops, applying half of his nitrogen and potash as a top-dresser.

Mr. Kelley produced 253 bales on 275 acres in 1929, using a top-dresser composed of 15 pounds of nitrogen and 25 pounds of actual potash. But where he tripled the potash in his top-dresser, he produced so much more cotton that he has decided to use in 1930 the equivalent of 800 pounds per acre of a 9-5-9 (PNK), with half of the nitrogen and two-thirds of the potash as a top-dresser.

Mr. David R. Coker at Hartsville, S. C., one of the most prominent cotton seedmen of the South, for several years has used a nitrogen-potash top-dresser, sometimes three applications per season, on his extensive breeding plots.

On the red soils of the Piedmont section of South Carolina, Mr. Charlie Beason of Woodruff in 1928 used an extra 66 pounds of muriate of potash per acre for his cotton with a gain of \$22.68 per acre. Is it any wonder that Mr. Beason and 36 of his neighbors top-dressed their cotton crops

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"*Seasoning*" Corn

By L. E. Thorne

County Agent, Rensselaer, Indiana.

SEASONING with a dash of fertilizer "salts" the black sands common to northwestern Indiana, one of the most important corn growing soils of the corn belt, more than paid in an outstanding demonstration in Jasper county, Indiana, last year. This demonstration was on the farm of Amzie Schultz of Union Township, north and west of Rensselaer.

Furthermore, the particular point of interest in this demonstration was that the potash in the fertilizer could be credited with a gain of 46.58 bushels per acre worth $32.60 at the current price for corn of 70c a bushel.

In commenting on this demonstration, Mr. Schultz said, "As this demonstration occurred on my farm, I know positively that all conditions surrounding the plants were identical in so far as possible save for the analyses of fertilizers used on the different plots, otherwise, I should have been unwilling to believe that merely putting a 27 per cent potash fertilizer in place of a no-potash fertilizer could make such an amazing difference."

The seed corn all came out of the same bag. The soil was uniform and typical of that low-lying soil locally referred to as black sand. It usually contains considerable organic matter and acidity tests of this soil showed it slightly acid (pH 6.3). The Neubauer test indicated that for corn it was slightly deficient in phosphorus but decidedly lacking in potash.

Acting upon this forecast, a series of fertilizers were built up in which nitrogen and phosphorus were kept the same and the potash content varied, trying to anticipate in the series enough nitrogen and phosphorus to surely meet the needs of the crop.

Four analyses were compared, 3-9-0, 3-9-9, 3-9-18, and 3-9-27, and an 0-8-24 and 0-8-32 also were included. The rate of application was 125 pounds per acre and the same amounts of fertilizer were used under each row and all tillage operations were performed at the same time.

Jasper county embraces many soil types and during the year, one sees some very striking chance demonstrations of what fertilizers do on the soil. But the Schultz demonstration, throughout the season, was the most striking of any I ever watched. In the early summer, no very marked differences appeared between the various combinations, but the checks got off to a slow start and were not again within speaking distance of the fertilized plots. The highest yielding plots were those fertilized with 3-9-27, 0-8-24, and 0-8-32, The check plot yielded 23.28 bushels to the acre. The 3-9-0 fertilizer brought the yield to 23.97 bushels, indicating that neither nitrogen nor phosphorus was very important at this yield level.

The 3-9-9 yielded 47.12 bushels; the 3-9-18, 53.7 bushels; while the 3-9-27 made the yield of 70.55 bushels.

The corn fertilized with a 3-9-0 was right beside that fertilized with a 3-9-27. At harvest time, the 3-9-0 was dead and prostrate, after having grown to five or six feet in height, while the 3-9-27 was eight and ten feet high, every stalk erect and nearly every one bearing a big pendulous ear.

When the corn was shucked, the difference was 46.58 bushels per acre, worth $32.60. The only difference between the 3-9-0 fertilizer and the 3-9-27 was 27 units of potash, costing approximately $1.70.

The check plot got off to a slow start and as far as growth was concerned, was not again within speaking distance of the others. The yield was 23.28 bushels per acre.

The 3-9-0 plot (125 pounds per acre) only brought the yield up to 23.97 bushels per acre, indicating that neither nitrogen nor phosphorus was important at this yield level.

The 3-9-27 plot (125 pounds per acre) brought the yield up to 70.55 bushels per acre, a difference of 46.58 bushels per acre worth $32.60, due to 27 units of potash.

A heavy yield of Concords, showing the well-formed clusters and large berries as the result of additional potash.

Better Grapes

By Russell E. Wilson

County Agent, Dover, Delaware

WHETHER you are in favor of the Volstead Act or "agin it" the fact remains that there were 2,636,076 tons of grapes produced in the United States during the season of 1928. During that same year, we are told that the people of Canada cosumed 5,486,614 gallons of wine. BUT this shows a healthy condition, compared to former years, as the consumption of spirits has decreased per capita from 1.032 gallons in 1912 to .452 gallons in 1928, while the consumption of mild home wines has increased per capita from .122 gallons in 1912 to .557 gallons in 1928.

However, this particular article has no interest in the Volstead Act nor in the amount of wine consumed, but the fact that there were 2,636,076 tons of grapes produced in 1928 indicates very clearly that the grape industry is truly a "big business" and as such deserves considerable study and consideration.

History informs us that this country of ours was often referred to as "Vineland" because of the many wild grapes found here by the early explorers. In the olden days grapes and wine were synonymous terms and colonial literature mentions wine and wine-making in speaking of grape culture. An English sea captain tells us that the Spanish colonists in Florida made 20 hogsheads of wine from wild grapes in the season of 1565.

The early colonists brought with them the European grape and tried to establish vineyards, but with scant success. It was not until about 1880 that the grape industry began to assume any importance. In 1895 California began the canning of grapes. Commercial raisin production in California was first emphasized in 1873 when nearly 6,000 twenty-pound boxes of raisins were marketed.

Although the Far West produces the major part of the grape crop, there are many acres scattered through the eastern States. The States of New York, Pennsylvania, Ohio, and Michigan are among the largest producing States in the East.

In the State of Delaware the grape industry is centered largely in Kent county in the Dover, Smyrna, and Wyoming sections. During the past eight or ten years the acreage devoted to this crop has increased from 300 to more than 1,500 acres of bearing vines.

Along with this rapid expansion of acreage has come improved methods of spraying for the control of black rot and other fungous diseases. The control of the berry moth also has received much attention from State entomologists with the result that methods are now followed which lessen the injuries from this insect. Better cultural methods, such as legume cover crops, more frequent use of the cultivator, and more efficient pruning have increased yields and quality.

Within the past six years, therefore, attention has been given more to the fertilization problem which is of vital importance in the maintenance of the vineyards and the production of high quality grapes. Experimental work in grape fertilization in Kent county was started in the spring of 1924 when Director A. C. McCue of the Delaware Experiment Station assisted in establishing plots in the Concord vineyards of B. B. Chase and N. W. Taylor. Each plot in these vineyards was divided into eight blocks and for four years each block, with the exception of the checks, received a different fertilizer treatment.

In securing the yields of grapes from the experimental plots in these two vineyards, it was noticeable that in most instances where potash was included in the fertilizer the yields were larger and the fruit clusters were more compact with less shattering at harvest time. The blocks receiving potash and superphosphate were consistent, year after year, in that the yields were larger and the quality higher than on the other plots.

The PK block, with the exception of one year, produced an average of 3.73 tons per acre during the six years' test, as compared with 2.83 tons from the other blocks in the Chase vineyard. In the Taylor vineyard the PK block averaged 2.96 tons per acre, whereas the other blocks yielded but 2.46 tons per acre. In each case there was a gain of one-half ton in favor of the PK blocks.

Increased production is desirable from the grower's standpoint, but im-

TABLE I—AVERAGE YIELDS FROM DIFFERENT TREATMENTS

	1924		1925		1926		3-Yr. Ave.	
Block-Treatment	Lbs. Per Vine	Tons Per Acre	Lbs. Per Vine	Tons Per Acre	Lbs. Per Vine	Tons Per Acre	Lbs. Per Vine	Tons Per Acre
No. 1 CHECK	12.19	3.69	4.33	1.31	12.33	3.73	9.62	2.91
No. 2 N	12.18	3.68	3.79	1.14	15.31	4.63	10.43	3.15
No. 3 NP	9.16	2.77	2.75	0.80	12.64	3.83	8.18	2.47
No. 4 CHECK	10.73	4.25	4.00	1.21	9.81	2.97	8.18	2.47
No. 5 NK	10.64	3.22	7.91	2.39	10.67	3.23	9.74	2.95
No. 6 NPK	11.10	3.36	6.38	1.93	13.44	4.06	10.31	3.12
No. 7 CHECK	10.15	3.07	6.04	1.83	10.58	3.20	8.92	2.70
No. 8 PK	9.65	2.92	10.85	3.28	16.54	5.00	12.35	3.73

Soil—well drained, gravelly loam.

Fertilizers applied at rate of 212 pounds nitrate of soda, 450 pounds superphosphate, and 80 pounds muriate of potash per acre.

proved quality is also an important factor in successful grape production. It is evident that potash plays an important part in both production and quality as the fruit on the potash blocks was larger and of better color, the clusters were more compact, and the sugar content was higher. The results of these first experiments prompted the establishing of other demonstrations in a few of the representative commercial vineyards in Kent county to study the effect of potash on growth of vine and quality of fruit.

TABLE II

B. B. Chase Vineyard—1927

Block	Treatment	Yield Per Vine	Yield Per Acre
No. 1	CHECK	9.32	2.82 tons
No. 2	N	9.30	2.81
No. 3	NP	11.58	3.50
No. 4	CHECK	9.57	2.89
No. 5	NK	11.83	3.58
No. 6	NPK	11.02	3.33
No. 7	CHECK	8.83	2.67
No. 8	PK	11.46	3.47

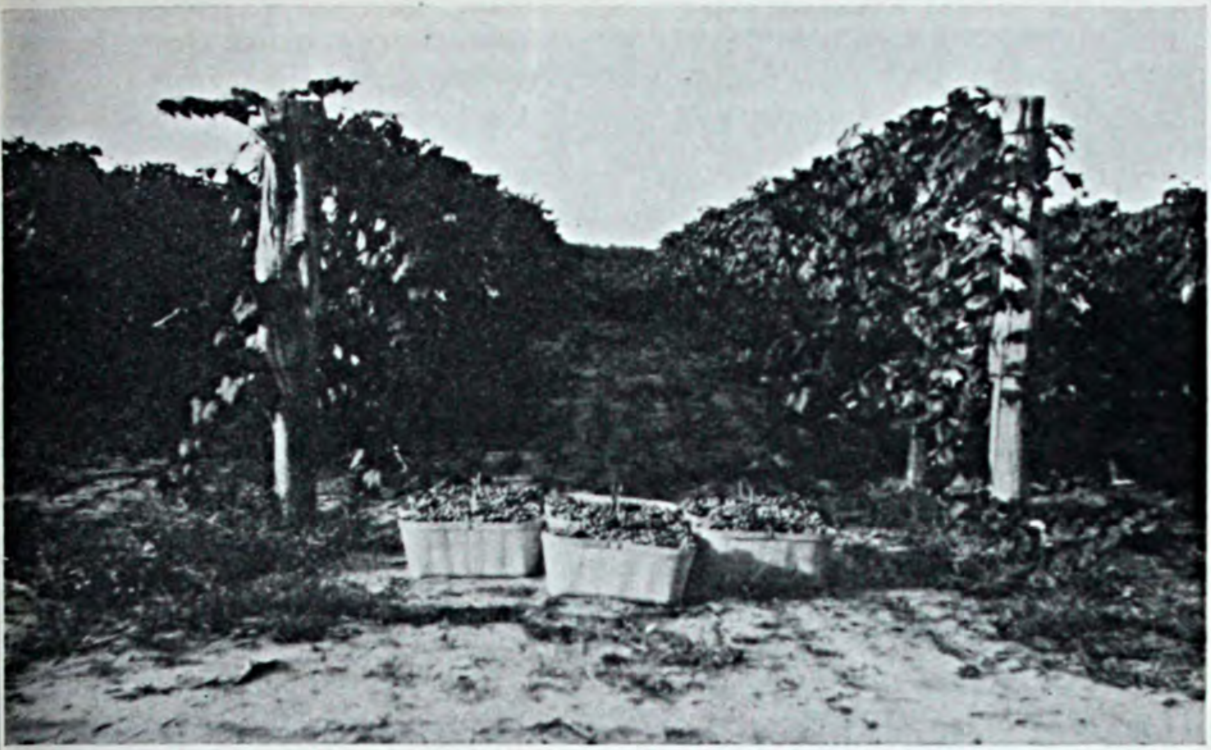
In 1928, arrangements were made with Messrs. Edward Todd, I. R. Jackson, R. F. Brown, B. B. Chase, Denny Pleasanton and Henry Ridgely to supply them with 100 pounds each of muriate of potash, to be applied to one acre in addition to their regular application of fertilizer. The soil conditions of the several vineyards were similar, a well-drained gravelly loam, but cultural practices and fertilizer practices differed. Animal manure was utilized whenever and wherever possible but because of scarcity and high price very little manure was used. Poultry manure is used by some growers as a source of nitrogen while others grow a cover crop of clover to supply organic matter and nitrogen.

One of the interesting facts brought out by these six demonstrations was that where the regular application of fertilizer ran from 10 per cent potash upward, at a rate of 600 pounds or more per acre, the additional potash may have showed but little increase in yield but there was a marked improvement in quality.

Aside from the differences in yields, the grapes produced on the potash blocks were more compact in the clusters (bunches), there was less shattering at harvest time, and the berries were larger with better color.

TABLE III—INCREASED YIELDS DUE TO POTASH

Grower	Regular Treatment	Yield Tons Per Acre	Yield with 100 lbs. KC1 Additional
Edward Todd	800 lbs. 2-8-5 no manure or cover crop	2.85	3.82
I. R. Jackson	800 lbs. 2-8-10 no manure or cover crop	4.39	4.59
R. F. Brown	600 lbs. 2-8-8 no manure or cover crop	2.22	2.43
B. B. Chase	600 lbs. 3-11-11 light manure, no cover crop	3.62	3.71
Denny Pleasanton	600 lbs. 0-12-5 no cover crop—light appl. hen manure.	3.46	3.83
Henry Ridgely	250 lbs. superphosphate 250 lbs. muriate of potash no manure or cover crop.	2.45	2.45



A section of the superphosphate and muriate of potash block in the vineyard of B. B. Chase, Wyoming, Delaware. This block has produced an average of 3.73 tons of Concord grapes per acre for the past six years as compared to an average yield of 2.83 tons per acre from the other fertilization blocks in the same vineyard.

These factors are regarded by growers as being of most importance in the production of a profitable crop of grapes. As practically all of the grapes from this section are sold for table use and juice purposes, it is also essential that they be of high sugar content. *There is no doubt that the use of more potash is responsible for this higher quality product* being placed upon the market.

Arrangements were made to continue the work during 1929. The demonstrations for this year were conducted in the vineyards of Edward Todd and Denny Pleasanton. In each of these vineyards, blocks were arranged to receive extra amounts of potash so as to make the analysis range from 5 to 20 per cent potash. This was done in order to determine the most practical amount of potash that should be applied with a com-

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TABLE IV—POTASH INCREASED WEIGHT OF BERRIES

—1929—

Owner	Treatment	Lbs. Per Vine	Tons Per Acre	No. Bkts. Per Row	Wt. per Basket
Denny Pleastanton—	Block 1—600 lbs. 0-12-5	9.37	2.55	56	15.40 lbs.
	Block 2—600 lbs. 0-12-5 60 lbs. KC1	11.13	3.00	65	15.76 "
	Block 3—600 lbs. 0-12-5 120 lbs. KC1	9.14	2.49	54	15.60 "
	Block 4—600 lbs. 0-12-5 180 lbs. KC1	9.82	2.68	57	15.85 "

(Although Block 4 yielded fewer baskets than did Block 2, the weight per basket was greater showing that high potash increases weight of berries or bunches).

Red Raspberries

By Wm. L. Teutsch

Assistant County Agent Leader, Corvallis, Oregon

SUPERPHOSPHATE and potash applied to Cuthbert red raspberry plantings in Multnomah county, Oregon, resulted in yield increases amounting to .87 tons per acre, worth \$69.60 at a fertilizer cost of \$7.11 per acre. These figures were obtained by S. B. Hall, county agent, in a careful survey of 18 raspberry fields in that county.

The plantings selected for the study represented a wide variation in soil conditions and fertilizer practices. On some fields stable manure was used, on others sheep manure, but on nine fields superphosphate and potash were used to balance the fertilizer program and on nine other fields no superphosphate or potash was used. On an average the nine fields used superphosphate applied at the rate of 294 pounds per acre and potash at the rate of 111 pounds per acre. The average yield on the nine fields receiving superphosphate and potash was 3.12 tons per acre and on the nine fields receiving no application the average yield was 2.25 tons per acre.

"To determine the effect of phosphate and potash on quality after canning, samples of raspberries were taken from each of the 18 fields," Hall said. "These berries were canned in a uniform pack and put away for several months. The cans were then opened and scored by three canning experts from northwest canneries on color, texture, and size. The scoring was based on 100 points for texture, 100 points for color, and 100 points for size. The berries receiving potash and superphosphate in texture made an average score of 90.9 per cent and for color averaged 94.5 per cent compared with the average for the berries from fields receiving no potash or phosphate of 87 per cent for texture and 90 per cent for color. The advantage in favor of the fertilized plots was 3.9 per

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Above: Fertilizer practically eliminated winter injury suffered from severe winter conditions in 1928.

Left: The check plot, receiving no fertilizer, had winter injury to the extent of 50 to 60 per cent.

Turning under green manure crops ahead of planting vegetable crops is a good practice.

Fertilizers *for* Vegetables

By E. R. Lancashire

Extension Specialist, Ohio State University

Editor's Note: While the recommendations in this story are given for Ohio conditions, much of value can be obtained from them for growers in other sections of the country who are raising vegetables under similar conditions.

WHAT fertilizer shall I use, and how much, and in what manner shall I apply it? These are very common questions in the early spring months. In answering these inquiries in connection with the vegetable crops, it might be well to state that definite answers could hardly be expected considering the wide range of soils and conditions under which vegetables are grown.

There is possible, however, a sort of general recommendation from which or upon which the gardener can base his selection of fertilizers. The amount of fertilizer to be applied varies more or less with the section of the country and with the intensity of the program. Whether or not the fertilizer is applied broadcast or in the row is fairly well decided.

Successful vegetable growing necessitates attention to other soil factors as well as to the use of fertilizers. Assuming that the gardener has used manure and green-manure crops to the best possible advantage and assum-

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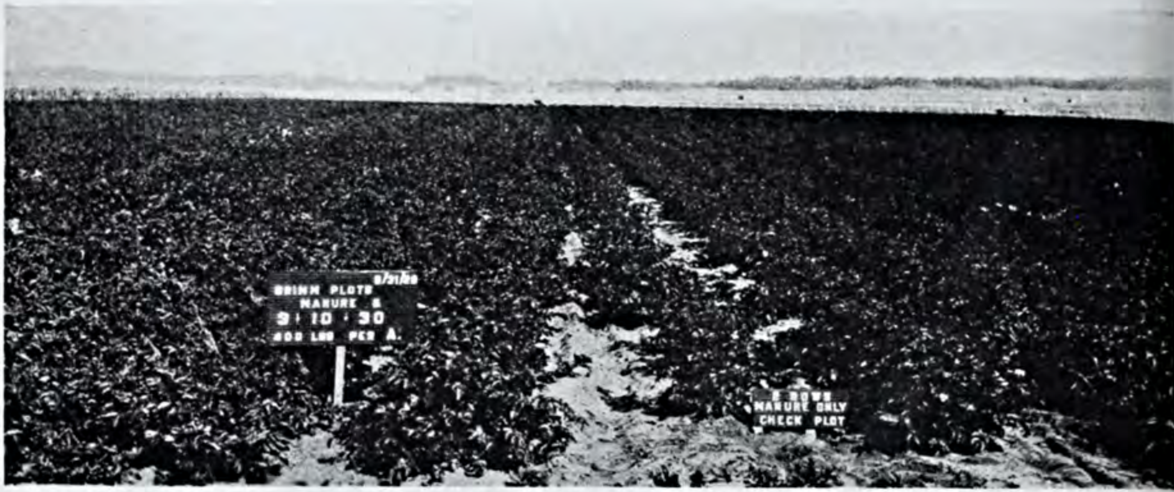
Central Wisconsin



This picture was taken August 31, 1929, on plots near Plainfield, Wisconsin. Note the difference in growth where fertilizer supplemented the manure.

THE old, sandy loam soil section of central Wisconsin is out to maintain its reputation as one of the most important potato producing areas in the United States. As far back as 1890, three counties, Portage, Waupaca, and Waushara, centrally located in the Badger State, were famed as strong growers and heavy shippers of late potatoes. It is to maintain this reputation and furnish profitable incomes to these light soil farmers who know potato production better than anything else, that is challenging the thought of some of the State's leading agriculturists.

Decrease in Yields

Wisconsin, ranking fourth among the States in potato acreage with about 260,000 acres or 7.2 per cent of the nation's total, still grows its commercial stock in rather restricted areas, of which the old, sandy loam section of the central portion of the State is of foremost importance. However, in 1927, this central district averaged only 80.5 bushels per acre as compared with an average of 107.6 in the northwest district and 105.6 bushels per acre in the northeast district which includes Langlade county.

Potato growers and potato buyers of central Wisconsin began freely expressing their growing concern for the status of the industry in their section. The relatively low production often appeared to be accompanied by inferior quality stock in respect to size, potato scab, and blight infestations which cause rot. With a farming population which was distinctly potato-minded and living on a soil ill-adapted to growing such heavy soil crops as corn, or heavy hay, the situation was becoming serious. The section had slowly developed a condition which prevented the successful growing of clover and alfalfa without first liming the soil. Thirty years ago or more, liming of the soil was unknown. Clover sometimes failed, but not regularly. Wheat was successfully grown there for years. All crops yielded relatively well. The soil, quite new then, supplied plant food abundantly.

Competition Arises

Just as this light soil could be easily worked and made to readily yield its meagre store of nitrogen, phosphorus, and potash to the planted crop so had it rapidly become depleted of these plant foods. It was no wonder that potato growing was on a down grade as far as yields and quality were

Stages a "Come-back"

By H. G. Frost

Portage, Wisconsin

Fertilizers help to keep this region prominent in the Badger potato game

concerned and that competition from other sections of the State was beginning to be keenly felt. Too, this competition was not only coming from other sections of Wisconsin but from neighboring States, like the Dakotas, Nebraska, Iowa, and Minnesota, which now ranks first of all the States in acreage, with 328,000 annually.

The sandy soil farmers began to look around them for a solution to their problem. Among other things they noted that the Langlade county district reported the use of 600 tons of potato fertilizer in 1926, 1,800 tons in 1927, and 2,800 tons in 1928, and they concluded that this decided upward trend in the use of fertilizer was not prompted by the desire for more exercise on the part of potato farmers in Langlade county. Accordingly, the best farmers in the sandy soil counties began following the lead of A. R. Albert, superintendent of the Wisconsin Experiment Station at Hancock in Waushara county and that of active, successful county agricultural agents, like H. R. Noble of Portage county, E. A. Jorgenson of Waushara, H. A. Murray of Adams, and James J. Lacey, who was then serving Green Lake county.

The sandy loam fields that had been hard to cover with good clover seedings were freely limed and then treated with one bag (125 pounds) of treble superphosphate and one bag (200 pounds) of muriate of potash per acre and a fair to good grain crop with an almost sure clover, alfalfa, or sweet clover seeding resulted. The equivalent of this fertilization, 325 pounds of 0-15-30, proved equally effective. Soil improvement along these lines has been accomplished upon acre after acre.

Wisconsin boasts of having 2,000,000 head of dairy cattle or 1/11 of the 22,000,000 head in the entire country.

A striking difference in yields continued the story told by the difference in vine growth between the two plots.

Good clover and alfalfa seedings encourage and support a barn full of cattle which in turn furnish barnyard manure. This matter of having a supply of manure is an important factor in maintaining soil fertility. Clover sod, top-dressed with an average of 10 tons of barnyard manure per acre, has been the practice of good potato farmers in the central, sandy soil section of Wisconsin for several years. These farmers began asking themselves if this combination was enough. Should this clover sod be top-dressed with manure supplemented by commercial fertilizer? The evidence strongly pointed to the answer, "Yes."

Start Tests

Consequently, this last season, nine tests were planned by the extension workers in these three counties of Portage, Waushara, and Waupaca, in cooperation with good farmers. Only fields of average fertility were chosen. The plots were laid out in a direction crosswise to the direction in which the manure spreader was driven when the field was top-dressed before the sod and manure were plowed down in the spring. This eliminated any danger of variation in plot yields due to streaked manure dressings.

In determining what fertilizer analyses were to be tested, the past findings of what had worked best for general soil improvement and clover growing in this region were kept in mind. Some cues also were taken from results of outstanding potato fertilization work by Professor F. L. Musbach of the Wisconsin Branch Experiment Station at Marshfield and the county agents of some of the counties lying to the north.

Four analyses were used, namely, 3-10-0, 3-10-10, 3-10-20, and 3-10-30. Whereas, an application of 800 to 900 pounds of fertilizer per acre is the rule for row application in the newer and heavier soils of northern Wisconsin, it was promptly decided that not more than 400 to 500 pounds per acre should be used in the row on these sandy loam soils of central Wisconsin because of their lower water-holding capacity and the danger of burning the crop.

But how was this 400-pound application of fertilizer to be applied in the row? Inquiry revealed that in Portage county, which grows upwards of 25,000 acres of potatoes annually,

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These records completed the story which was general throughout the other plots in the section.

An overhead sawdust feed apparatus is being used here in packing Emperor grapes in lugs for storage.

What's Ahead?

***"The optimist the doughnut sees,
The pessimist the hole."***

¶ Number Five

By Frank George

THE last car of lettuce was being loaded from a 100-acre field in the Imperial valley. Three days later the entire field had been plowed, harrowed, bedded for cantaloupes, and the cantaloupes planted along one edge of each bed. The tractor had run 24 hours a day, the drivers working 8-hour shifts.

The scene changes to the celery fields of Florida. Spools of paper are being unrolled against the sides of the growing stalks—a blanching device. One man, with a mechanical harvester that cuts the stalks two inches below the surface of the ground, in a nearby field is keeping busy a gang of 30 laborers sorting and crating the crop.

Everywhere—from California to Florida, from Maine to Texas—there is feverish activity to catch the first flush of the market demand for fruits and vegetables; to satisfy the seemingly insatiable appetite for garden produce. Crop follows crop in the same fields where climatic and soil conditions permit; high yielding, quick yielding varieties are sought; competition is rife between industries and within industries. Plow, plant, cultivate, harvest, ship to market!

Within 10 years the area of 18 leading commercial truck crops has been increased more than 1,000,000 acres, or from 1,700,000 acres in 1920 to 2,778,000 acres in 1929—and the end is not yet. Although sudden large increases in acreage are to be discouraged, the long-time prospect is one of steadily increasing con-

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Pasture Is Worth—?

By R. W. Donaldson

Extension Agronomist, Massachusetts Agricultural College

PASTURE plots top-dressed with complete fertilizers and lime showed an increased yield that was three times that of the unfertilized plots on 16 farms in Massachusetts where county agents conducted pasture demonstrations in 1929.

Last spring pasture top-dressing demonstrations were established on 53 farms for the purpose of finding the best treatment to restore run-out pasture sods. Records of yields for the first year were obtained on 16 of these farms.

Five plots were fenced off in each pasture, four for different treatments and one for a check. The following were the treatments and the average yields:

	Fertilizer Per Acre	Yield Dry Grass Per Acre
Plot 1.	Unfertilized	1196 lbs.
Plot 2.	600 lbs. superphosphate	1588 "
Plot 3.	600 lbs. phos. and 1 T. lime	1674 "
Plot 4.	600 lbs. phos. 200 lbs. potash and lime	1958 "
Plot 5.	1,000 lbs. 5-10-10 and 1 T. lime	3442 "

The results are what one would expect the first year. Treatments with superphosphate showed only slight gain. Where lime and potash were added, clover began to show up in many of the plots. Lime and minerals work slowly, but they improve soil conditions so that clover and better grasses gradually take the place of weeds and moss after several years. Where nitrogen was added to make a complete fertilizer, there was an immediate response and a stretch to the grass that did not require a microscope to detect it. Moreover the cows saw it, came, and ate it, reaching for it as far as they could reach under the fence.

Assuming a valuation of $20.00 per acre for rough pasture, a charge of $2.00 per year should cover investment, taxes, and fence repair. A ton of air-dry grass from the unfertilized plots costs, therefore, $3.34.

When lime or fertilizer is applied, these costs must be added. But the lime should be good for five years and the potash and superphosphate should last at least three years, so only the proportionate costs should be charged for any one year. Nitrogen, however, would be applied each year and charged in full against the crop. On this basis, a ton produced on the superphosphate pasture costs $5.30; on the superphosphate and lime, $9.80; on the superphosphate, lime, and potash, $10.00; while on the complete fertilizer and lime it costs $11.50.

Real Effects Follow

It is obvious from the above figures that so far as the first year is concerned, the grass was cheapest where no fertilizer was applied. Grass from the superphosphate cost about half as much again, but where lime was added the costs were trebled over that from the unfertilized. The complete fertilizer and lime treatment was slightly the highest cost of all.

Does this mean that fertilizer treatments do not pay? Let's see!

Conclusions must not be drawn from the first year's results. As pre-

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ENJOYING "SPRING FEVER"

Left: Here's a woodman who uses a hoe instead of an axe. The "windy" farmer has always had the reputation of being a poor worker, but in this case the more wind the more hoeing. He is a wooden weather-vane on a Connecticut farmer's porch railing.

Below: A familiar scene when early spring plowing takes place near the farm buildings. The chickens are having one of the best feeds of the year.

Right: Attempts are being made to evolve a new breed of chicken minus wings and toenails. The contrast between chickens of the same age, one with and one without wings, is shown here. Both specimens are perfectly healthy.

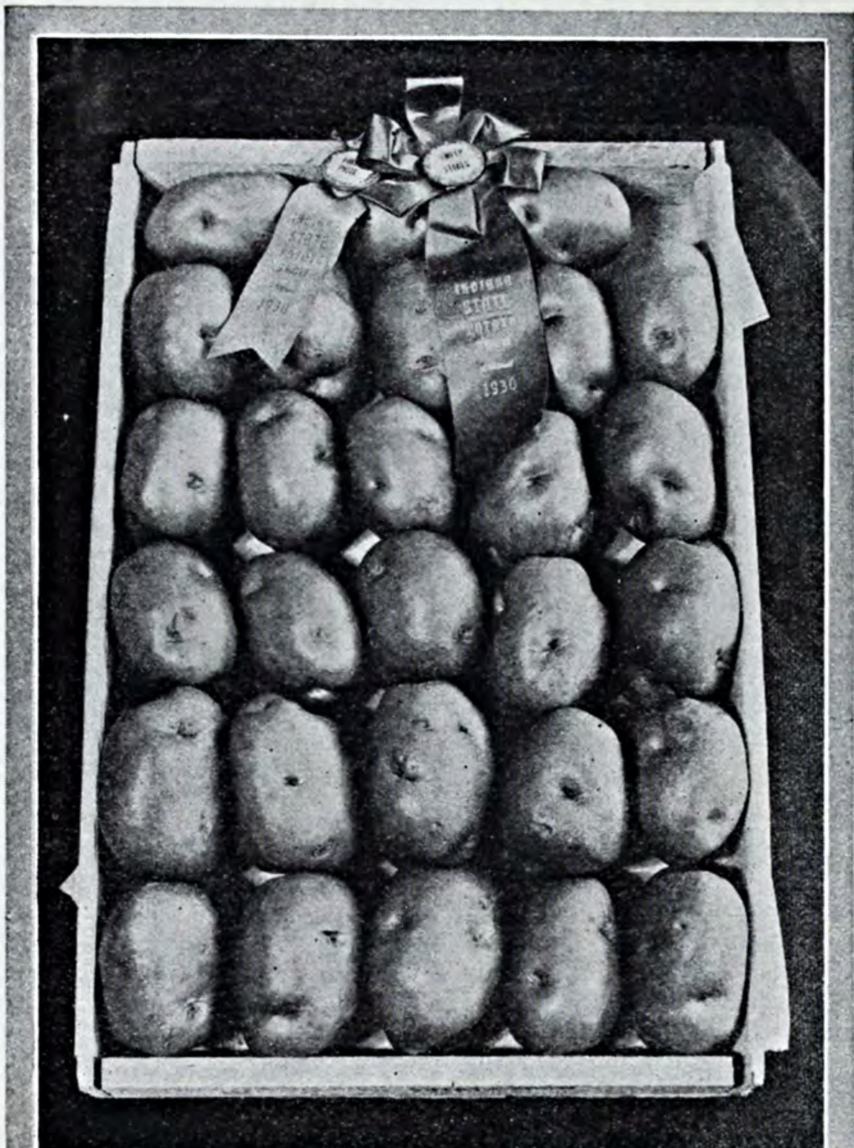
Below: A young farmer of the corn belt inspects his father's hogs. Judging from the looks, he will pronounce them about ready to market.

"This was one of the best and most interesting interviews that I ever had," says I. G. Kinghorn, Editor, Colorado Agricultural College. However, it didn't turn out successfully and he had to eat goose for Christmas.

Another typical sign of spring! Good shepherds dock all lambs to escape a docking in price by buyers when the lambs are ready to market.

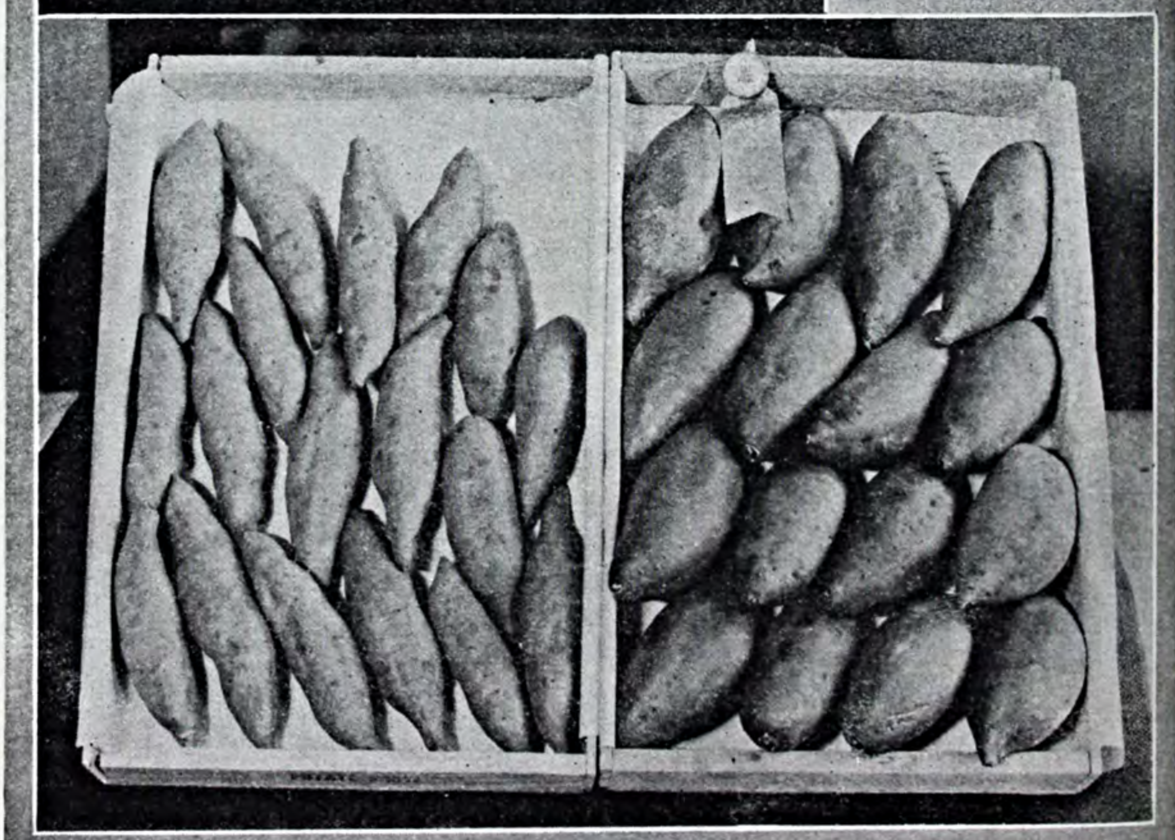
This quartet makes up the entire list of Pulaski county, Indiana, agricultural agents during the past seventeen years. They are, left to right: Walter Kell, I. J. Mathews, H. J. Yarling, and O. H. McNary, in the order of their service.

A bit unsightly perhaps, but very practical! This farm wife raised a flock of ninety chicks in an old abandoned automobile.



Left: The sweepstakes peck of potatoes at the annual potato show, Purdue University, was shown by W. W. Stauffer of Akron, Indiana. These potatoes were fertilized with 400 pounds of an 0-10-10 analysis per acre.

Below: At the same show the sweepstakes tray of sweet potatoes was compared with another tray entered from the same part of the State. Henry Quillen of Patoka, Indiana, exhibited the sweepstakes potatoes and selected them from sweets fertilized with 600 pounds of 0-16-32 commercial fertilizer plus six tons of cattle manure per acre. The "stringy" sweets were grown on a similar type of soil, but did not receive the necessary fertilizer. This shows the value of potash in producing large, plump sweet potatoes of show quality and greatest commercial value.



The Editors Talk

The Proper Use of Potash Salts

It has sometimes been observed that potash used at or immediately after planting has not given any increase in yield. From this it has been too often presumed that potash is not necessary. But this question of the value of potash cannot be properly answered until we are more certain of the method and time of application. This is an important matter and deserves much more attention than it has received.

Some years ago Dr. F. W. Zerban made a preliminary study of the question of the time of application of potash salts to soils and crops in the southwestern States. The author gave some rather striking figures as a result of experiments on corn, cotton, and a few other crops. For instance, on corn he found that when muriate of potash was applied one week or less before planting, 62.5 per cent positive results were obtained. But when the same amount of potash was applied more than one week before planting, the percentage of positive results increased to 96. The percentage of increase in positive results due to early applications varied with the crop, soil, and form of potash used. The increase in positive results of experimental work from all forms of potash due to early applications was from 71.1 to 93.6 per cent.

Dr. Zerban went on to point out that in certain sections a side-dressing or top-dressing after the crop has been planted may be as desirable as applying potash ahead of planting. In this connection, as a general series of figures applicable to the soils of the southwestern States, the author states as follows regarding the different forms of application:

> "As a total average, we have 69.2 favorable results from early applications against 63.7 from side-dressing and 51.6 from applications within the danger period."

Again the same question has been discussed by Faas in "Ernaehrung der Pflanze" January 15, 1930. In this paper the author reports on experimental work in Germany. Demonstrations on winter wheat, oats, sugar beets, and potatoes were conducted and the potash was applied at different times, ahead of planting, at planting time, and after planting. The small grain demonstrations showed that the plots where potash had been applied early were more resistant to lodging. In each case the early applications gave the highest yield.

Forty-four demonstrations with different crops and times of applications have been made with the following results. Of eight demonstrations where the potash was applied before planting, 100 per cent gave a profitable increase in yield. Of twelve demonstrations where the potash was applied after planting, 50 per cent gave an increase in yield, while only 16 per cent gave an increase when the potash was applied at the time of planting. The author goes on to point out that the Neubauer test may indicate a potash deficiency and yet the potash demonstration conducted on that soil may not do so.

It is considered that this is often due to the wrong time of application. These figures show how careful one has to be in laying out experiments and demonstrations with potash and especially in the interpretation of the results.

If no attention is given to the time of application, one may be inclined to assume that the soils or crops in the experiment do not require potash, which too often is not the case.

Along with the larger subject of the time and method of applying all fertilizers, certainly the proper use of potash should be given a very prominent place in such a program of research and experimental work, if the information given the farmer is to be of sound and practical value.

The How and Why of Farming

Show me a man in big business who, while keeping his eye on the main issues, does not overlook details, and I will show you a successful executive. Show me a farmer who carefully selects his planting seed; terraces, breaks and cultivates his land so that no gullies run across his fields; conducts fertilizer tests as to quantity and ratios of elements involved in maximum, economic crop production; tests labor saving devices; and looks carefully after the various other items involved in farm management; and I will show you a farmer who makes money farming.

According to Paul Burson, winner of the Georgia cotton contest in 1929, the three most important points in growing cotton are, "good seed, proper fertilization, and boll-weevil control." He has been selecting his seed for twenty years and he knows the how and why of seed selection.

The average Georgia farmer spends less than $5.00 per acre in fertilizing cotton, while Mr. Burson spends $20.00. Again, the average farmer uses a fertilizer with a 3-1-1 ratio as to phosphoric acid, nitrogen, and potash while Mr. Burson uses a 10-7-9 ratio, and Mr. Burson knows why.

Mr. Burson knows Mr. Boll-weevil's habits and life history, and whips him at his own game. The Burson record is: in 1927—120 bales on 125 acres; in 1928—134 bales on 125 acres; in 1929—161 bales on 135 acres. As winner of the Georgia 1929 contest, Mr. Burson produced 5,283 pounds of lint on 5 acres, almost 6 times the State average.

Cullum Medal Awarded Dr. C. F. Marbut

Everybody who knows Dr. Marbut will accord most heartily with the honor that has recently been conferred upon him for his distinguished services in geographic research. His untiring work and unfailing assistance in the organization of the recent International Congress of Soil Science held in Washington in 1927 will long be remembered by everybody who attended the Congress.

As Chief of the Soil Survey, Bureau of Chemistry and Soils, U. S. Department of Agriculture, Dr. C. F. Marbut has been awarded the Cullum Geographical Medal, conferred by The American Geographical Society in recognition of services of special distinction in the field of exploration and geographic research. The presentation was made in New York City February 25 at a banquet of the society. Major General George W. Cullum, president of The American Geographical Society from 1877 until his death in 1892, established the award which bears his name. The first award was in 1896, to Admiral Robert E. Peary, discoverer of the North Pole. Among those to receive this award in the past have been Peary, Fridtjof Nansen, Sir John Murray, Robert F. Scott, and Sir E. H. Shackleton.

Doctor Marbut's extensive studies and classification of the soils of Europe, Africa, South America, and North America have furnished an important contribution to the soil geography of the world. There is probably no man, says Dr. A. F. Woods, Director of Scientific Work of the Department of Agriculture, who has a wider or more intimate knowledge of the soil types of so many different countries.

In 1899, while a professor at the University of Missouri, Doctor Marbut spent a year examining and classifying soils in every country of western Europe except Spain. On a later expedition he made an extensive study of the soils of southeastern Europe. In 1918, at the instigation of the technical advisors of the American Commission to Negotiate Peace, he directed the classification of the soils of Africa. The result of this study was the publication of his scientific description and classification of African soils called "Vegetation and Soils of Africa" written in collaboration with Dr. H. F. Shantz of the Bureau of Plant Industry and published by The American Geographical Society in 1923.

For many years Doctor Marbut has had supervision of the soil survey work of the U. S. Department of Agriculture, in which more than 880,000,000 acres, approximately half the agricultural land of the United States, have been mapped and described. As a guide to farm practice, this inventory of soil resources is becoming established as the scientific foundation of this country's program of agriculture.

Doctor Marbut is chairman of the International Commission on Genesis, Classification, Morphology, and Mapping of Soils. He presided at the sessions of that commission held last May in the Free City of Danzig.

As chairman of the subcommission on mapping the soils of the Americas, Doctor Marbut recently made a study of the soils of South America, in addition to his lifelong study of the soils of the United States, upon which he will report at the triennial meeting of The International Soil Congress to be held in Leningrad, Union of Socialist Soviet Republics, in July this year.

On the Cullum medal received by Doctor Marbut are inscribed the words, "For his geographical work on the soil, 'the foothold of all things.' "

Fertilizing Tree Fruits

For a long time nitrogen has been recommended as the most important and in many cases the sole fertilizer required for tree fruits. Within the last few years from various sources, there have appeared signs of dissatisfaction with this program. Among others, the buyers of fruit have not always been satisfied, saying that the fruit produced by the nitrogen program was not of a good quality. In many cases it is reported that buyers have reduced the price, if it were known that the nitrate program had been followed too exclusively.

This discontent naturally led to further research and experimental work on the part of many horticulturists. The results of some of this work were discussed at the recent meeting of the American Society of Horticultural Science, which was held as a part of the general program of the Society for the Advancement of Science, in Des Moines, Iowa. The experiments reported are much more exhaustive than they were formerly. Various methods and materials are being critically examined under the best orchard conditions that it is possible to obtain. One paper showed definitely that phosphorus and potash in addition to nitrogen gave excellent results on apples. The general tenor of the other papers was that under the conditions of the experiments no definite result could be shown from phosphates or potash.

Therefore, at the moment the outlook is not very hopeful that those who are not satisfied with the nitrogen program will be reconciled to the expert advice of the horticulturists.

Undoubtedly much of the so-called damage or bad effect of nitrogen is due to an unbalanced fertility program and possibly the use of excessive amounts of nitrogen or under conditions that have not been recommended in the horticultural program. On the other hand, experimental work with tree fruits is difficult. Under many conditions it takes a long time for the fertilizers to influence tree growth and the method and time of application may not be satisfactory, so that on the whole it is probable that the experimental technique may yet have to be refined or modified before accurate results will be obtained.

Certainly, however, the nitrogen program does not seem to stay put. Neither, by any means, does it seem to satisfy everybody. Undoubtedly the best attitude on this question was expressed by a speaker at a recent horticultural meeting who said in effect that our present knowledge on nitrogen and tree fruits is the best we have, but it is far from final or complete, and that much more work needs to be done before practical and satisfactory answers can be given to all the problems involved in fertilizing tree fruits.

Fertilizers "Go West"

New Mexico now has a commercial fertilizer law. It was passed by the Ninth Regular Session of the Legislature of the State of New Mexico in 1929. Until that date New Mexico had been without any form of regulation with respect to fertilizers. It is pointed out that agricultural conditions are changing and with it the use of fertilizers. The law has been patterned after similar laws found successful in other States.

The law requires information regarding the kind and maximum percentage of substances used as fillers, also a guaranty that the fertilizer contains no horn, hoof, hair, feathers, or other inert nitrogenous matter.

The law also requires that each manufacturer, importer, jobber, firm, association, or corporation shall notify the fertilizer control office within twenty-four hours after making any shipment of fertilizer. The date, amount, destination, etc., of each shipment into or within the State must be reported.

Another feature is that all materials for which any claim of inoculation is made must be registered and reported. The registration must show the purpose of the organisms present and other information.

Thus it is very significant of the change that has taken place in our national agriculture that States considered far outside the old fertilizer territory are now enacting fertilizer laws.

Alfalfa

Sixteenth in this series

By Walter H. Ebling

Agricultural Statistician, Wisconsin

ALFALFA is probably a native of of Central Asia. It was brought to America about the middle of the last century and has since spread to all States. It is probably the best known of our tame hay crops, and efforts are now being made to grow it practically everywhere.

Of the tame hays it is not only the most important and valuable from the standpoint of total production, but it also excels in quality. Its feeding value for practically all classes of livestock is more and more being recognized, and this together with its high production per acre accounts for the great efforts which are being made to grow it in practically all States.

A Western Crop

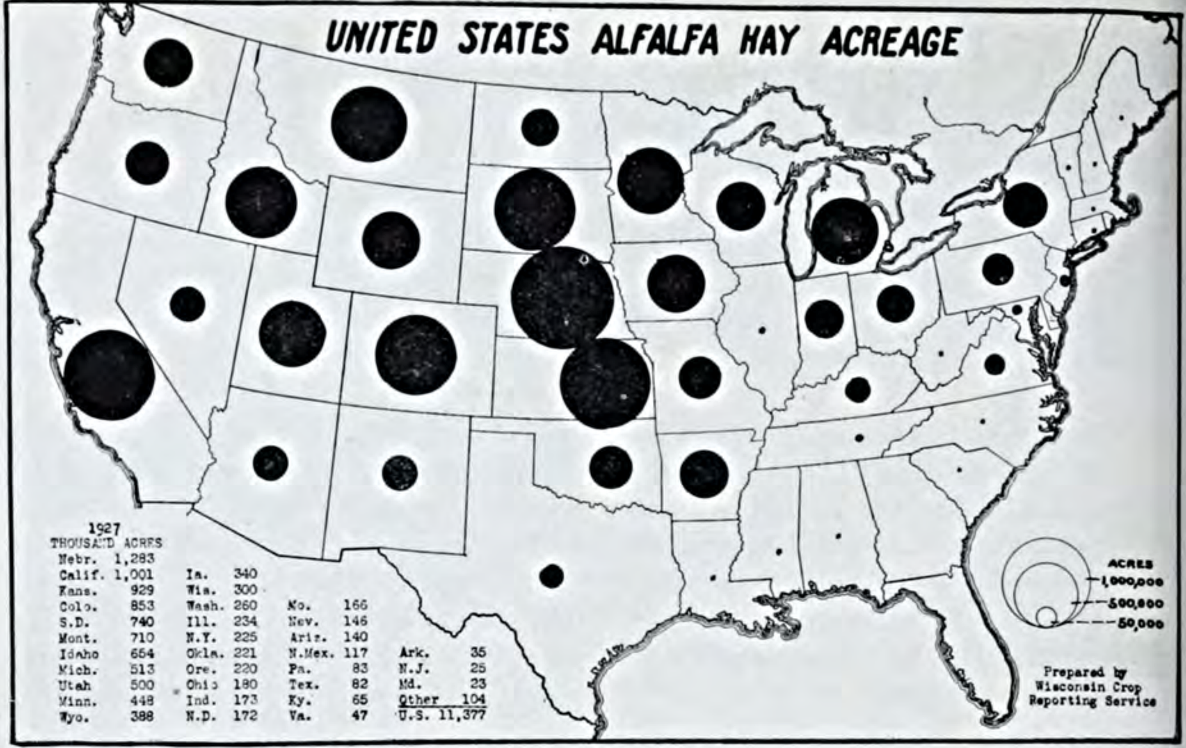
Geographically, alfalfa is still the great hay crop of the West. It finds its most favorable conditions in the western States where the soils are not acid and where there is relatively little rainfall during the summer. In spite of the marked efforts which have been made to introduce it on a large scale in the dairy and livestock regions of the East where a hay crop of this type is so much in demand, 83 per cent of the United States alfalfa acreage was still west of the Mississippi River in 1927.

A good hay plant must be suitable both from the standpoint of consumption and production—alfalfa excels in both. According to the United States Department of Agriculture more animal units are supported by alfalfa hay than by any other hay crop in the country. In fact, in rank as a livestock feed plant, alfalfa is exceeded only by corn and oats. Experiments reported by Kansas show that when the crop is cut in the one-tenth bloom stage it contains over 18 per cent protein; when cut in the one-half bloom stage it contains over 17 per cent; and even in the full bloom stage it contains over 14 per cent of protein. This unusual hay feeding value makes alfalfa a preferred hay for most classes of livestock. In its chopped form it is even fed to hogs and poultry.

As crop rotations go, those involving alfalfa run for unusually long periods. In the more favorable conditions found particularly in the West, fields have frequently been cut as long as 15 or 20 years. In the more humid sections it usually does not last nearly that long. While it grows on nearly all types of soil, it is usually found that in humid sections it is less vigorous and makes fewer cuttings per year. In addition, it suffers more from disease and yields to weeds more readily in regions of heavier summer rainfall, with the result that fields in the eastern part of the United States usually are plowed up much earlier than fields of the same planting date in the drier western States.

1929 a Good Year

In 1929 the estimated production of alfalfa hay in the United States was nearly 30,000,000 tons, which is approximately 30 per cent of the tame hay production for the country. The large production is in a considerable measure the result of high yields per acre, the average per acre yield for alfalfa last year being 2.59 tons per



acre as compared with 1.78 for clover and 1.34 for timothy. It must be remembered further that 1929 was an usually favorable year for clovers in the more important clover growing States. In total acreage Nebraska, California, Kansas, Colorado, and the Dakotas are usually the leading ones. In the production of seed, which is an important source of income for many alfalfa growers, Utah leads followed by Arizona, Idaho, Nebraska, and Colorado. The demand for American grown seed is increasing and prices have been well maintained. It is found more and more that imported seeds, especially those from countries of milder climates, are less satisfactory under American conditions than northern home-grown seeds.

Cultural Practices Vary

From the standpoint of cultural practices, there is considerable variation in the handling of alfalfa in the different sections. In the main, however, the seeding is done broadcast usually with a nurse crop. In the Midwestern States barley serves especially well for this purpose since it is harvested early and does not lodge or shade the ground excessively. Like most hay crops, alfalfa is usually harvested for the first time the year after seeding.

In cutting the crop different practices are followed. Probably one of the most important methods now used in the West is stacking the hay by the use of a stacker and buck rake. This method is probably the least expensive from the standpoint of man and horse labor. In the more humid sections raking the dried hay into windrows is common. Piling of the hay into small hay cocks for curing is also customary, but probably less so than in the past. A very satisfactory method of handling alfalfa on most dairy farms seems to be that of raking it into windrows by means of a side-delivery rake and loading it with a hay loader and thence hauling it to the barns. Because of the leafy nature of the crop, the matter of handling it is rather delicate since the loss of leaves reduces materially the value of the hay. Artificial drying experiments with alfalfa have been conducted with some success.

Quick Work

Lady—"Is this milk fresh?"

Milkman—" 'Arf an hour ago, madam, it was grass."

Foreign and International Agriculture

Apple Anthracnose

By E. R. Bewell, B.S.A.

New Westminster, B. C.

DURING 1928, I carried on an experiment at Courtenay, British Columbia, to see what effect the use of sulphate of potash had on controlling anthracnose of apple trees. I had been informed by a reliable authority that a good supply of available potash in the soil was necessary in order to produce a mature wood that would be resistant to anthracnose and increase the vigor of the tree so that there would be a yearly crop of apples, instead of a crop every second year which is the usual thing here in the coast area of British Columbia.

I wrote a report of this experiment about a year ago and it was published in the March issue of BETTER CROPS WITH PLANT FOOD. I was criticized for writing the report on only one year's work, but the results I got were better than I expected, and supported the lack of potash idea. The most important part of it was that the results agreed with the information I had received on the subject, and this year's work shows still more that the potash treatment is a success.

The common method of controlling anthracnose here is by pruning out badly diseased branches and spraying the tree with a spray recommended for the purpose.

I continued the experiment during 1929, and the results were very satisfactory. I had the man looking after the orchard apply more fertilizer to the tree. Three pounds of sulphate of potash as well as three pounds of superphosphate of lime were applied in September, 1928, and two pounds of each were applied in March, 1929, as well.

Only part of the dead wood was removed in 1928 so the tree was given a heavy pruning in the spring of 1929 and all dead wood removed. The District Horticulturist for this area visited the orchard and recommended a spraying, which was given.

The tree came into bloom and out in leaf quite normally this past season, and I was advised by C. W. Leedam that the tree produced a fairly good crop of apples again this year. This was somewhat of a surprise, as most fruit trees in the coast area of British Columbia only produce a crop every second year. They seem to need a year's rest after producing a crop.

Need Yearly Applications

I left Courtenay last May so was not able to watch the apple tree throughout the summer, but I visited the orchard the end of August and inspected the tree. I was agreeably surprised to find it in such a healthy condition, showing a strong, healthy growth of new wood, with dark green leaves and every evidence of maturing properly. There was practically no new infection of anthracnose to be seen. The old scars were healed up or were healing over.

An application of fertilizer, high in

potash, should be given yearly. This with proper pruning and spraying should give the tree a chance to produce good crops for several years.

Our soils in the coast area of British Columbia are usually lacking in potash, phosphoric acid, and lime, and most of the highland soils are low in nitrogen as well. The peaty soils and mucks are rich in nitrogen but lack the other elements. So it is only reasonable to expect a soft growth that is not hardy and which is more subject to disease. Where there is plenty of the essential elements, we naturally expect to get a more mature wood to have the trees in a more vigorous condition, and to get more uniform crops. I might add that we have a long growing season here, growth starting in April, sometimes in March, and brought almost to a standstill during the summer which is usually quite warm and dry. The fall rains start growth again, making practically two growing seasons in a year. This second growth continues late in the fall and many of our fruit trees have green leaves on them in November, and sometimes into December.

Prevents Winter-killing

We find these long growing seasons bring our fruit trees into bearing much earlier than in areas of shorter growing seasons where they have cold winters with plenty of snow. Our winters, that is periods of cold weather with snow, in the coast area are short. Most of our winter season is rainy weather. We often get a cold spell in December with or without snow, or it may come in January or February. These cold spells last from a week to a month or five weeks and vary in severeness, but as soon as a stormy period springs up with a southeast wind, we get rain which is most welcome, and the snow all disappears.

We also have trouble with winter-killing, especially after a nice fall with plenty of moisture which promotes a strong second growth. This good growing weather sometimes continues into November. This happened in 1924 and a severe cold spell set in, in December when temperatures dropped very suddenly, zero being registered at some coast points. As the trees had not become dormant yet, they suffered from winter-killing, especially where they were exposed to a strong north wind, but where they were not exposed to the wind the winter-killing was not so severe.

Last winter, the weather was quite mild up to the end of January. We had some snow during November, 1928, which stayed about two weeks. This stopped growth but was not severe winter weather. Rains about the first of December removed all the snow and the weather was fairly mild up to January 26, 1929, when it turned real cold and we had some real severe winter weather which lasted through most of February. For about one week we had zero weather, the temperature dropping to as low as three and five degrees below zero. This was the coldest weather experienced here for many years, but it had no bad effects on the tree treated with potash, showing that the wood was more mature than it had been previously and was able to stand this extremely cold weather, as well as being more resistant to anthracnose.

I am satisfied that the use of fertilizers high in potash helps produce a mature wood that can stand the cold spells we get during our winters as well as assists in controlling diseases. Our soils are all acid and need lime, which would make the fertilizers more effective, and by adding all elements to our fertilizers, I feel sure we can improve the quality and flavor of our fruits. They do not have the flavor of fruits grown in the colder fruit growing sections, as their soils are not subject to leaching since their rainfall is light. The heavy winter rainfall at the coast is constantly depleting the soil, and steps must be taken to replace what is lost in this way.

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, Crops, Crop Diseases, and Insects. 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

Profitable returns on the investment in commercial fertilizers can only be derived if farmers use them properly. Realizing this, many of our State experiment stations are finding it desirable to bring together the results of their experiments in the form of special bulletins, wherein the proper analysis and rate of application per acre are given for each important crop for both mineral and muck soils. Circular 53, "Fertilizer Recommendations for 1930," by Messrs. M. M. McCool, G. M. Grantham, and P. M. Harmer of the Michigan State College, is such a publication and of particular interest for the discussion concerning the economic use of fertilizer in profitable crop production.

In this same connection, the North Carolina Experiment Station has just published fertilizer recommendations for eight important soil regions of the State in eight separate circulars (Agronomy Information Circulars No. 34, 35, 36, 37, 38, 39, 40, 41) by C. B. Williams, H. B. Mann, and A. S. Cline.

These Michigan and North Carolina recommendations represent two distinct methods for treating the subject of fertilizer recommendations. Both of them serve a very useful purpose.

"Twentieth Biennial Report of the Department of Agriculture," Tallahassee, Fla., 1927 and 1928.

"Individual Samples of Commercial Fertilizers," Ga. Dept. of Agr., Atlanta, Ga., Serial 114, 1929.

"Commercial Fertilizers," Ga. Dept. of Agr., Atlanta, Ga., Serial 115, 1929.

"Official Inspections," Agr. Exp. Sta., Orono, Me., No. 133, October, 1929.

"Commercial Fertilizers," State Fertilizer Inspection Service, College Park, Md., No. 135, January, 1930.

"Michigan Fertilizer Bulletin," State Dept. of Agr., Bul. No. 58, 1929 Spring Report.

"Fertilizers, What They Are and How to Use Them," Agr. Exp. Sta., New Brunswick, N. J., Bul. 75, December, 1929, H. R. Cox.

"Analyses of Commercial Fertilizers, Fertilizer Supplies, and Home Mixtures for 1929," Agr. Exp. Sta., New Brunswick, N. J., Bul. 490, October, 1929, Charles S. Cathcart.

"Official Report on Feed Stuffs, Commercial Fertilizers, and Agricultural Lime and Limestones," Dept. of Agr., Columbus, Ohio, 1929.

Crops

Very compact information on red raspberry culture is presented by the University of New Hampshire Extension Service in a new Extension Circular 103. The authors, L. P. Latimer and H. A. Rollins, in the four-page pamphlet briefly discuss the chief factors in success with this small fruit, the quality of which plays such an important part in the demand. Small-fruit growers will find this circular a very interesting reference.

"Results of Cotton Variety Tests 1926-1929," Agr. Exp. Sta., Auburn, Ala., Cir. 55, Jan., 1930, H. B. Tisdale and J. T. Williamson.

"Forty-First Annual Report Fiscal Year Ending June 30, 1929," Agr. Exp. Sta., Fayetteville, Ark., Bul. 246, Dec., 1929.

"Monthly Bulletin of the Department of Agriculture, State of California," Sacramento, Calif., Vol. XIX, No. 1, January, 1930.

"American Potato Journal," The Potato Association of America, East Lansing, Michigan, Vol. VII, No. 1, January, 1930.

"Annual Legumes for Hay and Green Feed,"

Univ. of N. H. Ext. Serv., Durham, N. H., Press Bul. 157, May, 1929, Ford S. Prince.

"The Bimonthly Bulletin," Ohio Agr. Exp. Sta., Wooster, Ohio, No. 142, Jan.-Feb., 1930.

"The Climate of Ohio," Ohio Agr. Exp. Sta., Wooster, Ohio, Bul. 445, December, 1929, Wm. H. Alexander and Chas. A. Patton.

"Plant Forest Trees on Idle Land," Agr. Exp. Sta., State College, Pa., Cir. 130, Nov., 1929.

"Virginia Department of Agriculture and Immigration," Dept. of Agr. and Imm., Richmond, Va., Bul. 265, Jan., 1930.

"Training General Educational Administrators in Responsibilities for Vocational Education," Federal Board for Vocational Education, Washington, D. C., Bul. 140, Dec., 1929.

Economics

The cooperative marketing of agricultural products has increased rapidly since the war. Some cooperatives have been successful while many have failed. In order for progress to be made, it is advisable to profit by the experience and lessons that have been learned in the past. A new publication, Bulletin 245, "The Status of Cooperative Cotton Marketing in Arkansas," by B. M. Gile, is a study of the cooperative cotton marketing in Arkansas and what has been accomplished in the past. It, furthermore, is a study of the attitude of cotton growers toward cooperative marketing. With the present emphasis which is being placed on the cooperative marketing by the Federal government, studies such as these are timely and useful.

"Prices of North Dakota Farm Products," Agr. Exp. Sta., Fargo, N. D., Bul. 232, December, 1929, O. M. Fuller and Rex E. Willard.

"The Agricultural Outlook for 1920," U. S. D. A., Washington, D. C., Misc., Pub. 73, February, 1930.

Diseases

"Footrot of Citrus Trees and Its Treatment," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 417, Sept., 1929, Arthur S. Rhoads.

"The Rusts of Pennsylvania," Agr. Exp. Sta., State College, Pa., Bul. 239, May, 1929, F. D. Kern, H. W. Thurston, Jr., C. R. Orton, and J. F. Adams

"Gummosis and Psorosis of Citrus Trees," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 418, Sept., 1929, Arthur S. Rhoades.

"Treatment of Gummosis and Psorosis of Citrus Trees," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 419, Sept., 1929, Arthur S. Rhoads.

"Disinfectant Pastes and Washes for Treating Bark Diseases of Citrus Trees," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 420, Sept., 1929, Arthur S. Rhodes.

"The Cause and Control of Melanose," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 421, Dec., 1929, Arthur S. Rhodes.

"The Cause and Control of Citrus Scab," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 422, Dec., 1929, Arthur S. Rhoads.

Insects

"Biology and Control of the Southern Corn Rootworm," Agr. Exp. Sta., Auburn, Ala., Bul. 230, Nov., 1929, F. S. Arant.

"Cryolite and Barium Fluosilicate: Their Use As Insecticides," Agr. Exp. Sta., Knoxville, Tenn., Bul. 140, Nov., 1929, S. Marcovitch and W. W. Stanley.

Vegetable Growing

One of the most interesting and practical text-books on vegetable growing that has found its way to our library during the past few years is "Vegetable Growing" by James Edward Knott, Ph. D., Research Assistant Professor of Vegetable Gardening, Cornell University.

The contents have been recorded in a natural progression beginning with the simple question of producing vegetables for man and other animals. The author carries the student through problems of light, heat, moisture, and food supplies as affecting growing plants. A discussion of the condition, classification, fertilization, and cultivation of the soils is comprehensive and full of interest.

Chapters deal successively with production of seed and seedlings, the control of diseases and insects, and the growing and maturing of the numerous varieties of plants which constitute our vegetables.

Many useful and practical methods of preparation and treatment of a variety of soils, to meet the needs of the particular crop in question, are clearly and succinctly set forth.

The application of manures and fertilizers, as indicated by the needs of the different crops, having regard for the natural supply of the elements already contained in the soil, is ably discussed.

Harvesting, preparing for market, and marketing the many vegetables that go to make up our daily food are explained in separate chapters.

This volume of orderly contents, attractive illustrations, and alphabetical index, as a textbook for students and a reference book for practical gardeners, should prove a valuable contribution to our horticultural literature.

Row Application for Wheat

APPLICATION of commercial fertilizer in the row at time of seeding wheat increased the yield 6.8 bushels per acre over the yield obtained when the same amount of fertilizer was broadcast over the field, according to F. L. Duley, Professor of Soils at the Kansas State Agricultural College. The result was obtained during a recent study of the comparative value of various methods of applying fertilizer to wheat at the Kansas Agricultural Experiment Station.

The broadcast method of applying fertilizer is the one that has been most commonly used in experimental work in Kansas because it is the most convenient method when handling small test plots, but not, as the above results show, the most profitable method of using fertilizer. To apply fertilizer in the row a special attachment must be used on the drill.

Study of the new method has not been extensive enough to determine conclusively its value under varying soil and climatic conditions within the State, Professor Duley explains. However, the method has been used for many years in the southeastern counties where the application of fertilizer to wheat land is a well-established practice.—*F. E. Charles, Kansas Agricultural College.*

Pasture Is Worth—?

(*From page* 30)

viously noted, the real effects of the lime and fertilizer treatment in building up the soil have scarcely begun. We shall expect different results three years from now. Furthermore, with such an unusually dry season and with a rainfall during June and July that was less than one-quarter the normal and only one-eighth of what fell a year ago, full results could not be expected. But, the real point is—"*What Is Pasture Feed Worth?*" For the farmer who needs more pasture feed, what is it worth in terms of barn feeding costs?

Young pasture grass that has been fertilized averages 15 to 20 per cent protein on a dry weight basis. It is equal to alfalfa hay as a feed which costs $25.00 to $35.00 per ton. Good pasture is rich enough to replace at least half of the $50.00 grain that otherwise has to be fed. Gus Peterson of Bridgewater, Massachusetts, maintained 60 cows during June and July this past season on pasture feed without feeding an ounce of grain or roughage feed, and he uses a complete fertilizer as top-dressing.

The farmer who has enough pasture feed may not realize how fortunate he is. Possibly such a farmer needs only a cheap treatment to maintain it. But the farmer, who really needs pasture feed that is worth maybe at least $25.00 to $30.00 per ton in place of barn feeding costs, can well afford even the most expensive fertilizer treatment if it will give him three times the amount of grazing at a cost of between one-third to one-half what his barn feeding actually costs.

Note—A number of Massachusetts farmers are planning to apply 500 *to* 800 *pounds of a* 5-8-7 *per acre on their poorer sods or an* 8-6-6 *on their better sods. From* 500 *to* 1,000 *pounds of lime per acre would unquestionably be profitable in cases where an application of one ton would add too greatly to the initial cost.*

"Red" Raspberries

(*From page* 24)

cent so far as texture was concerned and 4.5 per cent on color."

Another interesting demonstration which Mr. Hall established in his county three years ago showed definitely that the use of superphosphate produces winter hardiness in Cuthbert red raspberries. Three years ago on the farm of Ray Reitzma a one-half acre plot of red raspberries was given an application of superphosphate at the rate of 1,000 pounds per acre. For two years this demonstration showed very slight results. During the 1929 crop season preceded by severe winter conditions, the results were marked. Since the application of the superphosphate the whole field has had the same treatment receiving a light annual application of stable manure and 100 pounds of superphosphate per acre and 100 pounds of potash per acre.

The winter injury on the plot which received the 1,000-pound application of superphosphate was but 5 to 10 per cent, while on the half acre immediately adjoining 60 per cent of the canes were injured by freezing. From this demonstration Mr. Hall believes that superphosphate has a definite effect upon the winter hardiness of raspberry plants.

Several years ago another Oregon county agent observed in a demonstration plot in Douglas county following a severe winter that broccoli plants growing on ground which received applications of superphosphate showed much greater resistance to cold temperatures than did broccoli on ground where no superphosphate was used.

Profits from Fertilized Pastures

(*From page* 13)

turing earlier to prevent too rank and woody a growth which the cattle did not like.

A very important benefit from fertilizing pasture and one that does not appear in the yield figures is how much better and closer cattle will eat fertilized pasture than they will the more woody and less palatable unfertilized grass. The closer grazing helps to keep down weeds and coarse growth and helps to increase the carrying capacity of the pasture.

RECOMMENDATIONS

1. Select the best pasture areas on which to begin fertilizing.

2. Top-dress with lime (on acid soils) and fertilizer carrying potash and phosphoric acid to insure suitable soil conditions and a good sod.

3. Top-dress with nitrogen fertilizer for immediate results and over as large an area as the feed can be used to good advantage.

4. Top-dress with nitrogen fertilizer when 10 or more additional days of pasture are desired at the be-

ginning of the pasture season.

5. Top-dress average pastures with not more than 30 pounds of nitrogen (200 pounds nitrate of soda or calcium nitrate or 150 pounds of ammonium sulphate) in early spring. For greater benefit from nitrogen make one or more midsummer treatments.

6. Do not fertilize large areas of poor pasture or pastures on light sandy soils or pastures likely to dry out early in the season until small trials show that it will pay.

7. Top-dress loams and sandy loam pastures with sufficient fertilizer carrying phosphoric acid and potash to last more than one season.

8. Top-dress heavy clay and clay loam pastures with superphosphate only or with fertilizer carrying phosphoric acid and nitrogen only until test trials show that potash will pay.

9. Wherever possible fence the pasture into three or more fields so that they can be pastured in rotation allowing each field from one to two weeks rest between grazings. The cows are then in fresh feed all of the time. They travel over much less ground to get filled up and graze the pasture more evenly.

Note—The writer wishes to take this opportunity of thanking the Rutland county bankers who supplied the money needed to finance these pasture tests. The work was conducted by the County Farm Bureau, County Agent T. D. Cook of the state extension service with the cooperation of the U. S. Department of Agriculture and the county farmers.

What's Ahead

(*From page 29*)

sumer demand. The lettuce area, for example, has increased from approximately 32,000 acres to more than 141,000 acres in the last 10 years; yet the Federal Bureau of Agricultural Economics, in its 1930 Outlook Report, declared that "the pronounced increase in the demand for lettuce continued in 1929 and there is as yet no evidence that the peak of demand has been reached."

Eyes are centering on the eastern cotton belt as the scene of great development in the truck crop industries in the next 10 years. The factors that will produce this change are the unprofitableness of cotton production in competition with the large scale, low cost production methods of the West; the increasing industrialization of the South with its consequent growth of cities, and the ever-increasing winter tourist travel with its corresponding demand for farm products. The continued growth of industrial cities in the North is also furnishing an expanding market for early fruits and vegetables.

Ten years ago the production of carrots was regarded by the Department of Agriculture as of too little importance for the compilation of production statistics. Peppers were in the same category. Today they occupy a place in the list of 18 leading commercial truck crops, the 1929 area of carrots being reported at 30,570 acres, and of peppers for market, 17,810 acres. The once despised tomato, or "love apple," which was considered poisonous, and at sight of which women are said to have fainted, now occupies 149,000 acres for market and 285,000 acres for manufacture.

Improved transportation and refrigeration are commonly accepted as the chief reason for the expansion which has taken place in the fruit and vegetable industry in recent years. These have practically doubled the market outlet for fresh produce by making supplies available throughout the winter on consuming markets. This situation and the current developments in electrical refrigeration with consequent speeding up of transportation are causing the canning industry some sleepless nights. To combat them, considerable experimentation is being made in the canning of fresh fruits and vegetables by the "frozen pack" method.

A railroad entering Chicago has developed plans for an overhead icing system in Chicago which will make it possible to ice 700 cars without moving any of them. Allowing 45 feet to a car, this means almost six miles of icing track contemplated in one new group of yards which at present handle somewhat less than one-third of the business in Chicago. Another recent development is an iceless refrigerator car which derives its refrigeration by power drawn from the axle, and the Department of Agriculture has announced the development of a portable device which enables fruit growers and shippers to convert an ordinary refrigerator car into a "pre-cooling plant."

The iceless refrigerator car maintains a constant temperature at any point from zero to freezing, by means of mechanical cold control. The power plant and refrigerating apparatus are contained in a small steel box located just back of the journal from which is derived the power that operates the generators. When the car stops the power stops, and while the car will maintain a given temperature for 72 hours, it is equipped with a supplementary motor which can be attached to any power line.

The portable pre-cooling device weighs 85 pounds and its use allows fruit to be loaded directly in a car from the packing house. It consists of a small electric motor and a high-speed blower. When two of these motor-driven blowers are put into operation in the bunkers of an iced and loaded car, the natural circulation of air is reversed. The cold air is pulled up from the ice compartments at each end of the car and blown out over the top of the load, cooling the top layers much faster than they would be cooled with the natural circulation.

The pre-cooling device has been used for pre-cooling strawberries in North Carolina and Florida, and for peaches in Georgia. More recently it has been used in pre-cooling citrus fruits in Florida. The arrangement saves time and labor for the growers, and in addition it makes possible the cooling of fruit loaded at many small shipping points where no pre-cooling plant is available.

Improved Planting Machinery

Time was when most fine garden seeds were sown between the thumb and finger even in commercial market gardens. Various kinds of garden seed drills pushed by hand were then developed. These could be operated successfully only in carefully prepared soil which contained just the right amount of moisture without clods or coarse vegetable material. Today a tractor draws an implement which throws up three flat-topped ridges with irrigating furrows between, and drills at the same time two rows of lettuce on each ridge. Cabbage plants, similarly, are transplanted or set in the ground by machinery with a rapidity that formerly would have required the services of literally hundreds of hand workers in a single field.

One of the new developments in potato production is a three-row automatic planter. Instead of cultivating with a one-row cultivator, many potato farmers now equip their tractors with vine lifters, and weed with multiple row machinery. One instance is cited of a farmer who rigged up a sprayer to mount on the rear of his tractor and operate from the power shaft, while the forward cultivators could still be used. With this outfit he can spray and cultivate in half the ordinary time. Power take-off boom sprayers have also been adapted for

Testing raisin grapes with a saccharometer to determine if they have proper sugar content for packing.

ise with tractors.

Considerable experimentation is being made just now in the use of gases for coloring and preserving products. Laboratory, "pony" refrigerator, and carlot studies have been made by the Federal Bureau of Plant Industry with solid carbon dioxide as a supplementary refrigerant, special attention being given to the effect of the carbon dioxide gas upon the fruit and the fruit rots. The gas given off by the solid carbon dioxide has been found capable of causing practically complete inhibition of both the development of rots and the softening of the fruit almost immediately upon the closing of the car or other container.

This discovery offers tremendous possibilities in the retail packaging of fresh fruits and vegetables which are commonly sold to consumers in bulk. There is a limit, however, according to the investigators, to the period of exposure that the fruit will stand; the greater the concentration of carbon dioxide, the shorter the period of safe exposure. Different fruits vary greatly in their tolerance of carbon dioxide. Strawberries and peaches are very susceptible to injury, whereas grapes are very resistant. The first indication of injury to the fruit is a slight loss of aroma. This is followed by a definite insipidity of taste and finally by the development of distinctly disagreeable flavors.

Better Market Facilities

"One of the most outstanding developments in the fruit and vegetable business in the last five years," according to F. G. Robb, marketing specialist of the Bureau of Agricultural Economics, "is the improvement in wholesale market facilities in many of our principal cities. The Chicago trade has moved from the old cramped quarters along South Water Street to the new South Water Market where it is housed in new stores with all modern conveniences. Two railroads have expended almost $10,000,000 in providing new terminal tracks adjacent to these stores.

"Cleveland has built an $8,000,000 terminal which will handle 95 per cent of the business which was formerly scattered between several yards and wholesale centers. In Pittsburgh the Pennsylvania Railroad has built a new $3,000,000 terminal and auction house on the site of the old produce yards. The unloading and sales platform is 1,200 feet long and 90 feet wide and furnishes space for the display of 225 carloads at one time. The new Detroit Union Produce Terminal cost $5,000,000. In New York City several millions have been spent enlarging and improving the city piers and the Bronx terminal.

"In nearly all of these cities and many others there are relatively new receiving houses built by the chain stores to which cars may be switched without delay in the terminal, and frequently without passing through it. The aggregate of such construc-

Filling a one-row, one-man potato planter with seed and fertilizer, Rockingham county, New Hampshire.

tion is large and shows the growth of this branch of chain stores. Their growing practice of dealing direct with the grower or growers' cooperative has materially affected the business of the jobber and broker in many of our large cities.

"Some of these terminals have had a marked effect upon the method of doing business. Briefly, some of them are sharply restricting the hours of selling, making the hours of business more nearly comparable with those in other industries. Buyers are able to look over more nearly the entire offering of the day before making purchases, but by the early termination of business are compelled to make their decisions with reasonable promptness if they are to secure deliveries that day. The net result seems to tend to equalize matters as between the larger and the smaller firms and as between the older house and the newcomer in the trade.

"Our men in some of the markets express the opinion that the new terminal arrangements have on the average speeded up the rendering of account sales on carlot consignments by at least 24 hours. In some cases there has been a marked effect upon the trade itself. With a definite minimum number of packages which may be sold in some of these new terminals, a number of carlot receivers are discontinuing their jobbing business, while in some markets it has seemed to operate also to decrease the number of jobbers since many buyers who can handle the minimum number of packages now buy in the terminal instead of patronizing the jobber. Small retailers even combine their orders, select one of their number to buy for the group, and then split up the purchase.

"It is generally agreed that all of these changes are in the desired direction and result in the sale of goods more nearly on the basis of real quality, hastened returns to the grower and delivery of goods to the consumer."

Fertilizers for Vegetables

(From page 25)

ing that the soil drainage is as satisfactory as conditions permit, the gardener is free to delve further into the more or less mysterious art of using commercial fertilizers to the best possible advantage. He has a right to expect a handsome financial gain from the correct use of such plant foods. Nor is he likely to be disappointed if the job is rightly done.

If the reaction of the soil is such that red clover grows well, conditions, as far as the acid content of the soil is concerned, are just about right for the luxurious growth of vegetables. The soil chemist refers to such a degree of acidity as pH 6. Neutral soil has a pH value of 7 so the gardener reasons that a soil should be just on the alkaline side of the divide for the best development of vegetable crops. A few vegetables require an acid soil.

For clearness of understanding and for briefness of statement, the vegetables will be grouped and the several soil types will be placed in four divisions. By so doing the gardener will be able to more easily fit his particular problem into this more or less general series of recommendations.

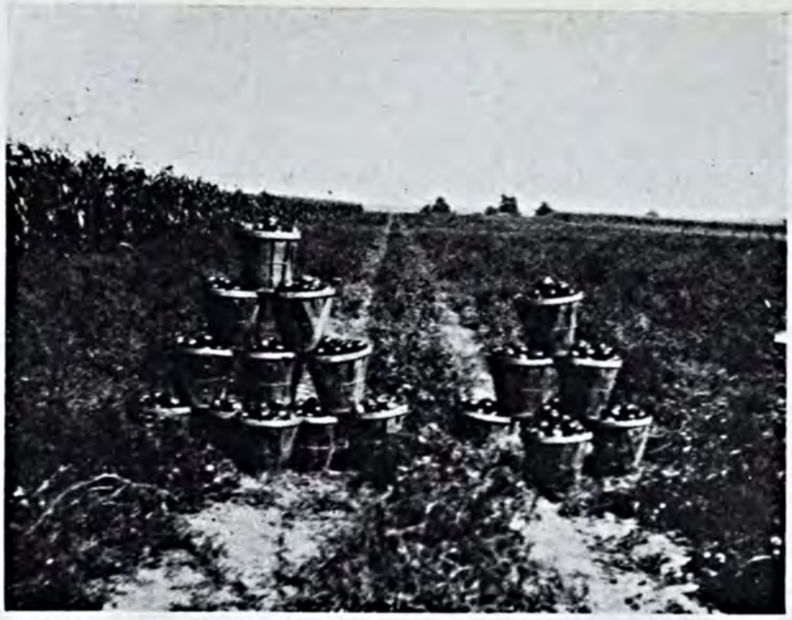
The first of the groups of vegetables contains only the early potato crop. A 6-8-6 fertilizer applied in the row at the rate of 800- to 1,200 pounds per acre is suggested for all light colored soils including sandy soils, silt loams, clay loams, or clays. On dark colored silt loams, clay loams, or clays the analysis might well be a 4-10-6. For the muck and peat soils the potato crop responds well to a 3-9-18. The rate and method of application remain the same for all kinds of soils. Side-dressings of free nitrogen are not found profitable with the potato crop.

The second group includes the late potato crop. On sandy soils the use of a 4-10-6 is found profitable. A 4-12-4 is used on the light colored silt loams, clay loams, and clays. A 2-14-4 analysis is suggested for the darker silt loams, clay loams, and clays. On the mucks and peats the late potato crop uses the same fertilizer as the early crop, namely a 3-9-18. The rate of application and the methods of application are also the same as for the early crop.

The third group of crops includes tomatoes and peppers. This group is the first one on which it is possible to secure worth while returns from the use of top or side-dressings with nitrogen carriers. However it is only when unfavorable growing conditions exist in the spring that such practices are recommended. The rate of application for the early and late crops in this group varies from 500 to 1,200 pounds per acre, but the method in every case calls for a broadcast application. Many a grower has tried out row applications of fertilizer on the tomato crop during wet seasons and found the results more than satisfactory. The next season the results of such a practice are disastrous if the moisture supply is low.

On sandy soils for the early and late crops in this tomato group the analysis is a 4-12-4. On silt, loams, clay loams, or clays of the lighter kind a 4-12-4 is used for the early crop and a 2-14-4 is used for the late crop. On the darker colored silt and clay loams and clays the early crop receives a 2-14-4 and the late crop an 0-14-6. An 0-12-12 is recommended for the mucks and peats.

The fourth group of crops includes cabbage and celery. With such crops the use of 30 to 50 pounds of available nitrogen applied at two-week intervals as needed until the plants are half grown is profitable. If ammonium sulfate is used 30 pounds of free nitrogen will be contained in 150 pounds of the chemical. Other nitrogen carriers can be figured in a simi-



The tomatoes on the left represent the yield from a plot where the potash requirements of this crop were satisfied. The tomatoes on the right were produced on a potash-starved plot.

lar manner.

In every case the cabbage and celery fertilizers are applied broadcast as in the case of the tomato crop. From 800 to 1,200 pounds per acre are advisable. A 4-12-4 fertilizer is used on all but the peats and mucks when a 3-9-18 is used.

The next group including such crops as lettuce and spinach is to receive the same treatment as the cabbage group in every way but one. The exception is in the analysis for mucks and peats. An 0-12-12 is used in place of a 3-9-18.

Other Groups

The root crops such as onions, beets, carrots, and others make up the sixth group. Only in unfavorable seasons is the use of available nitrogen as a side-dressing profitable. These crops are given broadcast applications of fertilizers at the rate of from 500 to 1,000 pounds per acre. A 4-10-6 is used on the sandy soils and a 2-12-6 is recommended for the light colored heavier soils. A 2-14-4 is applied to the dark colored heavy soil types and on the mucks and peats the analysis used is 3-9-18.

Melons and cucumbers form the seventh group and they are given one application of available nitrogen about three weeks after the plants start growth. From 30 to 50 pounds are used per acre as a side-dressing. In some cases row applications of 500 pounds of basic fertilizer are used per acre but the preferred method is that of broadcasting 1,000 pounds of a complete fertilizer before the seed is planted.

On sand soils a basic fertilizer treatment consisting of 1,000 pounds of a 4-12-4 is suggested. A 4-12-4 can also be used on the light colored heavy soils. A 2-14-4 is found suitable for the dark colored heavy soil types. On mucks and peats an 0-12-12 is found best.

Beans and peas constitute the eighth group. Like the tomato group and the root crops this group does not return a profit from the use of available nitrogen unless the season is unfavorable. From 300 to 800 pounds per acre of fertilizer applied broadcast is recommended. For all light colored soils a 4-12-4 is used and for dark colored heavy soils a 2-14-4 is recommended. On the mucks and peats an 0-12-12 is best.

The last group consisting of sweet corn calls for 125 to 250 pounds per acre of a 4-12-4 for the light colored soils. A 2-14-4 is used on the dark colored heavy soils and an 0-12-12 is advised for the mucks and peats. All fertilizer is to be applied in the row. Side-dressing of nitrogen is recommended if one application is made three weeks after the plants start growth.

Gardeners should remember that these analyses are merely suggested as a starting point from which to judge the amount and method and time of making applications. There can be no exact rule.

Central Wisconsin Stages a "Comeback"

(From page 28)

fully 90 per cent are planted by hand in cross checks so that the field is rowed both ways. Row application of fertilizers on potatoes, of course, ordinarily is done by potato planters with fertilizer attachments.

The potato farmers on these light soils feel that they save considerable machine investment when they use a hand planter costing $1.50 instead of a one or two-row horse planter. They like to plant their two or three acres apiece by hand per day and do it right. They think that fewer hills per acre give them better average yields and eliminate trouble with under-sized potatoes. They dig their crop in a wholesale manner with big, heavy potato-diggers that elevate the vines and potatoes while the soil sifts through the elevator chain-shaker screen. If the sods of the field have not well rotted and disintegrated during the growing season, the crop has been cheated out of some fertility that was planned for it and also the digging is made immeasurably more difficult, especially in a wet season. With 25,000 acres of potatoes in one county, it requires some labor to keep the weeds down and cross cultivation makes that easier.

In arranging the tests there was to be no attempt at planting reforms for the region. Accordingly, a sulky cultivator with fertilizer attachments was fitted up. The good farmers of the section quite generally cultivate their potato fields before the seed pieces have fully sprouted and come through to show the rows. They do this by cultivating the marks which they followed in planting and they speak of it as "blind cultivation." When blind cultivating, they roll the loose top soil in onto the row marks and then drag the ridges down to near the field level. This hastens the rotting of sods and kills weeds. It must be remembered that in these fields of late potatoes, soil processes must happen fast for the sods are often plowed down as late as June 1 and the crop is dug along about October 1, after the early frosts.

By rebuilding the cultivator so that the flexible fertilizer spouts extended down directly behind the inside shovels of the cultivator gangs, the fertilizers were delivered in a steady stream at the very bottom of the grooves made by the inside shovels, which were run as deeply as possible without disturbing the plowed down sods and manure and also close to the seed pieces that had been recently planted in the cross checks along the marked rows.

This system, of course, resulted in feeding the soil as much leachable nitrogen in between the hills of potatoes, which are regularly planted in squares ranging from 34 to 38 inches, as was fed in close proximity to the

The fertilizer was applied with a sulky cultivator which had been fitted up with fertilizer attachments.

hills, but this could not be helped. There was no fear of loss of phosphate and potash from leaching.

In inaugurating these nine exactly similar test plots in the three counties, the same field plan was followed in each case. A check plot of two rows was established and then next came the four, six, or eight-row fertilized plot. Then another two-row check plot was staked off to accompany the next four, six, or eight-row fertilized plot, and so on throughout. This allowed the yield from each fertilized plot to be compared with the unfertilized rows, immediately adjacent. Soil conditions are so often variable in any field that to compare the yield from a plot with that of a check plot several rows or even rods removed is very unsafe and unfair.

The Story Starts

The crop came on. At heavy vine stage the plots could be seen endwise, sidewise, and any old way. Every plot receiving any potash in the fertilized mixture showed lighter green, almost a sickly green along with increased vine growth. The degree of difference in color was almost in proportion to the strength of potash in the analysis. The heavier the potash in the mixture, the lighter the green color.

At mid-growing season, the plots promised some yield difference, if vines were any indication.

When it came harvesting time, the measured areas were dug and handled in the regular manner of hand digging. After the rows were picked separately, they were sorted and the yields calculated.

On one of the tests, the fertilized plot produced a gain in No. 1 potatoes from 82 bushels per acre as an average for the check plots to 171 bushels per acre of No. 1's as a result of 400 pounds per acre of a 3-10-30 fertilizer. In a field adjacent to the Hancock Experiment Station, the plot receiving the 3-10-30 fertilizer showed an increase of 56 bushels of No. 1's per acre more than the check plot.

In considering the averages from the nine similar tests in the three counties, the following results are significant:

1.—The 3-10-0 plot yielded no more No. 1's than the check plot, but did yield 2 bushels per acre more No. 2's. The 400 pounds of fertilizer cost $6.59.

2.—The 3-10-10 fertilizer gave a yield of 133 bushels of No. 1's and 19 bushels of No. 2's against the yield of 98 bushels of No. 1's and 22 bushels of No. 2's per acre from the check plot. This gain of 35 bushels of No. 1's per acre was credited to the use of 400 pounds of 3-10-10 fertilizer, costing $8.87, and was worth $36.75 in the local market at harvest time.

3.—The 3-10-20 gave a yield of

On a Sunday afternoon 250 neighboring farmers came to see the harvest of the Turrish plots.

142 bushels of No. 1's and 17 bushels of No. 2's against 101 bushels of No. 1's and 19 bushels of No. 2's per acre from the check plot, or a gain of 41 bushels per acre of No. 1's. The 400 pounds of fertilizer cost $11.14 and the 41-bushel increase of No. 1's was worth $43.05.

4.—The 3-10-30 gave a yield of 145 bushels of No. 1's and only 14 bushels of No. 2's per acre as compared to 96 bushels of No. 1's and 19 bushels of No. 2's per acre on the check plot. This 49-bushel gain in No. 1's per acre was due to 400 pounds of a 3-10-30 fertilizer costing $13.58 and the increase in yield was worth $51.45 on the local market at digging time.

A table more clearly picturing these results follows:

Large numbers of local growers came to see the results of these tests. The cooperating and visiting farmers thought that this was pretty good business from an investment and interest-bearing standpoint.

To be sure, these are only one year's results, but the progressive farmers and potato dealers of the old potato growing section of Wisconsin think they see the handwriting on the wall and they intend to carry on further in this matter of better crop feeding.

AVERAGE Results of NINE Central Wisconsin POTATO Fertilizer TESTS
Sandy Loam Soils of Portage, Waushara, and Waupaca Counties—1929

Treatments	YIELD in bushels per acre No. 1's	No. 2's	INCREASE of No. 1's over nearest check plot	VALUE of increase of No. 1's @ $1.75 per 100 lbs. ($1.05-bu.)	Fertilizer COST per acre	RETURNS per acre above fertilizer cost
Check Plot (Manure only)	99	17	....	....	....	....
Manure and 400 lbs. 3-10-0	99	19	none	none	$6.59	Loss $6.59
Check Plot (Manure only)	98	22	....	....	....	....
Manure and 400 lbs. 3-10-10	133	19	35 bu.	$36.75	$8.87	Gain $27.88
Check Plot (Manure only)	101	19	....	....	....	....
Manure and 400 lbs. 3-10-20	142	17	41 bu.	$43.05	$11.14	Gain $31.91
Check Plot (Manure only)	96	19	....	....	....	....
Manure and 400 lbs. 3-10-30	145	14	49 bu.	$51.45	$13.58	Gain $37.87

Notes: Six (6) of the Test Fields were manured—about 10 tons per acre. Three (3) of the Test Fields were NOT manured but were alfalfa or sweet clover sods.

Calculated per ton cost of fertilizers:

3-10-0	$32.95	3-10-20	$55.70
3-10-10	$44.35	3-10-30	$67.90

TEST FARMS: Edw. Hansen, Amherst; Norman L. Dahlen, Rosholt; Geo. Turrish, Bancroft; Jno. W. Burns & Son, Almond; Homer Hicks, Almond; Jos. Parkin, Hancock; Fred M. Stewart & Son, Wautoma; Frank Grimm, Plainfield; A. D. Larson, Waupaca.

Fertilizers Improve Kentucky Tobacco

(From page 16)

after 12 per cent, under these conditions, did not increase the crop.

As a result of these demonstrations for both burley and dark tobacco under the usual conditions, it seems most profitable to use from 300 to 500 pounds of 3-8-12.

The plant food needs of burley and dark tobacco are not exactly the same, however. The burley tobacco grower wants a medium crop of high-priced, high quality tobacco; the dark grower is interested in a thick, dark leaf with plenty of weight.

A thousand pounds of burley tobacco removes more plant food from the soil than does 1,000 pounds of dark tobacco. And since it must grow in considerably less time, burley tobacco needs a greater supply of available plant food. The dark, growing for one or two months longer, can get more of its subsistence from the soil. More than this, quality in a leaf of burley is quite a matter of the amount of oil it contains. The light, oily, "bright," thin leaves are where the quality lies.

Since potash is necessary both in the manufacture of starch in the leaf and to make oil, it is doubly important that fertilizers for tobacco contain an abundant supply of potash.

Better Grapes

(From page 23)

plete fertilizer applied at the rate of 600 pounds per acre.

Edward Todd— Treatment	Lbs Per Vine	Tons Per Acre
Block 1—600 lbs. 2-8-5	6.57	1.59
Block 2—600 lbs. 2-8-5 80 lbs. KC1	8.47	2.05
Block 3—600 lbs. 2-8-5 240 lbs. KC1	7.35	1.78

Although the 1929 results, as shown in Table IV, are not very consistent, they are more or less typical of the reaction to a heavy application of fertilizer followed by a severe dry period such as was experienced in many sections of Kent county this year.

As a result of this experimental and demonstrational work in our grape vineyards, several of our growers have changed their practices of fertilization, and this has been especially true with reference to the use of a higher percentage of potash in the commercial mixtures. The growers realize, now, the value of this material in the growing of high standard grapes.

The most practical amount of potash to use per acre in grape vineyards depends somewhat upon the soil type, cultural methods, type of pruning, and variety. However, based on the data secured from these experiments and demonstrations, it would seem that in a

Commercial grape growers inspected the fertilizer demonstrations in Kent county, Delaware.

complete fertilizer, applied at the rate of from 600 to 800 pounds per acre, the potash content should range from 10 to 15 per cent in order to secure the most profitable returns from the crop in this section of the country.

Potash

(*From page* 10)

muriate of potash in addition, at the rate of 230 pounds per acre. The project also includes a complete mixture applied at three different rates.

In this project, N is equivalent to 200 pounds per acre of nitrate of soda; P equals 120 pounds of treble superphosphate; and K equals 230 pounds of muriate of potash. The complete mixture was applied at the rates of ½(N-P-K), N-P-K, and 2(N-P-K).

The following table gives the average yields of potatoes, oats, and hay for the seven years from 1923 to 1929 inclusive; and also the average yearly increase per acre resulting from each treatment as compared with the yield where no fertilizer was applied.

These results show a striking benefit to the crops from applications of potash. This is especially marked in the case of potatoes and hay. The oat crop shows benefits from nitrogen and phosphate as well as from potash residues. The average annual increase of potatoes for a period of eight years from 230 pounds of muriate of potash applied alone was 70.46 bushels. The increase due to potash when used in combination with 200 pounds of nitrate of soda was 77.01 bushels.

The increase from the muriate of potash when used with 120 pounds of treble superphosphate exceeded the yield from an application of treble superphosphate alone by 104.93 bushels. When muriate of potash was combined with both nitrate of soda and phosphate, the increase due to

COMMERCIAL FERTILIZER PROJECT

With and Without Potash

Treatment	Potatoes Yield	Potatoes Increase	Oats Yield	Oats Increase	Hay Yield	Hay Increase
	Bu.		Bu.		Lbs.	
O	125.74	.....	44.84	...	2670	....
N	131.29	5.55	47.47	2.63	2886	216
N-P	137.49	11.75	52.52	7.68	2860	190
P	111.42	−14.32*	48.08	3.24	2606	−64*
K	196.20	70.46	49.88	5.04	3552	882
N-K	208.30	82.56	49.84	5.00	3880	1210
N-P-K	240.56	114.82	53.93	9.09	3962	1292
P-K	216.35	90.61	52.01	7.17	3736	1066
Average No Potash	126.49	....	48.23	...	2755	....
Ave. with 230 lbs. K.	215.35	88.86	51.41	3.18	3782	1027

RATE OF APPLICATION OF COMPLETE FERTILIZER

Treatment	Potatoes Yield	Potatoes Increase	Oats Yield	Oats Increase	Hay Yield	Hay Increase
O	125.74	....	44.84	...	2670	....
½(N-P-K)	183.12	57.38	47.58	2.74	3016	346
N-P-K	240.56	114.82	53.93	9.09	3962	1292
2(N-P-K)	247.46	121.72	56.84	12.00	4140	1470

*Decrease per acre as compared with the plot receiving no treatment.

potash was 103.07 bushels per acre. These results indicate that the potash is more potent when combined with phosphates than when applied either alone or only with nitrate of soda.

The average increase from 230 pounds of muriate of potash per acre for all treatments was 88.87 bushels, since the yield from all treatments without the potash was 126.49 bushels and with the potash it was 215.35 bushels. In the case of the complete mixture, the ratios between the rate of application and the increase in yield were the same up to 230 pounds of muriate of potash per acre. The double treatment, 2(N-P-K) gave a much smaller proportional return, indicating that 200 pounds of nitrate of soda, 120 pounds of treble superphosphate, and 230 pounds of muriate of potash are probably close to the optimum rate under the conditions of this project.

Residual Effects

The second-year residual effects on oats from the different treatments show definite benefits not only from the potash, but also from nitrogen and phosphate as well. In the case of the hay crop, there is apparently little or no benefit to it from the nitrogen and phosphate residues, but the yield is very materially increased by the potash applied three years previous. The average increase of hay from the 230 pounds of muriate of potash applied on the potato crop two years previous, was 1,027 pounds per acre. Taking the average yields from all treatments where potash was not included, and comparing them with the yield from all treatments exactly similar, except for the addition of 230 pounds of potash per acre, we find the average annual increase, over an eight-year period, 1923-1929 inclusive, from an addition of 230 pounds of potash per acre, was 88.86 bushels of potatoes, 3.18 bushels of oats and 1,027 pounds of hay.

Previous to 1929 we had assumed that potash functioned in two ways to increase the yield of potatoes. First, as a tissue building material whose presence in adequate quantities enables the potato plant to place in its tubers a large store of nutriments with which to propagate its species. Second, that potash is an essential active agent in the assimilation processes of the potato plant.

Potash Prevents Disease

Another role that potash plays in the life process of this plant was definitely demonstrated during the severe drought in July and early August in 1929, by the behavior or condition of the potato vines on the plots not treated with potash. Besides the very dark green color and warping of the leaves, apparent in previous years on the plots receiving no potash, local wilt areas, sometimes on the leaves but more often on the stems, were noticed. On August 5 the field was photographed when about 10 to 20 per cent of the plants appeared diseased.

Specimen plants were taken and sent to the Division of Plant Pathology of the University of Minnesota. Dr. J. G. Leach of that department reported as follow: "These plants are quite evidently affected with fusarium wilt. Some of the drying of the leaves may also be due to injury from leaf hoppers, as I found them quite numerous on the plants."

By August 15 almost every plant on the non-potash treatment plots was either wilting or withered, while the vines on adjacent plots treated with potash were maturing normally with no sign of injury or disease except where the applications were less than 125 pounds of muriate of potash per acre.

We conclude therefore, that potash plays a triple role as a benefactor for the potato crop; first, as a plant food substance; second, as an active agent in the assimilation processes; and third, as a disease preventative.

Top-dressing Cotton

(*From page* 17)

[w]ith extra potash in 1929?

Over in northern Alabama Mr. [J]ohn R. Witt at Belle Mina has two [fi]elds of 20 acres each situated be-[t]ween his home and the highway, with [a] private road between. On these [fi]elds about six crops of vetch have [b]een turned under during the last 10 [y]ears and the soil is a Decatur clay [lo]am—just the place where one would [th]ink extra potash would not pay on [c]otton. In 1928 Mr. Witt applied [.]0 pounds of muriate of potash per [a]cre as a top-dresser, in addition to his [re]gular fertilizer, to one of the fields [a]nd it produced two bales of cotton [m]ore than the other. But Mr. Witt [w]as skeptical about extra potash be-[ca]use his land was so red and con-[ta]ined so much clay. Then, too, his [ne]ighbors didn't quite believe the extra [ga]in was due to potash. So in 1929 [M]r. Witt switched fields and applied [th]e same amount of extra potash on [th]e other side of the road. The field [w]ith the extra potash made three bales [m]ore than the other field.

Over in North Carolina in 1929, [M]r. W. G. Edwards at Seaboard fer-[ti]lized his cotton with 800 pounds of [.]2-3-3 (PNK) per acre at planting [a]nd then top-dressed each acre with [.]00 pounds of 0-12-16 (PNK). Mr. [E]dwards said, "I made 520 bales on [.]28 acres under adverse weather con-[di]tions and heavy boll-weevil infesta-[ti]on. The extra potash stopped rust, [le]ssened shedding, and gave more uniform staple and better yields." Mr. W. D. Barbee, a neighbor of Mr. Edwards, used the same fertilizer and produced 251 bales on 300 acres.

Mr. Z. V. Pate of Laurinburg, North Carolina, in 1928 conducted a demonstration with extra potash on cotton, the results of which are shown in the accompanying photograph. In 1929 Mr. Pate fertilized 669 acres of cotton on one of his farms with 800 pounds of 8-5-3 (PNK) per acre at planting and 200 pounds of 0-14-15 as a top-dresser. On another of his farms he fertilized 553 acres of cotton with 800 pounds of 8-4-4 (PNK) at planting and top-dressed with 200 pounds of 0-9-15. Mr. Pate is not only a large farmer but one of North Carolina's most influential fertilizer men. He is using and selling much more potash than his section has ever known before. In 1930 he will increase the potash content of the tobacco fertilizer used on his own farms by 5 per cent.

Mr. C. S. Sealy at Edison, Georgia, said in October, 1929, "I have for the past two years used a top-dresser for cotton, analyzing 0-9-10 (PNK), on a 30-horse farm of mine. I intend to use the same top-dresser next year on my entire 60-horse farm. This top-dresser followed a liberal application of commercial fertilizer, analyzing 12-3-5 (PNK). I would not farm unless I could get potash to go in the top-dresser."

Non-conformists

(*From page* 4)

[i]c originality. The farmer adopts [c]ommonplace slang from the tender-[lo]in or the dance hall without any attempt at alteration. The country contents itself with trivial expressions borrowed from the city, because to

create new bon mots would be undignified for the craft. We seemingly have outgrown the Lincolnesque epoch of verbal virility.

The secret of the farmer's change lies in his literature, his lessons, and his environment. They are all directed at one objective, namely, to convince him that he is a business man, a capitalist, an executive; that he is a cog in a machine well oiled with efficiency and equipped with a regulation self-starter, hot spark, and steady clutch — by all means, the clutch!

OPEN derision is the share of him who feels an inherited hankering for the sentimental things of the soil, or who perhaps, has held onto a few legends and customs that were cherished by the misguided fathers. Hemmed in on the one side by lunch clubbers and demonstrators, and shamed into submission on the other hand by the grubbing labor of foreign-born neighbors, the descendant of the original settler finds it increasingly hard to keep his individuality. This is not confined to the mellow South, either. He tells himself feebly that he lives on the old homestead because he loves it. Right well he must know by this time, with all the information given to him, that his only mission on earth is to "produce economically" and "market cooperatively." That has been repeated so often that it is bound to be true.

He cannot escape it. His mail box is daily stuffed with the printed slogan. Demonstrators invade his corn field and spoil his peace of mind with talk of fertilizers and marl. His own farm as well as all the farms in his bailiwick is bored, blasted, mapped, and checked. His kine are scoffed at by societies of registration and discounted by the State. He accepts at last the obvious fact that life is a race for profits, and that he who owns the land is but a time server for the ultimate consumer and a trustee for unborn generations.

He leans on the gate with a wisp of straw in his jaws and watches the big parade. It is urged that farming be made a serious business. Some reformers want it to develop into a machine-like drag of precision and precept. They are utterly Calvinistic, declaring that there is no room for such antics as barn raisings and husking bees. They insist that one eye must be glued to the milk sheet and the other riveted to the market page.

Have work and diversion, sweat and sentiment, he asks, no companion parts in the duty which the made-over agriculturist has in this high-geared age? The plowboy who stops in his furrow to hunt for a bird's nest should not be wholly replaced by the new model who stays away from the swimming hole to fit prize calves for the Rotary junior round-up.

HE imagines that Youth can improve without being impoverished. He asks, "In the process of becoming standardized are we going to lose altogether certain worthwhile charms?"

The literature, lessons, and environment that are aimed at the elevation of the submerged farm sentimentalist culminate in the craze for organization. Organization is universal and usually inescapable. By the same token, it is easier to get joined up promiscuously in agriculture than to stay organized.

Battering down the walls of farm isolation was the earliest movement toward rural amalgamation. That was the reason advanced before the hectic day of the pool, the exchange, and the iron-clad contract. It was the social urge, mixed with Populist politics, that created the earlier propaganda societies, with a little pomp and mystic ritual thrown in for good measure by such sober agencies as the Grange.

In those innocent days of pioneer farming there was little to alarm the rovincial mind. A joiner had all he freedom of a church member or lodge brother—that is, he could be ircumspect or ritualistic, as the case night be, at meeting time, and do as e pleased in the intervals.

He was merely a recruit in the pading home guard while the battle vas attended to mostly by Congressnen. But since 1918 the deadly do r die gas attacks have been rolling nto the trenches. Hence the farmr's drill sergeants have sent harsher actics for the producer to master and or the home guards to muster under.

This is the age of technical aid to arm advancement. The higher the ost, the better the service—that's the on-conformist's idea of it. For exmple take the lawyer's part in the ew era of farm solidarity. Time was vhen attorneys were avoided except n dire cases of line fence wrangles or t the dramatic hour of making deeds, nortgages, or wills. The old order aw in the attorney an individual friend or a vengeful enemy—but never an overmastering agency that must enter into all personal affairs of barter and trade.

Collective bargaining and commodity sales systems are the pet terms with the farm economic crowd that harass our beleagured old-timer. In either of these systems we find the business attorney on top of the restless heap. He is the Grand Kleagle of the Korn Kob Klan. Author and arbiter of their weighty contracts and testamentary documents, the skillful commercial lawyer wins if they win—and loses nothing if they fail, except a slightly shelf-worn reputation! Equally at home in all phases of the game, he eases his clients into pools and bureaus, and just as cheerfully officiates at their economic obsequies.

Other consipirators against the rural peace of mind are department chiefs, publicity harriers, budget makers, and similar brothers of botheration. They are bent, he thinks, upon dinning the get-together rivets into the temple of farm security. And preceding them all, like John the Baptist, come the gaunt and unquenchable zealots of salvation—the paid and free-will organizers!

I have a friend in that class. He is not small of vision or picayunish. He will not dabble with the school district or the township or the county; he intends to organize the farmers of the world! He will first separate them by commodities and weld them together with the aforesaid legal help. Then he will proceed to federate the commodity groups for righteous revenge upon the middle men and special privileges. He is not concerned with men, mind you; he is thinking of the goods, the moneys, and the markets; and for quite a spell he will not awaken from his trance.

During this period many of his neighbors who *do* think of men have drifted in and out of various farm organizations and are neither wiser nor sadder for it, albeit somewhat robbed of repose.

HOW to make farm organizations function for those who have got mighty sick of the doses they once swallowed is the problem facing the uplift brigade.

That all this pressure and persuasion is part of a well-meaning conspiracy with no ulterior motive behind it, we have no doubt. The farming business is sick, the conspirators say, and the clinic must prescribe. If the farming business expires, it shall not be for want of good treatment and advice. One death after a major operation, they aver, is more to the nation's credit than a life-long tussle in a shanty with delerium tremens and the ague!

On every hand the intolerant friends lecture the contented reactionary and lose patience with him for his old-fogey notions. But many of the palliatives that they offer hint of bitter bile. So the conservative provincial mind hearkens to the voice of Sancho Panza and cares not to spur his spavined Rocinante into the bold tournaments of trade.

Granted that he is a back number, a drag on the road to progress, an echo of the vanished past—still, mindful that the likes of him helped make our country, we pause and give him obituary and decent burial.

He lived in an age of hand-planters, sheet-iron stoves, horse-drawn vehicles, flannel underwear, and other miseries, and yet withal he was not openly rebellious or frequently peevish. His place is taken by the uproarious, much-abused, and luxury-loving yeoman, who must have action all the time and plenty of it.

IN some remote places not reached by reformers, the old-timer dies hard. He is far tougher and more resistant than he has any right to be. How many more cussings, campaigns, and calamities will it require to change the "Last of the Mohicans" into one of the Six Best Sellers? In other words, when will the last contented farmer disappear from the good green earth?

Perhaps it isn't permitted for humanity on the land ever to wrap himself in complete content. Even the one who balks at the multiple hitch in farm affairs may not be completely content with his own domain.

Yet is seems to me that I can recall times at home when budgets and balance sheets were not the main theme around the fireside. Possibly it is even so with some folks on the modern homesteads of today. If such is the case, then my fling amid the quack-infested fields of our old backward brother is not entirely amiss.

Somewhere it seems to me that Emerson rejoices in the independence of the non-conformist. But if anyone prefers to be a non-conformist just to be different, I am not with him. But to be a lover of sentiment as well as success—that kind of objector is kin of mine!

Little Help

Mother—"When that naughty boy threw stones at you, why didn't you come and tell me instead of throwing them back at him?"

Willie—"What good would it do to tell you? You couldn't hit the side of a barn."

A colored man got his nerve together and took a flight in an aeroplane. As he climbed out of the ship on its return to the field, he turned to the pilot and said:

"Suh, ah has to thank you fo' both dem rides."

"What are you talking about?" said the aviator. "You only had one."

"No, suh," returned the passenger, "Ah done had two—mah fust an' mah last."

Diary of a College Grad

June 23, 1929—Graduated today.

June 28, 1929—Looked for a $10,000 job.

July 20, 1929—Looked for a job at $100 a week.

August 9, 1929—Looked for any kind of a job.

September 2, 1929—Still looking.

September 23, 1929—Went to work for my uncle for $75 a month.

"Officer," said a 300-pound lady, "could you see me across the street?"

"Madam, I could see you three blocks away."

Saxophone Player (after finishing number): "What was that we just played?"

No Help Offered

Rastus was devouring an apple, which he seemed to enjoy to his highest satisfaction.

Sambo: "Say dere, boy, you'd better look out for worms in dat dar apple."

Rastus: "Lissen heah, buddy, when ah eats apples de worms have to look out for themselves."

"Have you brought many people to your way of thinking?" "No," answered Senator Sorghum. "Public opinion is something like a mule I owned when I was a boy. In order to keep up the appearance of being driver I had to watch the way he was going and follow on behind."—*Washington Star.*

Giving Himself Up

"Offisher, you'd better lock me up. Jush hit my wife over the head wish a club."

"Did you kill her?"

"Don't think sho. Thash why I want to be locked up."

He Would Say That!

New Yorker (incredulously): "And you mean to say that in California you have 365 days of sunshine a year?"

The Man from Los Angeles: "Exactly so, sir, and that's a mighty conservative estimate."

Anxious Sufferer

"Doctor, how soon do you think I shall be well enough to eat things that don't agree with me?"

Better Crops WITH PLANT FOOD

April, 1930 | 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

VOLUME XIV NUMBER FOUR

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Agricultural and Scientific Bureau

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Better Crops with PLANT FOOD

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This is the year to count noses.

The Census

By Jeff McDermid

NO, indulgent householders, a censor doesn't take the census—but he once did in the days before Rome meant ruins.

When you or your wife sit down with resignation to do your duty as citizens while an important looking personage with portfolios and papers galore gazes at you over horn-rimmed specs, you can thank Heaven that the Department of Commerce hasn't anything to do with the Volstead law or the dministration of justice. (We hope this doesn't suggest something to a Congressman.)

The Romans did not invent the ersonal inquisition, although the vord "censere" refers to the Roman nagistrates who took registrations of he number of citizens and their laves and property. But they did not top there. These pioneer Paul Prys lso exercised the office of inspector of norals and censor of conduct, which uggests that their documents must have been heavy to carry and not as dry reading as the modern statistics.

It must have been a real ordeal for the conscientious objectors and the lovers of personal liberty, for the penalty invoked by the Romans against fraudulent returns was harsh enough to satisfy Anthony Comstock or Carry Nation. If a paterfamilias fibbed a trifle in his replies to the censor or failed to count his children or his slaves completely, he was scourged in the public square or faced loss of property and perpetual bondage.

However, the real motive of the Roman census was to enumerate the sources of taxation, so that the expense budget might be stretched this year to cover two or three years more of probable revenues. They spent as they went and then some, a custom that has been ardently copied by Chicago mayors and fervently cussed by Chicago policemen. It is this same ancient grudge that the victim of the census bore patiently in Rome which makes it so hard for the rural census-taker to get a complete list of the bovine, porcine and equine chattels thought to be harbored on the premises. There has remained with us through several generations a haunting fear that the hawkshaw with the looseleaf ledger might be in cahoots with the assessor or the town treasurer.

BEFORE taxation was used as an excuse for the census, the Hebrew tribes collected vital statistics for another purpose. As usual, the Jews were first in collection and addition, and no doubt quite thorough at it. It all began in the chapter of Exodus, when the tribal leaders resorted to a census in order to determine the actual fighting strength of the army. This is where the term "counting noses" originated. David's chief contribution to the census was a negative one because he reduced the population of the Philistines considerably during his term of office, to say nothing of the Ammonites and the Hittites. Solomon was a more positive contributor to the census, not only in providing census takers, but in giving them something to work on. Then, too, we mustn't overlook the Greeks. Before these noble people left sculpturing for shoe shining, they followed Solon's lead and adopted the census as a public nuisance.

During the Middle Ages I lost sight of the census somehow. You must pardon my neglect, but the only traces I found of it were the breviary of King Charlemagne and the Domesday Book of William the Conqueror. But neither of these rulers seem to have taught the English people anything, because I learn that the first census ever taken in Great Britain was in 1800, and an attempt to get a census bill past Parliament was defeated in 1753. Another striking thing revealed in my studious hours at the Y. M. library was that up to 1860 the Scotch census was taken along with that of the English. The Scots were probably just as anxious as anybody to know where they stood, but they let somebody else pay the tariff.

The Germans jumped in and began census-taking in 1805. How old Russia must have laughed through her whiskers because Peter the Great broadcast a ukase away back in 1720, calling for a census every twenty years.

When I roamed over into the Oriental bazaar looking for census data, however, the picking was good. Japan is noted for her self-knowledge, but China thinks there aren't enough adding machines to finish her job in one decade before another census begins. She just estimates, and as far as I am concerned a few Chinese more or less do not matter.

India, land of mystery, has done the job well considering that she has to print it in seventeen languages and give a list of every occupation from edible birds' nest collectors to conjurors and snake charmers. A census-taker in India could stand still and make his fortune, if he was a rapid writer.

I HAVE a friend who once traveled in Turkey, where they keep secrets but no statistics. He applied to a notable sheik for the history of a certain town, whereat this letter was returned from his Turkish correspondent:

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In South Carolina and some other southern States the tobacco leaves are plucked from the stalks and hung on sticks with twine. The workers are very expert and the work is performed rapidly.

What's Ahead?

"The optimist the doughnut sees, The pessimist the hole."

J Number Six

By Frank George

THE American tobacco industry has developed in little more than ›00 years from a small patch in the /irginia garden of John Rolfe to more han 2,000,000 acres distributed mong 19 States. Approximately one-ıalf the present area has been added n the last 30 years. The prospect is or further increases in the next 10 ears.

Careful studies of the tobacco sit-ation by Charles E. Gage, in charge f tobacco standardization and in-pection in the Bureau of Agricul-ural Economics, lead to the conclu-ion that a large expansion in flue-ured tobacco, the outstanding cigaret ype, is in prospect before the end f the 1930s. He believes that the roduction of Burley, which is be-ıg used increasingly in the manufac-ure of cigarets, also will increase. Decreased market requirements, on the other hand, are expected for chewing and snuff types.

Expansion of tobacco production in recent years has been the result of the universal increase in cigaret consumption. Whereas the domestic consumption of cigarets was 43 cigarets per capita in the year 1900, consumption now is estimated at approximately 1,000 cigarets per capita. Whereas the total number of cigarets manufactured in 1928 was roughly 109,000,000,000, Mr. Gage ventures the guess that in another 10 years total production will considerably exceed 200,000,000,000.

This prospective increase in consumption, Mr. Gage warns, should not lead farmers into an orgy of acreage expansion. Too rapid expansion would defeat the benefits to be derived from increased consumption. Emphasis should be laid, rather, upon increased production per acre and low unit cost of production. For the current year, the Bureau of Agricultural Economics, in its recent Outlook Report, declared that "an increase of 10 per cent for the entire flue-cured area would result in approximately 1,250,000 acres, which, with yields equal to the average of the last five years, would produce approximately 840,000,000 pounds.

"This, added to a probable carry-over of 600,000,000 pounds, would result in a total supply of 1,440,000,000 pounds, or nearly 100,000,000 pounds more than the supply of the present season. A total supply in excess of 1,400,000,000 pounds would probably result in prices less favorable than those of the 1928 and 1929 seasons, unless a crop of exceptional quality is produced. Prices above 20 cents a pound are not likely to be obtained for the 1930 crop unless production is below that of 1929."

The early history of the American tobacco industry is replete with governmental efforts to control production and prices. First and last, practically every plan of so-called farm relief agitated for American agriculture the last 10 years was put into practice on tobacco, ranging from price fixing to acreage restriction. None of these plans afforded more than temporary relief. Some of them aggravated an already bad situation.

Within seven years after John Rolfe in 1612 raised an experimental crop of tobacco and demonstrated its marketability in Europe, the Virginia planters were cultivating tobacco to the detriment of food products. This situation became so bad that Governor Dale decreed that no man should plant tobacco until he had at least two acres in grain. The Virginia Company urged the cultivation of other crops, but its arguments were lost upon the planters who saw more profit in tobacco. Cultivation increased rapidly, there was over-production, and by 1631 the price of tobacco had fallen to 6d. per pound.

The right to cultivate tobacco was then restricted to 1,500 plants per person, and carpenters and other mechanics were not allowed to plant tobacco or (sic) "to do any other work in the ground." These measures were ineffectual, production increased, prices fell, and by 1639 tobacco was bringing only 3d. per pound. It was then enacted that one-half the good tobacco and all of the bad tobacco should be destroyed, and that thereafter all creditors should accept 40 pounds for 100; that the crop of 1640 should not be sold for less than 12d., nor that in 1641 for less than 2s. per pound, under penalty of forfeiture of the whole crop. This law could not be enforced, and by 1645 tobacco production had increased to the point where the price was only 1½d. By 1665 the price fell to 1d. per pound.

A Treaty to Stop Planting

Tobacco prices were so low in 1666 that the colonies of Maryland, Virginia, and Carolina ratified a treaty to stop planting tobacco for one year. This afforded a temporary relief, but production thereafter continued to increase until 1683 when prices were so low that many growers signed petitions for a cessation of planting for one year. When these growers were unable to induce the authorities to issue such a decree, they banded themselves together and went through the country destroying tobacco plants wherever found. The Virginia Assembly then declared that these persons had passed beyond the bounds of riot and passed a law which provided that any persons to the number of eight or more who should go about destroying tobacco plants should be adjudged traitors and suffer death.

Planters abandoned tobacco production only when the price was too low to yield any profit or the land was drained of its fertility. For the better part of the seventeenth century, the land was tilled by indentured ser-

A stick of tobacco ready for the curing barn. (Maryland)

ants, but as the money advantage of lave labor came to be realized, the obacco fields were cultivated by imorted Africans. Ignorant slaves uner the supervision of overseers plowed nd planted and hoed the wide levels f rich loam. Extensive cultivation as practiced. When one tract of nd was exhausted, overseer and aves were moved on to new soil.

"The banks of the James, the York, nd the Rappahannock," we read, showed a series of great plantations, ich with its own wharf, to which very autumn sea-going vessels came irect from England to take aboard ne hogsheads of tobacco, and to put hore the commodities sent over in change. This was a highly profitle trade, even more so to the mother ountry than to Virginia.

"English manufacturers found nong the luxury-loving planters a ady market for their fine cloths, rich rpets, and mahogany furniture. Tocco was expected to pay for everying, if not this year's crop then that next. Every planter kept a runng account with his factor in Lonn, and many of them were hopessly in debt to their English creditors. The practice of mortgaging land and crops against the merchant's advances has characterized the Southern agriculturist to the present day."

Investigations by the United States Department of Agriculture show that a large portion of the tobacco crop is produced on soils which are naturally rather infertile, while the tobacco plant requires a fairly generous supply of plant nutrients if it is to obtain proper growth. Many growers find it profitable to apply fertilizers at rates considerably in excess of the immediate requirements of the tobacco itself, thereby providing for an important residual effect on other crops following in the rotation.

The Best Burley Soils

The best Burley soils of Kentucky and adjoining States have been found to be highly productive. In Pennsylvania and Wisconsin barnyard manure is widely used, whereas in the Connecticut valley almost no manure is used, the fertilizing being done with commercial fertilizers. In nearly all remaining tobacco-growing districts much reliance is placed on commercial

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Legumes *with* Corn

By C. K. McClelland

Agronomist, University of Arkansas

ON many of the lands of the South the yields of corn alone often do not justify the growth of the crop. If legumes can be grown with the corn, there will accrue many advantages of which the following are most important:

(1) A larger acre production of forage, provided proper fencing permits grazing of the fields after the corn is gathered.

(2) A source of cash, in case green pods of cowpeas can be gathered for market, or seeds of the various legumes can be saved.

(3) An enriched soil from the growth of the legumes, giving larger future crops with less outlay for nitrogenous fertilizer.

(4) Reduction of amount of crabgrass and weed seed produced, since the legumes (late varieties especially) prevent the development of these plants.

(5) Better Bermuda grass control. This applies only to limited areas of foul land. The legumes help subdue the Bermuda which often is kept under control only until laying-by time.

The disadvantages of the companion cropping are the uncertain success of the legumes under certain conditions and the reduction of corn yield under others.

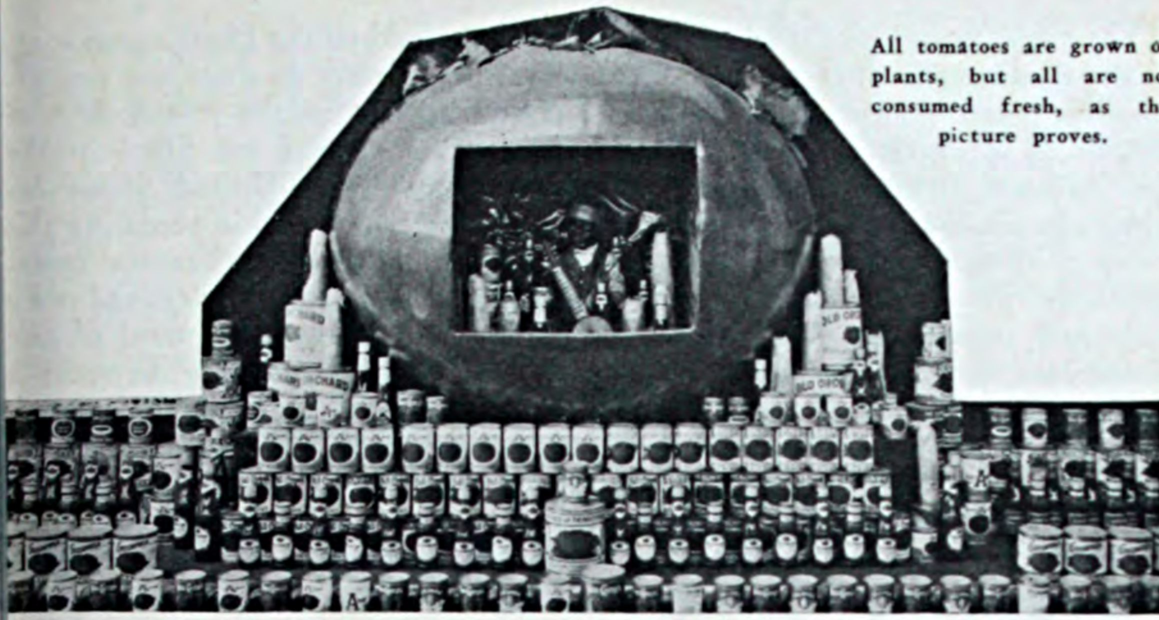
Three methods of management include: planting the legumes (early) in the corn rows when planting the corn; planting in wide middles of corn at a medium date, so that last cultivation of corn is a cultivation for the legumes; and planting late in the middles (normal width) at laying-by time, either in single rows or broadcast.

Early planting in same rows. This insures the legumes an even start with the corn and though causing reduction in corn yield, gives best development of the legumes. The reduction in corn yield may be 15 to 35 per cent, averaging 25 per cent but varying with seasonal and soil conditions. The advantages given are obtained to full extent under this method. The actual production in addition to the yield of corn has reached as high as 1.5 tons of legume hay though it is impracticable to save it as hay, except in an experimental way. Seed production, too, is good though the saving is possible only by hand picking as is usually done anyway for cowpeas and velvet beans.

Medium planting in wide middles. This method insures also a reasonably good development of the legumes with fair amount of all the advantages but again reduces the yields of corn. The main factor in this reduction, however, is the widening of the rows and not the competition of the legumes. The reduction is often as large as by the preceding method though the average is probably less. The total production of legumes is probably much less than under the preceding method.

Planting late in normal middles. This practice has long been followed in the South with cowpeas. Experiments show the reduction of corn yields to be negligible. At the same time, all reports are to the effect that with this method, failure often results. The shading and root com

(*Turn to page* 60)



All tomatoes are grown on plants, but all are not consumed fresh, as this picture proves.

A Queer MIXTURE

By E. R. Lancashire

Extension Specialist, Ohio State University

TOMATOES, sand, and potash make a queer mixture, but there s an early tomato grower down along he Ohio river, near South Point, Ohio, who found it quite profitable to out them together. He wanted to know exactly what kind and how nuch fertilizer would give the best esults on his Huntington sandy clay oam soil. He found that the element otash was worth $145.25 per 144 ounds or more than a dollar a pound.

Of course, he only paid about 3 cents per pound for the kind of potash he used, so there was a matter of some 2,700 per cent profit on the investment after the costs of the baskets and extra labor of keeping the records were deducted. It sounds nearly as good as investing in the stock market when it is on the up-grade. How this figure was arrived at is described in detail in the following paragraphs.

These figures from the record book give all the information at a glance:

Date Harvested—July 1-August 1, 1929

'lot No.	Size of Plot	Analysis (N.P.K.)	Fertilizer Per Acre	Yield Per Acre	Value Per Acre	Increase Due to Potash
.	1/10 A.	3-8-0	1200 lbs.	955 20 lb. baskets	$1630.25	......
.	1/10 A.	3-8-6	1200 lbs.	995 20 lb. baskets	$1775.50	$145.25
.	1/10 A.	3-8-12	1200 lbs.	985 20 lb. baskets	$1735.75	$105.50

The table shows also that 6 per cent of the element potash in the complete fertilizer was sufficient. The demonstration is, of course, a simple one and not inclusive enough to tell exactly where the dividing line is between the varying amounts of potash. It is somewhere between 6 and 12 per cent. It is just another example, however, of the fact that a little fertilizer testing work on the part of the early tomato grower, who has an inclination for keeping account of his business, will pay well.

This man paid about $5.00 for potash and gained $145.25. Such an investment is a much more practical one than is open to the tomato grower in other lines of business. He found the correct method of mixing tomatoes, sand, and potash to give the desired amount of net return which in this business, as in most others, is limited largely by the ability possessed by the man in charge.

The soil, on which these tomatoes were grown, was well drained and the crop was sold on the Huntington market. The prices received for the 20-pound baskets on the several days of the harvest period are listed in the following table. United States inspection was not used in preparing this crop for the market, but the tomatoes were of good quality and were packed with the same amount of care that would be necessary to meet a United States inspector's approval. The prices paid are evidence enough of the quality of the pack.

It will be noted that the 3-8-6 plot produced 7 20-pound baskets of marketable tomatoes more than the 3-8-0 plot during the first 8 days of the harvesting period. After the first 8 days the 3-8-0 plot held its own and along toward the last outyielded the 3-8-6 plot. But the secret of extra profits in the early tomato game lies in marketing the early fruits before the prices drop. Just how the market prices of the early tomato crop fluctuate is clearly shown by the table.

(*Turn to page 58*)

		The 3-8-0 plot		The 3-8-6 plot		The 3-8-12 plot	
Date	Price	Yield	Value	Yield	Value	Yield	Value
July 8	$2.50	6	$15.00	7	$17.50	6	$15.00
10	2.75	5	13.75	8	22.00	8.5	23.375
11	3.00	3	9.00	3.5	10.50	3	9.00
12	3.00	4	12.00	4.5	13.50	4	12.00
13	2.50	9	22.50	10	25.00	9	22.50
15	2.00	6	12.00	6	12.00	7	14.00
16	1.25	9	11.25	10	12.50	8.5	10.625
17	1.60	5	8.00	5	8.00	5	8.00
19	1.85	5	9.25	5	9.25	5	9.25
20	1.50	13	19.50	11	16.50	15	22.50
22	1.50	7	10.50	8	12.00	5	7.50
23	1.00	7	7.00	7.5	7.50	6.5	6.50
24	1.125	2	2.25	2	2.25	3	3.375
25	.90	5	4.50	4	3.60	5	4.50
26	.75	4	3.00	3	2.25	3	2.25
27	.70	2	1.40	2	1.40	2	1.40
29	.65	2.5	1.625	2	1.30	2	1.30
31	.50	1	.50	1	.50	1	.50
		95.5 Baskets	$163.025	99.5 Baskets	$177.55	98.5 Baskets	$173.57.5

Harvest was discontinued on July 31st.

Science *and* Agriculture

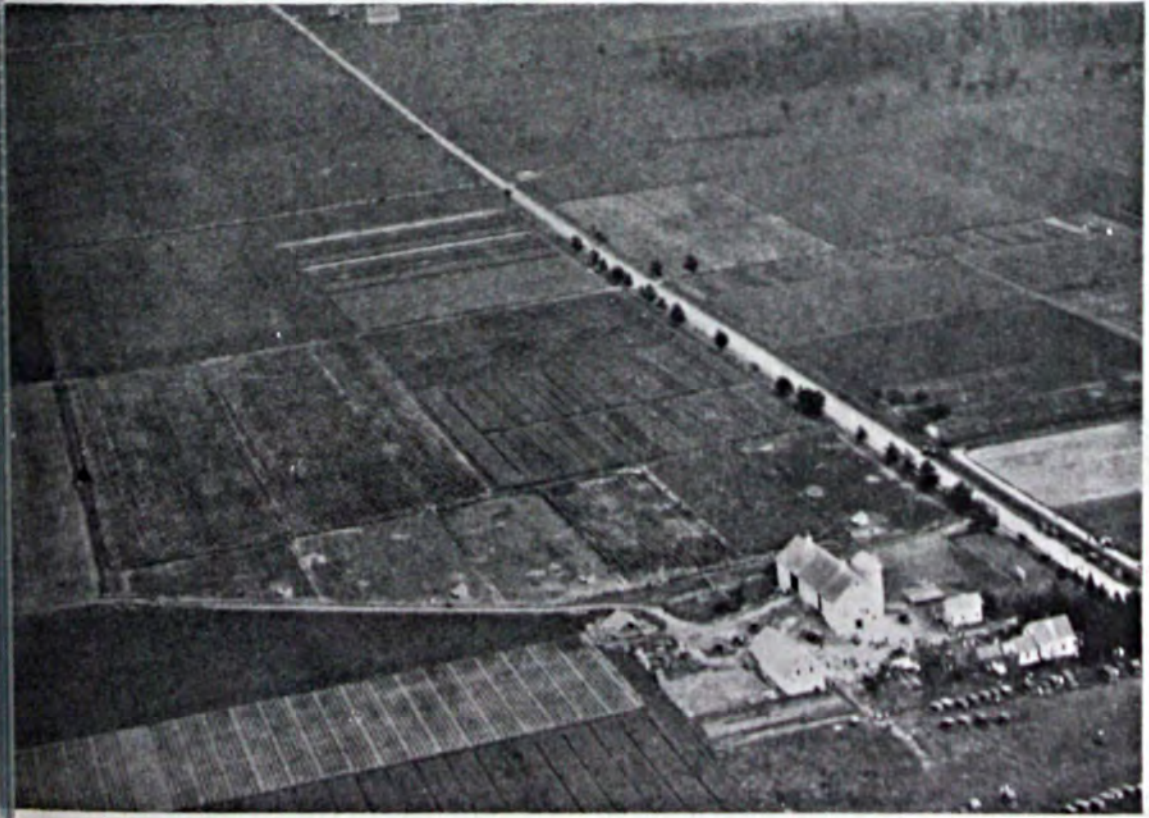
By F. L. Musbach

Professor of Soils, University of Wisconsin

AGRICULTURE has undergone a more radical change in the last 5 years than has any other impor- nt business. While the total opulation of the United States as increased from 76,000,000 in 1900 115,000,000 in 1925, yet the farm opulation has remained practically ationary during this quarter cen- ry. But what may seem quite start- ng is the fact that the production our leading farm products has in- eased 35 to 40 per cent.

It is, of course, impossible to discuss at length all the factors concerned in this record of efficiency on the part of the farmer. In the first place about 20 per cent more land has been brought under plow.

Power machinery is also a factor. It is not generally known that 25 per cent of the horses and mules in the United States, have been replaced by power machinery of one sort or another. This change released 18,000,000 acres which were required to fur-



d's-eye view of the Marshfield Experiment Station showing a section of the farm devoted to experimental plot work.

nish feed for these beasts of burden. These acres may now be devoted to the production of food-stuffs.

And a further consequence that cannot be overlooked is that less man power is required on the farm. Let me illustrate. Last year in the grain section of Illinois, three men with a combine cut, threshed, and binned 745 bushels of barley in the same time it required 12 men to shock-thresh 840 bushels with the usual threshing outfits.

Big Business

The livestock men have also made strides in efficiency. The science of feeding has been adopted by the hog raisers so that costs have been materially reduced. Competent authorities estimate that efficiency in feeding and care of swine has been the means of saving 100,000,000 bushels of corn annually. The dairy man, too, figures prominently in the picture. The U. S. Department of Agriculture reports that through improved practices of feeding, breeding, and culling the low producers, the production per cow has been increased at least 25 per cent.

There are some factors, however, which merit a somewhat further discussion. These are concerned with the soil and the crops. We are especially concerned with the soil. On it we must depend for food, raiment, and shelter. A prosperous farm community cannot be built on a depleted or worn-out soil. The wealth of any State "lies in her soil and her strength in its intelligent development."

In no small measure is the efficient production of the farmer due to the improvement of soil and crop practices. Both State and Federal governments have been liberal in supporting experiment stations to study soil and crop problems. The Hatch Act passed in 1887 made it possible for each State to establish an institution of research whose business is to assist in solving farm troubles.

It is interesting to note that in the past year about $20,000,000 were spent for research work by State and Federal authorities. This may seem a huge amount. It must be remembered, however, that agriculture represents a capitalization of approximately $60,000,000,000. Yes, agriculture is Big Business! The manufacturing interests of the United States are also considered big business, but the capitalized value represents only three-quarters that of agriculture, and yet these vast manufacturing interests spend annually $168,000,000 for various phases of research work. Experiment stations, I might state, stand in exactly the same relation to farming as do the research laboratories to manufacturing interests.

Seven Stations

In Wisconsin, in addition to the main experiment station at Madison, six other stations are maintained in different parts of the State. These are located on different soil types so that the problems peculiar to the particular soil on which they are located may be studied. But in all these studies the emphasis is placed *not on greater total production,* but *on greater acre production.*

The contributions to better farming resulting from the work of these experiment or research stations are many. Our agronomists have introduced new varieties of corn and small grains that have proven far superior to the scrub grains grown heretofore. For example, Golden Glow and Silver King corn over a period of years have outyielded the nondescript varieties 15 to 20 bushels per acre in Wisconsin. Pedigree Oderbrucker barley is known as a standard variety whereever the crop is grown. In a six-year test this barley yielded 10½ bushels more than the best barleys compared with it. The introduction of these new varieties in Wisconsin agriculture has increased crop yield, the value of which is conservatively estimated at $25,000,000.

Field Day at the Marshfield Experiment Station. "This interest in science in agriculture is further illustrated in the attendance on field days at the Experiment Stations."

Surveys made in Wisconsin indicate that 75 per cent of the soils are acid, requiring lime materials. Limestone, marl, and refuse lime from industrial plants are utilized for overcoming the sour disposition of the soil. The acreage of legumes, clovers, and alfalfa has increased so that the ratio now is one acre of clovers to 2.7 acres of the cereals, corn, wheat, and oats. In this connection I am reminded of the old saw:

"Lime, manure, and clover
Makes the old farm rich all over".

Acre yields are further increased through the judicious use of supplements to stable manure. Our experimental studies indicate that for maximum yields of general farm crops, the lack of available phosphate is limiting factor No. 1. When this deficiency is satisfied, the need for potash is soon apparent.

More Small Grains

At our Marshfield Station, located in the heart of Wisconsin, we have found that soluble phosphates with potash serve to increase yields of small grains 6 to 12 bushels per acre. The maturity of the corn crop, our results show, can be hastened a week to ten days by the use of fertilizers applied in the hill or row. Not only that, but an increase of nutrients is secured by proper plant feeding.

Potatoes are the most important cash crop grown in the State. Our study of the potato business soon revealed the fact that the fertilizers in use were not the kinds that produced highest financial returns per acre. As a result of four years' work, potato fertilizers with ratios of 1 of nitrogen to 4 of phosphorus, and 4-6 of potash have supplanted the mixtures in use heretofore. And by the use of these better balanced fertilizers, crop yields have ranged from 26 to 75 bushels per acre more than was secured with the fertilizers formerly used by farmers.

These few accomplishments serve to illustrate the scope of the work of the experiment stations. Just how much of the increase in efficiency of the farmer is due to the experiment stations? This is quite impossible to state in concrete figures. That it has been an important factor is evidenced by the increasing number of farm operators who adopt the station-recommended practices.

This interest in science in agriculture is further illustrated in the attendance on field days at the experiment stations. When the Marshfield Station was started 16 years ago, 75 to 100 people came to inspect our work, but now two days are required to accommodate the crowds numbering 2,000 to 3,000 people. The situation in Wisconsin is, however, no different than it is in any other State. Verily, the farmers of the U. S. A., in increasing numbers, are "hitching more science to the plow."

Seed Corn Treatment

By L. R. Combs

Extension Editor, Iowa State College

SEED corn treatment is valuable insurance for the corn grower and it should be looked upon as such rather than as a 100 per cent guaranty of a better yield. The treatment costs little. It may save the farmer planting his crop over; it may give an increased yield; and it undoubtedly is beneficial as a general rule; although there are certain conditions under which treatment might do little good.

Seed corn dust treatments now being tested by experiment stations do no harm at any rate, and since the cost per acre of treatment is small, the extra protection afforded is cheap. The treatment is especially valuable on high priced land where the lack of uniform stand wastes land.

Such, briefly, is the opinion of C. S. Reddy, assistant chief of the Plant Pathology Experiment Station at Iowa State College, Ames.

"Seed corn treatment cannot be over emphasized," points out Dr. Reddy. "Treatment is cheap. The cost of material per acre is only three or four cents. The labor required is small considering that one bushel of seed will plant five to seven acres of land. The dust costs $1.75 a pound and a pound will treat eight bushels of seed. The cost of treating will send no man to the poorhouse and it may save him from planting his crop over and may give an increased yield."

Certain conditions, not the average condition, however, may be found under which seed treatment will not show to great advan-

These samples were harvested from rows side by side. All the seed was infected with dry rot (diplodia). The sample on the right grew from seed treated with mercuric dusts and yielded at the rate of 59 bushels per acre. The other sample, untreated, yielded 42.2 bushels. This is one of the most striking examples of value of treatment.

A group of Chickasaw county, Iowa, farmers attending a corn seed treatment demonstration.

tage, says Dr. Reddy. No one claims that treatment will bring dead seed to life so it is useless applied on dead seed. Obviously when seed is disease-free and planted under ideal conditions, the treatment will not be needed. But the farmer seldom knows whether his corn seed is infected little or much. He may have ideal planting conditions when he starts planting and before he finishes the weather may be rainy and cold.

These and subsequent statements by Dr. Reddy tend to answer many questions which have risen and are still going the rounds of the Midwest. These questions are especially prevalent in some sections where seed corn treatment has not been accepted and where its value has not been proved.

Soil Efficiency

When seed corn treatments were tested in Iowa and Illinois, care was taken to select seed which was infected with rot diseases but in which the germ had not been killed. Part of the seed was treated and part was not treated. When the corn sprouted, it was not thinned because, obviously, thinning would have destroyed much of the benefit of the treatment. The actual stalks, not hills, per row were counted and at the end of the season the yield was carefully computed.

In practically all cases the yield was in favor of the treated seed. In the last two or three years much work has been done with dust treatments at Iowa State College. Yields taken last fall (1929) showed that the treated seed yielded, on the average, 4.5 bushels more per acre than seed which was not treated, according to R. H. Porter, extension plant pathologist at Iowa State College. The data were secured from 22 different tests in various parts of Iowa where treated corn averaged 59.5 bushels per acre as compared with 55 bushels from untreated seed.

In cases where weather conditions are extremely unfavorable or where seed is badly infected with some kind of rot, much greater differences may be obtained in yield by treating the seed. In some cases the yield from treated seed may be three times the yield from untreated seed. The average difference in tests in 25 counties over a period of five years was found to be five bushels in favor of treated seed.

Tests in which four different kinds of seed were used, namely, early selected, late selected, diseased, and disease-free seed, indicated that it pays to treat any seed corn. A gain in yield of 1.5 bushels was obtained when the disease-free seed was treated as compared to the yield of disease-free seed untreated.

The test also showed that seed selected early in the fall, reasonably free from disease as such seed usually is, when treated with one of the mercuric dusts and planted, will give practically as high yield as disease-free seed. This, however, according to Mr. Porter, is not an excuse to quit using the germination test since if seed is not viable the value of treatment is lost.

"If the seed is disease-free, the benefit of treating will come when the the seed is planted during cold, damp weather or when a cold rain falls immediately after planting," explains Dr. Reddy, who was one of the first men to start testing dust treatments for corn. "If disease-free seed could be planted and sprouted under ideal conditions, there would be no need of treating. But this ideal condition always cannot be obtained. A rain after planting may cause rot to develop in untreated seed. The mercury dust compounds, if applied properly, will make good healthy stalks from rot-infected seed."

On high priced land where the owner must have the full yield and efficiency of the soil, seed corn treatment is decidedly beneficial. The greatest increase in return from seed corn treatment comes not from increased stalks in the field but from having stalks in nearly every hill. It will not benefit a man to have four stalks in one hill and none in the next. For instance in parts of Illinois, farmers plow up their fields and replant if the corn does not show a uniform stand with plants in practically every hill. The farmers cannot afford to lose the corn from the vacant hills which in some cases would be 10 to 25 per cent of the area of the land. Seed corn treatment will help the seed withstand rot fungus and help make an even stand, according to Dr. Reddy.

In Illinois some farmers demand such efficient adjustment of the planting rate to soil fertility that they set one side of the planter to drop two kernels per hill and the other side, three kernels. This practice is based on the knowledge that between two and three grains per hill give the best results on Illinois soil. The seed treatment which guarantees the germination of the maximum amount of seed is valuable, especially since farmers do not dare plant too much seed because of the high cost of hand labor for thinning.

Planted Too Thickly

In many sections of the South corn is planted much too thickly. Then when it has sprouted, negro laborers are sent through the field with their heavy hoes to thin the crop to the desired stand. Under those conditions, seed treatment would hardly be necessary. In the corn belt States, however, labor is too expensive, not to mention the price of good seed, to permit such practice.

"No, seed treatment does not control the disease any further than the seedling stage," explains Dr. Reddy, in answer to a common question. "Treatment will protect the seed in the soil from infection as it starts growing, either from mycelium in the seed, or from infection from the soil as a result of wet weather. But treating seed in the spring does not mean that the owner will harvest disease-free seed in the fall. The plant or grain may become infected again during the summer."

Neither will the three commercial mercury dusts which are being recommended prevent rust, smut, bacterial spot, nor insect nor rodent injury. Nor are these three dusts recommended for the control of smut in small grain.

Treatments such as formaldyhyde, bordeaux mixture, mercuric chloride, and others have been found to be of no practical value as corn seed treatment. In some cases they have proved

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Can you see $97.68 an acre between the tobacco on left and that on right? Mr. Hugh E. Hardy, of Lagrange, N. C., found that difference when he sold it. Tobacco on left fertilized with 1,200 pounds per acre of 8-3-5 (PNK) and that on right with same amount of 8-3-9, extra potash as a top-dressing.

TOBACCO

By H. T. Maddux

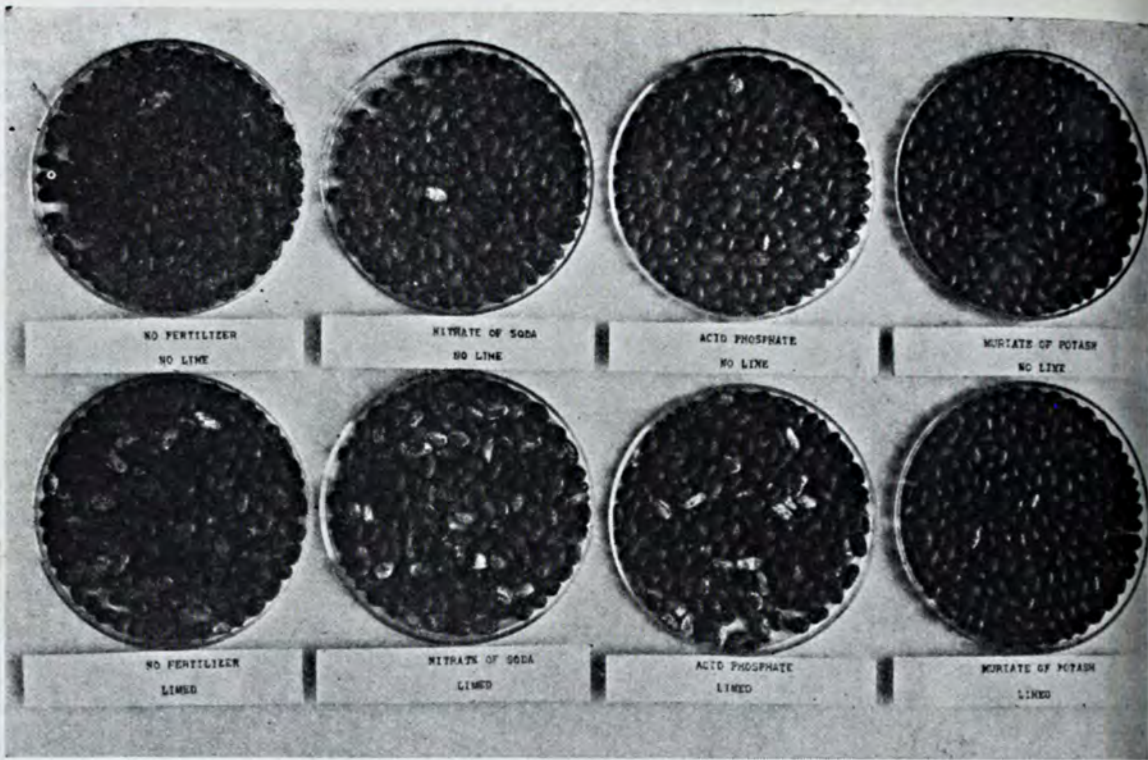
Atlanta, Georgia

YOU have heard about the straw that broke the camel's back and the story of the little Dutch boy who kept the dike from breaking. These tales seem rather out-of-date in this day of billion dollar mergers, but with farming the old basic principles still seem to hold true. It's the little things that count.

Some of the South's most progressive bright tobacco growers have tested extra potash for the crop with more than 1,000 acres under demonstration to see if small amounts of extra potash would count for anything under actual field conditions. The demonstrations were conducted on a barn basis; that is, 5 acres against 5 acres, with the regular fertilizer applied to the entire 10 acres at the usual rate at planting time—generally 1,000 pounds per acre.

Some of the farmers used 3 per cent potash in fertilizers at planting, but the majority used 5 per cent. Then they added 5 additional units of potash to one of the plots by top-dressing with extra potash in the field—generally from a week to ten days after the plants had been set. The extra potash, derived either from sulphate of potash or sulphate of potash magnesia, was applied early so as not to cause a second growth.

Both of the crops were cultivated in the same way, but they were cured in different barns because the extra potash gave tobacco of better body which necessitated different heats in curing. The crops from both plots were, however, sold across the floor in the regular way and on the same day. It was found by the farmers in North Carolina, South Carolina, and Georgia that the extra potash produced increased yields and tobacco which sold for a higher price per pound on the average. (*Turn to page 57*)



The effect of fertilizers and lime on producing sound beans is plainly seen here.

More *about* Soybeans

By George L. Schuster

Agronomist, University of Delaware

"THE soybean as a hay crop has literally leaped forward in the South in the past decade," said R. B. Fairbanks, in the October, 1929, issue of BETTER CROPS WITH PLANT FOOD. It has been grown for some time for seed purposes, but only in recent years has it gained prominence as a soil improver and a feed for livestock. Fairbanks continues by saying that the lack of home-grown feeds has been a serious draw-back to the development of the livestock industry in the South. Many cotton growers have been buying grain and roughage for their work stock, thus making it difficult to net a profit, and it is here that the soybean fits in and southern farmers have found out how profitably the crop may be grown.

O. E. Ackerson, BETTER CROPS WITH PLANT FOOD, *April*, 1929, said, "the acreage of soybeans has increased more rapidly than any other field crop in Illinois in recent years," and that it is becoming increasingly important in the cropping systems of the Midwest. It fits well into the rotations and furnishes a satisfactory substitute for oats, the market for which has been dwindling with the reduction of horse population.

The soybean has almost unlimited usefulness. "American factories are now producing oil, meal, flour, biscuits, milk powder, chocolate, soy sauce, and special foods for infants and invalids," according to Professor W. J. Morse of the United States Department of Agriculture. A crop

Soybeans and Sudan grass make an excellent hay mixture.

having such a wide adaptability and so many uses should not be overlooked. Practically all livestock on the farm can use the soybean or soybean products for a part of their feed. Soybeans also may be used with corn for silage or for hogging down.

Delaware was introduced to soybeans about 1908 by Professor A. E. Grantham. He conducted many tests at the Experiment Station as well as cooperative tests with farmers throughout the State. The Wilson variety has been the leading variety in the State as a result of this early work. More recently the Wilson V has been pushing to the front. The yield of hay and seed of the Wilson V is about the same as for the Wilson, but the hay is of a finer quality because of its finer stems.

Soybeans use more nitrogen and potash than phosphoric acid, according to Henry and Morrison. Grantham said no better fertilizer could be had than a crimson clover sod supplemented with 250-350 pounds per acre of a mixture of 400 pounds of superphosphate and 100 pounds of muriate of potash. This is equivalent to an 0-11-10 goods. This fertilizer practice not only balances the plant food removal, but should also increase the soil fertility.

Soybeans and corn are excellent for silage or hogging down purposes.

More recent results are given in the table below. Twelve years' work indicates that the soybean does not require lime. Lime does not increase the yield or the quality of the soybean. Potash is the limiting factor on the sassafras silt loam soil where the tests were made. An application of manure is practically as good as any fertilizer application.

Result for Soybeans 1916-1928

	Yield, bu. per acre		% sound seed	
Treatment	L.	N. L.	L.	N. L.
None	12.1	11.9	91.7	96.1
N. 100 lbs	12.0	12.8	93.1	95.7
P. 250 lbs.	12.0	13.3	89.7	94.7
K. 75 lbs.	19.7	15.9	97.9	99.6
N. P.[1]	13.1	14.6	81.6	95.3
P. K.	21.2	21.2	97.1	99.4
N. K.	23.6	20.9	98.8	98.9
N. P. K.	24.1	24.4	98.9	99.1
Manure 5 T.	23.4	23.4	98.2	98.1

[1] Amounts as above.

If nitrate of soda is valued at

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She Had Rather Plow Corn Than Bake Angel Food Cake—Now She is

Corn Queen of Illinois

By F. J. Keilholz

Extension Editor, University of Illinois

ILLINOIS' best corn growers have been outdone by the little 12-year-old daughter of a 240-acre tenant farmer. She is Mildred Riley, eldest of six children in the family of Mr. and Mrs. Jesse Riley, near Maroa, Macon county.

Always before Illinois has had a "corn king," but this year Mildred decided that it was time a "queen" took over the throne. At any rate, she captured the grand championship on ten-ear samples in the tenth annual Illinois Utility Corn Show held recently in connection with the thirty-third annual Farm and Home Week of the College of Agriculture, University of Illinois. In addition to winning the grand championship over veteran corn growers of the State, she took the sweepstakes in the class for boys' and girls' 4-H club members.

Her winning is all the more remarkable in view of the fact that she has had only two years' experience and training in her county 4-H corn club. Her sample scored 82 on the basis of 100 for germination, physical appearance, and conformation.

Instead of a "crown," Mildred will wear a white-gold wrist watch awarded by the Illinois Bankers' Association as a symbol of her achievement. She also was awarded a cash prize of $10 for winning first in her class.

Mildred is quite a cake-baker, as well as a corn grower, but her father claims that she would "rather sneak out to the field and plow corn than stay in the house and bake angel-food cakes."

Mildred took up corn growing with serious intention three years ago and has been a "queen" almost from the start. Her first venture was when she entered a ten-ear sample in the amateur class of the Macon county farmers' institute corn show, more for the fun of it than for any prize which she expected to win. She was rewarded with the championship of the class.

Thus encouraged, she enrolled in the Macon county 4-H corn club sponsored by the local Farm Bureau and the Extension Service of the College of Agriculture, University of Illinois. During her past two years in club work there isn't much about selecting and raising good corn that Mildred hasn't learned for herself.

Likes to Cultivate

The first year her acre of club corn was in the same field with some of her father's corn. Cultivating her crop for the first time, she discovered that the task was not as easy as it looked. Finally, she stopped her team and appealed to her father.

"Daddy, you plow my corn and I'll experiment on yours for a while;

MILDRED RILEY.

of the more difficult tasks of corn growing, but this year she is going to do the whole job herself.

She tests all of her seed and can recognize the various diseases of corn when they show up in the germination test. She can't pronounce the scientific names of all the diseases, but her father explained that that doesn't concern her. She just throws out the bad seed without worrying about the name of the disease.

Her First Year

The first year she was in corn club work her acre yielded 117 bushels, and she took fourth in the junior classes of the 1929 Illinois Corn Show. This year her acre yielded 127 bushels and before coming to the State show she took the grand championship in the Macon county corn show.

The acre which produced the sample that made her the "corn queen" of the State had been in bluegrass sod and was treated with 300 pounds of a commercial fertilizer, broadcast on the land. Mildred uses her own seed corn, the original stock of which was secured from I. D. Heckman, Cerro Gordo.

Mildred has a ten-year-old brother, Kenneth, who is pressing her for the corn growing honors of the family, according to the father. Already the brother is as good a judge of corn as his more famous sister.

'm plowing under a hill every once n a while."

Since then she has mastered the art f cultivating corn and during the ast season did it all summer. Although only in the eighth grade at chool, she can drive a team, operate tractor, milk cows, and feed livestock. In the past her father has elped her with the planting and some

A group of "leaders" studying a soils lesson with J. W. Sims.

A School for Michigan Farmers

By M. M. McCool

Pr fessor of Soils, Michigan State College

A SUCCESSFUL experiment on methods in soil extension has been conducted in Michigan. About 12,000 farmers have become interested in a better soils program, have attended school, and have studied their lessons. They also have formed themselves into a State Soil Improvement Association for continued study. They have done this because they have considered it to be profitable. Several of these farmers are putting into practice much of the information obtained in their schools.

This is a remarkable record, especially when the methods of instruction and procedure are taken into consideration. It shows that farmers are awake to the fact that the soil is the fundamental of agriculture and that they must study and take advantage of modern methods, and certainly it brings out that farmers are a public spirited lot of people. They are not only talking about cooperation, but are ready to put it into practice. Consider the leaders or individuals in these communities who are unselfish enough to spend hours in study and much additional time to pass the information they have accumulated along to their fellow farmers!

It also shows that the methods of soils extension have changed markedly during the past few years. We receive few requests for one-session meetings in which the entire field of soil man-

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Wheat Smut

By G. W. Fant

Extension Plant Pathologist, North Carolina State College

COVERED smut, a disastrous foe of the wheat grower, stands ittle chance of making inroads in nany wheat fields in North Carolina, roviding the efforts at seed treatment f numerous wheat growers count as n indication. The recently developed opper carbonate dust treatment for mut control has been used by many vheat growers in the wheat sections f the State.

During the spring of 1927 a wheat mut survey conducted by the writer, n the Piedmont section of North Car- lina, revealed the presence of covered mut in 24 out of 26 wheat fields ex- mined. Reports received from wheat rowers and millers indicate that few, if any, wheat fields are entirely free from this disease. In addition to an actual reduction in yield from covered smut, losses are further increased by severe outbreaks of the disease, which render wheat from badly infested fields entirely worthless for flour making. On this account the crop from individual fields frequently may render very little return.

Following the smut survey, a wheat smut control campaign was undertaken by the Extension Plant Pathologist, working in cooperation with County Agents, in order to introduce the new copper carbonate dust method in the grain growing counties of the Piedmont section. Local sources through which copper carbonate dust could be secured were established, after which seed treatment demonstrations were given in cooperation with county farm agents in several of the leading wheat counties of the State. At field demonstrations, special

(*Turn to page 54*)

Covered smut, a destructive foe of wheat growers, is shown on left. Sound wheat heads are shown on the right.

A PIONEER IN

By F. C. Gaylord

Horticulturist, Purdue University

BACK in 1925 the principles fundamental to the Hoosier Ten Ton Plus Tomato Club were laid down. That they were the essentials to high yields has been demonstrated by more than 2,000 tomato growers who have joined the club and followed these essentials on the road to profits during the past five years. A glance at the records is sufficient proof of the soundness of the "Ten Commandments" of Profitable Production laid down in 1925 and followed ever since.

Record of Hoosier Ten Ton Plus Club

Year	No. Club	No. Enrolled	Ave. Yield Club	Ave. Yield Non-club Members	No. Securing 10 T. Plus	High Winner	Yield
1925	14	223	5.92	4.31	30	John Cotty	15.88
1926	17	361	5.3	3.9	14	Harrison Powell	13.80
1927	29	371	7.8	4.7	33	Howard Harper	17.12
1928	34	763	4.24 (Frost) (Sept. 24)	2.2	8	Asberry Holt	13.82
1929	29	590	7.	4.42	65	W. C. Harper	19.08

Cliff Hays, left, presents W. C. Harper with championship watch in 1929. Harper produced 19.08 tons an acre highest official yield ever recorded in the Club.

The summarized records above show that the highest yield ever secured was hung up in 1929 when W. C. Harper of Tipton county delivered 19.08 tons of red ripe tomatoes per acre. This record was made in spite of a frost on September 19 that knocked practically all the leaves off the tomato vines. After the 19 tons had been removed, the field was still heavily loaded with tomatoes which

PROFITS

Fay Gaylord, left, started Ten Ton Tomato Club in 1925. John Cotty won first championship with 15.88 tons an acre. Mr. Gaylord presents watch to Mr. Cotty.

did not ripen on account of the early frost. Not only did Harper grow lots of tomatoes, but his crop, sold on the U. S. graded basis, averaged almost 70 per cent No. 1's for the entire season.

In laying down the principles that farmers were to observe in growing their crops a few minimum essentials were incorporated in the rules. In brief these were:

(1) Selection of a well-drained field, a clover or legume sod to be preferred.
(2) The use of a minimum of 500 pounds of 2-12-6 or its equivalent per acre.
(3) Setting of only stalky, healthy plants.
(4) Spraying of plants at least three times with Bordeaux mixture in beds before setting.
(5) Plowing ground 8-10 inches deep, either in fall or early in spring.
(6) Thorough preparation of plant bed.
(7) Early setting of plants in Indiana, May 20 to June 5.
(8) Cultivating close and deep first time, then level and shallow throughout the season, and keeping all weeds out.
(9) Picking only red ripe tomatoes.

That the essentials of success have always been the same from 1925 when John Cotty of Greenfield captured the $200 gold watch until 1929 when W. C. Harper grew the highest official yield ever officially recorded, 19.08 tons an acre, is proven by the records of the 2,308 members of the club. These ten-ton seekers have averaged for a five-year period, 6 tons per acre as compared with a 4-ton yield of non-club member growers at the same factories. The 150 who have reached the coveted goal of ten tons or more per acre have averaged 11.97 tons per acre.

All Use Plant Food

During all this time there has never been a winner that did not use at least the minimum requirements of plant food as set forth in the rules. Howard Harper in 1927 practically doubled the application of 500 pounds of 2-12-6 and secured over 20 tons on parts of the field so fertilized. The story of W. C. Harper, his brother, who made the 19.08 tons average in 1929 is typical of methods used by ten-ton winners.

"The field I used for tomatoes in 1929 had corn on it in 1928. After the last cultivation it was sowed to

(*Turn to page 53*)

Bringing Back a SECTION

By H. E. Cotton

Hancock, Wisconsin

UNDER the leadership of the Wisconsin College of Agriculture, with its experimental farms and extension workers, and with the aid of 0-15-30 and other high potash fertilizers, the central sandy area of Wisconsin is staging an agricultural "come-back" that is noteworthy in the annals of American farming.

This area is one of the earliest settled sections of the "Middle Border." Its pioneers were mostly townspeople from New England and New York. Some of the land was prairie, some was scrub oak and burr oak openings, and some was jack pine timber. It was all easily cleared and for a few years yielded heavily of wheat, flax, barley, rye, and hops.

Much of the sandy land was entirely free from stones and was easily worked. The soil warmed easily and quickly, it was well underdrained and never was muddy. It could be cultivated immediately after a rain without puddling and it could be depended upon to hold moisture if cultivated just sufficiently to maintain a dust-

Note the sandy hillside back of Mr. Bruch's alfalfa field.

Ten years ago this corn field was a sandy hillside.

nulch on the surface. Hence the emptation to overwork the soil was great, and most of the settlers, not having much training in the handling of soils, did overwork it.

Many reasons, chief among them being the coming of more convenient markets, caused the substitution of potatoes for hops and grain as cash crops. The tubers grown here were of excellent quality and were easily handled on this type of soil.

In a few years, however, it was found that production was falling off, and the uncertainties of the potato growing industry, especially the fluctuations of the price, forced the sand farmers to adopt a more diversified program. They were told that it would be necessary for them to have stable manure with which to renew the fertility of their land.

Dairy herds were installed, creameries were built, and a determined effort was made to return these three million acres of small farms to profitable production. The acres responded nobly for a few seasons and then fell off again. The dairy program was not enough. Clover could not be grown, and it was not generally known why this was so.

The experiment station at Hancock, which was started some 30 years ago, was at that time hardly abreast of the situation. Soil depletion of this particular kind was a new problem and required patient, detailed study.

Lime for Legumes

The farmers were told that the soil was acid and needed lime to sweeten it, so that the legumes could be grown. On some fields an application of two tons of ground limestone to the acre produced successful seedings of clover. On other fields no amount of lime did the trick. Something else, apparently, was needed.

A few farmers began about 20 years ago to experiment with alfalfa as a soil builder and feed crop, and for pasture. It grew on limed ground if

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FINANCING

By C. A. LeClair

St. Louis, Missouri

TODAY the measure of a farmer's success is not to be judged by the kind of a car he drives or the size of his strawstack, but by the quality of the crops he grows and the appearance of his livestock. In the early days, American farmers lacked incentive to use sound economic business principles in their operations. Land was so cheap that the fertility of a farm could be exhausted and new land purchased at less cost than would be required to maintain the productivity of the original homestead. Gradually this condition changed.

The combine saves this old-fashioned labor and expense of threshing.

Invariably good crops are grown on fertile land, and there is an old adage which states that any man who makes his land rich will get wealthy making it so. It might be added too, that in addition to acquiring wealth by improving his soil fertility, a farmer acquires contentment and happiness as well. Byron says, "As the soil, so is the heart of man."

Notwithstanding these truths, too few farmers are as yet following a systematic plan of soil fertility improvement and those who are employing modern means of land enrichment haven't begun to exhaust its possibilities for profit. Nevertheless, American farmers lead the world in per capita production. Only 4 per cent of those engaged in agriculture on this globe live in the United States and yet we produce 60 per cent of the world's food and clothing. This achievement has been largely attained by applying power to farming.

The acceptance of machinery as an adjunct to more economic production began to become noticeable in the nineteenth century, but progress was rather slow. It took 35 years for the reaper and grain harvester to gain general use. Less than half of this time was required to convince farmers of the advantage of using seed drills in preference to the hand sowing of grain.

In the early part of the twentieth century, less than five years were required to make farmers see the practicability of applying power to their operations. In the period from 1920 to 1925, seven million horse-power were put to work in the form of tractors, four million more horse-power

FERTILIZER Investments

in the form of motor trucks, and two million horse-power in the form of stationary engines. Today, 56 per cent of the motor cars of the country are owned and operated in rural districts.

A Day of Progress

This is truly then a day of unprecedented progress in farming operations. For example, last year an Idaho farmer with two men, using a tractor drawing seeders with a 55-foot sweep, was able to sow 150 acres of wheat in 10 hours. Furthermore, with an expenditure of less than one-fifth of the labor and expense required to harvest grain with a binder and threshing machine, it is now possible to do the work in certain localities more economically with a combine.

Even the aeroplane is finding a place in our modern farming operations. Last August, at Morris, Illinois, a farmer's thresher broke down. He cranked his plane and flew 100 miles to Peoria and back with the necessary parts which were needed. Thus, a delay of only two hours in the threshing operations resulted. The aeroplane has been used also for successfully dusting cotton in the southern States. Again, out in the State of Washington, a farmer reports having

Commercial fertilizer made the corn at the right make twice the growth of that at the left in the same time. Fertilizers similarly hasten the maturity of all crops.

sowed a quarter section of land to clover and grass in one hour and forty minutes. He used a plane and traveled at the rate of 95 miles an hour to do the work.

Power applied to farming operations has eliminated the ox and the horse to a large extent. This in turn has widened the limits of per capita production per farmer, and in at least one western State, more wheat is now being grown with 50 per cent less labor than was the case 10 years ago.

Speeding up production of the soil is now at last receiving nation-wide attention. Strangely enough, although the first published information about the benefits to be derived from the application of mineral fertilizers was made by Sir K. Bigby about the middle of the seventeenth century, commercial fertilizers were not introduced in this country until about 200 years later.

Until the beginning of the twentieth century, commercial fertilizers were employed largely by farmers of the eastern and southeastern States. Now, however, in nearly every agricultural State in the Union, farmers realize that they too, can increase their profits by supplementing with commercial plant foods the natural fertility of the land they farm.

Consider the case of corn for instance. This was the major crop grown by the American Indians when America was discovered. They grew the crop successfully even outside of the area where it was especially adapted. It is said that the Indians of the State of Wisconsin produced mature corn even as far north as the borders of Lake Superior. To accomplish this, they followed the practice of germinating the seed before it was planted and in this way shortened the time between planting and harvesting the crop. Today, farmers of Wisconsin and other bordering corn belt States do not have to bother with sprouting seed corn before planting it for they have found that by fertilizing with commercial plant foods, it is possible to hasten the maturity of the crop three times as much as the Indians were able to do by their method.

Those who have limited acres find that they can employ commercial fertilizers to increase their production without annexing more land. Commercial fertilizers also help to solve the farm labor problem. By the employment of commercial plant food to produce the same number of pounds or bushels on less acres, the tens of thousands of farm hands which would be necessary to cultivate wider areas are eliminated.

Expenditure for commercial fertilizers is an investment, for when judiciously used, they permanently improve the productive value of the land. Of course, if hail ruins a crop, if drought burns it, or if floods damage it, the plant food applied cannot entireily overcome such hazards. Farmers must take the same chances in their business as men do who purchase securities. However, in the case of commercial fertilizer investments, the residual effect of an application usually pays in the succeeding years.

Some who otherwise would use commercial fertilizers neglect to apply them following surplus crop years. This is a big mistake. In the case of such crops as corn or oats, farmers as a whole profit more in years of normal crops than they do in short crop years. Of course, short cotton and potato crops bring more money than normal or larger crops. Nevertheless, no man can tell in advance what any year's ultimate production will be.

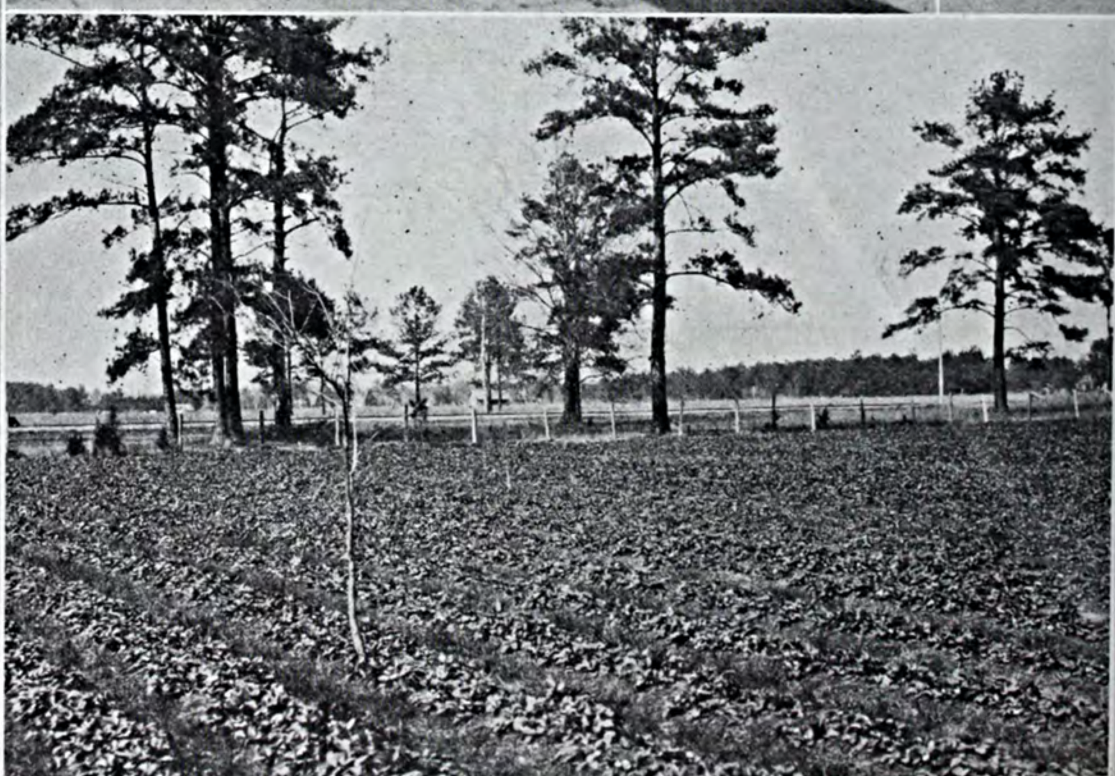
It always pays, therefore, to aim at high yields per acre of quality crops. For example, although a practically normal acreage of the following crops were planted, unfavorable weather cut the production of potatoes 23.3 per cent and that of corn 34.7 per cent below normal in 1901. Similarly, the total production of wheat in this country was 15.3 per cent and that of oats 25.5 per cent short in 1921.

(*Turn to page* 54)

EASTER GREETINGS!

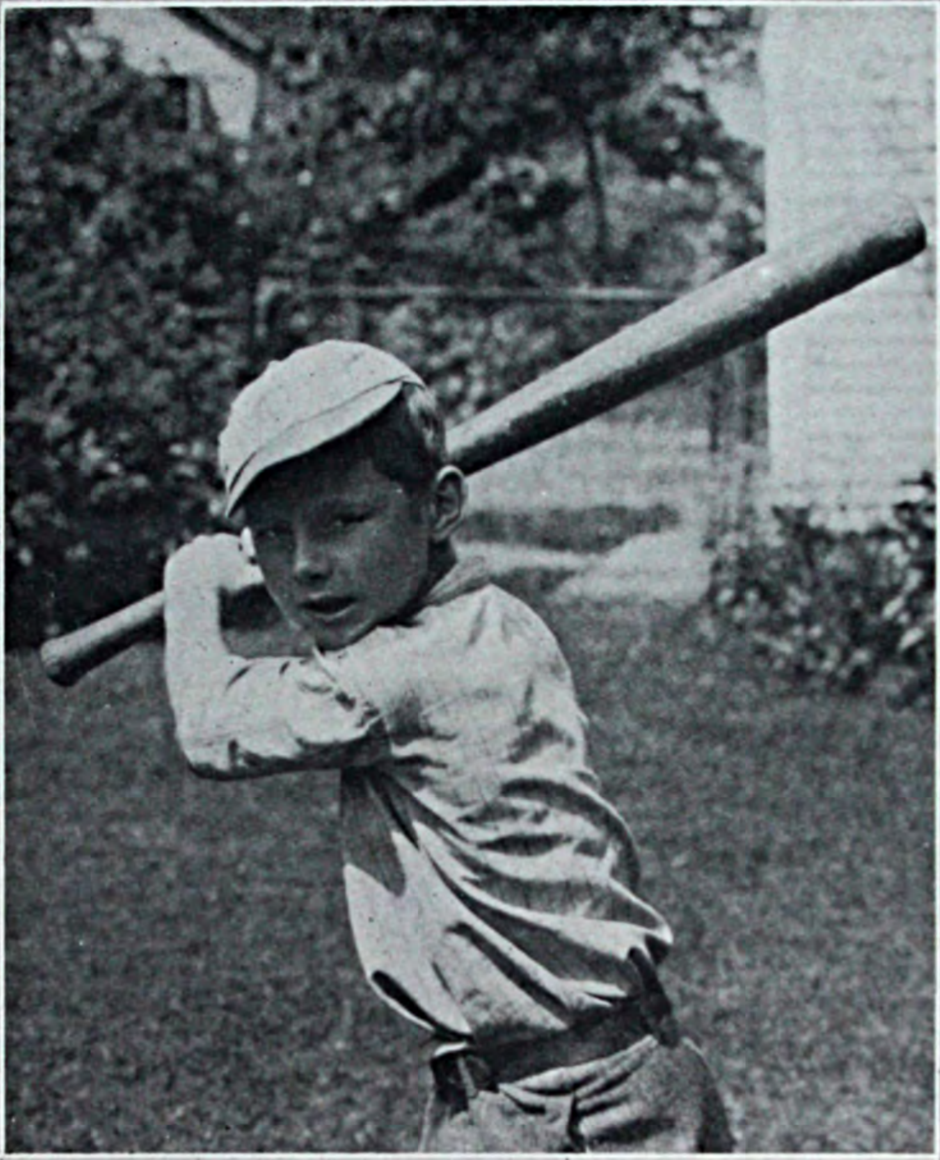
PICTORIAL

Left: Spring evenings find farm folk taking advantage of thawing streams.

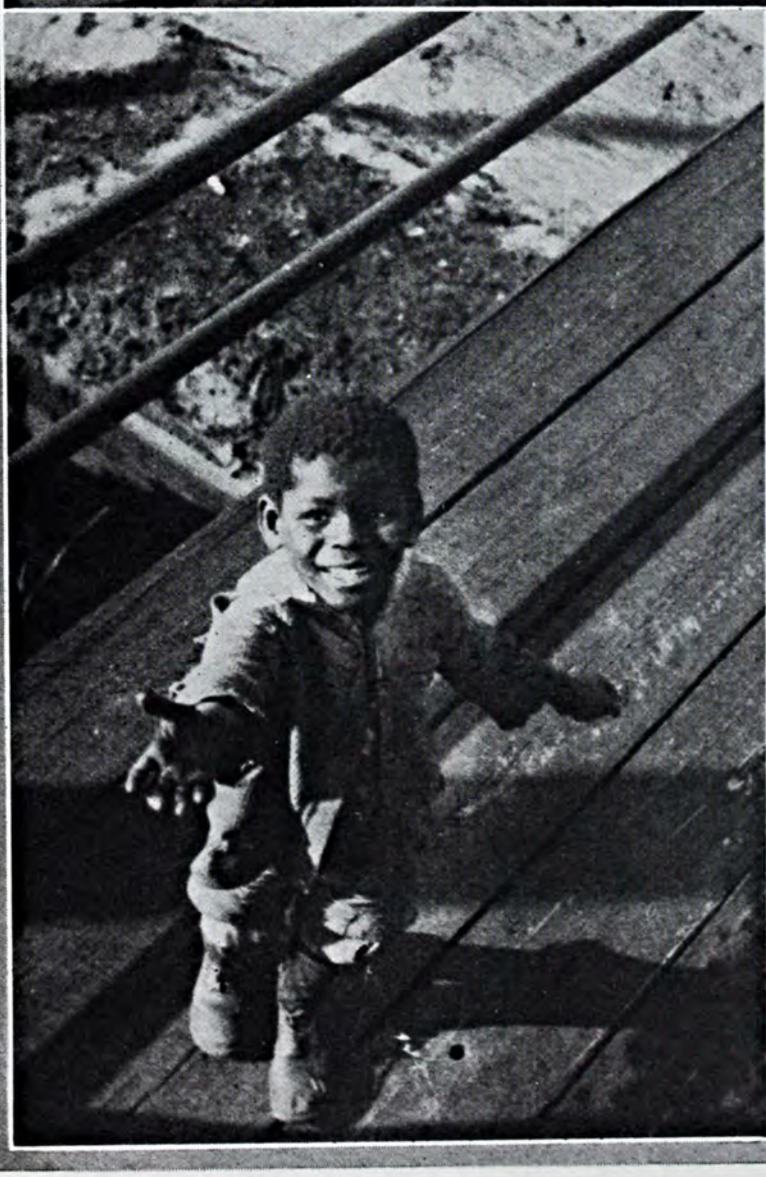


Below: An interesting strawberry field with promise of delicious desserts.

Right: "Let 'er come,"—son of Mr. and Mrs. J. B. Bailey, West Lafayette, Indiana.



Below: Spring planting in the Corn Belt—side view, two row, six horse hitch listing corn planter.

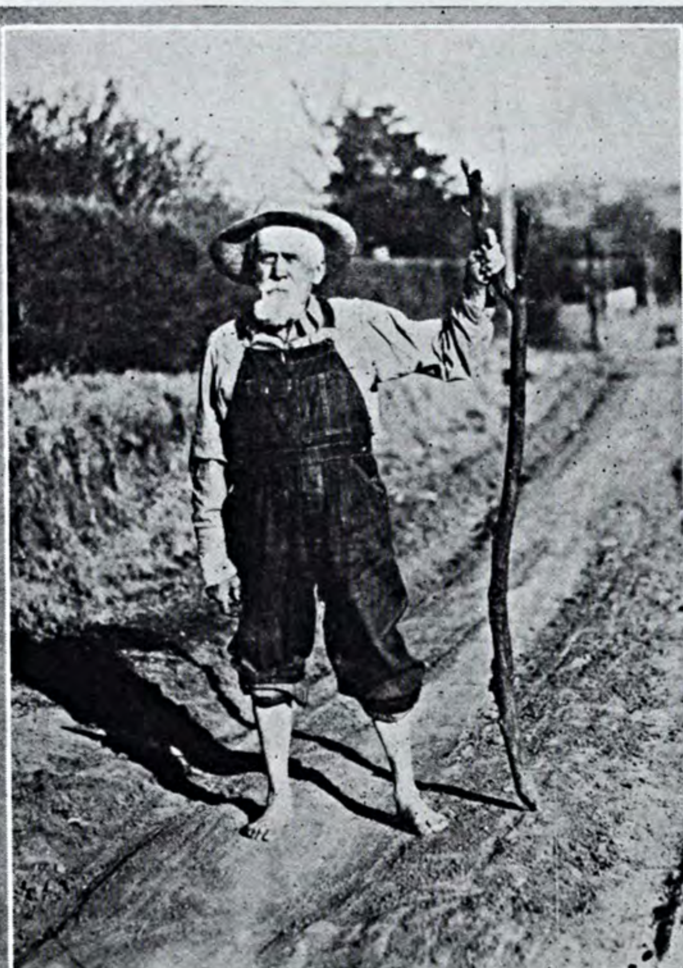


Above: A census taker in Porto Rico has his troubles. Here is a family of twenty-four.

Left: Down in Georgia—A nickel please.

Right: Loading sugar cane from ox-carts to railway cars is rapidly carried on in Cuba.

Below: And here the cane starts for the mill—eight oxen per team.



Left: The original "barefoot boy" is now a clergyman of 94. The Rev. H. P. Bertelsen, of Blair, Nebraska, in outfit made famous by John Greenleaf Whittier in the latter's immortal poem, "The Barefoot Boy." It was while Mr. Bertelsen was a youngster that Mr. Whittier saw him and was inspired for the famous lines which begin "Blessing on thee, little man, barefoot boy with cheek of tan."

Below: Gassing of insects on orange trees is made thorough by putting a canvas hood over trees. Here you see a man pumping a cyanide solution under the canvas. When the job is finished and live insects and eggs of the unhatched have been killed, the canvas is pulled off. Photograph taken in Los Angeles region.

The Editors Talk

Loyalty

The fundamental principle which governs the handling of every successful enterprise is loyalty. It is the common law of business and the whole practice of commerce is founded on it.

Every business must necessarily have its vast outlay in money and physical equipment. This is indispensable. But every business is not a success because of this. There can be no success unless back of the switch, so to speak, stands like the Rock of Gibraltar a wall of conscientious, loyal men and women, ever ready to give honest, efficient, dependable service.

The character and qualifications of the greatest leaders in business—those men, whose names and careers constitute the milestones in commercial history, are reflected in the junior staffs they selected and developed. Their loyalty, their efficiency, their ability to carry on when the burdens of business management fall to their lot depend upon those under whom they served. If their training is at the hands of a loyal, efficient management, they will invariably prove to be loyal, efficient and worthy successors.

Too frequently in business today and down through the ages, it has happened that those who labored hardest and gave their best service, did not enjoy their proportion of the fruits of their labors. This is obviously wrong. The good things resulting from labor honestly and efficiently given should go to those who produce it. Every organization should make this the worthy object of its efforts.

Short-Changing Mother Nature

The Creator was most generous to mankind in supplying abundant stores of valuable minerals, forests, and plant and animal-life necessary for the existence of man. Properly conserved and carefully utilized, these resources should be practically inexhaustible.

But man has been a poor husbandman. The forests are rapidly being cut away, valuable minerals are being depleted, and, most distressing of all, the once fertile soils of the earth are being exhausted of their fertility.

Agriculture is first in importance of all industries. The building up and maintenance of the fertility of the soil is the most important, the most complex and the most far-reaching problem confronting the nations of the world.

Farming, like any other business, calls for the application of sound business methods. There is a need for periodic stock-taking, for having a budget, for adaptability to changing conditions, and for economy in production.

Farmers have consistently short-changed Mother Nature; they have taken from her soil fertility far in excess of what they have returned. This practice is responsible in a large part for the agricultural decadence of certain regions and countries. In other words, Mother Nature has called a halt.

The Farm Census

"The 1930 farm census is of special importance, in view of the far-reaching economic changes which have occurred in American agriculture during the last ten years," says N. A. Olsen, Chief of the Bureau of Agricultural Economics, U. S. Department of Agriculture. He appeals to farmers to give assistance to the census enumerators.

Approximately 70,000 enumerators are engaged in taking the farm census in conjunction with the population census which began April 2nd. Preliminary results will be published by the Bureau of the Census, Department of Commerce, early in 1931, but the figures for some States will be available this fall. "The farm census," Mr. Olsen says, "has been organized to yield basic information which will enable Federal and State agricultural institutions to aid farmers in formulating plans for improving the economic position of farmers." The census will also make available exact data regarding acreage, livestock expansion in recent years and the various shifts in specific lines of farm production.

It will also give important information as to whether the tendency is toward the development of large farm holdings or land worked by tenants. Information will also be obtained on other questions of great interest, as pointed out by Mr. Olsen.

It happens that in this issue an article on the census has been written by Jeff McDermid, from a rather different viewpoint. Apparently whatever the ordeal the present census might be in every household, it is as nothing in comparison with the pioneering registrations which took place in the days of the Romans. As Jeff points out, the penalty for fraudulent returns was in that day harsh enough to satisfy either Anthony Comstock or Carrie Nation. Undoubtedly, because people are human, there does exist some lurking fear or resentment against answering personal questions regarding property and other matters. But if we realize that with the growth of social science and with the growth of the idea of democracy, it is essential, if sound social policies are to be formulated, that they be founded on the basis of facts, and the better the facts are known and the better social and economic trends are understood, the better such policies can be adjusted to actual and practical conditions. It is to be hoped, therefore, that everybody in rural communities will meet the enumerators in a free and cooperative spirit, and take the time and trouble to answer the questions as thoroughly as possible.

In view of the great changes going on in agriculture at the present time, the final report of this census should be of great value.

Teaching Cooperation

Many people will be glad to know that there is such a thing as the American Institute of Cooperation. This institute will hold its sixth annual summer session June 16 to July 23 at the Ohio State University.

The American Institute of Cooperation is an educational enterprise incorporated under the laws of the District of Columbia, not for profit. It is controlled by 33 participating organizations, and is managed by a Board of Trustees. It has five objects in view, namely: to collect and make available a body of knowledge concerning the cooperative movement, to serve as a means of clarifying thought, to serve as a means of training and developing leaders, to serve as a means of assisting educational institutions to improve their teaching courses, and to focus the spirit of the cooperative movement as a means of community and national development.

This Institute has already held five summer sessions—in Philadelphia, at the University of Minnesota, at Northwestern University, at the University of California and at Louisiana State University. At this, the sixth summer session, there will be six days of general sessions and conferences, a number of college courses given by the Ohio State University, special conferences daily and the annual meeting of the National Cooperative Council.

Undoubtedly such an Institute can do a great deal of good by resolving the ideal of cooperation into successful daily practice. It is easy enough to support an idea—the problem is how to work it out and apply it. This work should receive the active support of as many people interested in cooperation as possible, especially as it is planned to give courses in agricultural education, agricultural cooperation and rural economics for which credit will be given. Certainly this should be an inducement to young people to get in on a forward movement and learn, both from the courses and from the association with others, something as regards how to make practical cooperation a success.

A School for Grown-ups

That there is no reason to stop learning has been demonstrated by successful farm schools for soils which have been conducted in Michigan under the auspices of the Soils Department, Michigan Agricultural College. As an article in this issue points out, 12,000 farmers have attended school and have studied their lessons, and as a result have become interested in a better soils program for the State of Michigan.

The system of teaching is to establish farm leaders who have previously taken the lessons from one of the staff of the Soils Department of the College. Either the county agricultural agent or the farmers themselves select a leader, to meet with other leaders at a central point in the county one day each month to receive a lesson.

This system of teaching certainly has much to commend it. First and foremost it enables the staff at the college to be of the greatest practical assistance to the largest number of farmers. Of almost equal importance, since the farmers take part in the schools as leaders, it ensures a continual and intense interest in the soils program of the State. There are other very desirable features. It is very gratifying, therefore, to note that this experiment in soils schools has been successful to the extent of securing the attendance of some 12,000 farmers.

Undoubtedly, our whole outlook is changed. Formerly we went to school in our youth and then forgot about it—largely perhaps because of economic reasons. Now, people are finding the time and opportunity to renew a period of study in some particular field of work. This is happening in a number of States; it is happening in the graduate schools of many of the State colleges where much older students are returning to work.

The soils schools in Michigan are, therefore, fine examples of a progressive movement which might well be followed in other States, to the advantage both of the scholar and of our national agriculture.

Eternally Green

Someone has said, "So long as the fruit is green it continues to grow, but after it gets ripe its next step is to get rotten." This thought has unusual significance when applied to the problem of pasture management.

Millions of acres of once good pastures in this country are today past ripe. In fact their state, without any exaggeration, might be termed rotten,—so unproductive have they become.

The dependence of modern civilization on the products of the dairy and the dependence of the dairy industry on nutritious grasses, the product of pastures, have resulted in an intense interest in pasture management in important dairy regions. While this interest is to some extent due to the necessity for producing cheaper milk, there is reason to believe that it is in a large degree due to the extensive research work of our State Experiment Stations and other research organizations.

Aside from the published work of State Experiment Stations, probably one of the most recent and valuable contributions to our knowledge of pasture fertilization is to be found in a recent bulletin on the subject published by the National Fertilizer Association. In this bulletin are given results of one year's work of more than 100 pasture fertilizer demonstrations. This work represents the contributions of four materials companies who cooperated in a definite program to determine the best method of fertilization for pastures.

Though this work has been in progress but one year, the results are unusually convincing and may prove of value to farmers whose desire it is to increase their milk checks and at the same time reduce their feed bills.

Creeds

Since the dawn of civilization there have been men who have stood out as shining examples of success. Then, as now, such successes are attributable to steadfast adherence to certain fundamental principles governing their relations to mankind. They had their rules of conduct and their creeds.

One of America's outstanding business successes was Marshall Field. In an interview several years ago, he stated that his success and the success of his organization were based on twelve simple rules. These rules are—the value of time, the success of perseverance, the pleasure of working, the dignity of simplicity, the worth of character, the power of kindness, the influence of example, the obligation of duty, the wisdom of economy, the virtue of patience, the improvement of talent, and the joy of originating.

Whatever your business, these fundamental principles should prove most helpful. If you would succeed, have a creed.

Recent estimates by specialists of the United States Department of Agriculture indicate that a total of 126,000,000 pounds of plant food is washed out of the fields of the United States every year. This is 21 times as much as plant foods used by crops.—*Bureau Farmer.*

Canning Peas

By Walter H. Ebling

Agricultural Statistician, Wisconsin

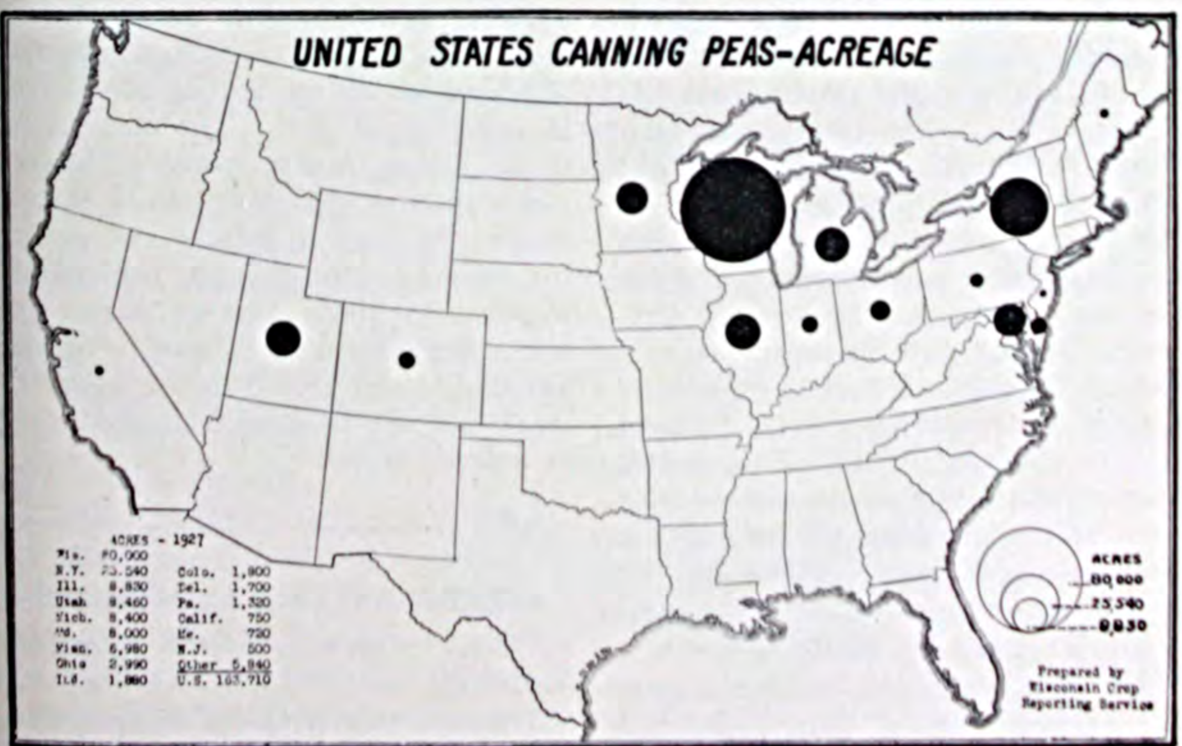
¶ Seventeenth in this series

THAT the American people are using more canning peas is quite clearly shown by the enormous increase in the production of this product. In the twenty-year period since 1910 our population has increased only about 32 per cent, while our consumption of canned peas in the United States has gone up about 425 per cent. Among the preserved vegetables, canned peas rank as one of the most important items, and with the high quality of this product now available as a result of improved canning methods, a further increase in its use seems likely.

Garden peas have been grown for centuries, in fact no one knows just how long. They probably are an offshoot of the field pea, though our garden peas now are a distinct type. There are numerous varieties of this viny-climbing, white-blossomed annual and their varied characteristics make possible a rather wide range of uses.

As an industry, the canning of peas is over a century old, it probably being begun in France some time between 1810 and 1820. The packing of this product in the United States probably was begun about 1860, but in the early periods it was necessary to hand-pick and shell the green peas before they could be processed. This was expensive and great expansion in the industry did not occur until after the development of harvesting and hulling machinery following 1890. Since that time, however, the industry has grown rapidly and spread into a number of States.

While this industry began in the eastern States it has spread westward and the most acreage has for a number of years been in Wisconsin, which State packs normally over half of the nation's total output of canned peas.



In 1929 the United States grew nearly 230,000 acres of canning peas with a farm value of $11,593,000. The total production for the country was reported as 18,530,000 cases of canned peas. Wisconsin's output last year was 111,000 acres and 9,399,000 cases of 24 No. 2 cans. The average yield for that State was 1,850 pounds per acre, which is rather low, and the average for the United States was 1,748 pounds per acre, which is also somewhat lower than normal. While world data on the industry are not available, it is well known that the canning of peas is very largely an American industry. Interest in it, however, is developing in other countries, and some American machinery is now being exported. It appears probable that the industry may also develop in other parts of the world where the climate is favorable.

Great Lakes Region

The production of canning peas in the United States is found quite largely in the northern States and mostly those in the Great Lakes Region. It appears that the cool humid climate in this region brings about a rapid growth of the crop which results in a high quality product both from the standpoint of flavor and color. In addition, the canning pea fits rather well into the rotation in such States as Wisconsin and New York, which are the leading producers. It provides an excellent cash crop which fits rather well into a scheme of dairy farming. Like other legumes, the canning pea does well on limestone soils and in Wisconsin the more important regions have developed on limestone soils of the eastern part of the State. Minor areas are developing in various parts of the State, but the bulk of the production has been confined to the regions where the soil seems to be especially favorable for pea production.

In these northern States the peas are normally seeded during the last half of April or early May and harvested during late June and July. There are two important types—the early or Alaska varieties and the late or sweet varieties. In each of these groups there are a number of varieties.

Seeding is usually done with a grain drill in a well-prepared seed bed, and when the peas have advanced sufficiently to reach the canning stage, they are harvested with an ordinary mower and loaded upon wagons by hand and hauled to the vining stations which are located at points within trucking distance from the canning factory.

The canning process is a delicate one and the crop must be packed soon after it is cut. Usually the day's cutting must be packed before the factory ceases operation that night. The green pea-vines are a valuable by-product used as a livestock feed. This material is stacked at the time the peas are hulled and it forms a solid block of fermented material resembling silage which is used in the late fall and early winter mostly for the feeding of cattle and sheep.

The seed requirement in this industry is very high, about four bushels of seed being required per acre. In the production of seed some of the western States are particularly favored. Idaho, Montana, and eastern Washington are the leading producers in canning pea seed. The climate in these States makes possible better yields than in the more humid States where the crop is largely cut green for canning. In addition, harvesting weather in these western States is also more favorable. Some canning pea seed is also grown in the canning areas, but the bulk of it is produced in western States.

ASLEEP AT THE CONTROLS

Officer—"How did the accident happen?"

Driver—"My wife was asleep in the back seat."

Foreign and International Agriculture

Corn in Other Lands

By E. N. Bressman

Plant Breeder, Oregon Agricultural College

OF much interest to the corn growers in the United States is the growing of the crop in the Argentine Republic. Much has been said and written about the Argentine corn bogey. Many writers have frightened our growers with the statement that the Argentine is a better corn country than the United States and will soon be growing more corn than we do. In general, this is not true, and there is not a great deal to be afraid of in regard to the crop from the Argentine.

I am of the opinion that there never will be more than half as much corn grown in that country as in the corn belt of this country. There are many reasons for this. The chief reasons are that winter wheat, alfalfa, and flax are far more profitable for the Argentine grower than corn. Another important reason is that the moisture supply during the growing season in the Argentine is not satisfactory and many years there is almost a complete failure of the corn crop because of drought. In years like 1911 and 1917, the average yield of corn in the Argentine was only 3½ and 6½ bushels per acre each of these years.

Another reason why the Argentine will not become really as important as the corn belt is that the corn farmer in that country is a share renter who handles about 100 acres of corn and does no other farming. He is not a progressive type of farmer who does diversified farming and in no way can be compared to the corn farmer in this country.

The average acreage of corn in the Argentine is from 8,000,000 to 10,000,000 acres each year. This is a little less than the corn acreage in Iowa. In addition, the average acre yield is much smaller and so their corn belt cannot be compared to the corn belt of this country.

The chief reason that the Argentine corn crop is of interest is because so much of their corn is shipped to other countries. It is, therefore, a competing crop on the world markets with our own corn crop. In 1927 it was estimated that about 275,000,000 bushels of corn were exported from that country. In fact, they export about half of their crop and in many years more than half of their crop. Livestock consume nearly one-half of the crop.

This is quite different from the situation in the United States where 80 per cent of our corn crop is consumed by livestock. Because of the uncertainty of their crop, it is doubtful whether they will base a livestock industry on the corn crop as is done in the United States. The chief crop in the Argentine is alfalfa, and they grow nearly twice as much alfalfa as corn. In addition, they have nearly twice as much wheat as corn and some less flax and oats.

The methods of growing corn in

the Argentine are of interest. Their planting time begins in October and runs into November, the time of harvest in the United States. Corn is tasseling in January and their harvest is about the time of our planting. Much of their corn is listed and some is broadcast. In general, they do not give as much care to the cultivation of corn as is given in this country.

The harvest methods are rather crude, as many of the growers husk corn into large baskets and then dump it into sacks, which are hauled from the edge of the field to the temporary cribs, which are made of stalks. The corn is then shelled and hauled to Rosario, the chief terminal for corn. This is a port town and so the cost of shipping corn to other countries is lower than shipping from one section of the United States to another. For example, they have lower costs of shipping to Liverpool than shipping from the corn belt to Oregon by rail.

Most of the Argentine corn is of a small, yellow, flint type. The kernels are very hard and are particularly desirable for making corn meal because of the hardness of the kernel and the deep yellow color.

Europe's Corn Belt

The European corn belt is located in the Balkan States, chiefly Roumania. They grow nearly twice as much corn as is grown each year in the Argentine. The average is somewhere around 18,000,000 acres. They have less moisture and less heat during the growing season than in the corn belt and the average yield is less than 20 bushels per acre. In some years it is almost a complete failure because of drought, insects, and hail. Most of the corn is similar to the Argentine flint and is planted in very crude fashion. Most of it is planted by hand and hoed by hand. Much of the corn in this territory is used for human consumption and some of it reaches the foreign markets the same as corn from the Argentine. Without a doubt corn from the Argentine and the Balkan regions has a great effect on the world prices of the crop.

An interesting corn growing area is South Africa, where they have a long season which is rather cool. Their growing conditions compare somewhat to Oregon's, as corn requires a long season to get ripe. They are using methods and varieties very similar to those used in the southern part of the United States. Without a doubt this is a section which will grow and will cause some competition on world markets with corn from other sections.

Mexico grows nearly as much corn as the Argentine. In 1927 it grew 8,000,000 acres as compared to 10,000,000 acres in the Argentine. The yield of corn in Mexico, however, is low and most of it is used for human consumption at home. It is the important crop in the southwestern part of the country.

Southwestern Europe, including southern France, Italy, and Spain, grows most of the corn of western Europe. Much of this corn goes for human consumption and there is not enough for home use. This section, without a doubt, will always be a corn importing section rather than one of export.

In all of Asia, which is not a very important corn growing section, there are less than 10,000,000 acres of corn. Morocco and Egypt in Africa grow less than 4,000,000 acres of corn which is used almost entirely for human consumption. Brazil, along with the Argentine, is a rather important corn growing section in the southern hemisphere. It grows on the average 6,000,000 to 7,000,000 acres of this crop.

There are about 180,000,000 acres of corn grown in the world, of which 100,000,000 acres or about 60 per cent of the acreage are in the United States. There are more than 4,000,000,000 bushels of corn produced annually in the world, and the United States produces nearly 3,000,000,000 bushels of this crop.

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, Crops, Crop Diseases, and Insects. 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

Suggestions as to ways and means of producing better hay at a lower cost are given in, "Meadow Improvement through Seeding, Fertilization, and Management," Cornell Ext. Bul. 181, June, 1929, by A. F. Gustafson. This bulletin discusses prevailing practices and suggests improved methods for meadow improvement. Yield and feeding value are stressed. In experiments, covering four years, the average yield of mow-cured hay was 1,497 pounds greater where timothy followed clover than continuous timothy. Likewise the amount of digestible protein in the clover-timothy hay was more than three times as much as in timothy alone. While nitrate of soda outyielded superphosphate or muriate of potash, the average yield was highest when all three of these elements were used. It is pointed out that any profit from the elements other than nitrogen must come from increased yields of the cash crops following. The maintenance of a sound fertility program which will insure a high level of production and fair profit is a most important consideration in meadow improvement.

"State Laboratory Fertilizer Report, Seed Report, July-December, 1929, Miscellaneous, January-December, 1929," State Board of Agr., Quarterly Bul., Vol. 19, No. 4, Dover, Del.

"Nitrogen Fertilizers for Tomato Production," Miss. Agr. Exp. Sta., A. & M. College, Miss., Bul. 273, Jan., 1930, J. L. Cooley, Jr.

"Inspection of Commercial Fertilizers," Agr. Exp. Sta., Amherst, Mass., Control Series, Bul. 51, Nov., 1929, H. D. Haskins, H. R. DeRose, M. W. Goodwin, and J. W. Kuzmeski.

"Bacteriological Effects of Green Manure, Study No. 111," Miss. Agr. Exp. Sta., A. & M. College, Miss., Tech. Bul. 17, June, 1929, Charles F. Briscoe and H. H. Harned.

"Inspection of Commercial Fertilizers for 1929," Agr. Exp. Sta., Durham, N. H., Bul. 248, Dec., 1929, T. G. Phillips, T. O. Smith, and J. C. Fritz.

"Five Years' Results with Fertilizers in Three Hudson River Valley Apple Orchards," Agr. Exp. Sta., Geneva, N. Y., Bul. 574, Oct., 1929, H. B. Turkey and L. C. Anderson.

"The Comparative Values of Different Phosphates," Agr. Exp. Sta., Knoxville, Tenn., Bul. 141, Nov., 1929, C. A. Mooers.

Crops

The Mississippi Agricultural Experiment Station in Cir. 87, Dec., 1929, "Preliminary Report of the Holly Springs Branch Experiment Station for 1929," by C. T. Ames and Otis B. Casanova, presents results of five years' experimental work with fertilizers on cotton. The tests involve comparisons of varying amounts of potash, varying rates of application, sources of nitrogen, as well as sources of potash. Their recommendation based on this work is 600 pounds per acre of a 4-8-6 fertilizer on average soils. On thinner soils they recommend the addition of 80 pounds of nitrate of soda. Where rust and leaf diseases are prevalent, additional potash should be added. They point to the tendency to use more phosphoric acid than is considered necessary to balance the nitrogen and potash.

Of particular interest to tobacco growers and research specialists should be Bulletin 311, Jan., 1930, "Tobacco Substation at Windsor Report for 1929," the annual report of the Tobacco Substation of the Connecticut

Agricultural Experiment Station, Windsor, Conn., by P. J. Anderson, T. R. Swanback, O. E. Street, and others. This report presents data on various phases of tobacco research, such as relation of amount of potash to fire-holding capacity, effect of source of potash on fire-holding capacity; effect of source of potash on soil reaction, use of manure as a supplement to commercial fertilizer, hyper humus as a source of organic matter, chemical analysis of poor burning and good burning leaf, studies on brown and black root-rot, fluctuation in soil reaction, and control of damping-off. A careful study of these data at the present time should enable farmers to avoid repetition of old practices which have not proven practical or profitable.

"Effects of Desiccating Winds on Citrus Trees," Cal. Agr. Exp. Sta., Berkeley, Calif., Bul. 484, Jan., 1930, H. S. Reed and E. T. Bartholomew.

"Frost Protection in California Orchards," Cal. Agr. Exp. Sta., Berkeley, Calif., Cir. 40, Feb., 1930, Warren R. Schoonover, Robert W. Hodgson, and Floyd D. Young.

"Report of the Agricultural Experiment Station of the University of California," Berkeley, Calif., From July 1, 1928, to June 30, 1929.

"Annual Report of the Director," Univ. of Del. Agr. Exp. Sta., Newark, Del., for Fiscal year ending June 30, 1929.

"Farmer's Cyclopedia," Fla. Dept. of Agr., Tallahassee, Fla., Quarterly Bulletin, January, 1930.

"High Yielding Strains and Varieties of Corn for Iowa," Agr. Exp. Sta., Ames, Iowa, Bul. 265 (Abridged), July, 1929, H. D. Hughes, Joe L. Robinson, and A. A. Bryan.

"Annual Report for the Year Ended December 31, 1929," Univ. of Ky. Agr. Exp. Sta., Lexington, Ky., Cir. 224.

"American Potato Journal," The Potato Association of America, East Lansing, Michigan, Vol. VII, No. 2, Feb., 1930.

"Thirty-seventh Annual Report," Univ. of Minn. Agr. Exp. Sta., St. Paul, Minn., July 1, 1928 to June 30, 1929.

"Flax Facts," Agr. Ext. Div. of the Univ. of Minn., Mont. State College, N. D. Agr. College, and S. D. State College, Minn. Ext. Spec. Bul. 128, N. D. Ext. Cir., 90, Mont. Ext. Bul. 107, S. D. Ext. Cir. 293, Feb., 1930, A. C. Arny, E. C. Stakman, H. A. Rodenhiser, Clyde McKee, Elmer E. Starch, H. L. Bolley, H. L. Walster, T. E. Stoa, A. N. Hume, and A. C. Dillman.

"Report of the Raymond Branch Experiment Station, 1929," Agr. Exp. Sta., A. & M. College, Miss., Bul. 271, Dec., 1929, H. F. Wallace and J. L. Cooley, Jr.

"Report of Holly Springs Branch Experiment Station, 1929," Agr. Exp. Sta., A. & M. College, Miss., Bul. 272, Dec., 1929, C. T. Ames and Otis B. Casanova.

"Report From the Natchez Branch Experiment Station on Pecan Work to December, 1929," Agr. Exp. Sta., A. & M. College, Miss., Bul. 275, Dec., 1929, S. J. Greer, W. T. Mallory.

"Cotton Varieties, 1929," Agr. Exp. Sta., A. & M. College, Miss., Cir. 88, Dec., 1929, J. F. O'Kelly and W. W. Hull.

"Better Methods of Potato Production," Agr. Exp. Sta., Columbia, Mo., Cir. 222, July, 1929, J. T. Quinn and T. J. Talbert.

"Legume Bacteria with Reference to Light and Longevity," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 132, Jan., 1930.

"Forty-eighth Annual Report for the Fiscal Year Ended June 30, 1929," Agr. Exp. Sta., Geneva, N. Y., U. P. Hedrick.

"The Present Status of Legume Inoculation in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 114, H. T. Conn.

"The Planting and Care of Shrubs and Trees," N. Y. State Col. of Agr., Ithaca, N. Y., Bul. 185, Sept., 1929, D. J. Bushey.

"New or Noteworthy Fruits, X," Agr. Exp. Sta., Geneva, N. Y., Bul. 578, Dec., 1929, G. H. Howe.

"Forty-second Annual Report, 1929: Part I," N. Y. State Col. of Agr., Ithaca, N. Y.

"Forty-second Annual Report, 1929: Part II," N. Y. State Col. of Agr., Ithaca, N. Y.

"Growing Cotton Under Boll Weevil Conditions," Agr. Exp. Sta., Stillwater, Okla., Ext. Cir. 256, Gen. Series 95, Apr., 1929, Henry F. Murphy and C. E. Sanborn.

"Forty-second Annual Report of the South Carolina Experiment Station of Clemson Agricultural College, for the year ended June 30, 1929," Clemson College, S. C.

"Cotton Variety Tests—1929," Agr. Exp. Sta., Clemson College, S. C., Cir. 38, Feb., 1930, W. B. Rogers and E. E. Hall.

"A Select List of Varieties of Vegetables," Agr. Exp. Sta., Knoxville, Tenn., Cir. 27, Dec., 1929, H. L. Fackler.

"Cotton Variety Experiments at Substation No. 2, Troup," Agr. Exp. Sta., College Station, Texas, Bul. 406, Feb., 1930, W. S. Hotchkiss and P. R. Johnson.

"Planning, Planting, and Caring for the Young Orchard," Agr. Exp. Sta., Logan, Utah, Cir. 83, Jan., 1930, Francis M. Coe.

"Building Young Deciduous Fruit Trees," Agr. Exp. Sta., Logan, Utah, Cir. 84, Feb., 1930, Francis M. Coe.

"Part-time Instruction in Vocational Agriculture for Virginia," Va. Polytechnic Institute, Blacksburg, Va., Vol. XXII, No. 1, Nov., 1928, Edmund C. Magill and Russell W. Cline.

"Growing Corn for Grain," Va. Polytechnic

Institute, Blacksburg, Va., Vol. XXII, No. 9, July, 1929, Harry W. Sanders.

"Yields of Barley in the United States and Canada, 1922-1926," U. S. D. A., Washington, D. C., Tech. Bul. 96, Nov., 1929, H. V. Harlan, L. H. Newman, and Mary L. Martini.

"Studies in Time and Rate of Irrigating Potatoes in Colorado," U. S. D. A., Washington, D. C., Tech. Bul. 118, Sept., 1929, W. C. Edmundson.

"Bud Selection in the Washington Naval Orange: Progeny Tests of Limb Variations," U. S. D. A., Washington, D. C., Tech. Bul. 123, Oct., 1929, A. D. Shamel, Carl S. Pomeroy, and R. E. Caryl.

"Spacing and Date-of-Seeding Experiments with Grain Sorghums," U. S. D. A., Washington, D. C., Tech. Bul. 131, Nov., 1929, John H. Martin, and John B. Sieglinger, assisted by A. F. Swanson and D. R. Burnham, H. J. Clemmer, E. H. Coles, F. E. Keating, and W. M. Osborn.

"Investigations on the Handling of Bartlett Pears from Pacific Coast Districts," U. S. D. A., Washington, D. C., Tech. Bul. 140, Sept., 1929, J. R. Magness, H. C. Diehl, and F. W. Allen.

"Growing Fruit for Home Use in the Great Plains Area," U. S. D. A., Washington, D. C., Farmers' Bul. 727, Revised Oct., 1929 H. P. Gould and Oliver T. Grace.

"Growing Annual Flowering Plants," U. S. D. A., Washington, D. C., Farmers' Bul. 1171, L. C. Corbett and F. L. Mulford.

"The Blakemore Strawberry," U. S. D. A., Washington, D. C., Cir. 93, Sept., 1929, George M. Darrow and George F. Waldo.

"Rate of Deterioration of Sugar Content of Some P. O. J. Sugarcane Varieties in Louisiana," U. S. D. A., Washington, D. C., Cir. 97, Nov., 1929, G. B. Sartoris.

"Index to Farmers' Bulletins Nos. 1001-1500," U. S. D. A., Washington, D. C., compiled by Mabel G. Hunt.

"Department of Agriculture Immigration of Virginia," Richmond, Va., Bul. 267, Mar., 1930.

"New Science for an Old Art," Agr. Exp. Sta., Madison, Wis., Annual Report, Bul. 410, Feb., 1930.

Soils

The reclamation and utilization of peat and alkali soils are real problems for farmers in many States. With proper systems of management both peat and alkali soil can be utilized on a distinctly profitable basis. Some of the problems of management and results of recent experimental work are ably discussed in Bulletin 266, Jan., 1930, Iowa Agriculture Experiment Station, Ames, Iowa, by W. H. Stevenson, P. E. Brown, and J. L. Boatman. The first requisite of peat and alkali soils is drainage. Peat soils require treatment with potash and frequently phosphoric acid. The alkali soils respond rapidly to liberal applications of manure or green manure and are also greatly benefited by potash.

"The Utilization of Moisture on Heavy Soils of the Southern Great Plains," Agr. Exp. Sta., Stillwater, Okla., Exp. Sta. Bul. 190, June, 1929, H. H. Finnell.

"A Piette Method of Mechanical Analysis of Soils Based on Improved Dispersion Procedure," U. S. D. A., Washington, D. C., Tech. Bul. 170, Jan., 1930, L. B. Olmstead, Lyle T. Alexander, and H. E. Middleton.

"Subsoil an Important Factor in the Growth of Apple Trees in the Ozarks," U. S. D. A., Washington, D. C., Cir. 95, Nov., 1929, A. T. Sweet.

"Soil Problems of the Wheatland Project," Agr. Exp. Sta., Laramie, Wyo., Bul. 168, Sept., 1929, T. J. Dunnewald.

"Soil Survey Calhoun County, Georgia," U. S. D. A., Washington, D. C., No. 2, Series 1925, J. W. Moon and H. G. Lewis.

"Soil Survey Randolph County, Georgia," U. S. D. A., Washington, D. C., No. 16, Series 1924, S. W. Phillips, Earl D. Fowler, E. W. Knobel, J. W. Moon, and G. L. Fuller.

"Soil Survey Barry County, Michigan," U. S. D. A., Washington, D. C., No. 14, Series 1924, E. B. Deeter and F. W. Trull.

"Soil Survey Isabella County, Michigan," U. S. D. A., Washington, D. C., No. 36, Series 1923, J. A. Kerr and F. W. Trull.

"Soil Survey Livingston County, Michigan," U. S. D. A., Washington, D. C., No. 37, Series 1923, L. C. Wheeting and S. G. Bergquist.

"Soil Survey of Antrim County, Michigan," U. S. D. A., Washington, D. C., Advance Sheets-Field Operations of the Bureau of Soils, 1923, J. O. Veatch, L. R. Schoenmann, and G. L. Fuller.

"Soil Survey of Lac Qui Parle County, Minnesota," U. S. D. A., Washington, D. C., No. 23, Series 1924, J. Ambrose Elwell, W. W. Strike, P. R. McMiller, G. B. Bodman, and C. H. Hammer.

"Soil Survey of Salem Area, New Jersey, U. S. D. A., Washington, D. C., No. 47, Series 1923, R. T. Avon Burkl, James Thorp, and W. G. Seltzer.

"Soil Survey of Northampton County, North Carolina," U. S. D. A., Washington, D. C., No. 9, Series 1925, W. D. Lee and S. F. Davidson.

"Soil Survey of Cass County, North Dakota, U. S. D. A., Washington, D. C., No. 29, Series 1924, E. W. Knobel and M. F. Peightal, Part B: The Chemical Composition of the

Soils of Cass County, T. H. Hopper and H. L. Walster.

Economics

The agricultural depression has been accompanied by declines in the prices of farm real estate. The index number of the estimated value per acre of farm land has declined each year since 1920. In 1929, the index was 116 per cent of the 1912-14 average. The declines for 1929 were relatively small as compared with other years. Fewer foreclosures and other forced transactions appear to have occurred. The new U. S. D. A. circular No. 101, "The Farm Real Estate Situation, 1928-29, by E. H. Wiecking, is very useful for anyone interested in farm real estate.

Bulletin No. 487, "Asparagus," by H. R. Wellman and E. W. Braun, California College of Agriculture, is one of the California series on crops and prices and is a contribution from the Giannini Foundation of Agricultural Economics. Practically all of the canning asparagus and about 45 per cent of the table asparagus produced in the United States are grown in California. About 90 per cent of the total receipts of California asparagus at New York arrive in March and April. The chief factor affecting changes in the weekly average prices of California asparagus during these two months is changes in the supply. In the past six seasons an average of 88 per cent of the variations in the weekly average prices of California asparagus at New York during March and April can be accounted for by changes in receipts of asparagus, which leaves only 12 per cent to be explained by other factors, such as changes in the average quality and size of asparagus and the supply of competing vegetables.

"The 1930 Agricultural Outlook for California," Calif. College of Agr., Berkeley, Calif., Cir. 39. Feb., 1930, H. R. Wellman, E. W. Braun, E. C. Voorhies, S. W. Shear, and H. E. Erdman.

"Georgia Agricultural Outlook for 1930," Georgia State College of Agr., Athens, Ga., Vol. XVIII, Bul. 381, W. A. Minor.

"Does Iowa 'Dump' Its Grain", Agr. Exp. Sta., Ames, Ia., Cir. 118, Oct., 1929, G. S. Shepherd.

"Economic Position of the Grape Industry in Missouri," Agr. Exp. Sta., Columbia, Mo., Bul. 273, July, 1929, F. L. Thomsen and G. B. Thorne.

"The Cost of Growing an Apple Tree to Bearing Age," Agr. Exp. Sta., Columbia, Mo., Cir. 225, Sept., 1929, H. W. Guengerich and D. C. Wood.

"Types of Farming in Minnesota," Agr. Exp. Sta., University Farm, St. Paul, Bul. 257, Aug., 1929, L. F. Garey.

"Factors Affecting the Cost of Production of Alfalfa Hay in Western Nevada," Agr. Exp. Sta., Reno, Nev., Bul. 117, Nov., 1929, F. B. Headley and R. M. Clawson.

"Economic Studies of Dairy Farming in New York ix," Agr. Exp. Sta., Ithaca, N. Y., Bul. 483, J. C. Neethling.

"Economic Conditions of Farmers in Oklahoma as Related to Membership in the Oklahoma Cotton Growers Association," Agr. Exp. Sta., Stillwater, Okla., Exp. Sta. Bul. 186, W. W. Fetrow.

"Ohio Agricultural Statistics for 1928," Agr. Exp. Sta., Wooster, Ohio, Bul. 442, Sept., 1929.

"Market Supplies and Prices of Apples," U. S. D. A., Washington, D. C., Cir. 91, Nov., 1929, J. W. Park.

"Classification of Leaf Tobacco Covering Classes, Types, and Groups of Grades," U. S. D. A., Washington, D. C., S. R. A.-B. A. E. 118, Nov., 1929.

"An Economic Survey of The "Dixie" Section, Washington County, Utah," Agr. Exp. Sta., Logan, Utah, W. Preston Thomas.

"Stabilizing the Farm Investment," Wis. College of Agr., Madison, Wis., Cir. 236, Feb., 1930, K. L. Hatch and H. L. Russell.

Diseases

Two New York bulletins, Nos. 575 and 579, issued by the Agricultural Experiment Station at Geneva, N. Y., provide new information on spray residues on fruit. The first bulletin, No. 575, "Washing Fruit to Remove Spray Residue in the Hudson Valley," is by E. V. Shear, who ably presents the results of experimental work to find the cheapest, safest and most effective way of removing spray residues from fruit. Bulletin 579, "Spray Residues," by Leon R. Streeter and S. Willard Harman, contains more discussion along the same lines.

"Experiments with Blister Canker of Apple Trees," Agr. Exp. Sta., Urbana, Ill., Bul. 340, Jan., 1930, H. W. Anderson.

"Studies of the Black-rot or Blight Disease of Cauliflower." Agr. Exp. Sta., Geneva, N.

Y., *Bul.* 576, *Nov.,* 1929, *E. E. Clayton.*

"Sprays, Their Preparation and Use," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 259, Feb., 1930, R. H. Robinson.

"Studies of Cotton Root Rot at Greenville, Tex.," U. S. D. A., Washington, D. C., Cir. No. 85, Nov., 1929, Homer C. McNamara and Dalton R. Hooton.

"The Nematode Disease of Wheat and Rye," U. S. D. A., Washington, D. C., Farmers' Bul. No. 1607, R. W. Leukel.

Insects

"How to Prevent Damage by the Mexican Bean Beetle," Agr. Exp. Sta., Knoxville, Tenn., Cir., 28, Jan., 1930, S. Marcovitch.

"Life History of the Oriental Peach Moth in Georgia," U. S. D. A., Washington, D. C., Tech. Bul. 152, Nov., 1929, Oliver I. Snapp and H. S. Swingle.

"Biology of the Cotton Boll Weevil at Florence, S. C.," U. S. D. A., Washington, D. C., Tech. Bul. 112, Sept., 1929, F. A. Fenton and E. W. Dunnam.

"The Corn Borer in Central Europe, A Review of Investigations from 1924 to 1927," Tech. Bul. 135, Nov., 1929, K. W. Babcock and A. M. Vance.

More About Soybeans

(*From page* 19)

$50.00 per ton, superphosphate at $15.00, muriate of potash at $45.00, and soybeans at a dollar a bushel, the net gain from the use of a complete fertilizer would be $5.93 per acre per season for the 12-year period. Where a complete fertilizer has been used there has been an increase of 12 bushels per acre over the unfertilized plots and it takes a little more than 6 bushels to pay for the fertilizer used. If only superphosphate and potash are used, there is a gain of 9 bushels over the unfertilized plot, but it only takes slightly more than 3½ bushels to pay for the fertilizers, leaving a gain of $5.43 for the investment in fertilizers. Where it is possible to supply nitrogen from green manures, the latter is probably the best practice.

Sound plump beans at maturity are what the grower wants. The use of lime does not seem to influence the percentage of sound beans materially. Potash seems to produce more sound beans than any other single ingredient.

Many growers of soybeans have stated that they have noticed that many of their beans have turned yellow at about blossom time or before, the edges of the leaves turning yellow first and then the yellowing advancing toward the veins. The term chlorosis has been applied to this early false ripening period. It has been noted on other crops and several different remedies have been found.

In Delaware it has been found that these plants suffer because of insufficient potash. Experiments in the greenhouse have shown that a chlorotic plant may be cured by applications of potash. Norval Pepper of Sussex county had considerable trouble with chlorotic beans. He had been using an 0-10-4 and 0-12-5 fertilizer, but when he changed to an 0-10-10 the trouble disappeared.

It seems that this 0-10-10 is a good recommendation to follow on the Atlantic coastal plain soils where the nitrates can be supplied from green manures. Where there are insufficient nitrates a 2-8-10 fertilizer may be used. These practices are producing results in Delaware.

HONEY INDUSTRY ORGANIZED

Bee Industries Association of America is the name of the organization representing both the bee and honey industry organized to enlarge the market for honey. A subsidiary organization, the American Honey Institute, Chamber of Commerce Bldg., Indianapolis, Ind., was formed at a meeting in Chicago and H. E. Barnard was elected president. This institute will give out information on bees and honey and will make contacts with all sources of information on the subject.

Potash *and* Peaches

By I. J. Mathews

Winamac, Indiana

SIX years ago V. V. Clarke gave up his salaried position as county agricultural agent of Marshall county, Indiana, and took over an old orchard on the Indiana - Michigan State line. This has since become The Bristol Orchards, Inc., one of the largest commercial orchards in Indiana.

When Clarke took over the old orchard, he found a wealth of poor varieties which had been allowed to degenerate through neglect, winter - killing, scale, and other troubles. However, being a practical optimist and a fellow who always delights in a job well done, he went on setting new trees each year.

V. V. Clarke and one of his vigorous young fruit trees.

When I was there on October 16, as we went over the hillsides, I noticed that some of the peach trees were wearing more leaves than most trees in the Peach Belt.

There was a small block that Clarke had left since the first with no soil treatment. These trees had had only the usual pruning and spraying. They were much smaller than the others and their leaves on October 16 were about all down. Clarke called this his "pepper" block because an occasional look at them as he makes his daily rounds keeps up his pep and tells him by comparison that he is making progress in the care of the orchard.

Where time permits, the first thing Clarke does to a site that he intends planting to peaches is to give it a six yard per acre application of marl. Then he plants alfalfa and after cutting the alfalfa two or three years, the sod is turned under and planted to peach and apple trees, or peach trees alone. The trees are clean cultivated, but in addition, they are fertilized.

Green Trees Until October 16

The first few years only nitrogen carriers were used, but last year he changed his fertilizer program, and this accounted for the green trees on October 16.

For 1928, he mixed a bag of nitrate of soda with a bag of 0-10-10 and used about four pounds of the mixture around each of the older trees. He believes that the potash in the mixture is what makes these trees look different than trees in the other orchards of the Peach Belt.

Another block contained six-year-old peach trees. The trees were from eight to ten feet high, leaves thick and dark green, only an occasional one yellowing at the tip. Examining the new growth, "twin" fruit buds for next year's crop commonly were found. This block got potash in the fertilizer mixture.

Other peach trees in the vicinity looked like this: the tree almost naked, the ground underneath covered with yellow leaves, with a few yellow ones clinging to the branches here and there. "Twin" buds were few and far between. These trees had nitrogen only.

Comparing the leaves and new growth with another block of peaches which got only nitrate of soda this year, Clarke believes that the potash kept the trees growing throughout the drought and kept the leaves on until late in the fall.

"Certainly" said this extensive peach grower, "the later the leaves stay on the tree, the more plant food will be stored in the trunk for next year's crop".

The Toxic Effect of Fertilizers

IN a recent issue of *Scientific Agriculture*, Dr. Albert Bruno, well-known French agronomist, briefly describes the toxic effects of some chemicals such as sulfocyanate, certain derivates of cyanogen in products with cyanamid bases, the perchlorates in the nitrate of soda, and the borax in potash obtained from salt lakes.

The author goes on to tell how farmers take advantage of the toxic effect of other products by using them under conditions where weeds are making headway. So, wild mustard and other weeds can be destroyed by applying sulfuric acid or finely ground kainit. Copper sulfate is applied for weeds in potatoes. Sometimes chemicals with toxic effect are mixed and applied with fertilizers in order to obtain a double effect.

Favorable results have been reported on the use of calcium cyanamid for flax in so far as it killed buttercup. The application had been given only 10 days prior to seeding. In another case, 160 pounds of cyanamid had destroyed the wild oats and twitch grass in addition to the fertilizing effect.

In northern France, kainit, applied in the fall, helps to a considerable extent to control the weeds and is better worked into the soil. This method has also the advantage that the chlorines will be leached out by the precipitations of the winter. Recently, kainit has also been found to kill dodder in alfalfa.

These methods of controlling weeds and insect pests help to cut down the cost of production in that considerable hand labor and cultivating may be saved. It is suggested to make further studies in that line and to have the data obtained published.

Bringing Back a Section

(*From page 27*)

carefully seeded and inoculated, more readily than clover. But in two or three years, blue-glass, or as it commonly is called, "June grass," began to crowd the alfalfa out. The June grass was fine pasture while it lasted, but it could not survive even a moderately dry summer on the light sandy land. And pasture was the thing most needed if dairying was to be profitably done.

In the face of this situation, many farmers simply abandoned their farms and went elsewhere to try to make a living, at farming, perhaps, or as wage workers in cities and towns. Some persisted in their program of alfalfa and livestock. And the experiment station kept on investigating.

It was observed that alfalfa was doing better on those farms where manure and lime both were used. But, of course, most of the farms could not keep stock, even with silos, in sufficient numbers to supply all the manure the fields needed. Commercial fertilizers were tried.

The early experiments appeared to indicate a need of phosphorus. Various forms of phosphate were used, but still results were not uniform. The idea was that since the soil needed humus and plant foods both, some combination that would make alfalfa, clover, and sweet clover thrive would be the most effective and economical aid to the sand farming program.

Then a little potash was added to the phosphates, and immediately there was something to write home about. More potash was added to the ration fed to the legumes at seeding time, and there was still more cause for rejoicing. Alfalfa seedings that had yielded weakly to the encroachments of June grass, began to make an aggressive counter-attack. They were found able to beat the enemy back. Potash-fed alfalfa was sent out against quack-grass and began to conquer it. Some plots that have been fed regularly with the high potash fertilizer are excellent stands and good producers after five and six years on the field.

Sweet clover, too, grows well here and seems to have an appetite for 0-15-30. It makes a permanent pasture which is a real boon to the farmer who wishes to keep a dairy herd on the high, sandy land. Sweet clover and alfalfa have more than doubled the carrying capacity of these farms in terms of dairy herds.

And that is not all. The land, having raised the legumes for three or four years, has in it enough available nitrogen and enough organic matter, where a good growth is plowed under, so that it raises good crops of corn and potatoes. Especially is this true if the manure made available by feeding the legumes to cattle is used on the cropped fields, supplemented in many cases with 3-9-18. Under this treatment yields of potatoes have more

Mr. Otis Hinc standing in his field of mixed alfalfa and sweet clover.

Bruch's farm, which about 10 years ago was just like the hillside and the narrow rye field between the hill and the alfalfa.

Six years ago, the field in which the owner stands knee-deep in alfalfa was like the hillside at which he points. This picture was taken about three weeks after the first cutting in the summer of 1929, the same day the corn field view was taken.

Neighbor Otis Hinc, standing in his field of mixed alfalfa and sweet clover, needs only to kneel to be completely hidden from view. Many more fields like these may now be found, bounded by old abandoned fields which now support a sparse growth of moss and

than doubled over what they formerly were.

Corn also likes this nitrogen, so considerately left in the soil by the alfalfa. Look at the sandy hillside just back of Mr. Bruch's alfalfa field in the illustration. Then look at the corn field on another part of Mr.

weeds. The movement is spreading rapidly and in two or three years more the number of limed, fertilized, and thriving fields of alfalfa in this sandy region will be multiplied by 10. And the prosperity and consequent happiness of its people will be multiplied by even more than that.

A Pioneer for Profits

(*From page 25*)

sweet clover. Conditions were favorable so I got a good stand. This was top-dressed during the winter with 10 tons of manure to the acre. The ground was plowed eight inches deep the middle of April and worked five times before tomato plants were set on May 11. Seven hundred pounds of 0-30-10 were drilled in broadcast before the plants were set. Reset tomato plants twice and cultivated six times. I secured 19.08 tons per measured acre, or $1,094.87 on 3.36 acres. My tomatoes averaged 70 per cent U. S. No. 1 and less than 2 per cent culls for the entire season."

Wheat Smut

(*From page* 23)

Wheat growers in Davidson county, North Carolina, getting first-hand information concerning control measures for the covered smut of wheat.

emphasis was placed upon the necessity of thoroughly mixing the dust with the grain by using a closed container. Also, attention was called to the small expense involved in the treatment, which amounts to only a few cents for each acre of treated grain sown.

The result of the grain seed treatment campaign as indicated by information secured from county agents and from dealers of copper carbonate dust is to the effect that more than a ton of the dust was secured by wheat growers for treating grain during each of the past two years. Estimates dealing with the acreage planted to seed treated with copper carbonate dust, which approximated 10,000 acres in 1927, have shown a marked increase in this acreage each year since. Perhaps the most beneficial result of wheat grown from treated seed comes about from the freedom from smut in the spring.

A final consideration and one worth taking into account, is the time and labor saved with the new method of seed treatment. The wetting of large quantities of wheat with blue stone solution, and also the subsequent difficulty experienced in sowing wet or swollen grain, are both eliminated with the new treatment. Farmers using the copper carbonate treatment for the first time express the intention of using the new treatment again for smut control in future years.

Financing Fertilizer Investments

(*From page* 30)

Now since the use of commercial plant foods enables a crop to produce better under unfavorable conditions, it is easy to see how he profits most who gives his crop the best start. On the other hand, because well-fed crops produce yields of highest quality, the use of fertilizer also pays well in sea-ons of over-production. This is be-:ause quality counts more in surplus :rop years than in normal or short :rop seasons. In fact, there never is n excess of quality stuff and prob-bly never will be.

Fertlizer salesmen and agricultural xtension specialists report that there re thousands of farmers throughout he country who are convinced that t would pay them to use commer-:ial fertilizers and yet they are not mploying them at all, or in a suffi-:ient quantity. Their excuse in most :ases is lack of funds to purchase the lant food they need. This position s taken in spite of the fact that there s hardly a commodity required by armers which can be obtained on nore lenient terms.

MOST manufacturers of commercial plant food are so convinced f the profits that the users will obtain rom its use, that when necessary they re willing to wait for payment for the oods until the crop which it grows is arvested. Hence, those who imagine hat they are unable to finance their ertilizer requirements and for this eason forego the benefits to be de-ived from such an investment are ctually fooling themselves.

The expense of commercial ferti-izer should be viewed from the angle f what it costs not to use it. Con-ider the case of winter wheat for nstance. In 1928 there were over 1,000,000 acres of winter wheat bandoned due to winter-killing. In ome cases to be sure, no amount of ertilizer could prevent the wheat's be-ng heaved by frost. However, when armers who used sufficient complete ertilizer had their crop come through n good shape because it was deep-ooted and had produced enough vege-ative growth in the fall to provide rotection against the open winter, nd farmers who did not fertilize had o plow their field, we have the evi-lence of what it costs not to fer-ilize.

The out-of-pocket cost to winter wheat growers in 1928 by not using enough fertilizer amounts to 10 times the sum that would have been required to adequately fertilize the acres which were abandoned. Considering loss of seed, taxes, cost of seedbed preparation, and value of anticipated crop, farmers lose about $30.00 for every acre of abandoned wheat.

The toll caused by under-nourished corn represents a loss of income to corn belt farmers each year which is estimated far in excess of their present plant food investments.

If bolls of cotton that never open because of starvation for plant food necessary to make them productive were properly fed, enough bales of cotton would result to add a third more to the income of the growers.

Finally, the expenditures of the livestock husbandmen of the United States for the 5,000,000 tons of mixed feeds they now require each year, would be greatly reduced if fertilizers were used to grow the same feed on the home farm. With commercial plant food, not only is it possble to increase the feeding value of ordinary crops, but alfalfa and other high protein legumes can be made to thrive.

These facts should be enough to convince of their error those who have been laboring under the illusion that they could not afford to buy plant food.

IT does not take a public accountant to appreciate that when one has assurance that he can double his money on a sound investment it is good business to invest. It even pays to borrow money when there is assurance of such returns.

To see with one's own eyes usually convinces. Claims when read may cause some measure of doubt. Yet facts confirmed by reliable investigations are usually accepted. One farmer may be mistaken in his judgment, yet it is generally conceded that when thousands of farmers draw the same conclusions, their deductions are without doubt sound.

Listen to this! A survey was made a year ago by the fertilizer industry in which a house to house canvass of farmers in representative counties of 32 States was made. Farmers were individually questioned about the returns they secured from the use of commercial plant food.

Some 6,000 potato growers estimated that for every dollar they invested in commercial fertilizers, they received $3.32 profit. Over 16,000 corn belt farmers were asked what returns their crop gave when treated with commercial fertilizer and their answers ranged from $4.01 in Missouri to $15.94 in New Jersey for every dollar invested in fertilizers. About 16,500 cotton growers were interviewed and they said that for every dollar they invested in commercial fertilizer, $4.71 profit was enjoyed.

The average returns reported by 48,000 farmers who use commercial fertilizers on everything from small grains to sweet potatoes, show that they got $3.54 return from every dollar invested in the plant food they purchased.

A School for Michigan Farmers

(*Continued from page* 22)

agement is to be discussed. We are asked to discuss definite subjects, for example, "Will you send us a speaker who will talk on, 'Liming the Soil,' for a group of farmers?" or "We desire a series of meetings in which the following subjects are taken up."

In February 1927, W. F. Johnston, County Agricultural Agent of Van Buren county, approached the writer concerning the possibility and practicability of arranging soils schools in his county. A few days following this conference, about 400 farmers from various communities of the county were attending the school. Through the leadership of Mr. J. W. Sims this program has been put over in 33 counties and the total attendance has reached nearly 12,000.

Much of the success of this type of adult education depends upon how the work is organized and set up at the beginning and how carefully it is conducted and kept account of during its progress. Certainly the selection, preparation, and presentation of subject matter to the leaders and in turn by them to the groups are important.

The first problem, of course, is the selection of local leaders. Either the county agricultural agent selects from 25 to 35 of the leaders in his county or, as is frequently the case, local meetings are held and classes are organized and the members of the classes select from their group. The leaders chosen or selected by the farmers meet at a central point in the county one day each month to receive a lesson from a representative of the staff of the Soils Section of the Michigan State College.

ABOUT five hours' time is devoted to this lesson. The subject matter is given carefully. It is thoroughly outlined; bulletins are given out, as well as information in other forms. The outlines and bulletins and other subject matter are kept in a loose-leaf notebook, so that when the school has closed or terminated each student has a practical reference book on Soil Management. Not only does the leader receive this material, but also each member of his class. After the leader has had this training, he returns to his community and relays this information to about 20 of his neighbors.

A second-year course has been asked for and given in several counties. County Agent Johnston has taught leaders for additional groups in his county each winter since the project was started, and as a result many farmers have at their disposal much information on soil management.

The lessons given out and studied involve the following subjects: lime, organic matter, barnyard manure, fertilizers, tillage, crop rotation, and soil survey. It appears that the most successful method of procedure is to have each farmer prepare a map of his farm, its layout, kinds of soils, the reaction of the different soils and their productivity. These should be brought to each meeting and the problems with respect to soil management discussed. It has been found to be profitable to place strong emphasis upon the economic phase, or the possibility for profit from soil improvement.

Tobacco

(*From page* 17)

Some tobacco growers in eastern North Carolina, where weather conditions were very bad in 1929, applied a top-dressing of 200 pounds of sulphate of potash magnesia per acre to obtain the five extra units of potash, using sulphate of potash magnesia rather than sulphate of potash because there was considerable sand drown in the territory. On eight farms 36 acres of tobacco fertilized in the regular way were compared with 36 acres whose fertilizer contained 5 extra units of potash. The 36 acres fertilized in the regular way produced 24,116 pounds of tobacco which sold for $4,374.72. The 36 acres with extra potash produced 28,025 pounds which brought $6,022.42. The magnesium in the mixture completely controlled the sand drown.

Farmers estimate that it costs on the average about $100 per acre to produce tobacco. Using that figure, the 36 acres fertilized in the regular way paid the farmers a profit of $774.72, while the 36 acres receiving the extra potash gave a profit of $2,-22.42. Three times the profit, but at what cost? The extra potash on the 36 acres cost $126.00 or $3.50 per acre.

Then there is the individual case of James A. Smith at Mount Olive, a real tobacco grower. Weather conditions were so bad in 1929 that he produced only $581.82 worth of tobacco from 6 acres fertilized in the regular way, at an estimated loss of $18.18. From an adjoining 6 acres with extra potash, he sold $886.08 worth of tobacco, with an estimated profit of $286.08.

Mr. W. L. Dunn of Pinetops, North Carolina, possibly the world's largest individual grower of bright tobacco, plans to increase the potash in his bright tobacco fertilizer by 5 per cent.

Mr. Alva Gaskins of Nashville, Georgia, known as the "daddy" of the tobacco industry in his section, purchased 175 tons of 8-3-8 and 8-4-8 (PNK) mixtures for use on his own farm in 1929 and sold more than 1,500 tons to his friends and neighbors.

Mr. W. L. Brown of Cobbtown, Georgia, who tested extra potash on a portion of his tobacco in 1929 after using fertilizers containing 5 per cent potash at planting, has stated: "Being the operator of one of the largest warehouses in Georgia, I feel that I am in a position to know good tobacco and do not want any of our farmers to overlook anything that will give the buyers what they want and the grower a profit on his year's work. Extra potash will do both."

Seed Corn Treatment

(From page 16)

injurious to germination, according to Dr. Reddy.

Any one of the three mercury dusts recommended is applied at the rate of two ounces to the bushel. It is essential that the dust be thoroughly mixed with the seed in a tight container. A barrel churn makes a practical device for mixing. Each kernel should be coated with the dust to obtain good results. Treatment may be made any time before planting, since it is not necessary to plant the seed at any certain time following treatment.

A Queer Mixture

(From page 10)

Seven baskets of tomatoes on the 1/10 acre plots would mean 70 baskets on the acre basis. These were sold before the price dropped below the $2.00 mark with the exception of the picking made on July 16. The price after that time became lower and lower until it finally reached the 50-cent level at which time the grower discontinued harvesting the crop. The yield figured on the acre basis is nearly 10 tons.

Of course there is no attempt made here to leave the impression that such a yield would have been made had the plots been one acre in size instead of 1/10 of an acre. The cost of keeping records on such large plots would be against such an undertaking. The information is offered only as an example of what a skilled grower can do towards speeding up the early maturity of his crop.

The fertilizing of such an intensive crop as the early tomato calls for a certain amount of skill as well as knowledge. One of the early tomato growers of Ohio had a very interesting experience some years ago. He tried out the business of applying large quantities of a balanced fertilizer in the row. The season favored such a practice as it was wet and the moisture supply was plentiful during the entire harvest period. With this one year's experience at hand he thought it safe to repeat the method the next year. But the following season was the reverse of the year before in the matter of moisture supply. The fertilizer was not diluted with enough water and the tomato crop "burned up," as he put it. He is now a firm supporter of the broadcasting method of applying fertilizer to the tomato crop. He has never had the misfortune to lose a crop in the several years that have elapsed since he gave up the row-application system.

The picture used with this article shows how very close to the surface the roots of the tomato plant grow. It also shows that the roots of the tomato spread out just beneath the surface of the soil. The roots of the tomato plant are called surface feeders and they can reach out and find the fertilizer applied broadcast very readily. There is little reason for using any but the broadcast system of applying fertilizer for the tomato crop. A wheat drill is used to make the application broadcast and the drill is set 2 or 3 inches deep so as to place the fertilizer down that far.

The time to make such application is just before the plants are set in the field. By delaying the application of fertilizer as long as possible, the loss of nitrogen is held to the minimum. Nitrogen is the only element in the balanced fertilizer which is likely to be lost by leaching. All of the other elements in the balanced fertilizer are held by the soil until the plant roots can use them.

The kind of fertilizer used depends upon the soil in which the to-

matoes are surface feeders. Apply all fertilizers broadcast to prevent injury to the plants in case of a dry season.

atoes are to be grown. The amount ed depends upon the condition of e soil and the kind of a tomato op. The early crop warrants the e of larger amounts of fertilizer an does the late or main crop. The llowing fertilizer notations are offred as a basis of calculating the obable needs of the tomato crop. It suggested that these formulas be ed only as a basis upon which to start e job of finding out the exact needs the crop on the particular field in hich the tomato crop is a part of the tation.

Read Your Plants

On sandy soils which have been ell supplied with barnyard or green anures a 4-12-4 gives good results r either the early or the late tomato op. On silt loams, clay loams, or ays which have been supplied ith organic fertilizers a 4-12-4 used for the early crop and a 14-4 for the late crop. These formas are for light colored soils. The nounts to use vary from 500 pounds r acre for the late crop to 1,200 ounds or more for the early crop.

On the dark colored soils the following suggestions are offered. For the silt loams, clay loams, and clays, which have been manured, a 2-14-4 can be used for the early crop. For the late crop, an 0-14-6 gives good results as a basic application upon which to test out the fertilizer requirements of the soil. The same rate per acre is used as in the case of the light colored soils.

On the muck and peat soils an 0-12-12 is perhaps the best analysis for either the early or the late tomato crop. These soils do not as a rule need either type of manure applied to the other soils. The amounts used are the same as for the soils listed above.

As far as top-dressing the tomato crop with nitrogen fertilizers is concerned such application is probably not needed unless the growing conditions existing in the spring have been unfavorable. If such a fertilizer application is made the rate used is from 150 to 200 pounds per acre. If the plants appear to be growing too slowly and have a yellow tinge in their color, such fertilizer treatment might well be tried out, at least in an experimental way on a part of the plants.

The grower who knows how to read the condition of his plants by their outward appearances has a real advantage over the one who is not so trained. One way of learning how to recognize such symptoms is that of trying out various fertilizer treatments on the plants in an effort to correct the growth of such plants as may appear to need help.

Legumes with Corn

(*From page* 8)

petition of the high corn plants are inimical to the growth of the legumes and the development of the latter often does not offset the cost of the seed. While working no disadvantage to the corn production, it yields few or often none of the expected benefits, especially in dry years.

According to Tennessee Station Bulletin No. 137, out of 16 years of planting cowpeas broadcast at last cultivation, failure to obtain stand or good growth is reported for eight years. The chances for failure equalled the chances for success and every other year the cost of the seed was lost.

At the Arkansas Station the effect of inter-planted legumes on the yields of corn and of other crops occurring in rotation with these has been under study. A progress report of the fir phase is given in Arkansas Bulleti No. 229. According to this bulleti the stand and growth of the legum when late planted was never sati factory in the years for which r ported. The data show that broadca legumes reduced corn yields mo than when the legumes were drill in single row in the middles. Alwa there has been an apparent great growth of the legumes in the sing rows. Observation also has indicate that better results were obtained wit cowpeas than with soybeans, velv beans, or mung beans in these la plantings.

Two years' results with a succee ing cotton crop at two test farms a now available. The accompanyin table gives the planting plan an

Table showing effects of legumes in corn on the corn crop and a following cotton cro

	Yields of corn in per cent of normal		Per cent gain or loss in seed cotton‡ following Legumes in corn		
Planting plan for corn and legumes	Av. three tests 1928† %	Av. of previous results* 1917-1927 %	Marianna 1927-1928	Scott 1927-1928	Avera fo te %
Cowpeas in corn rows (44") (1 hill)	74.35	75.2	2.3	21.7	12.
Cowpeas in corn rows (44") (2 hills)	75.37		14.5	29.9	22.
Cowpeas in middles (drilled)	93.51	100.3	1.08	0.74	0.
Cowpeas in middles (broadcast)	99.13		6.23	5.7	6.
Soybeans in corn rows (1 hill)	81.99	79.9	39.4	23.7	31.
Soybeans in corn rows (2 hills)	72.74		24.7	33.7	29.
Soybeans in middles (drilled)	96.83	99.1	—20.6	5.4	— 7.
Soybeans in middles (broadcast)	95.44		—31.4	8.3	—11.
Velvet beans in corn rows (1 hill)	74.48	77.3	21.8	10.6	16.
Velvet beans in corn rows (2 hills)	66.17		25.6	7.8	16.
Velvet beans in middles (drilled)	99.00	98.0	7.5	3.2	5.
Velvet beans & soybeans in middles (drilled)	99.64		1.13	0	0.
Mung beans in corn rows (1 hill)	89.32	76.9	0.83	11.5	6.
Mung beans in corn rows (2 hills)	89.58		18.3	10.9	14.
Mung beans in middles (drilled)	99.01	96.3	—17.7	31.3	6.
Mung beans in middles (broadcast)	97.66		— 3.6	13.3	4.
Mung beans in wide middles	92.79	75.2	— 4.4	21.3	8.
Cowpeas in wide middles (56")	90.73	74.8	— 1.0	20.1	9.
Soybeans in wide middles	74.37	90.8	10.5	6.2	8.

* Arkansas Station Bulletin No. 229.

† Averages of five check plots at Fayetteville, Marianna, and Scott, Ark., were 67.2, 31. and 34 bushels per acre respectively.

‡ Average yields cotton on check plots, Marianna, 2 years — 970 lbs. seed cotton. Ave age yields cotton on check plots, Scott, 2 years — 1087 lbs. seed cotton.

hows in percentage figures the effect f the four legumes under trial on he corn and cotton yields. Five check lots are used with corn alone and all lots are one-tenth acre in area. Reults are calculated on interpolated ields on the test plots except those aken from Bulletin No. 229 which vere based on averages of adjoining hecks.

The results as shown in the table re fairly consistent though there are ome unaccountably wide variations. The loss in cotton following late lanted soybeans and mung beans at Marianna is difficult to explain; since the late planted legumes were always near-failures, there should have been little or no effect on a succeeding crop.

No fertilizer was used on the corn crop; none on the cotton in 1927, but superphosphate was used in 1928. Potash and superphosphate will both be used in the future using the test mainly to measure the benefits of the increased nitrogen and organic material.

Corn and cotton, being clean cultivated crops there is need for supplying organic material and this test should reveal (in time) something in regard to best practices with legumes.

What's Ahead?

(*From page 7*)

ertilizers, especially in the bright ue-cured districts. The rate of aplying fertilizers ranges from 1 to 2 ons per acre in the Connecticut valey, 600 to 1,000 pounds in the bright ue-cured district and the cigar toacco district of Ohio, and 300 to 00 pounds in most of the dark fireured and air-cured districts.

The composition of the fertilizers aries widely in different localities. Cigar tobaccos require rather heavy pplications of nitrogen, whereas the ark fire-cured and air-cured types nd Burley require somewhat lower ercentages of this element in the fertilizer. For bright flue-cured leaf only the minimum quantity of fertilizer nitrogen required for proper growth of the plant is used. Phosphoric acid is usually applied in quantities in excess of actual requirements for growth in order to promote proper ripening. Liberal applications of potash have been found profitable because of favorable action on the quality of the tobacco. Under certain conditions magnesia is an important constituent of the fertilizer. Lime may be beneficial or injurious, depending on soil conditions and the type of tobacco.

The Census

(*From page 4*)

"My illustrious friend and joy of ny liver! The thing you ask of me both difficult and useless. Although have passed all my days in this place, I have neither counted the houses nor have inquired into the number of the inhabitants; and as to what one person loads on his mules or stows away in his garret, that is no business of mine. But above all, as to the previous history of this city, God alone knows the amount of dirt and confusion the infidels may have eaten before the coming of the sword of Islam. It were unprofitable for me to inquire into it."

Temptations for census-takers to manufacture population with pen and ink has always been a thorn in the side of the bureaucrats. If we pay them two cents apiece for each name, they will find writing easier than traveling, and if we shoot the ante up to five cents per capita they will travel faster and have more leisure after supper to pad out the lists some more.

THIS is one of the knottiest problems facing the nation for the sake of truth and veracity, probity and pride. The agricultural marketing act isn't in it for complexity of solution. Now that so many losers on the stock market are engaged in census-taking to recuperate their funds, I have grave doubts indeed about the outcome being anywhere near the solemn truth. It is almost bound to be ultra-American in optimism. I anticipate one hundred and sixty million souls at least. That's over nine million dollars worth to the unemployed on public works, so why complain?

But just put yourself in the place of the census enumerator and you'll see its seamy side. William Lane Austin has sent me a complimentary copy of the farm schedule. I have no farm, and he probably knows it, but he wanted me to be prepared for the worst in case I wanted to eke out my essay writing by hunting pigs and population on the dirt roads.

There are two hundred and thirty-two separate and distinct questions. All right! Your bedraggled census man is going to spend half a day at every homestead or else become a better guesser than the Department of Agriculture. He gets fifty cents for filling out the four sheets of bucolic data, and he stands a slim chance being invited to lunch. If they don keep bees, burros, Angora goats, pinto beans, his sailing is simpler. B when he hits one of those diversifi boys, his fountain pen will be thirs in five minutes.

OF course Mr. Austin saw to that nearly every farmer got copy of the schedule at about the san time I got mine. He didn't want me have a scoop. But whether they ha found time to "analyze it and pr nounce their reaction," depends on many factors as there are farms. T to one it got lost under a pile of see circulars and mail order catalogs.

In strict confidence and withou any desire to hurt Austin's feelin after all his hard work, those shee of his aren't designed to keep or awake very late after a long day o both ends of a log saw. Most of the will depend on the radio for amuse ment and wait for the census ma to point out the really exciting pa sages in Form 15-90.

It is just this apathy that often pre vents the folks from realizing ho great a contribution to agricultur progress the census might become; indeed, it hasn't already done muc to make home comforts and cooper tion more real and general. I thin we owe much to those chaps of othe decades who stumbled around in snow drifts and mud-holes so that the pub lic library in every town might have set of books compiled by the govern ment free from taint and without bia or commercial scheming.

No country can aspire to its bes ambitions without adequate informa tion gathered impartially and with out favoritism or prejudice. No in dustry within a country so comple as ours can long survive minus th means of knowing whether the link in the great chain are bright an strong or rusty and frail. Blank cen sus sheets to be filled in may loo tiresome, but did you ever notice ho lifferent they appear when somebody ias written into them a story of human values and achievement? The nere act of filling in those dotted lines vith facts and figures changes the ntire complexion of the census forms nd gives to a lifeless paper scrap the tmost vigor and intensity.

Without doubt, then, the humble ensus-takers today are the drafters f the most wonderful human epic of he decade. Their combined efforts vill be scanned by more people than he works of red-hot authors, and nany a spell-binder will take his neme from the "revised version" of nese back-door scribes.

TRIFLING with the census is like butting against any federal law— matter for fools who like buzz-saws. ail sentences await one who refuses to nswer the questions, and the booby atch is also wide open for the census-taker who peddles neighborhood ossip. The whole thing is organized ke a federal army, and reports are urned in daily to local marshals and Vashington headquarters. When your d Uncle Samuel desires to measure s size and weight, he won't have the b interfered with or bungled.

Between the eleventh and the velfth national census, the government saved five million dollars by lopting the use of electric symbolizg, adding, and tabulating machines. ypewriter adding machines also preented costly errors. So if some of e early critics could claim that the nsus of those times was compiled idiots, we may now say that it is one by robots.

I have been browsing among the iginal census books taken by the tient supervisors of the fifties and xties, in our state historical library. ost of them are done in a firm enossing style with writing still clear d sharp. But what a difference beveen their task and the one of 1930! t that time it was possible to get e inhabitants of one of our northern counties on a page by itself. But now when the waiting world is so used to instant communication, we must depend upon the robust robot to tell us quickly and accurately massive facts that the mind of man would be slow in assembling. The census will close its work early in May, but by July of this year the robot will hand the newspapers reasonably true pictures of each community's growth.

Who knows? Perhaps by the next census they will send the robots from house to house, but then they will have to be careful not to get a short circuit or crossed wires. I wonder if a census-taking robot would be as successful as a ward voting-machine. I fear somebody might take advantage of the robot unless it was equipped with an automatic fib-detector.

HUMAN interest, romance, reality, glory, shame, and progress are bound up in the dozen volumes depicting the state of the nation, which Uncle Sam publishes and embellishes in red cloth. When the hungry newspapers skim the cream from the first release of vital facts there is plenty left for the thoughtful seeker after fundamentals. Mere numbers, mere expansion, gross gains—these are only the index of the enthralling census serial story.

Drifts of population in themselves reveal a nest-egg of promise. The center of population moves westward. The hackneyed subject of urban and rural percentages bobs up in each decade to furnish arguments to pros and diatribes to cons. We learn that America has more marriageable men than "weddable" women. We hear that the working girl is either driving the smug bachelor into discard or despair. Mammas with susceptible daughters and ambitions, seeking the best field for matrimony, would leave the effete East and go westward toward the zones where the robot tells us there is a real feminine famine. Of course, quality of material is not given in the census, which confines itself mostly to quantity.

Startling is the news revealed by the census to the effect that the native children of native-born parents produce more illiterates than those of our immigrant population. We may need to turn from "Americanizing" the foreigner to the alternative of "liberalizing the American."

We find that farms which are mortgaged yield better returns than those which are not. Working capital, implements, and a spur to achievement often make a mortgage nearly equal to fertilizer. Tenants are characters in a pageant of their own.

In the "Dry Tortugas" of the industrial schedules we discover things some more. Here is where the watchful zealots get ammunition in the tariff fights, from oakum to oleo. No matter how obscure or involved the subject, your indefatigable solon can blast something weighty out of the good old census. If he is dramatic and popular he can blaze the facts across the national skyline, but as a rule he inserts them in the congressional record and so they become buried in a cement sarcophagus instead of a shallow grave.

Feature writers for the magazines and farm papers who know their ins and outs can take a dusty piece of census data and make it drip like an orange and squirt like grapefruit. To them the recurring census digests are like an oasis in a Sahara of speeches and resolutions.

OUR census began with the necessity for determining, on population, representation in congress. It long ago outgrew the original reason. Our founders who wanted to know how the general legislative bodies should be apportioned would indeed be astonished to find us tabulating data on bath-tubs, washing machines, co-operative associations, and the feeble-minded. But cleanliness is next to godliness and in union there strength, while the power of a natio is told in the vigor of the mind.

The census supervisor in my di trict is a party man, albeit alert an able. He has provided the sever wards and bailiwicks with enumera tors endowed with Hooverism, and h is surprised to find that all of ther passed the civil service test withou prompting. I am persuaded, such my loyalty and faith in democrac that we should have profited quite well in census gathering if th countersign had been "all, for Al. It doesn't make so much differenc who collects the dope as it does wha public spirit we show in supplying i

WHEN I was a boy we sang a old hymn about the recordin angel, with a refrain "Is my nam written there?" We assume Peter an Gabriel have been mighty busy takin census reports ever since Adam an Eve began to make it necessary. Ou mundane attempts at recording mu seem feeble and futile to the Choir In visible. But we can be thankful tha there are agencies observing the cen sus with an eye to human betterme and national hope. The commerci clans are not the only students o statistics.

By the time this reaches you perhap the census-taker will have secured th small tithe which you have to add i making up the sum total of nationa numbers, wealth, and culture. H won't stay long at our house, and hi fee there will be only twenty-fou cents. I have a neighbor who is go ing to stick the government one dol lar and forty cents for the privileg of going on the record. That's on time at least when a large family ca be trotted out and displayed with out a monetary crimp.

Hoping to meet you on page si hundred and seventy-one of volum five, I will sign off and let you ge back to the scientific part of thi issue.

A waitress was heard to ask, "Ain't that chicken good?"

The customer looked up and replied, "It may have been morally, but physically it's a wreck!"

A farmer, in great need of extra hands at haying time, finally asked Si Warren, who was accounted the town fool, if he could help him out.

"What'll ye pay?" asked Si.

"I'll pay what you're worth," answered the farmer.

Si scratched his head a minute, then announced decisively, "I'll be darned if I'll work for that!"

"Hey, Boss, I'm taking a month off," said the clerk as he tore another sheet off the calendar.

KNEW HIS ANIMALS

Rastus had taken Mandy to the circus menagerie and was having a great time explaining all about the animals to his girl.

"Lew-zee, Rastus, whut's 'at?" asked Mandy when they came to the zebra.

"Don't you know, gal? You sho' has neglected yore animology. Dat's nuffin but a spo't model jackass."—*Belleville Ontario.*

Co-ed Medic.: "How long could I live without brains?"

Cruel Prof.: "Time will tell."

CHANGED HIS DESTINATION

First Colored Lady: "Yo' husban's in de hospital? Ah thought he jes' only off on a jag."

Second Similar (with pride): "He was, but Ah interrupted him."

SUCH "CRUST!"

Bride: "Where's the paper plate I gave you under your pie?"

Groom: "Was that a plate? I thought it was the lower crust."

Boss: So you want off this afternoon, eh? Grandmother dead, I suppose?

Office Boy: No, indeed, she has two tickets to the game.—*College Humor.*

Mrs. West: "The average woman has a vocabulary of only 500 words."

Grocer: "It's a small stock, but think of the turnover."

Teacher—No Billie, you must not say "I ain't agoin'." You should say "I am not going, you are not going, he is not going, we are not going, you are not going, they are not going."

Billie (very surprised)—Gee, ain't nobody goin'?—*College Humor.*

Professor (fleeing from a lion in the jungle): This reminds me, I forgot to put the cat out before I left.

How much Potash?

...*in your fertilizer*

There is as much potash in the small pile of muriate of potash at left as there is in the bag of 4-12-4 (NPK) fertilizer at right.

DID you ever stop to figure out that a 200-pound bag of 4-12-4 fertilizer contains potash equal to only 16 pounds of muriate of potash? How many plants are you expecting this small amount of potash to feed on your farm?

Extra potash may be just the thing your crops need to pay you extra cash in extra yields and extra quality. You can increase the potash content of your fertilizer at planting by applying a 200-pound bag of muriate of potash with each ton of fertilizer used. Follow this up with a top-dressing of 50 to 100 pounds of muriate per acre. For cotton this top-dresser should be applied just after chopping.

For bright tobacco the extra potash should be in the form of 100 pounds of sulphate of potash or 200 pounds of sulphate of potash-magnesia per acre, applied either with the regular fertilizer or as a top-dresser. If it is used as a top-dresser it must be applied early within two to three weeks after setting.

It is false economy to go to all the expense and trouble of growing any crop and then not use enough potash to let it pay you as much as it should, when potash is so cheap. Plan now to use the extra potash that will help you collect extra cash when your crop is sold.

N. V. POTASH EXPORT MY.

of Amsterdam, Holland

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May, 1930 10 Cents

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R. H. Stinchfield, *Managing Editor* Sid Noble, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XIV NUMBER FIVE

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Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY.

of Amsterdam, Holland

Directors: J. N. Harper G. J. Callister

MAY INVITES

Better Crops
with PLANT FOOD

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OL. XIV NEW YORK, MAY, 1930 No. 5

Jeff recalls the days of—

Slow Motion

By Jeff McDermid

I'LL wager a tire against a horse collar that you haven't had a buggy ride in fifteen years," said my neighbor, who is also a small town prod-t and the owner of an accident policy and a misused car.

His bet was not accepted. I could not have won it, nor could I have pro-ced the horse collar. I doubt if I could find a shop in our town where rse collars are sold.

"I have stumped you, as I sup-ed," he continued, entering my vanized garage and seating him-f on an oil keg.

"I see you have been tinkering with ir engine again," he remarked. hat makes me think of another er for you. The human memory a very ephemeral thing, Jeff. You I I were brought up to admire good ving horses and we did our court- in carriages, but I am positive that all these motor mechanics have driven away all the horse sense you ever had! I'll bet you couldn't write a piece for your paper about the details and incidents of those good old days when Dobbin was your only means of departure!"

Since my neighbor is a surgeon whose practice has expanded somewhat with the evolution of the automobile, he commands my respect. So greatly did his challenge impress and stimulate me that I have tried to conjure up the vanished vehicles of the nineties, when he and I and so many of the rest of us were young. I will show Old Doc that I have not forgotten!

REMEMBER how we used to play at going riding in the old carriage shed on rainy summer afternoons? I recollect that there were eighteen separate tasseled cords on the front edge of the canopy top "carry-all" and fifty-two of those "do-dads" along each side. The whip socket on the right-hand side of the dashboard was wrapped in cracked patent leather; the dashboard was glazed in crinkley pattern; the velvet cushions had a few holes in them that exposed the cotton stuffing; and the whiffletrees creaked when you jerked the ropes on them in imitation of Father en route to a funeral.

I do not recall whether we had then learned to love The Deacon's One Hoss Shay, but the phaeton we played in—and sometimes really rode in—was just shakily, drowsily romantic enough to match my conceptions of the equipage of a mellow New England squire. You could lean back in the padded seat and plant your new boots straight out ahead for admiring inspection, with room enough between your feet and the high curving dashboard for the picnic lunch basket or the crate of eggs bound for market.

Make-believe sleigh riding did not come so handy, because it was customary to unfasten the thills and their resonant bells and suspend them from the ceiling out of the damp and mold, leaving the cutter bereft of much wintry suggestiveness. The buffalo robes were absent, too, having found summer hibernation in Mother's closet, packed in moth-balls. Thus the cutter called for a too finely strained imagination, and besides, it was usually filled with the chaff and litter of hens' nests. The sleigh ride simply could not be staged impromptu, while the carry-all and t phaeton were always beckoning to v sionary "joy rides" long before th word was coined.

No deterring parental comma was ever issued in the dark ages the horse-drawn vehicle to caution youngsters concerning possible serio accidents due to sudden application power or the impairment of moti processes. True, we had to obey t injunction not to "monkey" with t phaeton lamps or fuss around in t wrench-box at the rear, and the gi had to be careful not to get axl grease on their dresses. The whip, course, must be returned to its sock after our stationary outings, for t whip was often the starter and t accelerator of those innocent da He who attempted to drive old M jor up Gay's Hill minus any instr ment of urging would be likely lose his appointment and his temper.

THOSE who drove without whi were the stock-buyers and the d livery boys, and we never owned th kind of horses or boasted their voca ulary. Our motive power came fre from the plow and the driver of o carriage was frequently too wea from the same task to stop and cut switch from the willows. So t buggy whip, with its bent and fray tip, must remain in the accustom place, or no more play-days for us the family conveyances!

Thanks to the reliability of n auto-engine and the generous supp of Dutch-Colonial gas stations, n son has never taken a journey in horse-drawn vehicle. He has seen few of them faring cautiously alo on the extreme outer fringes of o concrete highways, but strange to sa the anxious expression of their dri ers has never appealed to him as source of new thrills. Modern you prefers to remain on the offensive si of exciting things.

(*Turn to page* 60)

Left: A check plot of corn on peat soil to which no fertilizer has been applied.

Below: The effect of superphosphate and muriate of potash on producing corn on peat soil.

Peat *and* Alkali Soils *in* Iowa

By L. R. Combs

Extension Editor, Iowa State College

A DEQUATE drainage, proper cultivation and cropping, and the dicious use of either superphosphate, uriate of potash, or a combination both will enable farmers who have at or alkali soils on their farms to ut that land into a profitable state production, judging from the exriences of Iowa farmers who have en cooperating with the Iowa Exriment Station. The futility of atmpting to grow crops on peat or kali soils without special methods of eatment aimed at reclamation of e land has been experienced by huneds of farmers who live in areas here these soils exist.

The so-called alkali spots usually not appear until after a peat bog s been drained. Then they appear what might have been the bank of e slough. Alkali soil contains an cess of soluble salts in the soil ater and is a result, usually, of poor drainage around the edge of the peat area where the salts have collected for years.

Peat deposits range from a few inches to two or three feet deep in what are called the shallow peat areas up to 20 feet in the deep peats. The suggestions for handling peat soils given herein are largely for the shallow peats.

Adequate drainage of peat soils is the first and most important step in reclaiming the area, which may vary from one to several hundred acres, according to J. L. Boatman, extension specialist in soils at Iowa State College. Mr. Boatman, W. H. Stevenson, head of the soils department, and Dr. P. E. Brown, also of the soils department, have compiled the results of their studies of peat soils in a recent bulletin. Proper cropping, plowing, fertilization and other treatments, although highly important, will be useless until drainage is accomplished.

After the soil is properly drained, the preparation of it for growing the crop is important. Fall plowing is desirable as the soil is exposed to the action of the rain, snow, and frost during the winter months. This action aids in the decomposition of the peat. The more rapid the decomposition of the peat, the more quickly the land will be made satisfactorily productive, points out Mr. Boatman. Fall plowed peat land may be worked earlier in the spring, giving opportunity to prepare a better seedbed.

Need Proper Fitting

Deep plowing of peat soils is recommended by the Iowa State College men. This is especially desirable if the peat is shallow and it is possible to mix some of the clay in with the peat. This improves the physical condition of the peat and brings up plant food from the clay to be made available for crop growth. Even where peat is deep, deep plowing is advantageous as more of the top layer is opened to the air and decomposition is hastened.

Rolling often improves the condition of the deep peats. Rolling compacts the soil and a firmer seedbed is secured. For shallow peat soils the rolling is of less value and on peats of less than 8 to 10 inches may compact them too much and retard their decay. Frequent cultivation of peat soils is desirable as it opens them up and hastens the processes of decay. Cultivation also keeps down weeds, whic is important on newly drained peat

Application of fertilizer will b found advantageous after the pe soil has been properly drained an prepared for cultivation, says M Boatman. Manuring is of little valu on peat soils. The addition of o ganic matter and nitrogen is not ne essary as the peat soil contains a abundance of these constituents. small amount of manure might be o value on newly drained peat soils b cause of the introduction of micr organisms which aid in the process o decay; new peat soils are deficient these bacteria. Too much manure w be detrimental and may retard cro maturity. Peat land, at least in Iow is high in lime content and applic tion of limestone therefore is not ne essary.

Need Phosphorus and Potash

Peat soils are, however, low in pho phorus and potassium content an tests indicate that these fertilize can be used to advantage. Supe phosphate and the sulphate or muria of potash have been used with a r sulting increase in crop yields.

Superphosphate and muriate potash applied at the rate of 2(pounds per acre were tested on ni different fields in Iowa. Check plo which were untreated produced average of 34.2 bushels of corn p acre on the nine peat fields. T average corn yield on the peat s treated with superphosphate was 41

The corn grown without fertilizer sorted—(Left) 59 per cent soft and unmarketable; (Right) 41 cent sound and marketable. When fertilizer was used, the corn was 90 per cent sound and o 10 per cent soft and unmarketable.

This peat bed can be brought into profitable production by drainage, good tillage, and the use of fertilizer.

bushels per acre and on that treated with muriate of potash, 43.1 bushels. The largest yield was obtained when 200 pounds each of potash and phosphate were spread on the land. This treatment resulted in an average yield on the nine plots of 54.1 bushels per acre. These nine fields included several depths of peat soil.

The corn which was grown on the untreated peat soil was from 33 to 95 per cent soft, that is, unmarketable because of high moisture content, immaturity, and poor quality. This reduced the yield of usable corn in many cases to as low as two to four bushels an acre.

On one field, in Story county, where the peat ranged from two to four feet in depth, superphosphate gave the highest yield of any treatment, 50.1 bushels. Only 10 per cent of the corn raised on the phosphated plot was soft. The check plot yielded 30.7 bushels, but 59 per cent of the corn was soft. Muriate of potash applied to one plot resulted in a yield of 28.8 bushels of corn of which 50 per cent was soft. Corn on the plot treated with both phosphate and potash yielded 42.5 bushels an acre with only 10 per cent soft.

This Story county plot was an abnormal case. In most cases the fertilizers all gave increased yield above the check plot although in all cases the same fertilizer did not result in the greatest increase. The most efficient treatments vary with different localities and the college men suggest that farmers make tests of their own to determine which should be used in their particular cases. These tests can be made by dividing peat fields into four small areas and leaving one without treatment. The others are treated, one with superphosphate, another with muriate of potash, and the other one with a combination of the two.

The fertilizers are applied at the rate of 200 pounds per acre in each case, 200 pounds of each being used in the combination treatment. The yields resulting from the different treatments may be observed and the best treatment for that farm adopted. The quality of the corn resulting from each treatment should also be taken into account.

In an experiment in Kossuth county superhposphate and muriate of potash gave about equal increases in yield, but the quality of the corn was much better on the phosphated plot. In most cases the phosphorus seemed to result in better quality corn being produced and in only a few cases did the potash result in higher yields than the phosphate.

Grow Good Oats

The most striking gain in yield due to application of both superphosphate and muriate of potash was in an oats field in Worth county. The check plot yielded 7.5 bushels of oats. The phosphated plot yielded 17.5 bushels of oats and the plot treated with potash yielded 47.5 bushels, a yield decidedly in favor of potash. But the plot treated with both fertilizers yielded 80 bushels, more than 10 times as much as the non-treated plot. In this field oats was seeded with sweet clover. Practically no stand of clover was secured on the untreated plot. A 50 per cent stand was secured on the phosphate plot; 75 per cent on the muriate of potash; and a nearly perfect stand on the plot treated with both.

Fertilizer treatments on peat land which has been pastured for a number of years frequently have little effect the first year, results of the experiment show. In Kossuth county a field where the peat soil varied from 18 inches to three feet in depth and which had been pastured for a number of years was treated. Little increase in yield of corn was secured on the phosphate or potash plots, but a combination of the two resulted in a yield of 52.7 bushels, an increase of 12.7 bushels more than the check plot. After the first year or two, however, the increases in yields on the single-treatment plots are more noticeable.

Potash Doubled Potato Yield

The potato yield on a field in Kossuth county was more then doubled by the addition of muriate of potash. The check plot yielded 89 bushels. The one treated with potash, the only treatment tested on potatoes, gave a yield of 186 bushels of potatoes of larger size and of higher quality than those raised on the check plot.

These results as a whole, points out Mr. Boatman, show that usually yields on peat soils are improved by an application of 200 pounds of superphosphate and that in many cases the addition of 200 pounds each of phosphate and muriate of potash is of great value. In fewer instances the application of potash alone gave the best results. Wherever there is variation in the peat, there will be variation in the response to fertilizers, he explains. Where there is a surface layer of 12 to 14 inches of well-decomposed peat, the need for potash is much less evident. Potash gives the best results on areas where the peat is quite raw and undecomposed. Application of superphosphate is desirable on practically all peat soils.

The growing of corn and small grains on newly drained peat soils may prove disappointing, Mr. Boatman says. The best crop to seed probably is a mixture of timothy and alsike clover. The crop may be cut for hay, but it is better to pasture it as the tramping will compact the soil. After two or three years of pasturing, corn and small grains, with proper fertilizer, should grow well. If the peat is well decomposed, corn and small grains may be grown immediately with proper fertilization.

The growing of vegetable crops will prove profitable on reclaimed peat land if markets are accessible and labor conditions permit. Onions, celery, potatoes, and tomatoes give good yields on peat land if it is first treated with 200 pounds each of muriate of potash and superphosphate.

Alkali Easily Detected

Alkali spots which frequently appear following the drainage of a peat area are identified by a whitish deposit on the surface of the ground. It may have the appearance of having been strewn with a fine white powder. The soluble salts remain in solution until after the land is drained and the surplus water withdrawn. The salts are brought to the surface then by water which evaporates.

Drainage is essential for washing away the excess of soluble salts which are causing the difficulty, says Mr. Boatman. It is desirable that two lines of tile be laid around the pond or slough at the edges of the water lines, thus passing through the area

(*Turn to page 53*)

Legumes Bring PROSPERITY

By C. A. LeClair

St. Louis, Missouri

RELATIVITY is a word that gained a new significance when he great physicist Einstein used it to how the interdependence of certain aws of nature. The same word qually can be applied to the surplus rop situation of this country and its emedy.

Farmers of this nation have pro-uced surplus crops of corn, wheat, nd cotton more or less consistently n the past few years. Yet, during he same period on eight farms out f ten the livestock have actually gone ungry for at least a part of each ear. This anomaly or paradox orig-nates from the fact that no amount f grain without supplementary high rotein roughage will provide an ade-uate ration for dairy cows, fattening eers or hogs.

Our production of quality legume ay has been consistently short of our ptimum requirements. This has pre-ented a large per cent of the live-ock from producing milk or meat onomically during the late winter nd early spring months prior to ring pastures being available. Then veral more weeks are required after ese animals have access to spring stures before they are again in con-tion to produce with profit. If this stly situation did not cut so deeply to the returns of farmers generally, would be easier to understand why ch circumstances have not been cor-cted before now.

To grow more acres of grain than n be economically consumed and at the same time be obliged to pur-chase large amounts of protein con-centrates that can well be grown on the same acres is certainly not good business. Yet that is what nine out of ten farmers have been doing.

On the other hand, when farmers of the North reduce their grain acre-age 20 per cent and increase propor-tionately their seedings to clover, al-falfa, and soybeans and as soon as Southern farmers plant one-fifth less cotton and put these acres into corn

Young soybean plants, showing how early the nitrogen-gathering nodules begin to form.

or cowpeas there will not be the problem of over-production.

Of course, it is easier to grow fair crops of corn and cotton than it is to establish productive fields of legumes. Yet the extra effort and investment required to grow high protein feed crops pays proportionately.

Progress Being Made

Never before has there been so marked a readjustment of cropped acres as there has been this year. It is cash crops to replace small grains and cotton that are now getting special attention. Farmers everywhere have become legume conscious. They are not only planting more acres of clover and alfalfa this year, but likewise more acres of soybeans and cowpeas are being planted both in the North and South.

For instance, thousands of acres of alfalfa have been added to the normal acreage in North Dakota. South Dakota has increased its acreage of sweet clover this season more than 300,000 acres. Twenty per cent more cowpeas are being planted in the Southern States, it is reported, while Illinois and adjoining States have increased the soybean acreage to a similar degree. Again, such extensive farmers as Campbell of Montana, who is the biggest wheat grower in the world, operating 150 square miles of land, planned to materially cut his spring wheat acreage in favor of beans and flax. Likewise, Iowa farmers in all parts of that great State have extended their legume acreage. The agricultural extension forces of Missouri have also inaugurated a clover and prosperity campaign which has done a great deal to materially increase the income of farmers of that commonwealth.

In the light of the present awakening to the possibilities of extending the acreage of legumes for greater profits, it is surprising that this means of agricultural relief has so long been overlooked. We have never had an over-production of quality legum hay or seed. On the other hand, w have been obliged to import both soy bean seed and oil from abroad. Mor than 500,000,000 pounds of soybea oil were imported last year. Th many new uses to which this produc is being put constantly increases s that its culture assures a healthy de mand in the future. Even unde present market conditions with yield running from 15 to 25 bushels to th acre, soybeans bring acre returns tha in most cases surpass what can be ob tained from corn and small grains.

Considering the culture of soy beans aside from the direct profit they offer as a seed crop, their valu for feeding purposes is equally good As a source of rich protein, th crushed beans or hay provide an ex cellent supplement to any ration.

When one realizes that farm profit represent what is taken in over an above out-of-pocket expenditures fo supplies, equipment, taxes, and labor the advantage of employing legume to reduce feed bills is apparent.

Another big advantage that accrue from the culture of soybeans is tha like the clovers, alfalfa, and othe legumes, they improve the tilth of th soil. Proof of this is evidenced b results observed by the Illinois Agri cultural Experiment Station where i was found that the presence of thi crop in a rotation increased the yiel of corn 10 bushels to the acre. Othe State Agricultural Experiment Sta tions report that soybeans in rotatio produced as much as 6 more bushel of wheat and 17 more bushels of oat when these crops follow in rotation.

Down in the Southland at th Branch Experiment Station of Arkan sas, cotton following soybeans plante in the proceeding corn crop produce 50 per cent more lint to the acre.

However, to get such results wit legumes requires corresponding pro vision of the essentials necessary fo their successful growth. In a cro like clover, the seed crop of whic

Where good crops of clover are obtainable, prosperity reigns.

alone brings over $1,250,000 to Wisconsin farmers, for example, every reasonable precaution should be taken to insure its success.

Recently a Missouri farmer aptly remarked that "If a law were passed making it compulsory for all farmers to plant at least a fifth of their acreage to legumes, there would be no surplus crop problem."

Cut Feed Bills

The disproportionate production of grains and fiber crops to the acres devoted to legumes has been brought about by a number of causes. Among them has been the increased cost of legume seed of all kinds. For instance, 20 years ago clover seed could be purchased for 10 cents a pound while now it is worth three times as much. To seed an acre thus entails an expense four times as great as is required to sow an acre of grain and 20 times more than to plant corn on the same area. This spread in planting cost is further aggravated by the great hazard the average grower faces in securing a good stand of legumes as compared to other staple crops.

Legumes require plenty of available plant food and most soils normally provide insufficient quantities for this crop unless they are treated. The cost of supplying the deficient fertilizing elements to fully nourish these crops is far less than is now being spent for feedstuffs.

Over a half million tons of mixed feeds are bought by Iowa farmers every year. Farmers of New York State spend three times as much as their Iowa brothers, while New England dairymen part with one dollar out of every three they take in for feed.

Then consider the case of Wisconsin dairymen. Each year they spend more than $30,000,000 for mixed feeds while not over a thirtieth of this amount is as yet being invested by them for commercial fertilizers. It has been estimated that if the annual investment in commercial fertilizers merely was doubled, it would be possible for these same farmers to grow enough nutritious feed to equal in value two-thirds of their present feed bill.

Today farmers everywhere who have not learned how to "baby"

(*Turn to page 55*)

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

Foreword

TO me, it seems of paramount importance that everything our hands find to do should be done with all our might and that enthusiasm, earnestness, thoroughness, and integrity should inspire and rule our efforts.

Let me tell you two little stories to indicate the different perspectives and principles which may influence the quality of work and allow you to "point the moral:"

I

An aged, white-haired Scottish stone-mason was slowly and carefully setting the great, grey granite stones in the wall of a little schoolhouse. A young man, who noticed the progress of the structure, as he passed that way daily, stopped and said to the builder:

"Say, friend! You are building awfully slow! You'll lose money on the job. Why don't you hustle and get it done in a hurry?" To which the old man replied:

"Aye! Nae doot I'm slow; but mind ye, lad, when I get through, my work will stand for a thousand years!"

II

A journeyman bricklayer, on a tramping tour through Kansas, ran out of funds and took on the job of building a tall, slim kitchen chimney to defray expenses, and employed a cheap laborer as helper. When the work was done the contractor said to his helper: "Here, Jake! Just hold the chimney steady while I go and collect our pay!"

Dr. A. S. Alexander

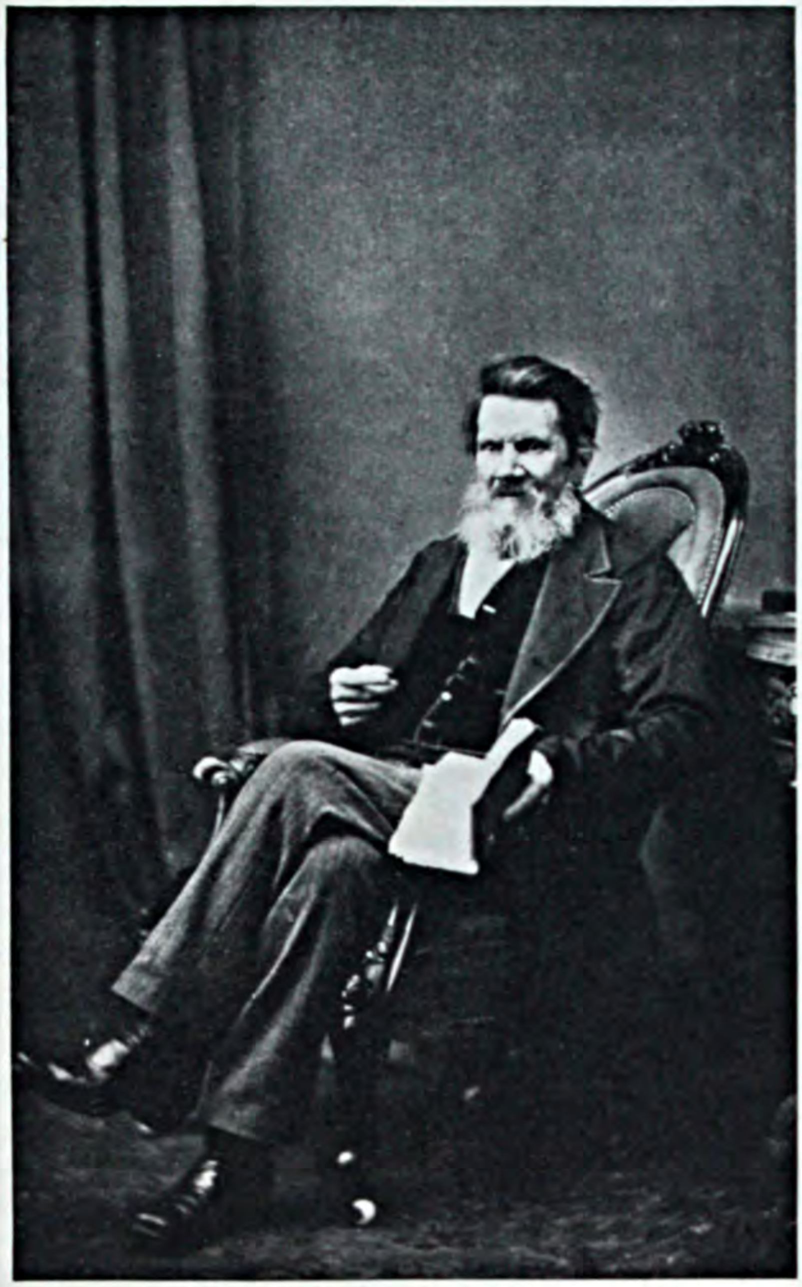
Widely known and loved for his homely portrayal of rural life, Dr. Alexander, agricultural writer and bard of Wisconsin, needs no introduction to those who hold Nature beautiful. We are happy, indeed, to secure for our readers a series of articles in his genial and sympathetic style which will appear under the title—The Inquiring Mind and the Seeing Eye. In these stories Dr. Alexander will pay kindly tribute to some of our great agricultural scientists whose praises are too little sung. In each we will find inspiration to carry-on in our absorbing interests toward the recognition which is bound to come.—The Editors.

NOW let me tell you, briefly, the inspiring story of a poor, working Scottish cobbler who accomplished marvelous things, by perseverance, industry, indomitable will power, and high purposes without a thought of personal gain.

Thomas Edward, the subject of this sketch, was born in

1814 and spent his life in Aberdeenshire and Banffshire, in the North of Scotland, in strenuous, successful research work, "subsidized" by nobody and entirely dependent upon his own humble resources.

Of him Samuel Smiles said in his book: "He was one of those men who lived *for* science, not *by* science. His shyness prevented him pushing himself forward. For nearly thirty years he fought the battle of scientific poverty."



Thomas Edward, Scottish Naturalist

Edward was a self-educated man. It has been remarked that a "high-brow" is a man who has been educated beyond his intelligence. Well, Edward wasn't a highbrow; nor was he ignorant. His triumphs in research work prove that lack of a university education does not necessarily prevent an earnest, thorough worker from gathering and contributing a wealth of facts regarding any science of which he makes a life study. It should also be plain, from Edward's experiences, that disappointments, adversities, and tribulations should not squelch the courage of any man who loves nature and her works.

Faced Many Obstacles

Despite his lack of higher education, equipment, means, books, and expert advisers, Edward achieved true greatness and success. In 1866 he was elected an Associate of the Linnean Society,—one of the highest honors that science could confer upon him. After that date, he was able to do comparatively little for the advancement of his favorite studies, so badly had he been battered about by falling from rocks in search of Coast birds. He had also become afflicted with rheumatism, caused by the damp and cold to which he was exposed at night, during which time he carried on most of his investigations.

As one result of his work, Edward collected 177 different specimens of British sessile-eyed crustacea on the shores of the Moray Firth and, of these, 20 were new to science. During his life time he made about 500 cases with no tools other than his shoemaker's knife, hammer, and a saw; and he papered, painted and glazed them all himself. These cases he filled with thousands of specimens and hundreds of them he had to sell to meet expenses during his many illnesses. Just before his death he had still 60 cases, filled with about 2,000 specimens of mammals, birds, fishes, crustacea, molluscs, and insects.

Considering that Edward began to work for his daily bread when but six years old, had labored incessantly for the rest of his life, brought up his family of 11 children respectably and virtuously, educated them much better than he had been educated and dressed them comfortably, his tremendous contributions to the science of natural history were simply astounding. Toward the end of his life he could earn but eight shillings ($2.00) a week and twelve shillings a week had, probably been his maximum earnings as a cobbler when fit and well. Sales of his collections sometimes brought in extra income.

The Will to Do

Edward never lost a moment of time. He worked daily from 6 A. M. to 9 P. M. then went out to the fields, woods, cliffs, or seashore with his supper of oatmeal cakes in his hand; and after the night had passed, he returned home in time for his next days' work. He stuffed his birds, or made the cases for his specimens, by the light of the open fire.

From his own experiences Edward came to the following conclusions:

"No one who steps this earth, or even crawls upon it, need ever despair of achieving whatever good they have set their minds on. Firmness of purpose and the *will* to do and dare will accomplish almost anything. The *will* is the key that opens the door to every path, whether it be of Science or of Nature, and everyone has it in his power to choose the road for himself."

Although he had many difficulties and sicknesses Edward enjoyed "a happy life." Smiles says of him:

"He was hopeful and cheerful. He had always some object to pursue with a purpose. That constitutes one of the secrets of happiness. He had a hobby; that is another secret."

His famous shotgun was a treasure and most important item of his equipment, when collecting specimens of birds and beasts. He bought the old gun for four shillings and sixpence ($1.12) and it was so rickety that he had to tie the barrel to the stock with a piece of thick cord. He carried his powder in a horn, measured out the charges with the bowl of a tobacco pipe, and kept the shot in a brown paper bag. That gun suffered, like its owner, in one of the two experiences we shall recount to illustrate his determination and courage in the face of all obstacles.

He Got the Bird

One morning when he was returning from his night's rambles on the sea-coast under the cliffs of Tarlair, Edward shot a rare bird that flew out of a cave. It fell on the top of the cliff, so he scrambled up after it, carrying his ramshackle gun. All went well until he reached a bend half way up the cliff. There he was halted. To come down, unless headlong, was impossible, and to go up seemed equally impracticable. At length, however, he managed to clutch a little projection of rock protruding far above him, then he clambered a little way up, secured a firmer footing, and at last reached the summit in safety. There, he looked about for the bird and saw it on the edge of the cliff, apparently dead. On stooping to pick it up, it fluttered, raised one of its wings, and went over the precipice. Edward grasped at it, failed, lost his footing on the smooth rock, and fell 40 feet to the sea-beach below. His gun fell out of his hand and lodged between two rocks on the beach. Edward fell upon the gun, and smashed it to pieces; but it broke the force of the fall and probably saved his life.

After lying unconscious for a time,

Edward came to, felt himself wedged tight between two rocks, and was quite unable to set himself free. Two farm hands had seen him fall and now looked down upon him. One of them called:

"Ye're no dead yet, are ye?" but Edward was unable to answer. Later, the men managed to free him and take him home. A month elapsed before he could return to the rocks and salvage the remains of his gun.

But he got the bird he was after!

Encountered a Polecat

On another occasion Edward had a terrible encounter with a polecat or fumart which is of the weasel family, but much longer, bigger, and stronger and quite as odoriferous as our own skunk, whose motto is: "don't hurry; others will!"

The fumart is an extremely destructive brute, especially in the poultry-yard, where it kills far more than it eats. Its principal luxury is to drink the blood and suck the brains of the animals it kills.

One night when it rained, Edward was sleeping in a vault, level with the ground, in the ruined, haunted castle of the Boyne, about five miles west of Banff. Suddenly, he was awakened by something pat-patting against his legs. It was so dark he could not see the animal. He moved, but the beast did not go away; then he raised himself up, and it scampered off. Again he tried to sleep, but felt the same pat-patting. This time it was higher up on his body, and he thrust the intruder off. It shrieked as it fell to the ground, telling Edward it was a polecat. There was the body of a water-hen in his breast pocket and that, he had no doubt, was attracting the polecat; so he buttoned up his coat to protect the bird and prepared for the return of the foe.

He had not long to wait. A glimmer of light now entered the cave, and as he watched the entrance, he dimly saw the beast approach. In a moment it was crawling upward toward the bird. When it raised its head, Edward gripped its throat and sprang to his feet. The beast screamed and yelled. Edward hung on. The vault echoed with howlings and an awful suffocating stench filled the air. Still Edward gripped and squeezed with might and main,

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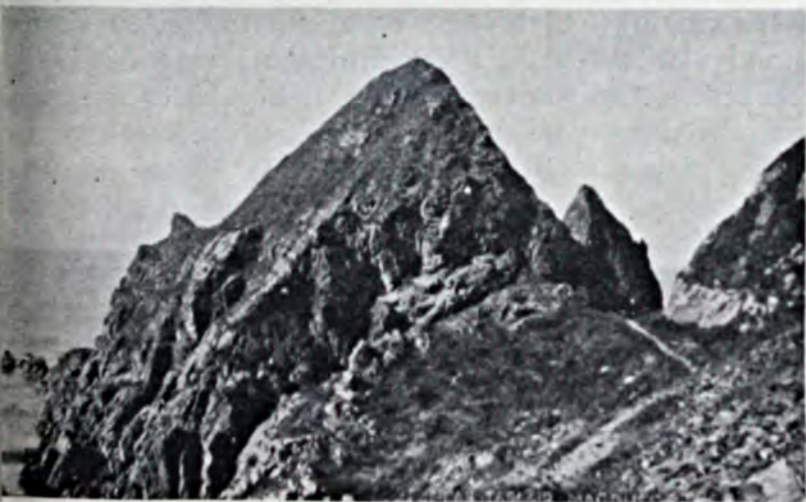

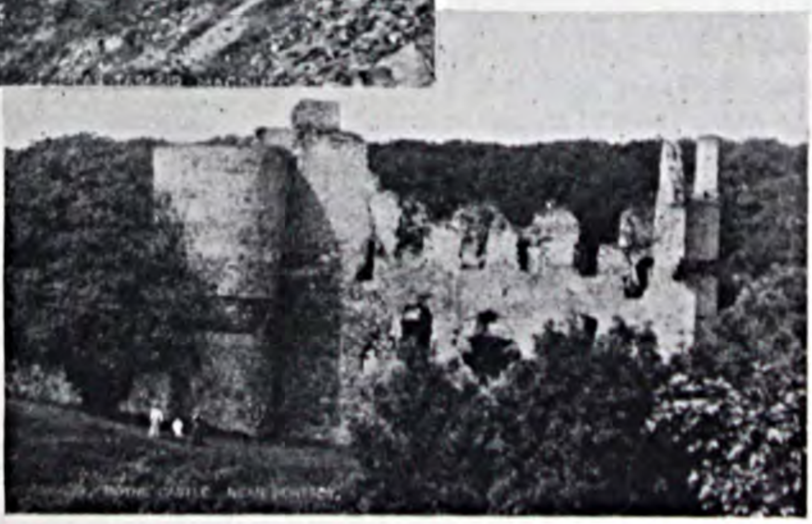

Above: The Cliffs of Tarlair, where Thomas Edward fell.

Right: Boyne Castle, where Thomas Edward fought a polecat.

¶ More intelligent cultural practices and use of fertilizers will produce—

BETTER SWEETS

By A. B. Bryan

Clemson Agricultural College, Clemson College, South Carolina

LARGER yields and a larger per cent of good quality marketable sweet potatoes were the result of larger amounts of fertilizers with high per cent of potash, in a sweet potato contest conducted among South Carolina farmers by the State Extension Service in 1929. Other factors having effect on the yield and quality were the quality of seed and plants, the time of planting, and the spacing or distance between rows and plants.

With about 50,000 acres planted annually to sweet potatoes, the crop is fifth in importance among South Carolina crops, and yet the carload shipments of marketable potatoes—262 carloads in 1928—have been much less than in other States which have much smaller acreages. For example, New Jersey, Maryland, and Delaware, with only one-sixth to one-third of South Carolina's sweet potato acerage, send five to eight times as many sweet spuds to market.

The chief explanation of the small movement of sweet potatoes from South Carolina is that the average farmer has seemed unable to grow a large enough yield and high enough percentage of No. 1 potatoes to make it a profitable cash crop, this, despite the fact that the crop is naturally adaptable to South Carolina soils and climate. These facts and conditions are true also of some other Southern States where sweet potatoes could be and should be an important supplementary cash crop. Georgia with over 100,000 acres ships only 600-700 carloads.

The feeling that it would be possible by improved practices to increase the yields for even competiton with other producing areas prompted the State-wide sweet potato contest which was initiated in the spring of 1929, and made possible by the cooperation of the South Carolina Sweet Potato Growers Association, which donated $600 for a State prize of $150 and first and second prizes of $100 and $50 in three districts, Upper, Middle, and Lower.

Contest Popular

About 300 sweet potato growers entered the contest and 180 turned in complete records, showing some very interesting results as follows:

Highest total yield	672 bushels per acre
Highest yield of No. 1's	378 bushels per acre
Average yield of No. 1's	176 bushels per acre
Average cost of production	$58 per acre
Average net profit	$125 per acre

The winner of the State prize, G. A. McCutcheon, a recent graduate of Clemson College, produced 468 bushels, of which 378 bushels were

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A difference in yield of 40 bushels resulted from the use of 300 pounds additional of an 8-4-6 (PNK) fertilizer.

Potatoes Pay in Oklahoma

By D. C. Mooring

Extension Horticulturist, Oklahoma Agricultural and Mechanical College

THE financial potato disaster of 1928 had a marked effect upon the growing of Irish potatoes in the State of Oklahoma during 1929. The commercial acreage harvested last year was very little over half that of 1928. Again, the acre yield of 1929 was not as great as that of 1928; however, prices were better. While it cannot be said that the potato growers were entirely satisfied, they felt much better at the close of the 1929 potato season than they did at the close of the 1928 season.

The essentials of successful Irish potato production are being recognized and heeded. Among the essentials which might be mentioned are: fall plowing, the use of legumes, good seed, intelligent use of commercial fertilizer, increased amount of seed planted per acre, better cultural methods, better harvesting and grading and cooperative car shipping. Oklahoma's acre yield in the commercial districts has been increasing.

Legumes

The legume most universally used by the potato growers, especially in following the spring crop potatoes, is the cowpea. The growers appreciate the value of a legume within itself, and as the use of commercial fertilizer is becoming more common, they also realize that there is greater net income where commercial fertilizers are applied to potatoes which have been preceded by a leguminous crop.

The marked effect of the value of

legumes is illustrated in the following demonstration:

Demonstration No. I—E. M. Durland, Hugo, Choctaw county, in 1928 planted Triumph Irish potatoes on ground that had previously grown cotton. He used 600 pounds of a 4-8-6 fertilizer and produced 165 bushels of potatoes per acre. The potatoes were followed by cowpeas, which were turned under that fall. In 1929 he planted the same variety of potatoes, used the same amount of fertilizer, namely 600 pounds of a 4-8-6, and the yield was 232 bushels per acre. As mentioned above, the average State yield for 1928 was greater than for 1929, so it is noted that the use of legumes was a big factor in the increased yield. Following the 1929 spring crop of potatoes, Mr. Durland planted soybeans and turned them under in the fall, at which time they were waist-high. He planned to plant potatoes on this same piece of ground in 1930.

In the larger potato sections of the State, the growing of legumes following the spring crop is becoming more common. On a trip through the Fort Gibson valley and Chooska bottom, a number of instances were noted where cowpeas were being turned under on ground which was planted to Irish potatoes in the spring.

Seed Source

The commercial growers realize the value of good seed and there is an increased use of certified Irish potato seed. The planting of certified seed is becoming more common in case of the home patch also. In some demonstrations the increased yield from the use of certified over common store run seed has been very marked, as illustrated by the following demonstrations:

Demonstration No. I—C. W. Puckett, Wayne, McClain County.

Variety	*Seed Source*	*Yield per A.*
Triumph	Certified	160 bu.
Triumph	Store run	40 "

Demonstration No. II—E. E. Shephard, Okemah, Okfuskee, County.

Variety	*Seed Source*	*Yield per A.*
Triumph	Certified	246 bu.
Triumph	Store run	116 "

About six years ago the average amount of seed planted per acre was 8 bushels, now 12 to 14 bushels are very common.

Commercial Fertilizer

The use of commercial fertilizer with the commercial growers is becoming an almost universal practice. The two main problems for each to settle are kind of fertilizer and the amount to use. Perhaps the most uniformly used is that analyzing 8 per cent phosphoric acid, 4 per cent nitrogen, and 4 to 6 per cent potash. The amount used per acre varies, however, 500 pounds coming nearer the general average at the present time.

Demonstration No. I—Chas. Dennison, Idabel, McCurtain County.

Triumph variety of Irish potatoes

Amount of fertilizer per acre	*Analysis of fertilizer*	*Bushel yield per acre*
500 pounds	4-8-6	123
Check		104

19-bushel increase per acre at $1.30 per bushel equals $24.70.

Cost of fertilizer and distributing same $10.00.

Net increase $14.70.

Results of the following demonstrations show the differences in yield where variable amounts of fertilizer were used.

Demonstration No. II—F. I. Edwards, Henryetta, Okmulgee County.

Triumph variety of Irish potatoes

Amount of fertilizer per acre	*Analysis of fertilizer*	*Bushel yield per acre*
None	. . . . .	70
400 pounds	4-8-6	175
800 pounds	4-8-6	250

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Crotalaria has proven an excellent crop to grow between rows of young trees in Florida citrus groves.

CROTALARIA

By J. Francis Cooper

Editor, Florida Agricultural Experiment Station

NEW life for old soils of the Southeast is being provided in abundance by a new and promising legumnous crop, Crotalaria. This crop, native to Africa, India, South America, Mexico, and the United States, has been brought into prominence in recent years by the United States Department of Agriculture and the Florida Experiment Station. It has spread like wildfire in Florida, and now is reaching out into other southeastern States. Apparently, it bids fair to be worth much as a rejuvenator of poor, worn-out soils.

It has taken Crotalaria 20 years to come into its own, but it is coming now with a bang—and yet it is a comparatively new crop.

Different species of Crotalaria have been under observation at the Florida Experiment Station ever since the late Dr. C. V. Piper, at that time head of the Forage Crops Office of the United States Department of Agriculture, sent some seed there for testing in 1909. Except for the fact that a few seed were planted each year and the plants kept growing, very little attention was paid to the crop until W. E. Stokes was appointed to investigate forage crops at the Florida Station, in the fall of 1921.

Seeing the plant and realizing its possibilities, this young agronomist set about testing it on a more elaborate

Crotalaria growing in a tung-oil grove.

scale. Having thoroughly tested it in practically every part of Florida, Mr. Stokes sent some seed for trials in other States, notably South Carolina, Tennessee, Alabama, and Mississippi. The crop has shown up well in limited tests in all of these States and now is being tested in North Carolina, Texas, Louisiana, and some other Southern States. Investigators of the Department of Agriculture's Forage Crops Office report that the plant has made good growth as far north as Ohio and Illinois, but has not produced seed.

Large Spring Planting

Florida farmers and grove and orchard owners like it so well that they have planted every available seed this spring and have endeavored to obtain more. Something like 125 tons of seed have been sold in the State. Planted at the usual rate of 10 pounds to the acre, this would be sufficient for 25,000 acres of grove, orchard, and crop land. It is estimated that in 1931 the plantings will be increased by 50 per cent in Florida alone. If letters and inquiries about it are a fair indication, the acreage in Crotalaria in other Southern States will be rapidly increased as fast as seed can be obtained.

Until recentl growers were handi capped in plantin this new crop on ac count of lack of seed However, a large frui company has starte growing Crotalaria i its pineapple field and grapefruit grove of Porto Rico. Witl the cheap labor whic prevails there, th company can harves Crotalaria seed an sell it in the Unite States at prices whicl make the growing o this crop possible o a large scale. Thi company alone sold 105 tons of th seed in Florida this spring, and coul have sold many more tons if it ha had them.

The words "cover crops" don' mean a great deal to the Northern farmer, whose lands are frozen an snowed under for weeks during th winter. His land retains its fertility and crop production year after yea is not so difficult. However, in th South, which boasts of its balmy climate and its winter sunshine, maintaining soil fertility and crop production is something else again.

Twenty years ago practically every Southern farmer cleared for himsel one or more "new ground" fields each winter. This virgin soil, which had been blanketed by forest trees, wa fertile and would produce good crop for a few years. Ten years ago th practice was on the wane, and now i is almost extinct. Most of the tillabl lands and many not so easily tille have been cleared. Forest trees ar not as plentiful as formerly, and th marginal as well as non-farming land are being left in timber. Farmer realize that they must cultivate yea after year their best lands.

With mild winters, which permit the soil organisms to work unhampered practically all the year in tear-ing down organic matter and making it available as plant food, principally nitrates, and with considerable rainfall during the winter to leach these nitrates out of the soil, it is little wonder that the Southern farmer found himself with lands which had lost a good part of their fertility after having been cultivated for a few years.

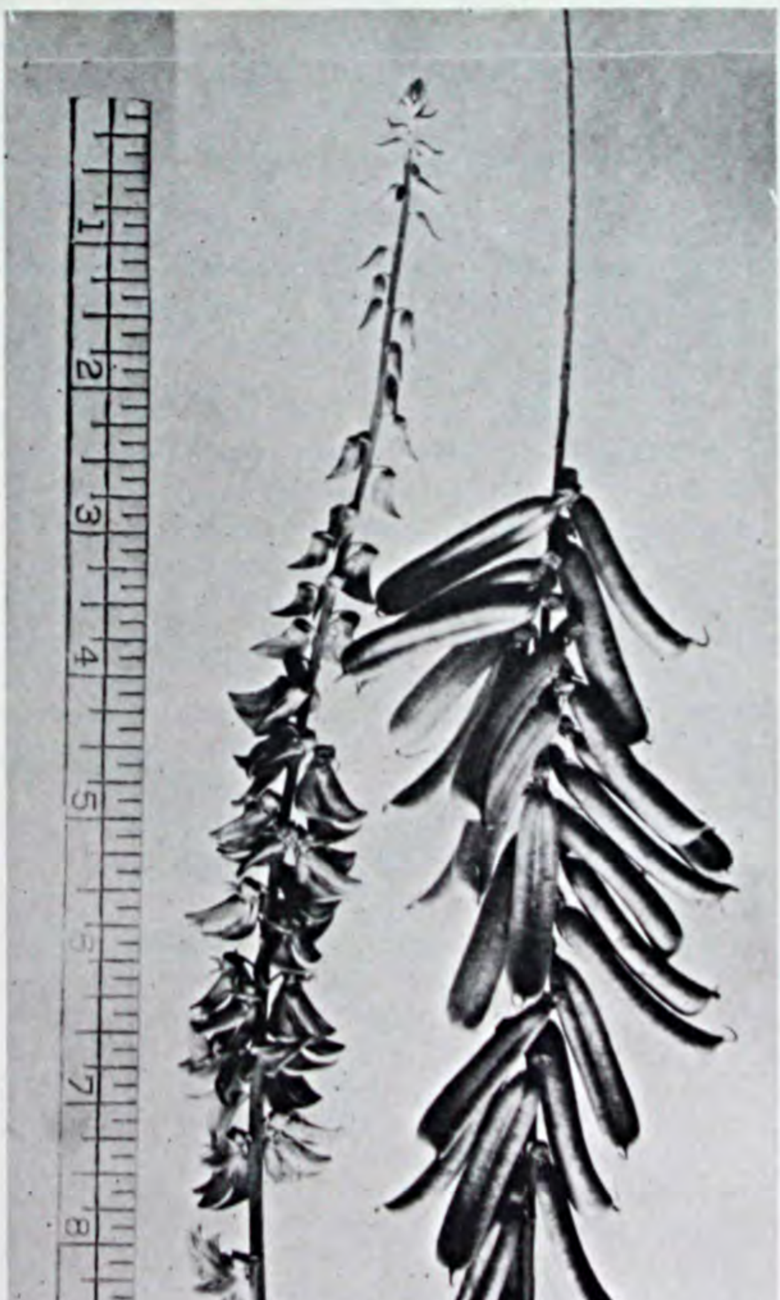
To Maintain Fertility

What to do to stop this flow of fertility from the soil was a question that agitated agricultural investigators and farmers for some years. However, out of it came the practice of growing soil-improving crops, notably the legumes, whose roots harbor the millions of tiny bacteria which have the power of taking nitrogen from the air and fixing it for use by plants which grow in the soil. These bacteria are the original manufacturers of nitrates from the nitrogen in the air.

Both summer and winter legumes in wide variety have been tried as cover and soil building crops in the Southern States. Many of them have proven good. Among the array of summer legumes which have found a place in Southern agriculture are cowpeas, velvet beans, soybeans, and beggarweed. One of these, velvet beans, was introduced into the Southeast by the Florida Experiment Station, in cooperation with the United States Department of Agriculture.

Desiring to obtain some accurate information about the place of leguminous and other cover crops in the soil building and crop production scheme, I sought out Dr. R. M. Barnette, brilliant young soils chemist on the staff of the Florida Experiment Station.

"The live or rotting portions in the soil are necessary for the successful production of any crop under field conditions," he told me. "They are needed not only to furnish nitrogen but also to maintain in the soil a balanced condition of the nutrients necessary to plant growth. Among these nutrients are not only nitrogen, potas-



The flower and seed heads of the Crotalaria are large.

sium, and phosphoric acid, which are needed in large amounts and commonly applied in fertilizer, but also the rarer elements, of which only traces are required by the plants.

"This decaying organic material is the stomach of the soil. It digests the mineral as well as the organic portion of the soil, making available to the numerous plant rootlets in the soil the nutrients essential to plant production, and renewing these nutrients when they are removed by plants or other means. This matter of readjustment and renewing of nutrients is extremely important in sandy soils which are subject to leaching.

"Besides being the stomach of the soil, the decaying organic matter aids in fixing plant nutrients in the soil and keeping them from being washed out.

"In addition to furnishing organic matter, cover cropping has another very important advantage. In a rainy season, large quantities of materials are leached from the soil unless there are growing plants on the land. A large amount of green growth stops this loss. We have observed in our lysimeter tests that growing crops actually keep from 40 to 50 per cent of the water from going through the soil in a rainy season.

"This function could just as well be performed by non-leguminous crops if the land is fertile enough to produce a luxuriant growth. But Crotalaria has the ability to make a heavy growth on poor soil, and thus is more desirable."

Two Popular Varieties

Thus the need exists for organic material in quantity. Crotalaria has the ability to supply this need. Of the many varieties tried, two have given most promise as cover crops in Florida and are being tested in other Southern States. These are Crotalaria striata and Crotalaria spectabilis.

The following descriptions of the two species are furnished by Mr. Stokes, the man who is largely responsible for the widespread interest in the crop. "Striata, the species now most widely used, is an erect growing annual, which reaches a height of six feet or more under average conditions. The stems are woody, especially as the plant advances in age. The flowers are yellow and borne in long terminal racemes, but are not as showy as are the flowers of several other Crotalarias, some of which are used as ornamentals. The seeds are small and olive green to mottled brown in color. The leaves are trifoliate, the three leaflets averaging 2 inches in length and 1½ inches in width. The root system is fibrous and extends to a great depth in sandy soils. Striata is very indeterminate in its seeding habits. Flowers, immature pods, and mature pods may be found on the same plant during entire season after seeding has started. It produces a heavy growth.

"Spectabilis also is an erect annual which attains a height of six feet under average conditions. The stems are not as woody, the yellow flowers are more showy, and both seeds and seedpods are larger than are those of striata. It has a tendency to mature more seeds at once, thus facilitating machine harvesting of seed. The leaves of this species are not divided into leaflets.

"Both species reseed well, if allowed to grow until seed are produced. Owing to the fact that a considerable number of hard-coated seeds are found in any lot of seed, often a satisfactory stand will be secured the second year after seeding, although no plants have been allowed to produce seed the first year.

"From four to five months after planting are required for the production of mature seed. It seems to be this factor which limits the northern use of the crop. By obtaining a fresh supply of seed every year, it is possible that farmers in States north of Tennessee and North Carolina could grow Crotalaria and obtain its benefits as a cover crop. It may be that strains which mature seed more quickly will be developed, as was done with velvet beans, making this crop accessible to more States."

Crotalaria seed is sown either broadcast or in rows, the former being the method most widely used. Inoculation is not necessary. It has been found by Lewis T. Leonard, legume bacteriologist of the United States Department of Agriculture, that the bacteria forming nodules on the roots of Crotalaria are the same as those in the nodules on cowpea roots. Also there is growing wild in Florida a dwarfed native species of Crotalaria, so that the inoculating organisms are widely scattered.

Why Crotalaria?

Why is it necessary or desirable to grow Crotalaria? Why can't the farmers use cowpeas, velvet beans, soybeans, and beggarweed, which have been established for years? Perfectly logical questions, these.

The answer is that certainly these other leguminous crops should continue in use. But Crotalaria is desirable for the reasons that it will produce more growth and result in greater amounts of organic matter and nitrogen to turn back to the soil, and that it will produce luxuriant growth on quite poor, sandy soils where many of these other crops will not grow at all, or will make very poor growth.

Mr. Stokes has found that Crotalaria will yield as high as 18 to 20 tons of green material to the acre, although average yields range from 5 to 15 tons. Over a five-year period on the Experiment Station farm it yielded three times as much as velvet beans, three times as much as cowpeas, four and one-half times as much as Mexican clover (also known as Florida pursley), and over seven times as much as beggarweed.

In addition to higher yields, it carries a higher percentage of nitrogen. With the five-year average yields and the average per cent of nitrogen in each plant as bases, Mr. Stokes figures that the amount of nitrogen in each annual crop ranges about like this: Crotalaria, 118.4 pounds; velvet beans, 34.6; cowpeas, 29.6; Mexican clover, 13.7; and beggarweed, 8.8 pounds.

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A close-up view shows the rank growth of Crotalaria.

Staked Tomatoes

By E. R. Lancashire

Extension Specialist, Ohio State University

BETTER tomatoes can be grown on stakes than can be produced on the ground. Every gardener can have a dozen or two tomato plants growing on stakes with very little trouble. In the commercial producing sections it is customary to see thousands of plants growing in this way.

Since the commercial growers find it profitable to tie tomato plants to stakes, it is more than likely that the same system would be practical in the home or farm garden. Earliness is the big reason behind the job of staking tomatoes. From 10 to 14 days may be cut from the time required to grow tomatoes on the ground. Another factor of considerable importance is that the staked tomato plants produce more ripe fruits in the early part of the season than do those grown on the ground. While the tomatoes sell for more per pound is a good time to have them for home use or for sale on the roadside stand.

Cleaner Fruit

Staked tomatoes do not yield as many pounds of fruit per plant as do those grown without stakes, but there are more plants per square foot of garden space. The usual distance for staked tomatoes is 14 to 16 inches between plants in the row and four feet between rows. This is from 4 2/3 to 5 1/3 square feet per plant. The usual spacing for ground tomatoes is four feet each way or 16 square feet per plant.

Fruits grown on staked plants are always cleaner and usually less subject to rotting than are fruits growing in direct contact with the soil. Then, too, the labor involved in tying and suckering the staked plants is offset by the ease with which the fruits are picked from the staked plants.

Farm and home gardening is an intensive operation. Growing tomatoes on the ground is extensive in principal. A garden looks much neater with tomato plants trained to stakes five or six feet high. That which adds pleasure to the gardener's work is best not overlooked. Pleasure is to be derived from growing tomatoes on stakes.

The necessary knowledge of how to go about growing tomatoes on stakes is easily acquired. First, the gardener obtains or grows tomato plants in such a way that when the time arrives to set them in the garden they will be from 10 to 12 inches high. These plants should be husky in appearance. Short, blocky plants are the kind that give best results. The first blossom buds should be well formed but not opened when the plants are set in the field. Experience shows that plants with open blossoms or with small tomatoes on them often drop them because of the shock caused by the transplanting operation. There is little to be gained by setting plants out with open blossoms and perhaps a fruit or two already well formed only to have such an apparently good beginning disappear.

Plants to Plant

Such plants as the one described as most likely to give the best results can be grown at home or purchased from a plant grower. The secret of growing such plants lies in giving them plenty of room in the plant beds. The seed is sown from 8 to 10 weeks before the time to set tomatoes in the field.

As soon as the plants are two to three inches high they are removed to a coldframe and here spaced six inches apart each way. Ten days before the time to take them to the field, it is well to take a large knife and cut between the rows of plants in the coldframe. Such cuts are made four or five inches deep. Three days later a second cut is made; this cut is at right angles to the first one. This job is called "blocking the plants." It is done to separate the tomato roots so that the "blocked" plants can be lifted out readily when they are removed to the field.

Better tomatoes can be grown on plants staked like this.

In the week or more allowed between the first cutting and the transplanting operation, the severed roots have time to heal. Hundreds of new fibrous roots are forced out by the root system because of this cutting of the plant's root system. These new roots bind the soil together and make it possible to move the plants with very little disturbance to the root system. Blocked plants rarely wilt when the job is correctly done.

Plenty of ventilation is needed at all times in growing good tomato plants. Plants need to be kept fairly well watered, too, so that there will be no serious checking to the growth of the plant. A growing plant can be kept from becoming too tall by exposure to low temperatures. All the ventilation possible should be given without exposing the plants to danger of freezing. Between 55 and 60 degrees is a suitable temperature for tomato plants.

A plant which has been grown too dry is likely to be woody near the ground line. When such a plant is set in the field this woody part of the stem cannot enlarge rapidly and so the plant has to form a new root system above this point. In doing this the maturity of the first saleable fruit is delayed.

The second step consists of transplanting these tomatoes to the field. The "blocked" plant is lifted with as much of the root system intact as possible and is set in an open furrow. The depth of the plant can be an inch or so lower than it was in the coldframe. The soil should be firmed about the "blocked" plant's root system so as to establish immediate contact between the soil of the field and that on

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LED by a BOY

By G. O. Mullan

Teacher of Vocational Agriculture, Martinsburg, West Virginia

IN the gateway of one of America's most beautiful and famous valleys, the Shenandoah, is located Berkeley county of West Virginia. The county is in the eastern Panhandle of the State, extending as a crooked finger between Maryland and Virginia and is famous for its apple products.

In Berkeley county, West Virginia, an apple country, is a boy, Oscar Dick, who, a year ago, produced 667 bushels of potatoes on 1½ acres. This is the more remarkable because of the fact that the average potato production in Berkeley county is approximately 110 bushels per acre and the fact that the boy never grew potatoes before, his father being manager of one of the largest apple orchards in that section.

Oscar was a student in the class of vocational agriculture at the Martinsburg High School and selected potatoes as his project. In the class all details of potato growing were gone into and thoroughly studied and then carried out as far as possible.

The boy selected an old alfalfa stand and plowed it as early as possible to permit soil breaking up by freezing. He then decided to grow Irish Cobblers and purchased certified seed. He purchased enough seed to plant at rate of 15 bushels per acre. Then came the fertilizer and he decided to use 2,000 pounds of 2-7-10 per acre.

As soon as the ground could be worked, it was disced thoroughly and half the fertilizer was drilled broadcast. The ground was then laid out and the potatoes were planted 3 inches deep and 12 inches apart, one piece to the hill. The other half of the fertilizer was drilled in the row with the potatoes. Ten days after planting, a spike-tooth harrow was used on the field to kill young weed growth. When the potatoes were about six inches high, they were sprayed with Bordeaux arsenate and then top-dressed with 100 pounds of nitrate of soda per acre.

A few days later the potatoes were cultivated to preserve a mulch and kill weeds. This system of cultivation was very shallow and did not disturb the network of roots the vines were making between rows. It was followed by the same type of cultivation all through the crop life until bloom when all cultivation ceased. Oscar continued to spray his potatoes with Bordeaux arsenate until the vines were entirely dead.

His crop of 667 bushels, all of which could have been certified, were very even in size and smooth and of exceptional quality. The large yield astonished local farmers, as it beat the county record by many bushels. The boy and his father attribute his exceptional success to the fertilizer and spraying.

Following is a summary of his cost of production:

Labor, man—443 hours	$112.42
Horse—67 hours	8.35
Tractor—5 hours	2.50
Gas, Spray Materials, Delivery, Depreciation on machines	15.05
Potatoes	32.00
Fertilizer	45.43
	$215.75

Produced 667 bushels for $215.75, or a cost of 32 1-3 cents per bushel.

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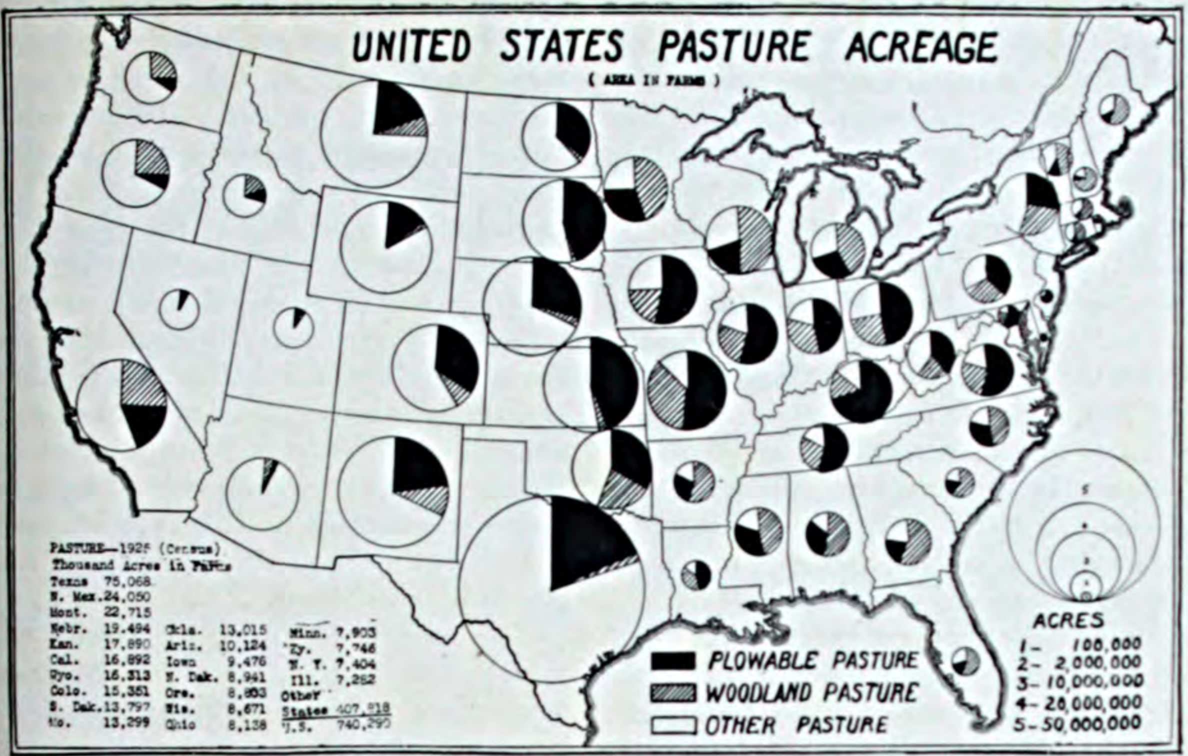


Pastures

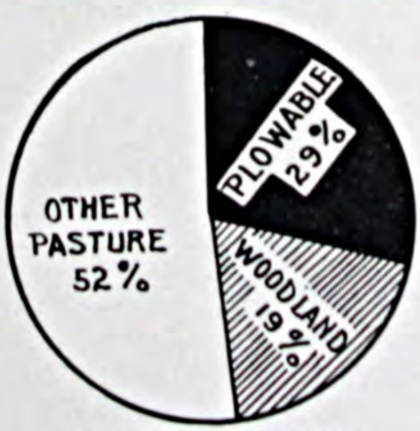
¶ *Eighteenth in this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

OPPORTUNITY for progress in the management of our pasture resources is probably greater than in most other phases of our agriculture. The subject of pastures is one of the broadest in the entire field, and the amount of attention it has received up to now has probably been much less than the subject will have in the future.

The widespread importance of pastures can probably be appreciated when we realize that out of an entire land area of about 1,903 million acres in the United States, 1,055 million, or about 55 per cent of the total, are in some form of pasture. To be sure, much of this pasture is on poor land and relatively unproductive. There are about 257 million acres in other forage crops, of about one-fourth as much as the pasture area. Yet, the total productivity of animal sustenance of this smaller area in harvested feed crops is probably greater than that of the huge pasture acreage even though it is four times as large.



UNITED STATES FARM PASTURE LAND

According to the last census, 29 per cent of the pasture acreage in the United States is plowable, 19 per cent woodland, and 52 per cent other pasture. The bulk of the plowable and woodland pasture acreage lies in the valleys of the Mississippi and the Ohio Rivers. The "other pasture," which is to a large extent open ranges, lies in the dried Western States. Among the Central States, Kentucky leads in the percentage of plowable pasture with a total of 71 per cent of its pasture reported as plowable. Illinois ranks second, Iowa third, and Missouri fourth in the percentage of plowable pasture in this region. Of the East Coast States, Virginia, Delaware, Maryland, and New Jersey rank high in percentage of plowable pasture.

The New England States run high in the percentage of pasture that is in woodland, the total for the group being 54 per cent. In the Midwest the States with the largest portion of their pasture in woodland are those at the head of the Great Lakes: Wisconsin with 51 per cent, Minnesota with 45 per cent, and Michigan with 43 per cent. Pasture acreage which is classified as neither plowable or woodland, and is listed as "other pasture," refers largely to the open range of the West. In acreage, Texas, because of its great size, is the leader, and most western States rank high in the portion of their total pasture area in this class. In Arizona, Nevada, and Utah, more than 90 per cent of the pasture reported is in the "other pasture" classification.

Can Be Classified

In the United States the pasture regions can be roughly classified as the Northern humid grasslands, the Southern humid region, the Western range, and the Pacific humid region. More than half of the entire pasture area is in the form of the more arid Western range and more than one-fourth of it is in the form of woodland pasture, both of these forms having a relatively low livestock carrying capacity.

Since there is such a vast difference in the number of animal units being carried by the pastures in the different areas, separate estimates have been made for certain of the more important types of pasture. Taking the humid grassland pastures as a whole, much of which is improved land in farms and would fall in the plowable pasture class in the more humid regions, it will be noted that the carrying capacity is relatively high though the pasture season is rather short. The average number of acres of pasture per animal unit for this pasture class is about 4.8 acres per season. The approximate acreage of this type of pasture is 231 million of which about 64 per cent is in farms.

The semi-arid grazing lands of which there are about 587 million acres have a lower carrying capacity per acre. About 24 acres of this land are used per animal unit per season, but the pasture season is considerably longer than on the humid grasslands and most of the semi-arid and arid grazing lands are in the West. Only about one-fourth of this type of pasture is in farms.

Forest and cut-over pasture also have a rather low carrying capacity. Most of this type of pasture land is found in the eastern half of the United States and the Pacific Coast States. For a growing season averaging less than six months in length, about 23 acres of this land carry one animal unit. About 237 million acres fall into this group, and about 28 per cent of it is in farms. The animal unit employed by the United States Department of Agriculture in these estimates represents the estimated feed consumption of one adult cow, horse or mule, 5 hogs, 7 sheep or goats, or 100 poultry per year.

Pastures as a rule have not been valued very highly in our agricultural enterprise. Because of their abundance on the American frontier, relatively little attention has been given to them. Pastures were more or less taken for granted, and studies or experimentation with them have had

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He saw and seized
OPPORTUNITY

By E. R. Jackman

Extension Specialist in Crops, Oregon State Agricultural College

ONE of the leading sheep men of the West, a man who has built a real fortune from nothing, says that the only difference between men who make money and those who don't is that the successful men see opportunities and grab them and the others see opportunities and say to themselves, "Now there's a chance to make some money. I'll look into that some day." And then the idea languishes and dies.

Howard Wagner of Corvallis, Oregon, is an example of a farmer who saw an opportunity in specialized farming and unhesitatingly seized it. Most farmers talk of their output in terms of bushels. He talks of his only in tons. An idea of his business may be gained by his products last year. In round numbers he sold 250 tons of Austrian winter peas, 150 tons of seed oats, 100 tons of rye grass seed, 50 tons of various kinds of vetch seed, and 3 or 4 cars of clover seed. This runs into "important money," well over $100,000. All of these products are seeds and the business has been built up in six years.

Mr. Wagner says, "I used to grow wheat and oats and just about went broke. The land around here got so it would only yield 12 to 20 bushels an acre and taxes and labor kept going up but the price stayed the same as before the war. It got to the point where I had to do something.

"I thought I saw an opportunity in

Mr. Wagner now uses tractors. He still has seven horses, but does not use them very much.

seeds. At first I sold to some of the western firms here but I made up my mind I might just as well really get into the business and have enough stuff to sell to interest the eastern companies. I couldn't see any reason why I couldn't sell to these eastern folks direct if I had enough and could put it out right. So I began to experiment with seed cleaning machines and investigated the quality of seed being wholesaled by seed companies of the West. I found that by spending some money and using what brains I have I could clean any kind of seed as well as any of them.

Quality Builds Business

"So with good quality stuff to sell I began to expand my business. One of my main supporters was Harry Schoth, forage crops man at the Oregon Experiment Station. He told me what to grow and to some extent where the market was. It took me a couple of years to get my nose in with the larger eastern dealers, but as soon as I sold one firm and they found they could depend on me for quality, the rest was easy.

"I have pretty well learned now which firms to do business with—which ones will live up to their contracts with me. One year I had a lot of vetch seed contracted for. The price went down and I made a shipment east to one company which they rejected on a technicality. Other firms of better standing took theirs and took the loss without a whimper. I have refused to sell to that firm since and it has been some satisfaction to me to be in a position to tell them to "jump in the lake." They wanted very badly to buy some winter peas from me and I reminded them of the vetch incident and told them I didn't care to deal with them.

"Nearly everything I grow is on a contract basis. I am in business now to such an extent that I cannot take a chance. If I know I can grow a certain seed crop and make money on it at five cents a pound, I contract at that price and then it is up to me to get out and get in a big enough acreage so that the profit will amount to something.

"If 10 acres of vetch seed is a money-making proposition, I don't see any sense in stopping at 10 acres—I get out just as much as I can possibly handle. There is a lot of land around here which can be rented and I sub-contract quite a lot with neighbors. I have the cleaning machinery and have built up a reputation for my stuff and can sell more than I can produce myself, so it is a good proposition all around to recontract with some of the neighbors. It gives them some of the benefits of my business and me more volume.

"The United States Department of Agriculture sends out frequent price information and I keep informed on the market this way. In some seasons I get daily telegraphic market reports.

"Right now the Austrian winter field pea is the big end of my business. There is a heavy demand for the seed down South and I contracted for 3,800 acres in 1930. They bring in about $40 an acre on land which would be lucky to produce $20 worth of wheat.

"I had to pioneer more or less. With these peas, for example, they were a new crop here and I had to work out the best way to handle them. I now cut them with a tractor and eight-foot mower with a wind-rower attachment. I let them lie two or three days, then go in with a combine with a pick-up attachment and take them out of the windrow. It developed at once that they have weevils, so I built a fumigating house and rush them from the combine to the fumigating room. I control the weevils 100 per cent in this way.

"Nearly all of my farming is done with tractors. We have three months to get a crop in and only three weeks to get it off, so speed in harvesting is the important thing. I still keep seven horses, but don't use them much any more."

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Pictorial

One Pair of Twins Greets Another

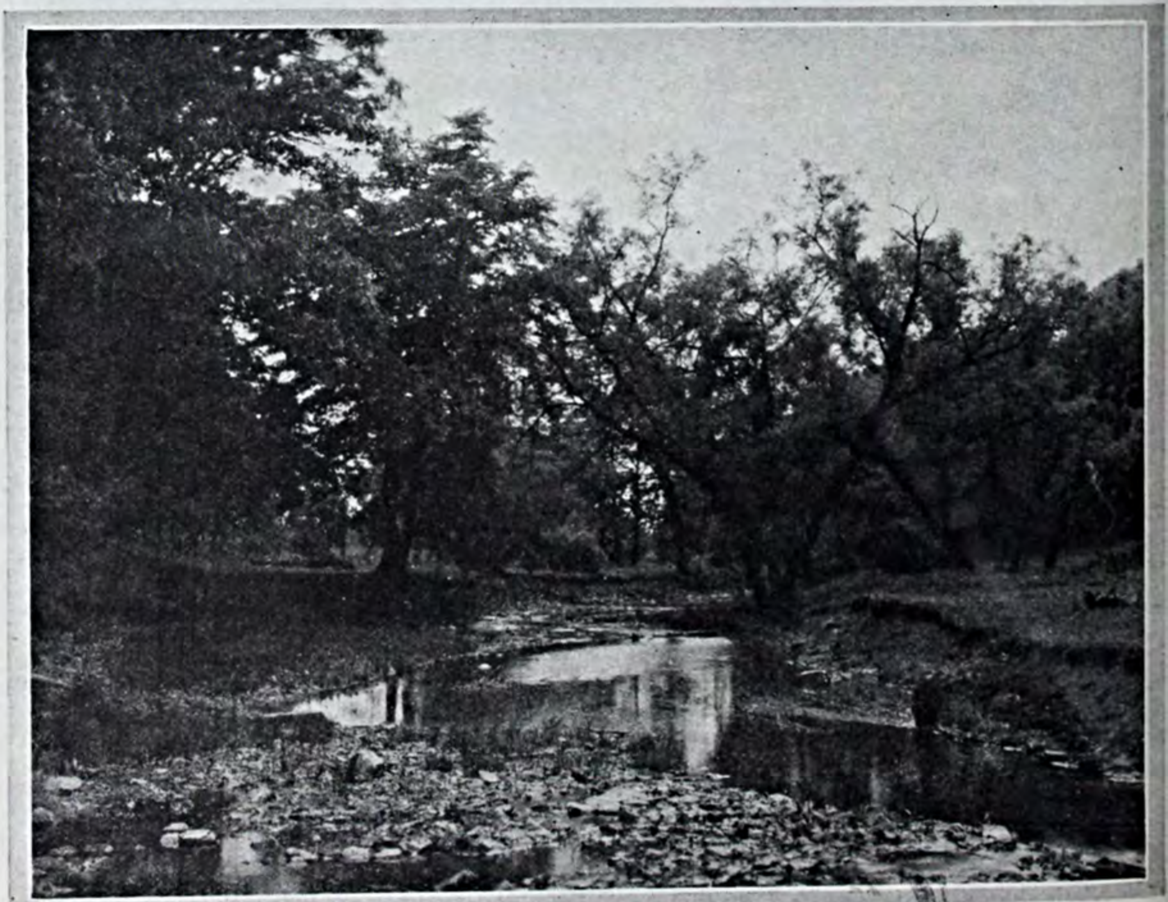
Above: The farmer doesn't need to worry about reducing exercises. No one really knows the number of miles he walks in the planting, cultivation, and harvesting of his crops.

Left: At the end of a long furrow a wise man "spells" himself and his horses. And no farmer thus seen can be accounted lazy.

Right: May finds city park benches crowded with "gentlemen of leisure," glad of a chance to rest their tired feet, until the next policeman orders them to "move on."

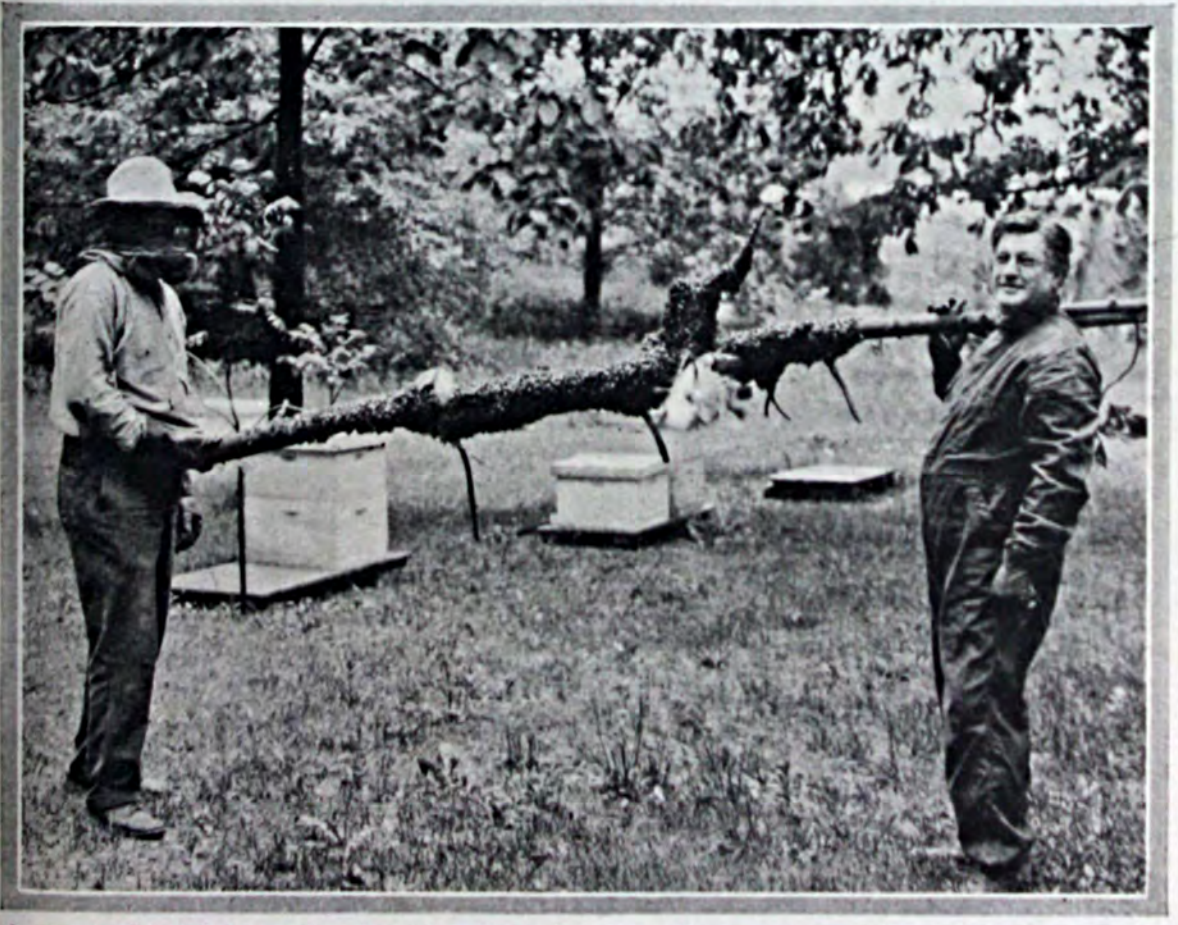
Below: Chicago's new skyscrapers stand guard along the river. Among these are the Medinah Athletic Club, the Chicago Tribune Tower, and the Wrigley Building.

Ploughing corn on the Purdue University Farm in West Lafayette, Indiana. Two-row cultivators and Percheron horses are being used here.

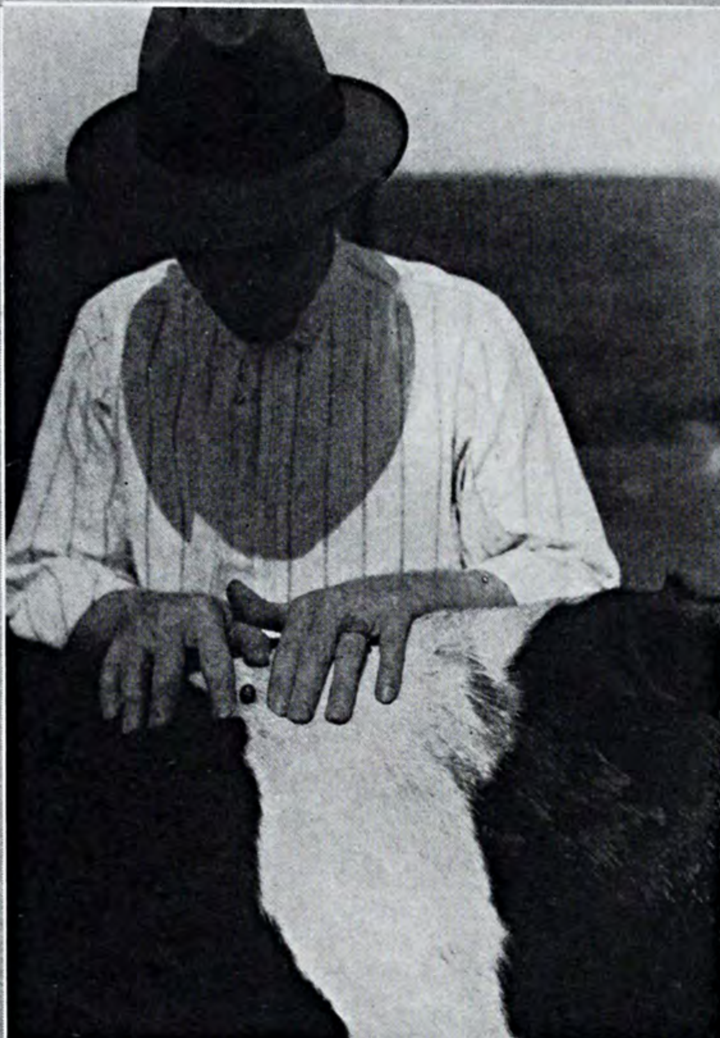


A quiet stream in northern Indiana. There are depths and shallows here, and alternating shade and sunshine, to attract fish and fishermen.

A young milkman's rapid delivery system. Engine-trouble and traffic jams don't bother him. But a meeting with a strange cat might cause trouble.



A swarm of bees being returned to their hive. Evidently the man at the right is not as timid as his friend, or perhaps he is immune to bee-stings.



(Left) Pop Goes the Warble: Removing grubs of the ox warble from the back of a cow. This insect causes loss in several ways, including effects on growth, gain, milk yield, and the quality of the hide. Nearly 20 per cent of all cattle hides handled are classed as "grubby." The Department of Agriculture has detailed information on this insect and the possibilities of its control.

(Below) Mrs. Ruth Hanna McCormick, the first woman to be nominated as a candidate for the United States Senate, proudly displays one of her prize Holstein cows, "Aggie Wauconda." In addition to her extensive political work, for which she is widely known, Mrs. McCormick has for years been interested in farming and its details. Her cows are usually prize-winners.

The Editors Talk

Alkali Soils

Alkali soils appear in almost every country of the world. The extensive acreage of these soils, which under natural conditions are practically worthless, and the fact they have a high potential value if properly handled make their reclamation and utilization a problem of great economic importance.

Considerable work has been done by soil scientists in an effort to overcome soil alkali and to bring these soils into production. Various phases of this problem have been studied in different countries of the world, but unfortunately the results of these studies are not available in any one language.

The progress of soil science during recent years has been phenomenal. This progress is probably the result of the changed attitude of the scientists themselves. For many years satisfied with the products of their own research which were carefully guarded, they have acquired the true research spirit and now vigorously comb the scientific literature of the world for facts to aid them in their work.

Probably the greatest factor in breaking down the conservatism of the old line soil workers has been The International Society of Soil Science. This organization in recent years has held world congresses at which almost every agricultural country of the world was represented. The society from the first has set itself to the task of bringing together all available literature on soil research and by the preparation of bibliographies to give research workers access to valuable sources of information. This exchange of ideas on soil research has resulted more than anything else in making Soil Science a World Science.

The Alkali Subcommission of the International Society of Soil Science which met in Washington, D. C., June, 1927, emphasizes in its report of that meeting, the need for assembling world literature dealing with alkali and salty soils. The papers presented on alkali soils were too numerous and lengthy to be reported in full. Abstracts from these papers and a fairly complete bibliography of world literature were prepared by Prof. A. A. J. de Sigmond of Budapest, Hungary, and his associates. Prof. Sigmond, a leading authority on soils and president of the Second Commission and Alkali Subcommission of the International Society of Soil Science, reviewed at considerable length, in his report, the papers on Genetics of Alkali Soils.

Alkali soils from the reclamation and utilization viewpoint were ably reviewed by Prof. A. Arany of Debrecen, Hungary. Of particular interest are his suggestions that further research on the chemical, physical, and biological aspects of alkali soils be undertaken. He emphasizes also the need for more specific studies on reclamation by water treatment, use of chemicals for treatment of alkali soils, influence of surface evaporation, and cultivation of alkali resistant crops.

As land utilization becomes more and more a definite subject in the program of scientific and practical agriculture, these contributions on the possible methods of handling alkali soils assume an added significance and importance.

Price of Potash

The price of any fertilizer material is a very important matter to farmers. They pay out millions of dollars a year on this account. They are entitled to know the facts regarding fertilizers and are entitled to buy their supplies as cheaply as possible.

The index number of prices are currently published. The index number of fertilizer materials at the present time is 111, while the index number for all commodities is 141, showing that fertilizers are cheap in comparison with other materials which the farmers must buy. In addition to these index numbers, articles and editorial comments regarding prices are frequently published. These all help in guiding farmers toward profitably programming their operations.

It is, therefore, very gratifying to note the following editorial regarding the price of potash, reprinted from the April 25, 1930, issue of the *Progressive Farmer*, one of the most influential farm journals, circulating widely through the South: —

> " 'Cheaper potash for American farmers may be looked for in the not distant future, with the development of potash deposits recently discovered in this country,' says the United States Department of Agriculture.
>
> "*The Progressive Farmer* has never been worried about the price of potash even though it does come from Germany and France. Commodities that come from abroad have the habit of costing us less than those produced in this country. The best way to keep down the price of potash is to keep plenty of it coming in from abroad. If it ever comes to the point that we must depend on our domestic supply of potash, even though this supply be ample, our farmers can count on paying higher prices. High prices are necessary, they say, to maintain our American standard of living.
>
> "Potash is one of the few materials the farmer buys that is very reasonable in price. In 1910-14—prewar days—muriate of potash cost \$37 to \$38 per ton at the port. Today it is selling for \$36 to \$37. During the war, when potash imports from Germany were cut off, the price soared to as high as \$400 per ton. Potash is one of the few products that sell for less than before the World War.
>
> "No, potash prices are not unreasonable. If everything else was as reasonable in price as potash, there would be no serious farm problem."

Company Coming

We all know the preparations in the home incident to the announcement that company is coming. Going beyond this, we are familiar with community pride in getting ready for conventions, expositions, and other public gatherings. Now comes cognizance of the commonwealth's preparations for its annual visitors, the tourists.

We were interested in recent press releases from the University of Vermont and State Agricultural College relative to conferences held to consider problems pertaining to the tourist business. People interested in the business within a radius of many miles attended sessions at Rutland, Vermont, and contributed to the general discussions on the various phases of the problem. The magnitude which the tourist business is assuming in Vermont and the future prospects of its continued increase were carefully considered. Details concerning the comfort of out-of-state visitors, attractiveness of home grounds, and in fact all efforts which local people might put forth in caring for the wants of tourists and making them eager to come again were presented and talked over.

These conferences in Vermont are typical of the growing tendency of States to put on their best bibs and tuckers for the vast army of people who start out during each vacation season to "See America First." It is a most commendable movement and every individual should share in the civic pride which is being developed.

Our countrysides can be made more attractive to our city dwellers, our cities more hospitable to our rural folk. And in this interchange of hospitality rests a greater understanding of the problems of each.

Increased Production

The role of commercial fertilizers in improving the status of American agriculture is well understood by practical minded farmers—men who realize the necessity of cutting production costs. Much has been written and said on the subject but it remains for Dr. Oswald Schreiner, chief of the Division of Soil Fertility of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, to clearly set forth with recent data just how important is a more universal use of fertilizers.

"If all the fertilizer—7,500,000 tons of it—used annually by farmers of the United States were sold in bags it would take nearly a hundred million of them," says Dr. Schreiner. "The use of chemical fertilizers is one of the best means of increasing productivity and improving soil fertility. It is conservatively estimated that for every dollar invested in fertilizer the average return is about three dollars. The reason that farmers are buying 250 million dollars worth of fertilizer a year is that the best farmers of the country know that it pays them to use fertilizers."

Summing up the relation of fertilization to farming under present economic conditions, Doctor Schreiner says: "With the present high cost of labor, increased acreage is not so advisable as increased production per acre. Under present costs of production the proper use of fertilizers offers one of the best ways for the American farmer to increase his farm income. An acre of underfed plants, struggling for growth and reproduction, means not more, probably less, than an average yield of crops, the selling price of which is absorbed to meet the costs of interest, taxes, cultural operations, and seed. If there is to be any profit it must come from a higher yield. Therefore it is better to produce a high and profitable yield on less acreage than an average yield on the full acreage. This is true of all crops."

Doctor Schreiner says that intelligent application of lime and complete fertilizers makes it easy to double or triple yields of pasture grasses and—— a point which is more important but is often overlooked by dairy farmers— to increase by this means, the protein, lime, and phosphorus content of the grasses. Such forage often improves the health of the stock and insures against mineral deficiency diseases and nutritional abortion.

Doctor Schreiner warns farmers that they must not expect fertilizer to work magic or to make up for shortcomings of crops, soils, poor seed, inefficient spraying, poorly plowed and cultivated land, poor drainage, acid soil, or for a low supply of humus.

"Use manure to improve your soils. Grow green manure when you can not get stable manure. Then you will have better returns from your fertilizer," he advises farmers and points out that there is a specific quantity of fertilizer which yields the maximum profit in any given case and the amount varies greatly with different crops and different soils, and is greater, by far, for high-priced crops than for low-priced crops.

Traditions

So treasured are some of our traditions that we are enslaved by them to the extent that progress is greatly delayed and sometimes prevented. A great many progressive movements are held in abeyance for a lack of precedence, the result being that our minds are so bound up with visions of the past that we cannot see clearly into the future.

In our agricultural life customs and practices have delayed progress just as seriously as has tradition in our social and political lives, the result being that we have found out many of our best ideas by accident rather than by careful planning. When commercial fertilizer first came into use, many declared that it would kill the land and that once used it would have to be continued.

A southern farmer who thought that he was a great fertilizer enthusiast once sent a negro out to apply fertilizer to a cotton field. When the farmer returned from town he found that the negro had applied three times as much fertilizer to the field as he had intended. He censured the negro very severely and threatened to fire him. He considered that the ignorant old darky had temporarily ruined the field, but finally he decided to plant it to cotton. The accident proved a blessing in disguise and this farmer, for the first time in his life, made a bale of cotton per acre.

So pleased was he at picking time that he presented old John, the negro who didn't follow precedence or even know what it was, with a new suit of clothes. This ignorant negro opened the eyes of the whole community and showed them the way to greater profits. Old John made a mistake, but his "Marster" made cotton.

The Phosphorus Digest

The "Phosphorus Digest" is the new publication of the Superphosphate Institute, Washington, D. C. The purpose of the "Digest" is to bring the results of current field and laboratory investigations regarding phosphorus to the attention of those most interested. As the subhead says, it is "A Monthly Review of Recent Investigations of Interest to all Agricultural Workers."

The "Digest" gives the results obtained from the experimental work with crops and fertilizers and notes particularly the profitable effects of phosphorus, under the headings, Field Crops, Truck Crops, Fruit, and General.

The magazine is well illustrated and printed and, undoubtedly, this additional source of authentic information will be welcomed by our agricultural extension workers.

AGRICULTURAL DEVELOPMENTS

By L. C. Farle

A NEW CARROT

A new variety has been added to the list of garden vegetables through the work of Victor A. Tiedjens, a member of the research staff of the Massachusetts Agricultural Experiment station at Waltham, Massachusetts. Seed is being distributed as rapidly as it can be obtained and it is hoped that the new variety will take the place of certain other kinds on the market. The station at Waltham expects to have 1,000 pounds of seed for distribution by next year.

In addition to the new variety of carrot, a mildew-resistant variety of head lettuce has been developed at the station which will replace all other greenhouse varieties grown in Massachusetts this year. Besides developing these two new varieties of vegetables, Mr. Tiedjens is working on the developments of squash, cucumber, corn, asparagus, and bean plants. Mr. Tiedjens is a graduate of the University of Wisconsin in 1925.

MORE GRADED TOMATOES

Farmers in Pennsylvania sold over two and one-half times the tonnage of tomatoes to canners on the basis of Federal Grades during the past season as were sold by grade in 1928, according to records of the Bureau of Markets, Pennsylvania Department of Agriculture. More than 2,330,000 pounds of tomatoes were graded by State inspectors during the past season compared to 905,000 pounds in 1928.

Six canneries in Pennsylvania have adopted the graded system of purchasing all tomatoes under State supervision. This system is found to pay good dividends to the producers of a high quality product, since the return is based entirely on quality. The best indication of the success of the new system is shown by the fact that canneries using this method of purchase are receiving the tomatoes from an increasing acreage while other canners are finding it more difficult to secure sufficient acreage for their needs, the Bureau states.

UDOBRENIE I UROJAI

A new journal under the above name, meaning "Fertilization and Crop Yields" or better "Better Crops With Plant Food," has been published in Moscow by the Committee on Chemistry of the Soviet of Commissars and the Scientific Fertilizer Institute. The first two numbers have just been received in America. The Editorial Board, headed by Professor E. B. Britzke and L. L. Balasheff, announced that the monthly journal will be devoted to the various problems of fertilization, also chemical warfare with pests and diseases of plants.

THE CARE OF THE LAWN

There are some lawns that no amount of fertilizing will ever make perfect, according to a recent issue of Nature Magazine. The fault here, and it is an exceedingly common fault, is in attempting to grow grass on the infertile clayey subsoil cast up when the house foundations were excavated, to which frequently has been added masses of waste building material. It is almost hopeless to attempt to grow grass on so poor and unnatural a foundation—about the only thing that can be done to produce a good turf under such conditions is to add a layer of good top-soil and start all over again. Fortunately, the layer need not be very heavy—two inches are sufficient for all practical purposes—since grass roots do not ordinarily penetrate very deeply.

It is a mistake to spade fertilizer into the ground to a depth of six inches or more since most of this plant food, below a depth of an inch or two is simply wasted. The more important of our turf grasses are surface growers.

SECOND EXTENSION SCHOOL

The University of Wisconsin will again this year be host to agricultural extension workers from all over the United States who wish to study methods for improving their work.

The 1929 course at the Badger institute was the first opportunity ever offered extension workers in this country to pursue graduate study in their profession. The extension school attracted wide interest and attention. Workers came from 11 States and an equally scattered representation is expected in 1930, according to Dean J. A. James of the Wisconsin College of Agriculture.

The United States Department of Agriculture will again assign M. C. Wilson to present the results of research studies which he has conducted during the last five years in 17 States.

Because agricultural extension work in the past 15 years has developed from a meager background to a well defined profession, it has been felt that much valuable information in regard to methods and technique of extension teaching has been accumulated, and that this fund of knowledge should be made available.

The course may be taken for either undergraduates or graduate credit. It will deal with ways of measuring extension progress, methods of collecting research data relating to extension, the influence of size of farms, land tenure, educational training, age, contact with extension workers, and other factors upon effectiveness of extension teaching.

The various means and agencies employed—result demonstrations, method demonstrations, meetings, informational material in the press, personal service, bulletins, exhibits, circular letters, schools, and radio—will be analyzed from the standpoint of their functions in teaching, adaptability to particular subject matter, relative influence, cost, interrelationship, and how they may be made more effective.

Attention will be given to the problems of program determination, leader training, extension campaigns, educational principles underlying extension teaching, office management, and other problems.

FIFTY-SIX YEARS OF ONIONS

In a recent survey of the muck areas in New York State, it was discovered that F. J. Kurowsky, a farmer in Orange County, owns a piece of muck from which was harvested this year the 56th successive crop of onions. There are other records showing that onions can be grown on the same ground for a long period of years provided disease is kept under control and the fertility of the soil is maintained. However, a yield of more than 700 bushels per acre in the 56th year of continuous onion production from this muck denotes careful management. The land is manured every other year, green crops are plowed under, and each season an application of a ton per acre of a 2-8-10 fertilizer is made.

Some of the busiest people in the world are only picking up the beans they spilled.—*Exchange.*

Foreign and International Agriculture

Potatoes in England

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College

IT was my good fortune recently to have the opportunity to visit the large potato area in Lancashire, England. Lancashire is just north and East of the city of Liverpool and is a very interesting farming country for one to visit. The fields are large, either level or very gently rolling and the soil is particularly well adapted to this crop. Almost 20 per cent of all the potatoes raised in England are raised in this section.

The largest yield per acre for potatoes in England has been secured in Lancashire. During the last 10 years the average yield on many farms in this section has been approximately seven tons. This does not mean seven American tons of 2,000 pounds but it means seven tons of 2,240 pounds, or as we express it in American bushels about 260 bushels per acre.

Comparisons

It is of interest to compare the growing of potatoes in this section with methods employed in this country. The soil is a heavy loam but there also is found, particularly near Ormskirk and Southport, a lighter soil of a reddish color. Much of the soil has a relatively high water table, which is a decided aid in potato growing.

The common rotations practiced in this section are potatoes followed by winter wheat, followed by grass or oats, followed by potatoes. There are, of course, modifications in this practice such as planting early cabbage on the land following grass and following the early cabbage with sprouted potatoes. Another practice is to allow the land to be fallow, giving fallow culture. Follow that with potatoes or oats, then wheat, then back into regular rotation.

If the land to be plowed for potatoes is grass land, it is generally fall plowed. The furrows are allowed to remain over winter in a plowed condition. If the land is not grassed, it is generally spring plowed. The soil is very thoroughly prepared, and at the time of planting potatoes, furrows are made in the soil as close as 27 inches apart. In these furrows stable manures are applied. Most of this stable manure is purchased and costs approximately $3.00 per ton and has to be carted to the farm. About 15 tons are needed per acre. When the furrow has been filled with the stable manure a hiller or the plow is used to cover this material.

The growers using commercial plant food use a complete fertilizer made up as follows: In a ton of 2,240 pounds —2 parts of superphosphate, 1½ parts of sulphate of ammonia, 1 part of sulphate of potash, and one-half part of steamed bone. This is used at the rate of 700 pounds per acre where the stable manures are used and where a very limited amount of stable manures is used, or none at all, 1,200 pounds per acre of this material are used.

A bow harrow is now used on this furrow. It knocks the ridge down slightly and also fines the lumps and kills the weeds. It may be used again for this same purpose.

The land is now ready for the planting of the potatoes. The amount of seed used is about 1,500 pounds per acre. The preference is for big seed pieces. The general belief is that the big seed piece will give a larger yield. This is in accord with the American belief. Very little is known of certified seed as we know it here. What is meant in the Lancashire section of England as certified seed is first, trueness to type; second, immune to the wart disease and produced on clean land not affected with wart. It is interesting to know about their seed, that only certain varieties such as Ker's Pink, Great Scott, or Ninety Fold can be used. I say can be used because the law in that section which is enforced is to the point that only potatoes immune to wart disease are allowed to be planted.

There is an Experiment Station located in this section that determines just which sorts are wart free and instructs the growers accordingly. The seed is cut from the seed end to the stem end and in many instances a portion of the stem end is cut off and used for pig feeding or for other purposes. Many fairly large potatoes are only cut in three pieces. Practically all seed is cut by hand. The potatoes are cut just previous to planting, and the planting date is in March.

Plant Late Varieties First

The planting practice is slightly different from that in our country. The late potatoes are seemingly planted first because as a general rule these are not sprouted. The early potatoes are planted in April and in almost every instance are sprouted previous to planting. The spacing of potatoes is very much different from ours. The late potatoes are spaced 18 inches apart in the row and the rows as previously mentioned are 27 inches apart. Early potatoes are spaced closer, the pieces are from 10 to 12 inches apart in the row and 27 inches between rows.

Much of the planting is by hand although there are a few machines. As most of the work in that section is with one horse, the planter is a one-horse type. One man drives the horse, another is seated at the rear of the machine, and at the right of this man an endless chain with cups is found. This chain is quite near the wheel on that side. In each one of the cups, one piece of potato is placed; and as the cups are spaced on the chain correctly, the potatoes are spaced in the soil correctly. It operates very much as our machines do after the potatoes are in it.

Free From Pests

As soon as the potatoes come up and are from one inch to two inches tall, a scarifier, or what we call a weeder, is used. This is worked the same way as the rows or ridges extend. A little later it is used again even when the potatoes are quite large size. Hand weeding and frequent cultivations with just a tendency to hill are practiced.

The potato growers in this section know little or nothing about spraying as compared to our American practices. In fact I did not see a good spray equipment in the entire section. In talking with the men, there were only a few who knew anything about blight or anything about some of our most common pests such as lice, potato bugs, flea beetles, rhizoctonia, etc. They are to be congratulated; our close knowledge and special corrective needs are expensive.

In many of the early fields towards the end of the season, not only between the rows is a cultivator used but also a deep soil-working tool such as a sub-soiler is used to loosen the soil to a considerable depth. Half

(*Turn to page 60*)

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, Crops, Crop Diseases, and Insects. 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

"Fertilizers for Tobacco" is the title of Bulletin 413, the most recent treatise on Tobacco from the Wisconsin College of Agriculture. The authors, James Johnson and W. B. Ogden, treat the subject broadly and in a most practical manner. They do not accept the general belief that more or better fertilizer is the panacea for all ills of the tobacco crop. The chief object of the bulletin appears to be to emphasize the importance of all soil factors involved, in an effort to effect adaption of a sound and practical farm program. The suggestions of the authors for such a program call for proper rotation, proper soil type, disease-free soil, disease-resistant seed, moderate use of manure, proper use of well-balanced complete fertilizers to supplement manure, and careful attention to sources of potash. Wisconsin tobacco growers should find this information both interesting and profitable.

The use of sulphur as a soil supplement has been regarded in the past by many investigators as a necessity. Results of six years' experimental work by the Texas Experiment Station where sulphur was applied in varying amounts on a variety of soils and crops do not warrant its use under Texas conditions as a fertilizer. Complete results of this work and a review of experimental work in several other States are published in Texas Experimental Station Bulletin No. 408, "The Effect of Sulphur on Yield of Certain Crops," by E. B. Reynolds.

"Commercial Fertilizers Agricultural Minerals, (1929)," State of Calif., Sacramento, Calif., Spec. Pub. 98.

"Fertilizer Registrations for 1930," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 495, *Jan.,* 1930, *Charles S. Cathcart.*

Soils

A valuable contribution to our knowledge of basicity and acidity of soil is made by the Department of Chemistry of the Texas Experiment Station in Bulletin 400, the title of which is "The Basicity of Texas Soils," by G. S. Fraps and E. C. Carlyle. It is a common knowledge that basicity and acidity are closely related to agricultural value of soils. Basic soils are generally better suited to growing of crops than acid soils. This bulletin should prove of interest to teachers and investigators interested in a study of short methods for determining acidity, basicity, and buffer capacity of soils in all parts of the country.

The efficiency of tillage implements depends to a large extent upon their design, with special relation to certain physical properties of soils which are ever present. Tillage, the greatest power-consuming operation on the farm as influenced by implement design, is treated exhaustively in Bulletin 229 by M. L. Nichols of the Alabama Experiment Station. "Methods of Research in Soil Dynamics as Applied to Implement Design" are presented and should prove of immense interest and value to manufacturers of tillage implements as well as soil technologists.

"Properties of Soils Which Influence Soil Erosion," U. S. D. A., Washington, D. C., Tech. Bul. 178, March, 1930, H. E. Middleton.

"Soil Survey of The Salinas Area, California," U. S. D. A., Washington, D. C., No. 11, Series, 1925, E. J. Carpenter and Stanley W. Crosby.

"Soil Survey of Wilson County, North Carolina," U S. D. A., Washington, D. C., No. 10, Series, 1925, R. C. Jurney and W. A. Davis.

"Soil Survey of Moody County, South Dakota," U. S. D. A., Washington, D. C., No. 2, Series, 1926, W. I. Watkins and G. A. Larson.

"Soil Survey of Hidalgo County, Texas, U. S. D. A., Washington, D. C., No. 13, Series, 1925, H. W. Hawker, M. W. Beck, and R. E. Devereux.

"Soil Survey Cameron County, Texas," U. S. D. A., Washington, D. C., No. 17, Series, 1923, M. W. Beck and B. H. Hendrickson.

"Soil Survey of Monroe County, West Virginia," U. S. D. A., Washington, D. C., No. 15, Series, 1925, J. A. Kerr.

Crops

One of the most interesting of the new bulletins which have come into circulation during the past month is Bulletin 414, University of Wisconsin, Madison, February, 1930, by G. B. Mortimer and the late Griffith Richards. "Permanent pastures in Wisconsin can be improved," the bulletin starts out. The following 28 pages are devoted to telling how and why. Excellent photographs on the experimental work done aid in the ease of reading this valuable information. Regarding the results of fertilizing, the authors state that perhaps the most significant observation to be made is that the largest yields were associated with the use of potash. Lime, phosphate, and potash gave significant increases on an old worn pasture on Miami silt loam. Lime alone gave 15.6 per cent increase; lime and superphosphate, 42.6 per cent; and lime, superphosphate, and potash, 153.2 per cent. On soils low in mineral fertility, nitrogen fertilization is not economical.

"Proceedings of the Sixty-second Convention of Fruit Growers and Farmers," Calif. Dept. of Agr., Sacramento, Calif., Vol XIX, No. 2, February, 1930.

"The Home Vegetable Garden," Colo. Exp. Sta., Fort Collins, Colo., Bul. 357, Feb., 1930, A. M. Binley.

"Ideal Types for Colorado Standard Potato Varieties," Colo. Exp. Sta., Fort Collins, Colo., Bul. 359, Feb., 1930, C. H. Metzger.

"The Causes of Degeneration of Irish Potatoes in Connecticut," Agr. Exp. Sta., Storrs, Conn., Bul. 160, Oct., 1929.

"Report of the Director for the Year Ending June 30, 1929," Agr. Exp. Sta., Storrs, Conn., Bul. 162, Nov., 1929.

"Lawns in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 209, Dec., 1929, C. R. Enlow and W. E. Stokes.

"Apprenticeship Practice in Training Teachers of Vocational Agricuture," Ga. State College of Agr., Athens, Vol. XVIII, Bul. 378, Jan., 1930, John T. Wheeler.

"Gardening for Health," Ga. State College of Agr., Athens. Ga., Vol. XVIII, Bul. 380, Jan., 1930, T. C. Morcock.

"Five-acre Corn Production Contest, 1929," Ga. State College of Agr., Athens, Ga., Vol. XVIII, Bul. 382, Feb., 1930, E. D. Alexander.

"Report of the North Louisiana Experiment Station for the Years 1928-1929," No. La. Exp. Sta., Calhoun, La., Bul. 204, Mar., 1930, Sidney Stewart.

"Report of the Rice Experiment Station for the Years 1928-1929," Rice Exp. Sta., Baton Rouge, La., Bul. 205, Mar., 1930, J. Mitchell Jenkins.

"Report of the Fruit and Truck Experiment Station for the Years 1928-1929," La. State Univ., Baton Rouge, La., Bul. 206, Mar., 1930, B. Szymoniak.

"Cannery Tomatoes—Results of Three Years' Tests of Varieties," Agr. Exp. Sta., College Park, Md., Bul. 318, Dec., 1929, Fred W. Geise.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XII, No. 3, Feb., 1930.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., Vol. VII, No. 3, Mar., 1930.

"Weeds of New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 219, Sept., 1929, Jessie G. Fiske.

"Geneva, A Greenhouse Cucumber That Develops Fruit without Pollination," Agr. Exp. Sta., Geneva, N. Y., Bul. 580, Feb., 1930, Leslie R. Hawthorn and Richard Wellington.

"Ohio Agricultural Experiment Station," Wooster, Ohio, Bimonthly Bulletin, No. 143, Mar.-Apr., 1930.

"Forty-eighth Annual Report for 1929-29," Agr. Exp. Sta., Wooster, Ohio, Bul. 446, Feb., 1930.

"Soybeans for Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Exp. Sta. Cir. 77, Mar., 1930, B. F. Kiltz.

"The Effect of Selection in the Tomato," Agr. Exp. Sta., State College, Pa., Bul. 248, *Jan.*, 1930, *C. E. Myers and M. T. Lewis.*

"Cotton Variety Tests—1929," Agr. Exp. Sta., Clemson College, S. C., Cir. 40, *Feb.*, 1930, *W. B. Rogers and E. E. Hall.*

"Three New Varieties of Lespedeza," Agr. Exp. Sta., Knoxville, Tenn., Cir. 30, *Mar.*, 1930, *S. H. Essary.*

"Virginia Department of Agriculture and Immigration," Richmond, Va., Bul. 268, *Apr.*, 1930.

"Thirty-Ninth Annual Report for the Fiscal Year Ended June 30, 1929," *Agr. Exp. Sta., Pullman, Wash., Bul.* 237, *Dec.*, 1929.

"Rotation and the Tobacco Crop," Agr. Exp. Sta., Madison, Wis., Bul. 412, *Jan.*, 1930, *James Johnson and W. B. Ogden.*

"Forest Nursery and Planting Practice in the California Pine Region," U. S. D. A., Washington, D. C., Cir. 92, *Jan.*, 1930, *S. B. Show.*

"Federal Legislation, Regulations, and Rulings Affecting Land-Grant Colleges and Experiment Stations," U. S. D. A., Washington, D. C., Dept. Cir. 251, *Apr.*, 1923, *revised Feb.*, 1930.

"Oats in the Western Half of the United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1611, *Dec.*, 1929, *T. R. Stanton and F. A. Coffman.*

"Vegetative Propagation from the Standpoint of Plant Anatomy," U. S. D. A., Washington, D. C., Tech. Bul. 151, *Dec.*, 1929, *J. H. Priestley and Charles F. Swingle.*

"Investigations in Weed Control by Zinc Sulphate and Other Chemicals at the Savenac Forest Nursery," U. S. D. A., Washington, D. C., Tech. Bul. 156, *Jan.*, 1930, *W. G. Wahlenberg.*

"Master Teachers of Vocational Agriculture," Federal Board for Vocational Education, Washington, D. C., Mon. No. 8, *March*, 1930.

"List of Bulletins of the Agricultural Experiment Stations for the Calendar Years 1927-1928," *U. S. D. A., Washington, D. C., Misc. Pub.* 65, *Jan.*, 1930, *Catherine E. Pennington.*

Economics

More and more is the government called upon to give services that were formerly provided by individuals or were not available. For instance, toll roads have given way to public roads. The increase in the services performed by governments necessarily means increased taxation. "The Cost of Government in Massachusetts 1910-1926," bulletin 256 by Hubert W. Yount and Ruth E. Sherburne of the Massachusetts Agricultural Experiment Station, is an interesting study of government costs in this commonwealth. The bulletin is very useful in showing the things which have happened in this State because it undoubtedly indicates trends applicable to other States.

"Cherries," Agr. Exp. Sta., Berkeley, Calif., Bul. 488, *Feb.*, 1930, *H. R. Wellman and E. W. Braun.*

"Some Evidences of Economic Progress," Ga. State College, Athens, Vol. XVIII, Bul. 384, *Feb.*, 1930, *Dr. Andrew M. Soule.*

"Farmers' Cooperation in New Jersey, 1926," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 487, *Oct.*, 1929, *Charles B. Howe.*

"Farm Family Living Among White Owner and Tenant Operators in Wake County," Agr. Exp. Sta., Raleigh, N. C., W. A. Anderson.

Insects

"The Rosy Aphid in Relation to Spray Practices in 1929," *Agr. Exp. Sta., Geneva, N. Y., Bul.* 582, *Feb.*, 1930, *P. J. Parrott and Hugh Glasgow.*

"The Oriental Fruit Moth," Agr. Exp. Sta., Clemson College, S. C., Cir. 38, *Feb.*, 1930, *C. O. Eddy, M. H. Brunson and W. H. Clarke.*

"Control of the Mexican Bean Beetle for 1930," *Agr. Exp. Sta., Clemson College, S. C., Cir.* 39, *Mar.*, 1930, *C. O. Eddy and W. H. Clarke.*

"Sweet Potato Sawfly," Va. Truck Exp. Sta., Norfolk, Va., Bul. 68, *July*, 1929, *P. J. Chapman and G. E. Gould.*

"The Mexican Bean Beetle and its Control," Va. Truck Exp. Sta., Norfolk, Va., Bul. 70, *Jan.*, 1930, *Neale F. Howard and L. W. Brannon.*

Diseases

"Angular Leaf Spot and Fruit Rot of Cucumbers," Agr. Exp. Sta., Gainesville, Fla., Bul. 207, *Oct.*, 1929, *George F. Weber.*

"Cucumber Diseases in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 208, *Revision of Bul.* 177, *Nov.*, 1929, *G. F. Weber.*

"Corn Diseases in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 210, *Jan.*, 1930, *A. H. Eddins.*

"Some Common Tomato Diseases and Their Control," Agr. Exp. Sta., Knoxville, Tenn., Cir. 31, *Mar.*, 1930, *S. H. Essary.*

"A Comparison of Wilt Resistant Tomatoes in Virginia," Va. Truck Exp. Sta., Norfolk, Va., Bul. 69, *Oct.*, 1929, *Frank P. McWhorter and M. M. Parker.*

"Inheritance of Fusarium Wilt Resistance in Canning Peas," Agr. Exp. Sta., Madison, Wis., Research Bul. 97, *Dec.*, 1929, *B. L. Wade.*

The Winogradsky Test

By Anthony T. Koelker

Ames, Iowa

A NEW method of studying nitrogen-fixing bacteria in the soil has been experimented with successfully by R. H. Walker, assistant chief in soil bacteriology, at the Iowa Agricultural Experiment Station. This new method, called the spontaneous culture method, was devised by Winogradsky, a noted Russian bacteriologist at Pasteur Institute, Paris, just recently. Relatively little work had been done on it in this country until the past year when Walker began his tests.

He found that this method is especially valuable in studying the occurrence and activities of nitrogen-fixing bacteria in their natural habitat. It indicates the suitability of various soils for crop production due to the fact that soils that are suited for the development of these organisms are also suited for good crop production.

From all appearances the new method of studying the nitrogen-fixing bacteria involves the simple making of a "mudpie." Five grams of starch are added to 100 grams of soil and then mixed into a thick paste, the surface of which is glazed, or patted smoothly over the top. Walker states that this mixture of starch and soil widens the carbon-nitrogen ratio and stimulates the growth of bacteria that are able to take their supply of nitrogen from the air.

Ordinarily common bacteria will grow in a substance containing 10 times as much carbon as nitrogen. But with the widening of the carbon nitrogen ratio, due to the starch, there is a large excess of carbon. Those organisms that get nitrogen from the air are the only ones that can grow successfully in this mixture. Hence, this "mudpie" is especially well fitted for growth of nitrogen-fixing bacteria, and as a result more conclusive experiments can be made.

After the surface of the mixture has been glazed, colonies of bacteria develop on it similarly to the manner in which they develop on agar, a jelly-like substance used in bacteriology experiments which is peculiarly adapted to the successful growth of micro-organisms.

The older method, which has been used extensively, involves the inoculation of 10 grams of soil into a nutrient solution of sugar.

The spontaneous culture method may afford a better means for testing the lime and phosphorus needs of soils, whereas by the older method it was impossible to determine these requirements. These needs will be indicated by the type of growth on the soil surface of the "mudpie." One portion of the substance is treated with lime, another with a phosphate, and a third part with both lime and phosphate. The resulting growths on these plots show which treatment produces the best results.

This additional information makes the newer method more practical, simple, and conclusive than the older and indefinite method, thus making it a beneficial change in research work in the field of soil bacteriology.

EDITOR'S NOTE:—*There is also a paper on this subject entitled "The Direct Method in Soil Microbiology and Its Application to the Study of Nitrogen Fixation," by S. Winogradsky of the Institute Pasteur, France, in the January, 1928, issue of Soil Science, Volume XXV, No. 1. Considerable interest has been aroused in Colorado by experimental work with the Winogradsky test, by Dr. W. G. Sackett, Bacteriologist. Dr. Sackett has been applying the test to soils all over the State and in a short time will publish his findings. In connection with his studies in certain districts in the State of Colorado, deficiencies in potash and phosphorus were found.*

Sweets *for* Exhibit

By H. S. Benson
County Agent, Vincennes, Indiana

A FEW years ago it would have taken no small amount of courage to advocate to the growers of sweet potatoes of Busseron Township, Knox county, Indiana, that they feed their soil a liberal amount of fertilizer to produce quality sweet potatoes. Today, through the leadership of the vocational boys supervised by B. T. Bond of the Oaktown High School, the growers are wanting to know the kind and amount to use.

The vocational boys have led the way through their sweet potato 4-H club by not only producing the potatoes, but in making an exhibit at the county Indoor Fairs, and by marketing the crop cooperatively and securing a premium for it. The success of the production and marketing of the sweet potatoes by the 20 vocational boys lies in being able to produce a large per cent of potatoes that grade U. S. No. 1, which not only yield better but cost less per bushel to produce.

The use of 500 pounds per acre of fertilizer analyzing 3-10-12 increased the yield of No. 1 potatoes 128.9 per cent and the crop yield 104 per cent, at a total cost of $11.08, making a profit of about $90 per acre.

In a study of yields from different members of the vocational class, those using fertilizer obtained yields from 244 to 315 bushels per acre, with an average of 274 bushels. The yields of non-users of fertilizers ranged from 52 to 166 bushels, or an average of 118 bushels, making a difference of 156 bushels in favor of the users of fertilizer.

The members of the class who used fertilizer had no trouble in securing a uniform grade and presenting a package of pleasing appearance to the buyer. Their potatoes were smoother, better shaped, showed less disease, and the kind that the housewife likes to buy for her family dinner.

These young future farmers are leading the way, and all other growers are watching and following their lead, with the result that all are planning to use disease-free treated seed on clean ground and with a liberal amount of well-balanced fertilizer for their 1930 crop.

The New Yearbook of Agriculture

The annual Yearbook of Agriculture published and distributed by the United States Department of Agriculture is now in circulation. Like its predecessors, the volume is a gold mine of recent scientific, technical, and economic information on American agriculture, presented most attractively illustrated and indexed for latest reference. The whole is as complete a picture of what is being done to better the agricultural industry in the United States as possibly can be found anywhere.

A change has been made this year in that the present volume is called "Yearbook of Agriculture 1930," designating the year in which it is printed rather than the year of activity which is surveyed. The new system of dating more truly indicates the strictly up-to-date quality of the volume. This procedure does not break the continuity of the statistical and other material published, nor does it involve any omission in the Yearbook series.

Led by a Boy

(*From page 26*)

This crop was produced with no regular potato machinery except a planter. This necessitated a greater expenditure of money for labor and a consequent increase in cost per bushel.

The project was well planned and well executed as the results show, and has led to increased potato plantings in this section, particularly an increase in the use of nitrogen and potash fertilizer. Until this project was run hardly any potash fertilizer was used. The increase in the use of these fertilizers has increased our production and will continue to increase it, making a greater net income for the farmer.

Staked Tomatoes

(*From page 25*)

the roots.

The third step consists of driving a stake into the ground close to each plant. This stake will need to be at least three inches away from the plant so as to injure the root system as little as possible. Rows of staked tomatoes running north and south are said to be more apt to produce sunburned fruits than those running east and west. Where it is convenient to arrange for such plantings, it is best to do so. The shade from one plant protects those next to it more when the rows are east and west.

These stakes can be secured from the woodlot or can be purchased at a lumberyard. Six or seven feet is about the right length for these stakes. An inch by one and one-half inches is the approved thickness for stakes. As soon as the plants are 12 or more inches high, they can be tied to the stakes. Space between the stake and the stem of the plant is allowed for the stem's enlargement. Some soft cloth or twine is used in tying. The string is used to hold the plant stem close to the stake; no attempt is made to keep the string from slipping down the stake. A new string is used for every 12 inches or so in the height of the plant.

Suckers appear on the tomato plants. When plants are grown on stakes it is necessary to remove them to prevent over-crowding the planting. A sucker appears in the axil of every leaf. It is easiest to remove these while they are very small. They are easily located between the main stem and every leaf and can be pinched out by hand.

Tomatoes grown on stakes will contine to bear fruits until killed by diseases or by frost. A good early variety such as the Bonny Best is preferred by most gardeners. Where wilt infested soils are used, the Marglobe variety is planted.

The plan suggested for growing tomatoes on stakes will, if tried out, lend attractiveness to the garden and to working in the garden. It is a practical way of economizing on space and at the same time improving the quality of the garden tomato fruits. It also speeds up the time when the gardener can eat his first home-grown tomato. The early fruits are picked more often than not from the staked and suckered tomato plant.

Pastures

(*From page* 28)

much less attention than our cultivated crops. For a long time American agriculture expanded its crop acreages pretty largely at the expense of pasture. When land was once taken out of the wild pasture only a small portion of it has usually gone back into grazing use. Only about one-tenth of the area of our improved land is used for rotation or permanent pasture.

Recently, however, the agricultural industry has come to a fuller realization of the value of pastures in the livestock industry. Pasture is now known to be the most economical source of feed for milk production. It furnishes a balanced ration at a relatively low cost, and the cow does her own harvesting, leaving at the same time a fair amount of original soil fertility absorbed by the plants on the land. From now on it is very probable that the better pastures will not be left to themselves to anything like the degree that they have been disregarded in the past.

Even the pasturing of mature crops on cultivated land is more and more finding a place in our agriculture. Increasing acreages of corn, cowpeas, velvet beans, peanuts, soybeans, and other crops now are harvested by grazing. The animal does the harvesting in a fairly economical manner and removes much less of the original fertility from the soil. According to the census of 1920, there were harvested by the pasture method 2,350,000 acres of corn, about 1,000,000 acres of cowpeas, about 800,000 acres of velvet beans, 1,125,000 acres of peanuts, and 174,000 acres of soybeans.

Our pasture plants are of many kinds. Native grasses are abundant in some sections, but more and more tame grasses and clovers are supplementing and replacing the native grasses. Of the tame grass plants probably the most used in humid regions are blue grass, white and alsike clover, red clover, timothy, and alfalfa. Practically all of these were introduced from Europe, the blue grass coming over with the early French settlers and spreading throughout the humid pasture areas of the Northern and Central United States. In the Southern States most of the grasses and clovers suitable to the humid Northern section have not proven satisfactory and the livestock development of the south has been handicapped by a lack of suitable pasture plants. The accidental introduction of such plants as Bermuda grass, carpet grass from the West Indies, and Lespedeza from Japan has brought about a marked improvement in the Southern pasture outlook.

Better management of pastures by means of more careful grazing and fertilizers will probably make rapid progress in the United States from now on. Pastures respond to care and fertilizers fully as well as most of our crops. The application, particularly of mineral fertilizers such as the phosphates and the potash carriers, has proved very effective. Lime likewise is giving good results in many areas. The reseeding of old pastures with supplementary plants such as the grasses and clovers, particularly adapted to the locality, is bringing results in many trials. The introduction of such crops as sweet clover, which produces large yields per acre and makes possible high carrying capacity, is going to be helpful in regions where these crops readily can be grown.

Study and experimentation with pasture problems are now being pushed as never before and valuable information is being accumulated. The years just ahead will probably add much to our knowledge of the subject of pasture and result in much improvement in our pasture management.

Opportunity

(*From page* 30)

The "Twin Buttes Seed Farm" takes its name from two hills or buttes behind the Wagner house. The farm now has a seed cleaning plant which is more modern than the ones in many city warehouses. Some of the machines have been bought and some built. They are all connected with hoppers and elevators so that hard work is cut down to a minimum.

From a moderate start with a few acres of grass seed in 1922, the business has now grown until Mr. Wagner needs a full-time bookkeeper. Telegrams and long distance calls come in from everywhere, just like a city business. Mr. Wagner does not do any retail trade. He says he can make more money by selling a carload of seed by a telegram than he can by selling it out in little dabs for 10 cents a pound. Trips 10 miles to town and back cost money and he can't bother with them.

He says, "There isn't anything particularly remarkable about the growth of this seed business. It is a specialized business and there aren't so many in it as there are in wheat for instance. A firm 4,000 miles away can depend upon my quality as well as a firm right here. Maybe my policy of always trying to give them a little better stuff than they expect has helped in getting contracts, but it seems to me that the big reason for the present size of my output is because I have never been afraid to take on all the business I could get.

"Whenever old Dame Opportunity knocks I ask her in and don't let her stand there waiting. If she tells me I can grow 500 acres of Austrian peas, I look around and see if that can't be stretched to 5,000 acres. If I can talk with an Atlantic Coast firm in terms of all they will need of a certain kind of seed, they begin to sit up and take notice."

Peat and Alkali Soils

(*From page* 8)

where the alkali salts are apt to accumulate. Below the slough the two tile lines may run together. If the slough is not wide, the two lines of tile may provide adequate drainage.

Liberal application of manure on alkali soils will increase the rapidity of the removal of the alkali salts in the drainage water and will hasten the reclamation of the area. If manure is not available, other forms of organic matter such as corn-stalks, cobs, or straw may be used. Weeds, winter rye, or early oats plowed under also serve as organic matter. Sweet clover is one of the best green manure crops to plow under on alkali soils. Deep-rooted crops are the best for growing on alkali soils.

Tests conducted on three alkali fields in Kossuth county indicate that the application of muriate of potash, 200 pounds per acre, will give increased yields of 7 to 16 bushels of corn per acre, depending on the amount of alkali salts present in the soil. In one field where corn had never been grown satisfactorily 36 bushels per acre were secured when potash was applied at the rate of 300 pounds an acre and 43 bushels when 400 pounds per acre were applied. An application of 300 pounds of 0-10-10 mixed fertilizer resulted in a yield of 42.4 bushels per acre in the same field. The 400 pounds of potash, however, resulted in a larger yield in a better quality of grain, only 32 per cent of the corn being unmarketable as compared to 60 per cent of that grown on the plot treated with mixed fertilizer.

Although the actual increase in yield of corn because of fertilizer on alkali soils is not so great the increase in quality is still more important. Of the corn on the untreated plot, 73 per cent was unmarketable.

Crotalaria

(*From page* 23)

During the last four years of this same period, a test covering all of these crops except Mexican clover was run at the Citrus Experiment Station, Lake Alfred. The acre yields of nitrogen for the different crops were as follows: Crotalaria, 103.3 pounds; velvet beans, 47; cowpeas, 33.7; and beggarweed, 26.1 pounds.

With yields like this, and with millions of acres of poor soils crying for something to restore their lost vim, vigor, and vitality, it is little wonder that Crotalaria is forging to the front as a summer cover crop for soil building purposes. In addition to the nitrogen content of the plant, it supplies large quantities of much needed organic matter or humus to the soil. Five to fifteen tons of green material, the average annual yield of Crotalaria, turned into an acre of soil will result in a tremendous increase in the number of bacteria and other soil organisms necessary for plant growth. In addition, this decaying organic matter will absorb and hold moisture, making it available for the growing plants during dry weather, and will result in a more friable soil.

But after all, the acid test of a soil-improving or cover crop is its ability to effect increased yields in succeeding money crops on the same land. The cover crop has cost the farmer money to produce it, and he has received no direct return. His justification for growing such a crop is its effect on the land, and, through the land, succeeding crops from which he obtains revenue. If a cover crop turned into the soil will result in yields of money crops sufficiently increased to pay the cost of the cover crop and still leave a profit, then the cover crop has been justified. How does Crotalaria stand up under this test?

It has proven itself to be especially good in groves and orchards. Tree crops seem able to use the plant food it furnishes, without letting a great deal of it be lost through leaching from the soil. In Florida Crotalaria has been grown extensively in citrus groves, pecan orchards, and tung-oil groves, and it has come through with flying colors in each case. In fact, it is in such groves and orchards that the crop largely is being planted at present.

Compare With Other Legumes

At the Citrus Experiment Station, Lake Alfred, Florida, Crotalaria is being tried in comparison with clean cultivation, velvet beans, beggarweed, cowpeas, Natal grass, and a rotation of legumes. A young grove, set five years ago, was divided into plots so that these various cover crops could be tested for their effect on tree growth. All plots have received the same fertilizing, cultivating, and other treatment except for the difference in cover cropping. The trees in the Crotalaria plots have made considerably more growth, in both height and circumference, than those in any other plots. In fact, the investigators declare that these trees are now receiving too much nitrogen, and they plan to reduce the quantity of nitrogen applied in the fertilizers on the Crotalaria plots.

Citrus growers who are using Crotalaria in their groves report similar results. One grower recently made the statement that he had saved $1,000 a year or $25 an acre in fertilizing a 40-acre grove where Crotalaria was grown each summer. Another grower stated that he had practically eliminated nitrogen from his grove fertilizer.

Owners of citrus groves where the trees are so big as to cover the ground almost completely, leaving little room for the growing of cover crops, are already considering plans for growing Crotalaria on near-by lands and hauling the cover crop onto the citrus grove. Some of them are doing that very thing this year.

This crop has been tried in pecan groves in Florida, Georgia, Alabama, and perhaps elsewhere. Florida Experiment Station workers report that this crop has a salubrious effect on tree growth. Indications are that the crop will result in increased nut production, also, but the tests have not been running long enough for this to be definitely announced.

Crotalaria is grown every summer in thousands of acres of tung-oil groves near Gainesville, Florida, and helps to bring the young trees into early production, at the same time lessening the fertilizer bills in connection with the groves.

While Crotalaria is especially good for tree crops, field crops are not planted soon enough after the Crotalaria begins to decay to receive full benefit from this cover crop. Particularly is this true on sandy lands, where rapid leaching takes place. Actual tests along this line have been rather few. However, the Florida Station is running more experiments on this phase.

Results Favor Crotalaria

Results of two tests have been announced by Mr. Stokes of the Florida Station. One concerns the yields of corn on some quite poor land, and shows that both velvet beans and Crotalaria practically doubled the yield of corn, while beggarweed and cowpeas caused a 50 per cent increase in yields, over a period of four years. Over a similar period, sweet potatoes planted where Crotalaria had been plowed under the preceding fall returned increased yields amounting to 40 per cent. Cowpeas, beggarweed, and velvet beans gave increased yields of sweet potatoes ranging from 2 to 10 per cent.

Certain of the Florida Experiment Station workers believe that Crotalaria can be used to advantage to precede fall, winter, and early spring truck crops, but no tests have been made to determine this point. It is believed that the leafy vegetables, which need nitrogen, would do well following Crotalaria.

So much for Crotalaria as a cover crop. That has been the principal use of the plant to date, as livestock do not relish the plants of either the striata or spectabilis species, and thus it has not been used as a forage or feed crop. However, the ground Crotalaria plants have been fed in comparison with alfalfa meal, and found to be worth about three-fourths as much, pound for pound, as the latter. Occasionally, stock have eaten the green striata and spectabilis plants with no ill effects, although certain species of Crotalaria are poisonous to animals.

Professor G. E. Richey, assistant agronomist at the Florida Experiment Station and associate agronomist of the Forage Crops Office of the United States Department of Agriculture, is testing two species which he believes have excellent forage possibilities. These are grantiana and maxillaris. Foliage of these species is sweet, in taste strongly resembling the foliage of alfalfa. The grantiana grows to a height of about three feet and is quite bushy, producing a tremendous amount of foliage. The maxillaris grows to about three and one-half feet, but is not as bushy as the other species.

Crotalaria has already established its place in the sun as a cover crop for soil building. It is possible that in the near future it may begin to shine equally as well as a forage crop.

Legumes Bring Prosperity

(*From page* 11)

legumes into thrifty growth are finding it increasingly more difficult to get good stands. They have gradually depleted the fertility of their lands by exhaustive cropping in grain and cotton until the more particular crops like clover, alfalfa, or beans just won't do anything unassisted.

Literally millions of dollars worth of legume seed is scattered over the earth each spring with hope which in a great measure is unfulfilled. This demonstrates that farmers know what legumes will do for them, but they must learn how to insure their success.

Two essential conditions required by this family of plants must be fulfilled. First, the seed must be inoculated. Inoculation is a big word but it means a simple thing, costs a trifle, and requires only a few minutes to accomplish. Second, because legumes are able when inoculated to get a part of the nitrogen they need from the air, it has been too generally overlooked that these crops nevertheless are gluttons for the mineral plant food elements.

Few soils of this country are naturally rich enough in lime, phosphorus, and potash to supply all that these plants can transform into valuable protein. The United States Department of Agriculture places the burden of legume failures primarily on lack of fertility of the land.

To insure investments in legume seed and cash in, to the fullest, on the protein dollars which they produce it is essential to supplement the plant food of the soil by generous applications of commercial fertilizers. To be sure this entails a little more investment, but this item is insignificant in the light of the dividends which begin to accrue in less than 100 days.

Twenty years ago when clover seed

was worth only 10 cents a pound, it didn't matter so much if a seeding failed to catch. Today, with the seed worth 30 cents a pound, it is folly to plant the crop on sour or thin land. It is even more necessary that a seeding of alfalfa be provided with the conditions it requires to thrive. Even soybeans and cowpeas, which do fairly well on moderately acid soil, demand plenty of phosphoric acid and potash.

The cost of sufficient fertilizer rich in phosphoric acid and potash to insure good stands of clover or alfalfa in most cases is less than $5 an acre. If the fertilizer is applied to the small grain nurse crop with which the legume seed is sown, the profit from the increased yield of grain resulting will more than pay for the treatment. Investigations show that about 60 per cent of the fertilizer applied to a grain crop remains to nourish the succeeding crop. Hence, in reality to insure good crops of these legumes with plant food really costs nothing.

For clover and alfalfa a fertilizer containing 16 per cent or more of available phosphoric acid and at least six per cent of potash applied at the rate of from 250 to 375 pounds to the acre through a fertilizer attachment of the drill is recommended for the average soil. If the land is thin and hasn't been recently manured, it is better to use a complete fertilizer containing two per cent nitrogen.

Soybeans and cowpeas need about the same amount and kind of fertilizer as do the perennial legumes. However, they are a bit more sensitive to concentrated plant food mixtures so that it is always best to apply the fertilizer in a separate operation and mix it thoroughly with the soil before planting.

A farmer or farm adviser who reads these facts and agrees that they are sound only completes his duty when he acts upon them. Legumes in rotation boost the yields of all other crops that follow, but to keep legumes in a thrifty state they must be fed. A ton of fertilizer costing less than $30 brought better than $300 return in a four-year rotation including a legume crop as a 30-year average at the Ohio Agricultural Experiment Station. Returns such as this mean more prosperity—nothing less.

The Inquiring Mind

(*From page* 15)

but could not choke the brute. It bit and scratched his hands.

The struggle lasted for almost two hours; then Edward remembered a bottle of chloroform in a pocket of his coat, got hold of it, removed the cork, and thrust the contents down the fumart's throat. That quickly ended the fight.

Edward won. *He got the beast!* And he rejoiced that it was taken without the slightest injury to its skin.

Many more episodes of like nature might be described, but what has been said will suffice to demonstrate the "do or die" character of the man. Nothing deterred him. Always he got what he went after. There was no such world as *cannot* in his vocabulary. His enterprise and persistency were inspiring.

One might have heard him philosophically saying:

"Anyone having the mind and will, need not stick fast, even in this world. True, he may not shine so greatly as if he were better polished and better educated but he need not sink in the mire altogether."

And we can understand the incentive behind his efforts, from his own explanation. He said:

"I never succeed in describing my

unbounded admiration of the works of the Almighty; not only the wonderful works which we ourselves see upon earth, but those wondrous and countless millions of orbs which roll, both near and far, in the endless immensity of space—the Home of Eternity. Every living thing that moves or lives, everything that grows, everything created or formed by the hand or the will of the Omnipotent has such a fascinating charm for me and sends such a thrill of pleasure through my whole frame that to describe my feelings is utterly impossible."

Would that all of us were imbued with the inquiring mind and seeing eye of Thomas Edward who fought the fight of science inch by inch, until he could fight no more and, as Smiles said, "also fought the fight of honest poverty—a great triumph and a great glory!"

"The honest man, though e'er sae
poor,
Is King o' men, for a' that."
Burns.

Potatoes Pay in Oklahoma

(*From page* 18)

Demonstration No. III—W. A. Loftin, Idabel, McCurtain County.

Amount of fertilizer per acre	*Analysis of fertilizer*	*Bushel yield per acre*
700 pounds	4-8-6	119
400 pounds	4-8-6	79

Thus it was seen there was a 40-bushel increase by the use of 300 additional pounds of commercial fertilizer. Forty bushels at $1.30 per bushel equals $52.00. Mr. Loftin reported $6.00 additional cost for fertilizer, thus giving a net increase of $46.00 per acre.

There are a few growers who have taken up the side-dressing of potatoes with nitrate of soda. Mr. Q. T. Bethel, Savanna, Pittsburgh county, using the Triumph variety of Irish potatoes, applied 150 pounds of nitrate of soda per acre as a side-dressing on one plot of potatoes. The acre yield was 256¼ bushels. The acre yield on the check plot was 236½ bushels. The increased yield of 19¾ bushels at $1.00 per bushel equalled $19.75. The cost of the nitrate of soda was $6.75, making a net increase of $13.00 per acre.

Cooperation

Perhaps there has been no one county in the State that has practiced co-operative grading and marketing as has Pushmataha county. The local association there consists of about 250 members who bring their potatoes into a central shed where they are graded, loaded, and sold co-operatively, and the expenses prorated to the

Showing what happened to the yield when the percentage of potash was increased from 8-4-4 (left) to 8-4-8 (center) and 8-4-12 (right).

growers. This year they have employed a manager to look after the details of the work. They marketed cooperatively 31 cars, although there was some complaint as to what they thought was a little high expense for grading and selling which amounted to 16 cents per hundred pounds. The average receipts were $1.02 per bushel.

The Fourth Oklahoma Annual Potato Tour was held June 3rd to 8th, inclusive, taking in the following counties: McCurtain, Pushmataha, Bryan, Atoka, Pittsburg, McIntosh, Muskogee, and Wagoner. We had with us on the tour Dr. William Stuart of the U. S. Department of Agriculture, Professor E. E. Isaac, Extension Horticulturist, University of Montana, and Mr. Marx Koehnke, Alliance, Nebraska, of the Nebraska Certified Potato Growers' Association.

Better Sweets

(*From page* 16)

No. 1's. The value of his crop was $490, cost of production $89, net profit $401. The fact that the 180 contestants reporting averaged a yield of 300 bushels per acre of which 176 bushels were No. 1's and that the average net profit was $125 per acre, proves conclusively that profitable yields of sweet potatoes can be grown in South Carolina.

An average of 1,150 pounds of commercial fertilizer was used by the prize winners, the most common formula being either an 8-3-8 or an 8-3-10 (PNK), suggested by the extension horticulturists. Many other contestants, however, used different amounts of various analyses. The yields were considerably larger on the average where larger amounts of fertilizer were used. A comparison of yields where 800 pounds or more of fertilizer were used against less than 800 pounds indicates that the recommendations to use 800 to 1,000 pounds per acre were not too high. About 50 contestants used 1,100 to 1,500 pounds per acre. Records from 120 growers using 800 pounds or more show an average of 189 bushels of No. 1's, while the records of 53 growers using less than 800 pounds, show an average of 145 bushels of No. 1's.

The liberal use of potash played an important part in the production of high yields and of a high percentage of roots of the desirable "chunky" shape in greatest demand on the markets. In the Middle district 49 growers using eight per cent potash or more averaged 185 bushels of No. 1's, while 33 growers using less than eight per cent averaged 158 bushels of No. 1's. In Orangeburg county, where many sweets are grown, 16 growers using eight per cent potash or more averaged 202 bushels of No. 1's, while five growers, using less than eight per cent, averaged 151 bushels of No. 1's. All of the State prize winners except one used analyses containing 10, 12 or 15 per cent potash. It seems logical therefore to conclude that for large yields and high percentage of No. 1's a liberal amount of a good fertilizer high in potash is a first necessity.

Next in importance to liberal, intelligent fertilization should perhaps be named plenty of plants per acre. Tests having shown that close spacing commonly results in larger yields, the directors of the contest recommended rows not over 42 inches apart. A study of the results shows that in all except two cases closer spacing gave larger yields, and many of the growers writing of their experience in the contest have referred specifically to the importance of close spacing in obtaining high yields. The results indicate that rows should be 36 to 40 inches apart, with plants spaced eight to 12 inches apart in the rows. A few growers insist that rows might be even closer than 36 inches.

Time to Plant

Early planting gave, on the average, best results, the largest yields having resulted from April and May plantings, in all except two cases, while yields from July plantings were noticeably low. The winner of the State prize planted April 15, but the winner of one of the district prizes did not plant until July 15. However, some good growers have found an objection to planting before June 1, feeling that a better quality of potatoes is obtained from somewhat later planting dates. This involves such points as shape, size, and smoothness in making a first class marketable product. Early plantings yielding more bushels per acre may also yield rough, cracked, or diseased sweets. The horticulturists believe now that in general planting should be done between May 1 and June 15.

Vine cuttings seem to have one important advantage over sprouts in that they produce a crop less likely to be diseased, and for this reason they are preferred by some growers. They should always be used, therefore, in the production of seed sweet potatoes. The vine cuttings also are said to produce roots of smoother and better finish. However, because of the lateness of the crop made from vine cuttings, the yield is often less than that from sprouts. The conclusion is naturally drawn that if early maturity or largest yield is desired, sprouts should be used instead of cuttings; if a marketable product of high quality or seed stock that is disease-free is desired, vine cuttings are to be preferred to sprouts.

Tests made at the North Carolina Experiment Station and practical experience have caused definite advice against the use of stable manure in growing sweet potatoes, the idea being that the compost causes the roots to be rough, cracked, and diseased. The South Carolina sweet potato contest results show that a good many growers used stable manure, and that especially in Horry and Lee counties, where many potatoes are grown, those using stable manure made considerably higher yields than those who did not. In two other counties the reverse was true. Noticeably bad effects seem to follow unless the manure used is well-rotted and thoroughly mixed with the soil.

The winner of the State prize used four loads of stable manure on his acre and the winner of one of the district prizes used 13 loads, and their yields are interesting: McCutcheon, the State prize winner, made 468 bushels, of which 378 bushels were No. 1's; while C. W. Galloway, a district prize winner, made 501 bushels per acre, of which 311 bushels were No. 1's. It seems safe to say that only small quantities of stable manure should be used under sweet potatoes and that it should be well-rotted and thoroughly mixed with the soil.

Suggestions for Success

A study of the South Carolina sweet potato contest leads to the following suggestions to growers especially those in southeastern States with conditions similar to those in South Carolina.

1. Use only the best seed potatoes or plants.
2. Use sprouts for earlier and larger yields, which will be of satisfactory quality except in unfavorable seasons.
3. Use vine cuttings for sure production of smooth, disease-free sweet potatoes.
4. Set plants in the field fairly early—May or first half of June.
5. Use plenty of plants—8 to 12 inches apart on rows 36 to 40 inches wide.
6. Fertilize liberally—800 to 1,000 pounds of a fertilizer high in potash.

Potatoes in England

(*From page* 44)

way between the potato hills in many of the early fields cabbage is planted. As the potatoes are dug by hand, the cabbage is not damaged and this practice gives an opportunity for two crops to be obtained from the land in one year.

The potatoes after digging are graded or "racked," as it is spoken of there. The grades differ from ours—their best potatoes being 1⅝ inches or over in size. The smaller potatoes are kept on the farm mostly for feed. This gives a larger number of potatoes in the top class.

The potatoes are sold by the ton, either being placed in cars (freight) and sent to distant markets like London, are carted in to near-by markets such as Liverpool. Many of the potatoes, however, are sold to commission men, the selling to commission men being a common practice in that country. The price of potatoes at this writing in that section is less than in this country; the average price being $13.38 for an English ton or approximately 33 cents per bushel.

When figuring the cost of potatoes with the men in that section, I found that it costs them approximately $170.00 an acre to raise potatoes. There were a few of the growers that it costs over $200 per acre up to selling. Many of the growers said that at seven tons per acre there was very little if any money in potatoes. But they do know that if they received 10 tons yield per acre and 3 pounds 10 shillings, about $17 American money per ton, that they could pay all their bills and receive pay for their own labor and other labor employed. It is readily seen that this is not unlike conditions which we have in our country.

In making up these figures, it is interesting to compare the costs of labor with some of our costs. A man for general farm work costs 35 shillings per week or $8.40. A good teamster and all-around man will cost $9 per week. Women for picking up potatoes, for cutting potatoes, hoeing, and other work on the potato field and working 49 hours per week cost as follows:

Over 21 years of age, six pence per hour—12 cents American. 18 to 21 years, 5 pence per hour—10 cents American. 16 to 18, 4 pence per hour—8 cents American.

Boys are paid from 3 pence to 6 pence per hour according to age and ability, 6 to 12 cents American money. These wages are, of course, less than our American wages. Where men, women, or boys are hired, they are not permitted to remove produce from the farm. They do not necessarily live on the farm, nor is the house, milk, firewood, or any other item furnished them. All they get is their wages.

Slow Motion

(*From page* 4)

We of the bygone equine age were usually on the defensive, like the poor old family barns that have become repair shops and garages in our Midwestern towns. We were on the defensive when a new horse was purchased, and forever remained so against tangled harness, axle-grease, ammonia fumes, colic, fistula, bots and distemper. Yet how glorious the defensive, even when figuring in a runaway episode with a fractious colt and a timid flapper of the Flora Dora vintage! Shade of De Quincey! Can any roaring motor race provide a nobler element of uncertainty or give more horrid fabric to a feverish dream than a wild colt with a tough bit?

But the kind we went sparking with were livery stable horses, trained to lather up for impatient overland drummers before the great Gideonite reform. Our own horses in the family barn had a proprietary, kindred outlook upon the calm Victorian epoch that made our relations with them far less fraught with bodily hunger, albeit subject to imposition. Our family's traveling defensive was truly one against equine imposition. Frequently there *was* no defense, except to change the subject and button up our linen dusters.

SPEEDING UP

This two-row hand corn planter was made by one of the early pioneers of Miami county, Indiana. It recently was presented to the Miami County Historical Society. The man holding the planter is Mr. E. Dutchess, Custodian of the Miami County Court House.

UNDERTAKING a journey to cousins in Watertown, thirty-five miles away, called for much detailed foresight, as well as punctuality at breakfast table on the dawn of our departure. On the day before this journey the harness was examined, the axles greased, the springs oiled, and the horse curried and well bran-mashed and bedded down against the exigencies of the Marathon. Bulky hampers of lunch, rattling tin cups, bottles of cold tea, arnica and liniment, the rope halter and the "rum" strap, wrenches and lap-robes, fly-nets and side curtains, and a bag of oats—these and other sundries engaged the stewards and hostlers against that serious venture. Why Americans ever felt a need for lessons in preparedness so late as 1917 is not for me to answer!

Preparedness for this long anticipated travel, (it might have been spelled "travail") included special dressing for the occasion. Father's kindly face had an uneasy dignity beneath the stiff, black derby which he scorned to wear at home. Mother and the girls played their courageous best in whatever little adornments their happy ingenuity and slender means afforded. Experience had taught them not to wear bonnets which crushing would utterly destroy, or fabrics that dust and mud would entirely ruin. The habiliments of the delighted small boy, perched beside Father in the front seat, little concerned him.

"WE must favor old Kit for the first ten miles until we get to Cringle's corners," was the policy laid down by Father, as he clucked to the mare and we rode past the first envious neighbor's place. No wonder the mare wiggled her ears and flung her tail over the reins at this prompt surrender to her habitual imposition. The sun was not yet above the horizon, the roads were clear of traffic, and the air was refreshing and cool. Yet Father allowed the old impostor to lag along in lackadaisical fashion until we hove in sight of Cringle's corners. By that time the sun was scorching hot, the dust puffing up in stifling clouds, and Mother had discovered that Kit was sweating where the harness rubbed her hide.

This meant a rest for the mare under the elm tree at the foot of Gay's hill, at which time the lunch was uncovered and messed around from hand to hand. When we had crept at last over the brow of that long and sandy hill, a noisy, spark-spitting traction engine hove in sight on its way to the threshing. Out we all piled, while Father trudged on ahead leading our mare and equipage past the snorting demon over which Kit pretended such frantic alarm.

Thus we proceeded until the end of the journey, making thirty-five miles in about six hours. We became martyrs to Christian forbearance and exemplars of humane, unselfish principles. No inanimate mechanical contrivance or careless machinist could receive the blame in those days for our tardiness, our weariness, or our unkempt and grimy persons. To our hosts we explained about "slow roads," and then "washed up" for dinner.

SOMETIMES, when one of us went alone to Watertown, we took the stage. The exertion of driving old Kit, plus stabling fees, was extravagance unless the whole family participated in the alleged benefits.

The stage of the seventies and eighties inherited a flickering suggestion of the erstwhile glamor of the overland coach. This traditional spirit was manifested chiefly in the person and behavior of the driver, who was usually a retired liveryman known to every small storekeeper and farmer along the trail. Of course, the small boy rode up ahead with the driver unless there was some pretty school-ma'am on the passenger list. At such times there was no space for urchins on the front seat.

The conveyance was often a democrat wagon over which had been built a light framework covered with canvas or tarpaulin. There were two or three hard seats, listless springs, wheels with loose spokes, and some space at the rear for baggage, parcels, and the mail. The stage line usually operated a star route to carry mail for farms and hamlets, and the driver was the trusted messenger and errand boy for busy merchants and busybody old ladies.

PERHAPS the sole comfort for us when we took the stage in lieu of our own outfit was the opportunity to witness the struggles of another driver with perverse horseflesh and miserable roads. In such a position we could indulge in ironic comment because our ticket entitled us to *some* compensation. Yet the ready rejoinders of the stage driver made it uncomfortable for loquacious ones who had the temerity to "start something."

Whatever appeal the cross country stage held for the adventurous youth of those days was eclipsed by the swash-buckling careers of the hotel bus-drivers. Passengers alighting from any of our "four trains daily" found five gaudily painted side-seaters lined up at the edge of the depot platform. Two of these vehicles were "ten-cent rigs"—precursors of the jitney—"any part of the city for one dime." The drivers of the other three buses stoutly proclaimed rival "hospitalities," usually taking forcible possession of luggage and wearing apparel in delightful disregard of owners or ownership. When the disheveled spoils had been securely seized by the respective pirates of refreshment, the whole procession turned and "larruped" down the rutty streets at a speed calculated to discourage any captive guest from jumping out before his name had been scrawled on the hotel register.

The man who originated the Gideon idea of hotel reform probably first saw the light of inspiration under such circumstances. To make this memory complete, it may be recalled that not infrequently the dapper hotel clerk, himself, rode down to the depot to meet the trains. With pointed yellow shoes, peg-top trousers, and a rose in his lapel, his presence was especially urgent when the county teachers' institute met in convention assembled. Ordinary traveling men and lyceum stars could be bundled into the narrow buses with easy dispatch, but a bevy of visiting ladies required the town's most polished professional welcome.

AT mention of professional polish as against mere crude efficiency, we stir anew old thoughts of small town funerals. We have lived through scores of them, albeit we cannot hope to maintain that record forever.

Herein lies a fundamental which marks the difference between funerals then and now. The family horses and livery turnouts were in their real element at a funeral. I recall only one instance of bad judgment with colts, which resulted in a runaway hearse. For the most part the slothful nature of our horseflesh gloried in the decorum of a processional toward the cemetery. It was, therefore, no hard task for us to maintain the dignity and slow motion fitted to the interment of a fellow townsman. But now we find it difficult to move along in solemn array, at suitable, uniform distances apart, although the successful salesmen of high-priced cars often mingle in the funereal line to demonstrate the silent "creeping" qualities of their models when geared to high speed.

Obsequies for the Respected Citizen bring to mind the welcome for the Conquering Hero—also largely an affair of stylish livery transportation, handled by the versatile drivers of the cumbrous hacks. One point of difference was the position in which the hack top was placed. Mourners demanded seclusion, a full top and curtained windows. When the rival candidates or the worthy senator arrived, down went the top so that all might bask in the radiance of his super-personality. No confusing, glassy reflections and limousine exclusiveness and hauteur hid the public servant from his crowding constituents in

A RELIC OF SLOW MOTION

This ancient plow of the vintage of 1776 is in the possession of the Emerson-Brantingham Company of Rockford, Illinois. It is one that was used at Colebrook, Connecticut, before 1780. The plowshare, which is of iron, was melted in North Coleburg by ancestors of the late Ralph Emerson who smelted some of the metal used in the guns of the patriots of the Revolution. This plow is similar to those which were abandoned in the fields near Lexington by the Minute Men when they hurriedly assembled to fire the "shot heard around the world."

those days—and nights—or torchlight fervor.

Why have political economists ignored the part played by closed cars in lowering the universal public interest in statesmen? True, the means of exit from a speaking date are swifter and more comfortable in these days, but the old chumminess and sympathy are gone.

WE possess Daniel Webster's carriage in our State museum. The height of its stilted seat from one standing at its side may be described best as a comfortable handshake. Like the oratory of that period, it was something in which to pause, to linger, and to deliberate. It also has heavy substance about it, and the hint of certainty in reaching objectives. Modern political motive apparatus runs much to gas and emergency brakes. It is easier riding on inflated tires, but the old wrought iron ones were more durable and economical. Styles in politics likewise may have changed.

Rather grudgingly we assume that the horse-drawn vehicle has had its day, except as a transporter of heavy, serious, commercial tonnages. Consequently there is a premium put upon bulky, sinewy, muscular draft horses. The cob, the pony, and the family driving horse seldom serve in their old tyrannical, temperamental way. The natty landaus and four-in-hands appear here and there in our parks, driven by those who can afford them as a luxury, like genuine antiques. More largely, however, these turn-outs are used in a hopeless professional effort to reawaken interest at some of our State fairs and stock shows in the Midwest. Our county fairs and "pumpkin shows" really know better. The big crowds look for road-burning auto races and leaps from airplanes, while the farmers' hitching posts have yielded to compressed air tanks along our court-house square.

The village blacksmith has become a vulcanizer of rubber tires and a restorer of smashed fenders. The G. A. R. travel to the cemetery on Decoration Day in silent sixes, and one by one, are mustered out to ride in our "mortuary's" motor catafalque. Our depot guests must hustle in order to catch a ride with the dignified, stoical liveried auto-bus drivers.

Most hopeless of shibboleths vainly conjured was the phrase but lately used: "Back to the buggy!" Who of any consequence, of any pretentious ambitions cares to go back to the buggy? Youth never will, and youth must make the times ahead of us. Save in some sequestered southern valleys or among tortuous mountain roads, the buggy has almost become a relic. One who indulges in retrospect about it feels almost like an antiquary.

Doubtless such things in which we elders have taken modest delight are subjects which proud youth has little inclination to ponder. Back to the buggy, indeed! Why not be practical and say "Aspire to the airplane?"

BUT I maintain that the old mare had her compensations now and then. For instance, my son cannot ever hope to find his old car mothering a brand new recreated model, while he gazes in wonder over the fact that the young thing cannot get its nose to the ground!

Though we may say that the motor era depends upon materials which are not self-renewing, even this is small consolation; for we are living in an age of motion and emotion of thrills and spills, and he who talks of conservation or conservatism is quite apt to "get the air."

We have made the final payment on the family wander wagon. How many former necessities can we transfer to the luxury class in our budget this season so that we may travel ten thousand miles without misgivings? We must camp in a car by the side of the road and be a friend to man!

Accidental

Two small boys returning to their schoolroom after recess showed evidence of having been crying.

Teacher: "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, I didn't, but he turned around just as I kicked."—*Typo Graphic.*

Giles: "Fine day today, Jarge. Spring in the air."

Jarge (who is slightly deaf): "Eh?"

Giles: "I said, 'Spring in the air today.'"

Jarge: "Eh?"

Giles: "Spring in the air."

Jarge: "Why should I, why should I?"—*Kreelite News.*

"Listen, remarked the exasperated driver over his shoulder, "Lindbergh got to Paris without any advice from the back seat."

"Gracious," said the doctor, "how did you get these awful bruises on your shins. Are you a hockey player?"

"Oh, no; I just led back my wife's weak suit."

Our cat was not hygienic,
So we kicked it off the place,
Because he spat upon his feet
And wiped them on his face.

Still Going

Silas: "What's that I hear, Hiram, about your hired man falling off the roof when he was shingling the barn last week?"

Hiram: "Yeh. He fell into a barrel of turpentine."

Silas: "Did it hurt him much?"

Hiram: "Don't know. They ain't caught him yet."—*Wroe's Writings.*

Abe Martin sez: "Women an' dogs are crazy about autos, but you never saw a fox terrier jump in an' ride with jest anyone that pulls up to the curb."

She came into the police station with a photograph in her hand.

"My husband has disappeared," said she. "This is his photo," and she handed it to the inspector.

"I want him found at once," she added.

The inspector looked up from the photograph.

"Why?" he asked.

"Were you a slave, Uncle Tarr?"

"Nussah, Cuhnel; but 'bleeged to yo' for de 'terrygation, dess de same, sah. I isn't old enough. Ise been mar'd fo' times; dat's what makes me look all disintegrated dis-uh-way, sah."

City Banker (visiting the farm): "I suppose that's the hired man?"

Farmer (who had visited banks): "No, that's the First Vice-President in charge of cows."—*Exchange.*

Alabama Experiment Station averaged $8.43 in seed cotton for each $1 spent for potash

In fertilizer experiments with cotton on the six oil groups listed in the table below the Alabama Experiment Station averaged a return of $8.43 in seed cotton for each $1 spent for muriate of potash. The tests were conducted over a period of five years and are described in Bulletin 228 of the Station. The cotton was fertilized with superphosphate, nitrate of soda and muriate of potash, and returns were compiled from each of these elements. Here are the tabulated results:

SOIL GROUP	Pounds of Seed Cotton Produced Per Ton of Material			Return Per Dollar Invested		
	Superphosphate	Nitrate of Soda	Muriate of Potash	Superphosphate	Nitrate of Soda	Muriate of Potash
Highland Rim	2340	3120	6480	$11.01	$4.03	$12.96
Limestone Valleys	580	2500	3360	2.73	3.33	6.72
Appalachian Plateau	1020	3440	4480	4.80	4.59	8.96
Piedmont Plateau	520	2700	2080	2.45	3.60	4.16
Greenville	720	2740	2480	3.39	3.65	4.96
Norfork	850	2860	6400	4.00	3.81	12.80
AVERAGE	1005	2893	4213	$4.73	$3.84	$8.43

Note that muriate of potash was far in the lead both in pounds of seed cotton produced per ton of material and in return per dollar invested. In fact the combined return from $2 spent for superphosphate and nitrate of soda was $8.57 as compared to $8.43 returned by $1 spent for muriate of potash.

N. V. POTASH EXPORT MY.
of Amsterdam, Holland
740 Hurt Building Atlanta, Georgia

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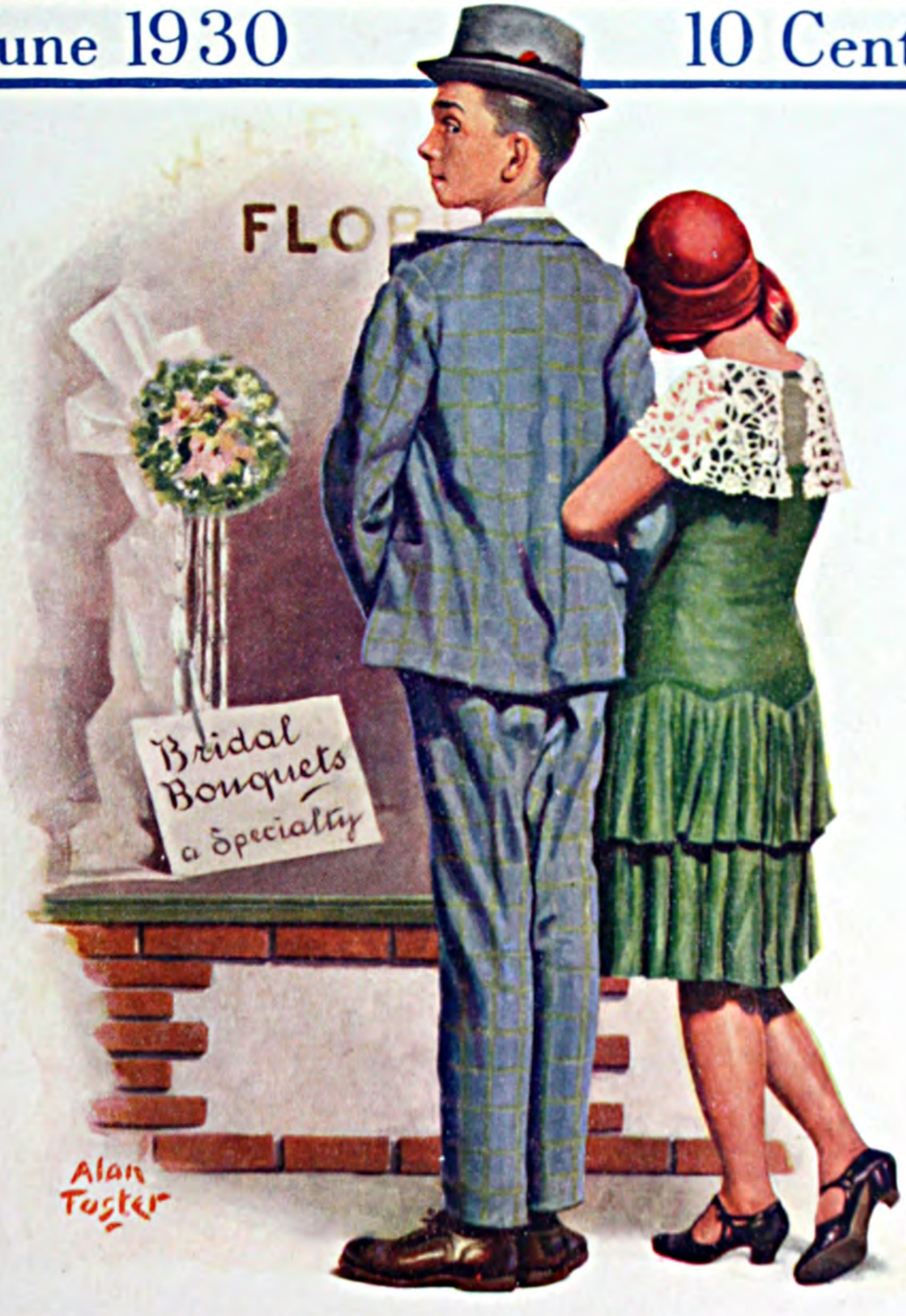
June 1930 10 Cents



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

VOLUME XIV NUMBER SIX

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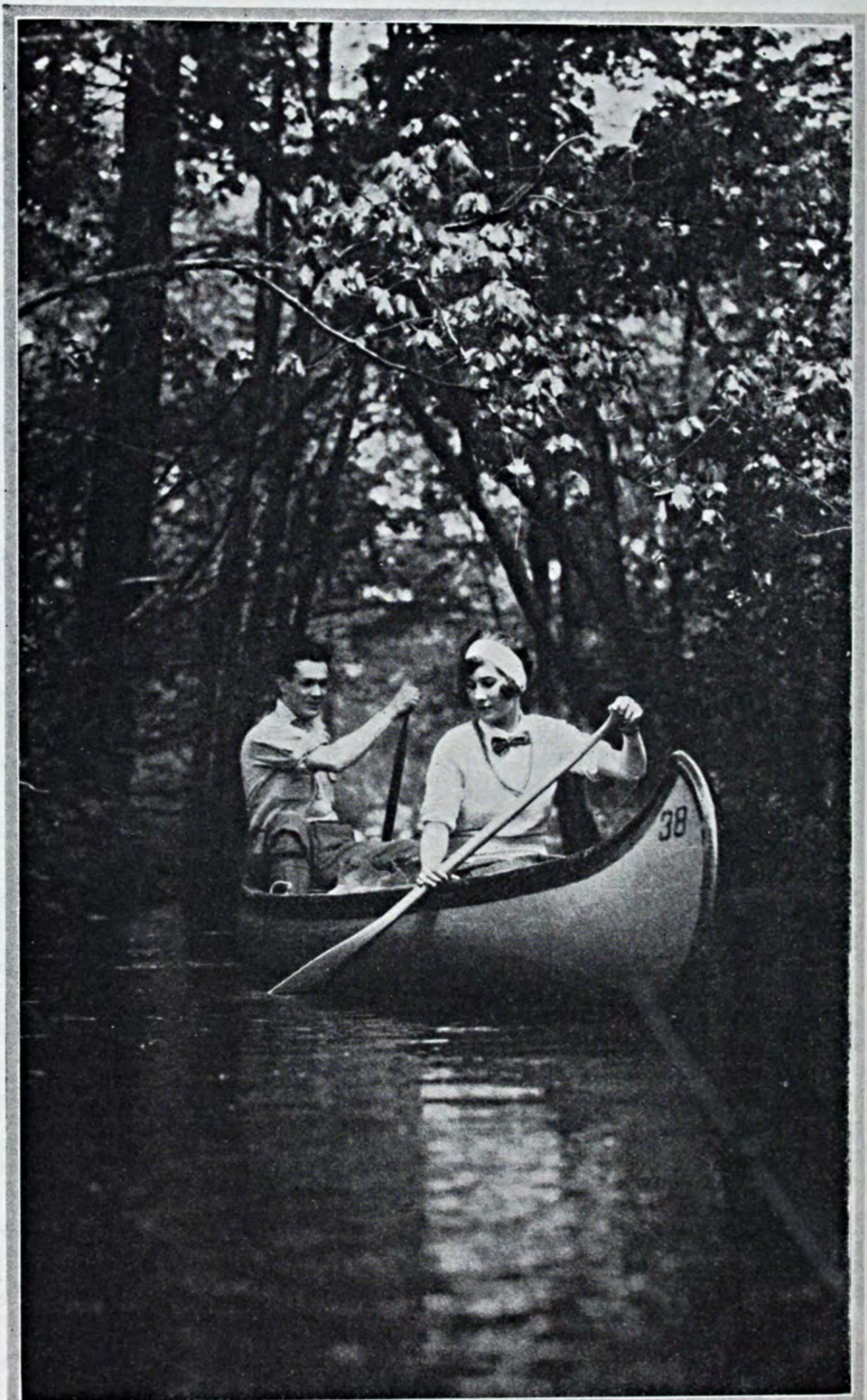

VACATION DAYS

Better Crops with Plant Food

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Vol. XIV NEW YORK, JUNE, 1930 No. 6

"Am I different?"

A Summer Idle

By Jeff McDermid

OUR daylight-saving coterie, homeward bound on the suburban jitney, are of somewhat divided opinion as to the spending of the daylight we have saved. We likewise nurse opposing notions as to the meaning of "re-creation" as applied to forthcoming vacations.

In short, I find myself a minority shorn of listeners, for my futile observations about patching garden hose and the merits of lead arsenate and other concoctions to control codling moth are washed out under a torrent of tee-talk about fairways, putts, mid-irons, and mashies. Some of them seem to think I prefer the hoe to the golf stick because there is no substantial entrance fee to amateur garden clubs, or because overalls are cheaper than knickers. Others no doubt pity me for busting sod with a spade instead of doing it their way. But at least I don't need a caddy to point out the holes I have ripped up in the sward of bent grass and fescue. My strength is saved for solo efforts in devastating quack and sand-burs.

What I abhorred in my youth has become a doting pastime for me in the middle years. My change of front toward practical outdoor labor, since those summers of some time ago, sets me thinking, surrounded as I am by normal men who seem *not* to have outgrown their boyhood's pet aversion. Are they different, or am I? Am I goofey in a suburb of wise ones? Must one be careful how he works up a sweat lest he lose caste along with his calories? Apparently, the plea for a higher standard of living, as many of us in America regard it, is a flare for more leisure in which to do nothing and do it well. The ability to do nothing with a high rating of achievement signifies the *sine qua non* of contentment in many of the cliques where I don't seem to click. Let's think along; maybe it's my fault, not theirs.

BUT when I was a lad the adult members of our village society had not reached quite that stage in their yearning ambitions for standards of living. Many families kept their brindle cows and there were carriage horses, too, by means of which the manure piles in the alleys easily kept pace with the needs of the gardens. Hens had to be fed, eggs to be gathered, and wood boxes filled; lawns had to be clipped, hedges trimmed, and plank sidewalks nailed down. We were a busy lot in those days before flat houses or flat tires.

The be-whiskered seniors of those Free Silver and Gold Standard days may have hated work as hard as we juniors, but they couldn't afford to acknowledge it. To boast of being unoccupied was *declasse.* There was no openly organized form of adult recreation outside of the saloon and the American Order of United Workmen. The former showed red noses daily and the latter displayed red fire on the Fourth. I suspect that the absolute zenith of their soul's complex for higher personal liberty consisted of a silent souse. Those who bore in their hearts certain Calvinistic horrors of booze were probably the fathers most responsible for those tremendous gardens and wide-spreading lawns. They had to have some vent for their superfluous energy before the days of motoring and "pill pasting in cow pastures."

So those Good Templars and Free Soilers undertook the management of as much arable land and livestock as the village board tolerated—with the small boy of the family as "caddy." It was in just such arboreal surroundings that the universal enmity for domestic toil seized grim hold upon so large a portion of our citizens who now close their desks at three o'clock in June.

We are obliged to get the psychology of the small boy toward his play hours before we go any further. He considered the rake and the wheelbarrow bothersome obstacles to the performance of things which his boy world deemed paramount. The drama of his imaginary realm of frolic shared with his playfellows, was as real and as urgent to him as the fussy obligations that his father hurried off to meet each morning. So the small boy's play was (and still is) identical with the grown man's duties.

It still remains of equal value and perhaps of equal virtue—providing the boy's play is wholesome and providing that the grown-up loves his work. No sire caught in the meshes of a detested occupation can for a moment claim kindred spirit with the ecstasy of his boy, whose play is his work.

HENCE we see that what some folks would spell "idle" is really spelled "idyl." To be idle in the boy's way of yore is merely drifting into the state of mind for which summer and cloud shadows and rainbows and bird songs were created. Every doer is first and last a dreamer. He is an idealist and an idyl lover—not an idler. He is a perpetual boy, curious and eager and naive.

Theocritus and Tennyson have put their idyls in immortal form, but the small boy now grown up must ever cherish his own idyls and carry them with him as he goes forth to claim

(*Turn to page 62*)

This picture, showing the influence of potash in the control of cotton wilt, was taken on the plantation of J. N. Parker, Dyersburg, Tennessee. The demonstration was conducted on land typical of vast bodies that lie just above the flood plain of the Mississippi river. Both wilt and rust are prevalent, and the picture illustrates the control of both. Where there was no potash, practically all the cotton died before the end of the season. With 100 pounds of muriate of potash, the rust was entirely controlled and the wilt largely controlled. The final yields from the differently fertilized plots were: 600 lbs. 6-8-0, 561 lbs. seed cotton per acre; 600 lbs. 6-8-4, 867 lbs. seed cotton per acre; and 600 lbs. 6-8-8, 1,308 lbs. of seed cotton per acre.

Healthy Cotton

By E. B. Ferris

Jackson, Mississippi

THE States of the Southwest are younger agriculturally than those of the Southeast. As a consequence, they have been later in reaching a point of soil exhaustion where the use of fertilizers is imperative. Statistics show that in 1928 the six States of the Southeast from Alabama eastward used about five times as much fertilizer as the six States of the Southwest from Mississippi westward, although one State of the latter group, Texas, is as large or larger than any three of the States of the Southeast.

However, the rate of increase in fertilizer consumption in the Southwest in recent years has been much higher than in the Southeast. As an illustration, North Carolina doubled her fertilizer consumption between 1921 and 1928, while Mississippi increased hers five-fold and Texas seven-fold in the same time.

Naturally, with the rapid increase in fertilizer consumption in the Southwest, the tendency has been to use single plant foods or combinations of two or more of these that lack the proper balance. Since the extension of the use of fertilizers has usually preceded any definite information as to the real needs of the soils, it has been only natural that the plant foods that show the greatest tendency to increase size of plant growth, regardless of quality or real fruiting ability, or that have had the greatest pressure brought to bear in the way of salesmanship, have been the first to be introduced and used.

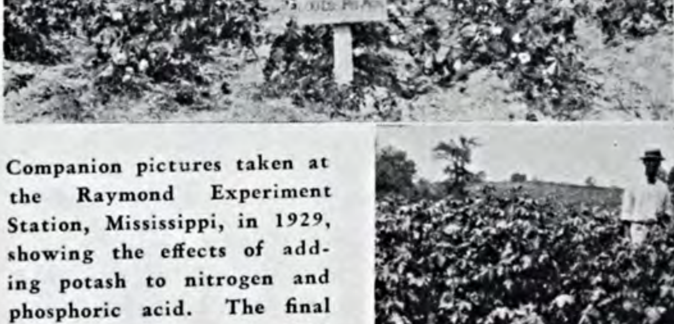
Thus, it will be seen that in much of this newer fertilizer territory, nitrogen and phosphorus carriers are being used out of all proportion to the potash. In more than one West Tennessee county, the writer found the Farm Bureaus selling materials about in this proportion: 400 tons nitrate of soda, 800 tons superphosphate, 200 tons mixed fertilizer, and less than 10 tons of muriate or other potash carriers. In one of these counties a demonstration conducted by the writer had shown an increase of 390 pounds of seed cotton per acre as a result of adding potash to nitrogen and phosphorus, while this Tennessee county is joined on the south by Marshall county, Mississippi, in which is located the Holly Springs Experiment Station on practically the same soil type. This station published in 1929 the average results of five years' work where potash was added in varying amounts to uniform quantities of nitrate of soda and superphosphate. They have just reported these results, giving increased value of seed cotton per acre over the cost of the fertilizer and above the unfertilized plots as follows:

600 lbs. 4-8-0	$ 2.97
600 lbs. 4-8-2	14.23
600 lbs. 4-8-4	26.54
600 lbs. 4-8-6	29.76
600 lbs. 4-8-8	35.42

The Mississippi Experiment Stations have shown that in beginning the use fertilizers, no very great differences resulted from leaving potash out of fertilizer mixtures for a few years, and for a time such stations advised that Mississippi soils contained enough potash to meet the demands of crops. However, as the work was continued, marked differences in yield became apparent, and later this lack of potash manifested itself in the appearance of rust, wilt, and leaf diseases generally, often to such an extent as to make the growing of cotton entirely unprofitable.

Thus, for a time this same Holly Springs Station told the farmers of North Mississippi that they did not need potash. Their present recommendations with reference to potash as contained in their latest 1929 report are as follows: "The cotton farmers of this section should use 600

(*Turn to page 58*)



Companion pictures taken at the Raymond Experiment Station, Mississippi, in 1929, showing the effects of adding potash to nitrogen and phosphoric acid. The final yields of these two plots as given by Director H. F. Wallace were 686 lbs. of seed cotton per acre from the 4-8-0 and 1,122 lbs. from the 4-8-8.

Rotating Chickens

By Walker E. McBath

United States
Department of
Agriculture

¶ Many county agents and teachers may find in the following story ideas and answers to inquiries on small flock management.

YOU may have tried various methods of chicken management on a small place, but "the best is yet to come" if you have not tried rotating the chicken with the garden crops.

For the chickens on the farm there usually is abundant range; and proper range provisions generally are made in the large hennery. But the chickens kept on the small lot and raised to supply eggs and meat for the family often have this necessary playground taken from them, or sorely limited for the sake of the garden.

This cramping of the chicken yard, however, is unnecessary, and both the chickens and the garden will profit if, in the planning of their allotted portions of the back lot, the fence lines are not drawn too hard and fast. The principle of crop rotation is well accepted, and the small poultryman who is planning the lay-out of his back yard will do well to consider the advantages of including his chicken range in his rotation, just as if it were a crop.

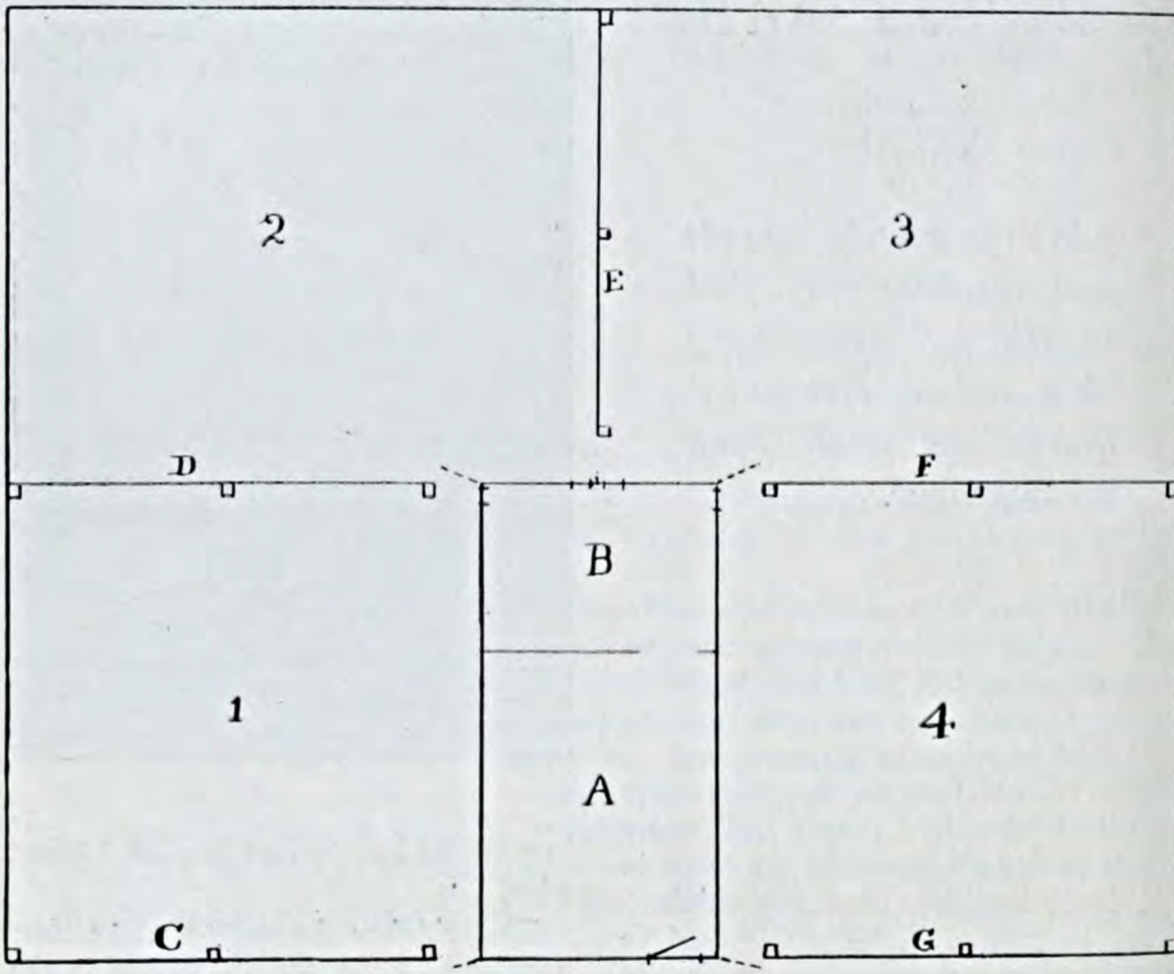
Before building your next chicken house on a lot of the ordinary small town or suburban size, study the arrangement shown for a combined chicken and garden lay-out, adapted here to the last 40 feet of a lot 50 feet wide.

The chicken house (A), 10 feet wide and 20 feet long, is placed in the center and to the front of this 40 by 50-foot space. It has a covered scratch shed (B) at the rear which is included in the dimensions of the house. It will be seen that the surrounding ground is laid off into four sections. The outer border of this, except at the front, is permanently fenced, as in every back yard, but the lines C, D, E, F, and G are merely laid off and posts set as indicated.

For the fencing of the chicken run, provide two lengths of chicken wire, 18 feet long and of a height depending on the type of fowl to be raised. Fasten a narrow board at each end of each length. Through these end boards bore holes near the top and bottom for ⅜ inch bolts. The holes in all four end boards should be spaced exactly the same distance apart and the same distance from the bottom of the wire. To be sure of this, lay the first board drilled on top of the others and bore down through each, one at a time.

tions, these can be partially embedded in the earth and the lower edge of the wire lightly stapled to them.

Between each fence section and the chicken house there is left a 2-foot



These pieces of fencing are for use in any of the 18-foot spaces on the lines C, D, E, F and G. In the posts that mark the ends of these lines, holes, similarly spaced to those in the end boards of the fence lengths, should be bored. It will be evident, then, that by the use of eight bolts these lengths can be quickly attached across any two of these partition lines. It also will be evident that to have these lengths of fence interchangeable so that they will stretch tightly across any of the spaces, the posts must all be exactly spaced and bored. When attaching these lengths to the posts, let the wire be between the end board and the post.

The wire is then lightly fastened with staples to the posts in the center of each line. If it is necessary to provide bottom boards for the fence sec-

gateway. Two gates with loose-pin or lift-off hinges, equally spaced, are to be made to hang in any of these five openings. Butts are permanently attached to the chicken-house wall to engage the corresponding butts on the gates, and a strong wire is fastened over the gateway from the house to the post to take the strain of the fence.

With these fence sections and the necessary posts ready, the scheme is apparent. Any one section, or any two or more sections of the plot can be fenced in for the chickens at will, while the rest is in garden use. It will be noted that in the plan the small chicken doors into the house are indicated in the corners of the four sections. It is well known that whenever there is occasion to herd the flock into the house the corner of the lot is the place for the hole.

Starting with the preplanting period, which includes the winter, the two fence sections and gates are attached on the lines C and G, and the chickens have the entire lot at their disposal. This can be spaded, or plowed if you are applying it to a larger lot, and the chickens will not only enjoy the freshly turned earth but will clear it of cutworms and other grubs, and of all hibernating insects that have not gone too deeply into the soil.

As soon as it is time to do the earliest planting, move the one section of fence back from C to D and plant the part of the garden now taken from the chickens. If this is to be put into early maturing vegetables with the intention of using it for a second planting, it will be found an advantage to have all of it planted to vegetables that will be out of the way at about the same time. As more planting is to be done, move the fence around from D to E, and then lastly to F, thus confining the chickens to section No. 4.

Before replanting No. 1 bring the fences to the lines C and D, and let the chickens have the left-overs of the old crop and any insects that have moved in in the meantime. When ready to replant this space, it may be that some of the other sections are at the point where the chickens can have the run of the rows with little likelihood of damage by them. I have found that the taller varieties of garden corn make a delightful shade for the chickens after the stalks have grown too high for the fowls to injure the plants. This will leave section 4 free for planting to a late garden crop as soon as the chickens are moved to the first section. With this in mind plan to have all of either section 2 or 3 in something that the chickens can share at that time.

At any rate, only one space need be left at a time for the chickens. As that can be changed from time to time during the growing season, the birds will not mind the restricted space so much when they are given the pleasure of "hogging" off" the crop remnants as soon as the vegetables in any section of the garden have been harvested.

As the season gets late and a section that will not be used again for garden truck becomes vacant, plant it to rye or oats. This can be left for the winter use of the chickens until they have dug it all out. Of course permanent beds, such as strawberries or asparagus, will have to be laid off in front of this 40 by 50-foot plot. For the next spring, begin the planting with section No. 4 and work around the other way.

There are a number of variations in the rotation that may be worked into this simple scheme, these depending on the kind of vegetables planted and the ingenuity of the gardener in selecting his planting scheme in advance. With any plan, however, the advantages are evident. The sections will be periodically cleared of insects and weed seeds, and will get the benefit of the droppings of the hens. The chickens will have a wider range, and fresh, uncontaminated soil every so often, green food with every new shift of the fences, and a better chance at the insects. The owner will realize that he has taken a forward step out of the common rut of chicken management that leaves the chicken yard in one place year after year, and will be getting eggs from contented hens.

Since the Colonial

By George F. Johnson

Editor, Pennsylvania Department of Agriculture

IF farmers in the American colonies had adopted a definite soil improvement policy before 1750, the Revolutionary War might not have been fought in the eighteenth century!

The Boston Tea Party was as much the manifestation of a great economic and agricultural depression which engulfed the colonies, as a revolt against taxation without representation. The depression grew primarily out of the impoverishment of agricultural land. For 100 years or more, the fertile land in the colonies had been forced to the limit in the production of grain crops, tobacco, and cotton, which were largely exported. So long as the land would yield 30 to 40 bushels of wheat per acre and other crops accordingly, the colonies were able to maintain a most favorable balance of trade. Land values increased and there was prosperity generally. Paying a tax on tea and other imports under such conditions would not have been a hardship. But soil impoverishment combined with increasing local demands for farm products resulted in an unfavorable balance of trade and most unsatisfactory economic conditions. Paying a tax on tea and other imports under such circumstances became intolerable.

By the time of the Revolutionary War, agricultural conditions in the colonies had become so decidedly unsatisfactory that progressive farmers in Pennsylvania and probably other colonies began to give serious consideration to soil improvement. One agricultural leader of the time describes the turning point as follows: "The use of lime and gypsum as fertilizer of the ground, the introduction of clover, and the rotation of crops con-

A typical Pennsylvania valley where maintenance of soil fertility means a prosperous agriculture.

Days

A Review of Soil Improvement in Pennsylvania

stituted the happy causes which gave the first grand impulse to the agricultural prosperity of modern Pennsylvania."

It is now almost 160 years since Judge Richard Peters applied a bushel of gypsum to the soil on one of his farms in the vicinity of Philadelphia. This jurist and farm owner, whom George Washington described as one of the best practical farmers in Pennsylvania, might well be termed the father of chemical fertilization in America.

The Discovery of Gypsum

The real story of gypsum—the forerunner of modern soil fertilization—makes an interesting chapter in the early history of American agriculture. The story is told by Robert Vaux, a progressive land owner who prepared an essay on the subject and delivered it before the Philadelphia Society for Promoting Agriculture in January, 1825.

The value of gypsum as a fertilizer was accidently discovered in Germany. The story is told that a laborer who had been employed in mixing stucco mortar passed and re-passed from his work to his cottage across a field of worn-out soil. The succeeding season, his path threw up a luxuriant crop of grass which he attributed to the gypsum that fell from his clothes. He was induced to make an experiment near his dwelling with the remainder of the article in his possession. The effect astonished everybody and the

Good Holsteins on good legume pasture.

cottager received a reward from his landlord for divulging his secret.

In 1770, Judge Peters became acquainted with gypsum, a small quantity of which had been sent from Germany to a merchant in Philadelphia with some information on its value as a manure. Judge Peters began his experiment with a single bushel of gypsum obtained from the maker of stucco ornaments in Philadelphia. Not long afterward, about 20 tons of this valuable material came to Philadelphia as ballast in a ship from London. The captain had no idea of its value as fertilizer and it was dumped near a wharf in Philadelphia.

Judge Peter's efforts in getting other farmers to use gypsum were at first limited and very discouraging. He finally triumphed over the combined forces of ignorance, prejudice, and ridicule and the practice became quite common in the vicinity of Philadelphia.

About the time that gypsum was first brought to America, a small quantity of red clover seed also reached Pennsylvania and was sown in gardens and on pastures in the neighborhood of Philadelphia. One of the early advocates of growing clover was James Vaux of Montgomery county, Pennsylvania. He had planned some extensive experiments about the time the Revolutionary War broke out and consequently, these had to be delayed. However, in 1785, he sowed 80 pounds of clover seed on 35 acres of green wheat. His success with the clover prompted him to ask the Philadelphia Agricultural Society to recommend to the Legislature a bounty on the growing of clover seed. At this time, he said: "I will boldly assert it will prove of more benefit to agriculture in the present state of our country than anything that can be done. Reduce the price of clover seed and instead of the bare fields daily washing away, you will see them covered with grass and cattle."

Improvement Begins

The beginning of better agriculture in the East was found principally in the neighborhood of the three largest towns—Boston, New York, and Philadelphia. Gypsum, clover, and barnyard manure were extensively used and the worn-out soil responded to the treatment. The historical records indicate that the first gypsum worked miracles with the soil but it was soon discovered that the effects were greatly diminished by repeated applications.

Lime, which superseded gypsum, began to be used on land in Lancaster county about 1820. However, it was about 10 years before the favorable, good effects secured by the leading farmers convinced others that lime was a good investment. The effects of lime were most noticeable on light, sour, or worn-out lands. It is said that much land of this type was actually reclaimed with lime since it provided the starting point for red clover. At first the limestone was hauled from the quarry to the farm and burnt, but later the quarry owner burnt the stone and delivered it to the farm.

The next step in the fertilization of soil in Pennsylvania was the introduction of guano about 1840. Between 1840 and 1860 it was quite extensively used but was later replaced by bonedust and finally by phosphates. One of the interesting sidelights in the history of soil improvement is the fact that the value of animal bones as fertilizer was first appreciated in Europe and for a time bones were collected and exported from the United States. Gouverneur Emerson, speaking before the Philadelphia State Agricultural Society in 1854, said: "Comparatively few persons are aware that such a thing as a bone trade exists in our country, and fewer still that it is carried on to such a great extent. I have known a single vessel to leave Philadelphia for England with not less than 700 tons of bones on board, enough to give a good dressing to 5,000 or 6,000 acres of our suffering farm lands, if converted into the superphosphates. Should others of our commercial cities contribute in like proportion, the aggregate amount of the precious phosphates annually sent out of our country, in which they literally constituted the fatness of the land, must, indeed, be immense."

Mixed Fertilizers Appear

Between 1850 and 1880, acid and rock phosphates began to be widely used in Pennsylvania and during the same period specially mixed fertilizers made their appearance. The sale of these mixed fertilizers by unscrupulous merchants did much to delay the general use of commercial fertilizers by farmers in Pennsylvania. Thousands of tons of fertilizer material were sold in Pennsylvania at prices far in excess of the actual value of the product. For example, a fertilizer was sold about 1880 for $15 a ton which had an actual commercial value of only 15 cents. Of course, there was the other extreme also. Fertilizers having a value as high as $74 were selling for $68 per ton. In most cases, however, the fertilizers sold during the period centering around 1880 were over-priced and in many cases, were an outright fraud.

This condition led to the passage of the Pennsylvania Fertilizer Law in 1879. This law has been amended various times since that date so that today Pennsylvania is rigidly enforcing a law which requires all fertilizers to be registered and all fertilizers to contain at least 14 per cent of total units of plant food. The result of this law and the splendid cooperation of fertilizer manufacturers has been that fewer brands but higher grades of fertilizer are being sold to farmers in Pennsylvania. Approximately 100 fewer brands of fertilizer have been registered with the Bureau of Foods and Chemistry for sale during the past few years than were registered during 1925.

Use Higher Analyses

The amendment to the Fertilizer Law prohibiting the sale of low grade fertilizer became effective January 1, 1926. While fewer brands are being sold, the quality of fertilizer is much higher, Dr. James W. Kellogg, Director of the Bureau, explains. The total tonnage of fertilizer sold in 1925 was 328,462; in 1926, 328,904; and 1927, 326,514. The total plant food (nitrogen, phosphoric acid, and potash) contained in these fertilizers was estimated at 52,520 tons in 1925; 55,402 in 1926; and 80,801 in 1927. Thus, farmers secured 28,281 tons more plant food in 1927 than in 1925 with an actual purchase of 1,948 tons less fertilizer.

The results of the 1928 inspection compared with that of the preceding year show continued improvement in guarantees for the plant food supplied. The average composition of each class was slightly higher than the average estimated for 1927, showing a tendency to increase the plant food units and to sell higher grade materials.

Spring planting closely follows seedbed preparation on this Pennsylvania farm.

The accompanying table shows the trend in the use of fertilizer on Pennsylvania land during the period from 1879 to 1919. It will be noted that the tonnage used has increased fourfold and that the estimated amount used per acre of principal field crops has increased from 27 pounds in 1879 to 104 pounds in 1919. During the same period, the weighted index of productivity of acreage in principal field crops has increased 19 per cent.

An increase in the total production of the more important field crops in Pennsylvania accompanied by an actual decrease or only a slight increase in the area growing these crops has been one of the outstanding features in the progress of farming in this commonwealth during recent decades.

Increased Production

Between 1884 and 1924 the annual production of corn was increased 18,000,000 bushels while the area growing the crop was increased only 170,000 acres. Wheat is even a better illustration of the trend. An increase of 2,000,000 bushels of wheat in total

(*Turn to page* 60)

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

AN ancient writer once said: "On their own merits modest men are dumb".

That, surely, is wonderfully well borne out by our esteemed friend, Dr. Stephen Moulton Babcock.

He was born at Bridgewater, New York, away back in 1843, yet, despite his ripe old age, he is still actively searching, searching, searching into the mysteries of science.

What the simple, jovial, unassuming old savant is after now, nobody seems to know; nor does this Dean of the research workers say. Maybe, he doesn't quite know himself! That, I fancy is true; but his work certainly has to do with the discovery and understanding of the ultimate divisible particles of matter and the chemical theory that atoms are congeries of electrons in rapid orbital motion.

On a table in his office lies a slab of bitumen into which a weight gradually is sinking. Will the weight in time disappear; and, if so, why?

Near-by is another weight, suspended by a spiral wire and, inadvertently, the good Doctor gives it a glance each morning on arrival at his office. How much will that old wire stretch? Does it stretch? When will the weight fall?

"The inquiring mind and the seeing eye" never rest. Always there is the unquenchable urge to find out things, to know more, to make some new discovery; and ever there is some new treasure chest to unlock—and a missing key!

One day, I gave the great discoverer of the Babcock butterfat test a little problem to solve and expected to hear in return a profoundly learned discussion of the subjects, such as many a less modest authority would be likely to inflict; but that was not to be the case. Here is the conundrum.

One Sunday, when visitors came to our farm, Mrs. Alexander scattered shelled corn on the front lawn and gave some coaxing "come-and-get-it" calls. Immediately, then, from all quarters, ran together an aggregation of Rhode Island Red

Dr. Stephen Moulton Babcock and his original tester.

and White Leghorn chickens, some Chinese and Emden geese, domesticated wild Mallards and Pekin ducks, bronze turkeys, three magnificent peacocks, a Clydesdale foal, a Guernsey calf, and lastly, some Duroc Jersey shoats. All of them eagerly gobbled up the corn, while exhibiting their various characteristics and colors.

"Doctor," I said, "all of these birds and beasts are eating corn and have been raised largely on corn. Is it chemistry, or what, that enables them to change the elements of corn into those rainbow-hued eyes on their tails, those feathers of different colors, those bay, yellow, and red coats of hair, those breed characters of form?"

> Not selfishness has ruled your life,
> philosopher and sage,
> Not gain and luxury of wealth have
> been your aim and wage;
> But service rich, of head and heart, in
> love for all mankind,
> You've freely, fully, gladly given,
> with never self in mind.
>
> Such service has its own reward,
> unlooked for tho it be—
> (Not told in titles, 'graved on stone,
> or paid in golden fee)—;
> In your own heart there is the joy
> of noble work well done,
> And in the heart of all the World,
> deathless esteem you've won.
>
> A. S. Alexander.

There came no learned disquisition about metabolism, anabolism, katabolism, hormones, centrosomes, or heredity. The modest Doctor merely sounded his merry laugh and exclaimed:

"You may search me!"

That is characteristic of Doctor Babcock. He will not give a speculative answer. He has never "played to the galleries" with imaginative deductions founded upon hurried, incomplete, unproved experimental work. Ever, he has had perfectly to satisfy himself of the absolute correctness of his conclusions before publishing them to the world. Always, he has remained the shy, retiring, somewhat reticent "vehicle of expression" and never has he sought notoriety, fame, applause, or monetary gain from his work. What an admirable example he has set the younger, rising generation of research and field workers in this respect! They may well regard it and "go and do likewise."

This phase of Doctor Babcock's character is well illustrated by the following anecdote of him, told by Professor Andrew W. Hopkins, chief in journalism, at the Wisconsin College of Agriculture:

"One day he thought he had a test. His new test gave the same results as the older, more complicated ones that the scientists had been using. Time and again he tried it on the milk of the cows in the University herd and each time the new test checked with the old—until he came to Sylvia. That cow was merely a grade Shorthorn, but she was 'different.' Her milk did not test like that of the other cows. The readings on the new test did not correspond to those on the old.

" 'Give out the test anyway,' some friends urged the Doctor. Sylvia was only one cow in a herd of thirty, and a test which proved correct that often would help dairymen, they reasoned. But the Doctor could not see their point of view. No test was going out under his name that did not work on *all of the cows* of the University herd. So he went back to his laboratories to work until he had a test that was accurate, even for Sylvia's milk."

"Finally, after working some weeks more, he walked into Dean Henry's office, holding one of his test tubes in his hand, and exclaimed: 'Well, I have it at last.' "

And so it proved, for the Babcock butterfat test has "stood the test of time" practically unchanged and is, today, used throughout the world.

In addition to perfecting the test for butterfat which bears his name, Doctor Babcock, with Dr. H. L. Russell, worked out the cold process of curing cheese, which has been widely adopted. He also has given dairy breeders a basis of breeding for production, which has made possible much of the development of the five great dairy breeds and likewise devised scientific ways of doing things that have enabled other scientists to go on in all branches of dairy chemistry.

Noting the retiring modesty of Doctor Babcock, one never would suspect that he had achieved such great things, chiefly since coming to the University of Wisconsin, in 1889, but well might understand why he did not patent his butterfat test and become a multimillionaire. However, the world would not consent to have him remain wholly unacknowledged. The Legislature of Wisconsin conferred upon him a huge bronze commemorative medal made in London, as an expression of appreciation. Tokens of esteem and admiration have come to him from many parts of the world, including far away New South Wales and Victoria, Australia. He received the "grand prize" from the world fairs of Paris and St. Louis. Thousands of commendatory letters also must have been received by the Doctor, but of these we have never heard him say a word, nor has he ever adopted a "high brow" mien or an air of superiority.

Democratic Simplicity

Many a morning I have seen Doctor Babcock humbly carrying a little pitcher of cream from a shop near his unpretentious home, caring not a whit who saw him or what they might think of his lack of dignity. If he ever heard of an old lady called "Mrs. Grundy" he certainly had forgotton her existence and pursued the even tenor of his simple, democratic ways, happy as a lark, with a cheery laugh and kindly greeting for everyone he met, except, perhaps, those who doffed the hat and tried to kowtow to him with well-intended respect.

I have seen many a half-fledged beginner in science put on painful airs of pleased complacency and self esteem, on the strength of some little achievement in the laboratory that, ten to one, would later be disproved. How pretty is the gas-distended pink toy balloon; how sad its collapse when someone pricks it with a pin!

All of these things have I thought of as I saw Doctor Babcock carrying that pint cream pitcher and stopping, perchance, to discuss with a "common laborer" or sophisticated barber's assistant the latest batting triumphs of Babe Ruth or some other celebrity of the baseball diamond. Yes, Doctor Babcock is a keen baseball and football fan and the University Athletic Department, in appreciation, set aside for him two choice seats in the grandstand for all its games.

Supreme Modesty

There is another side to Doctor Babcock's character that should be mentioned, as an illustration of his supreme modesty and integrity. That is his unselfish, generous recognition and appreciation of the work done by his colleagues. Often he has said: "All the credit is due to my able assistants"—such eminent men, in turn, as E. V. McCollum, E. B. Hart, Harry Steenbock, and others. Without question, he has given his associates many a valuable suggestion that enabled them to do admirable work which later brought them fame. The wise old brain of Doctor Babcock ever was scheming new experimental work —it is today—and the variety and scope of the ideas there conceived probably have been exceeded by few.

In his early days, Doctor Babcock had not been "spoon fed," as are so many of our students in science today. He had not been surrounded with the latest, most modern and expensive equipment imaginable, nor had he an instructor at each ear and printed laboratory guides plainly directing every step in each process of experimental work.

Several times he has told me that

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A pasture scene in Ashe County, North Carolina—a natural dairy country

What's Happening?

By F. H. Jeter

Agricultural Editor, North Carolina State College of Agriculture and Engineering

TOBACCO is king in North Carolina, if one should be interested in titles. Cotton is the imperial prime minister. But the titles and emoluments of both are shaky. Not that we shall ever discontinue the growing of these two crops, as the old timer in farm institute work would say, but other things are engaging the attention of Tarheel farmers and some of these other things are making a right attractive showing.

Most folks not fully acquainted with North Carolina farming think that it embraces only the growing of tobacco and cotton with a few peanuts in the northeastern part of the State, a good acreage of soybeans in the tidewater country, and some truck, fruit, and forage crops where folks don't know any better. At one time that might have encompassed the correct view-point. Now it doesn't. North Carolina has a changing agriculture.

I never could handle figures very intelligently, my own included, for despite a wish to appear youthful and graceful the ravages of the years have brought about a certain rotundity which is neither pleasing nor desirable; and so, when I must use figures, I generally deal only in round numbers. From what the last farm census of this State reports, the tobacco crop of 1929 was worth at farm value $93,991,000 and the cotton crop for the same year, lint only, was worth $60,574,270. The acre value of tobacco was $123.03 which by far exceeded anything else grown in the State except early and late irish potatoes and the commercial truck crops grown in restricted areas.

Therefore, one can't greatly blame a good tobacco farmer for growing the crop of his choice. The same is true of cotton. Even at the low acre value of $32.02 for last year, cotton also exceeded the other crops, except those mentioned for tobacco and with the addition of sweet potatoes, sugar cane, sorghum, peanuts, and cowpeas. Cotton is a delightful crop to grow and when the farmers of this State begin to concentrate on the kind of staple needed by the textile mills of the Southeast, it will pay more profit.

In the meantime, however, the bulk of farm wealth in North Carolina comes from the production of tobacco and cotton. Slowly and steadily other new enterprises are being placed on a business basis with resulting good returns and one hears more now of pastures, hay crops, hogs, chickens, beef cattle, sheep, purebred dairy cows and other things than he did formerly.

On the Dirt Roads

Recently I had the pleasure of spending about two weeks in a swing about over the State. The trip took me from the blackland region of the tidewater to a turkey farm some 3,000 feet above sea-level in Madison county. Nor did we spend the whole time on the magnificent hard road system which covers the State.

Much of the time was out on the dirt roads of the counties along which the real farming is done. Some interesting facts were found. The dairy people began to point out farm after farm where a few purebred cows had been placed or a purebred bull had been recently purchased. They said that dairying with its attendant activity of growing pasture and hay crops is becoming one of the major farm industries of this crop country. As an evidence, they gave figures showing the value of the milk and milk products produced last year to be about $20,000,000.

There are now 20 buttermaking plants or creameries buying butterfat from 11,000 farmers. There are 32 ice-cream plants, and the milk plants of the small cities bought over 10,000,000 gallons of milk last year while local dairymen selling to city consumers pocketed about $15,000,000 from their sales. A great new dairy industry is springing up in the mountains of northwestern Carolina where a large cheese factory has just been finished. This western country is naturally a pasture section and is the home of lush grasses and succulent clovers. There are no wild onions and the cool springs and equable climate permit milk to be delivered fresh and sweet.

Then in the foothills and upper piedmont, where cotton apparently is being grown with more profit than anywhere else in the State, it was found that these folks are also interested in pasture. One out of every three farmers in Alamance county planted pastures in the campaign conducted there this winter. About 3,000 acres of permanent pasture were seeded in addition to about the same amount seeded last spring. Alamance claims to have the largest Jersey calf club in the world with 175 boys and girls owning purebred heifers. Rowan county seeded over 5,000 acres of sweet clover and Stanley planted over 20,000 acres of lespedeza this spring. Over in Union county where potash pays on all crops, 17,000 acres of lespedeza were planted.

E. C. Blair, extension agronomist, says that soybeans now occupy 25 per cent of all the cultivated land in 10 northeastern counties while one-sixth of the corn grown in the entire coastal plain area has cowpeas or soybeans intercropped with it.

Poultry Become Important

But it is not alone with dairying and its related feed and forage crops that a changing agriculture is apparent. North Carolina farmers are going after the poultry business in a way that means big money. The hatcheries are demanding that their supply flocks be blood-tested. All last winter, the veterinarians were busy blood-testing while the county agents and poultry extension specialists worked with them to cull out the loafing non-producers. As a consequence the percentage of baby chicks out of blood-tested flocks to die this spring was so low as to be practically nothing. Some poultrymen reported as low as 5 to 10 out of a 500-egg hatch. Thus, to hear good

Young pigs thrive on crimson clover pasture in eastern Carolina.

breeders tell of a business amounting to $12,000 and $15,000 a year gross was good news. One practical farmer said his poultry flock paid him a monthly wage of $250 a month. Another said he got $3,000 a year out of his farm poultry flock. The entire value of poultry and poultry products produced in North Carolina now is nearly $38,000,000 and the industry has just begun to get started. In six months last year nearly 6,000,000 pounds of live poultry were sold co-operatively at the market cars loaded regularly by farm agents.

Hog feeding and shipping are getting to be sciences in the Tarheel State now. We know we can breed and feed so as to catch the high market in March and September. We can have early farrowed pigs that the Midwestern breeder can't have and when this plan gets to working smoothly, it's going to be too bad for the famous corn belt. W. W. Shay is conducting feeding demonstrations all over eastern Carolina and he is unyielding about feeding corn and such supplements as will produce hard pork and hard pork only. As a result of his demonstrations, more than $500,000 in new hog money went to a few growers in 30 eastern counties last fall. These animals paid about $1.50 a bushel for the corn consumed.

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Poultry are raised on 91.7 per cent of all North Carolina farms, and few farms without a good laying house and a fine strain of chickens are found.

ASPARAGUS

What an acre should yield, and how to get big yields

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College

BEFORE a business is to be taken under consideration, some statement as to its possibilities should be at hand. Let us consider the business of asparagus raising. What is our knowledge as to yields per acre?

Our knowledge of actual yields is very limited. The data available seemingly skips this most important fact. The reason for this shortage of yield facts is undoubtedly due to the wide variations in yields due to the variety, the soil, the fertilizer, the weeds, the spacing of plants, pest control, etc. All of these factors, if unfavorable, or any one may cause low yields. But let us get down to brass tacks. What are some of the recorded yields?

Most of the recorded yields are between 1,500 and 2,500 pounds per acre for the cutting season of approximately 7 to 8 weeks. Multiply these figures by the average price of from 7 cents to 15 cents per pound and it is immediately seen that there is much to learn and to be done if a reasonably sized income is to be received from asparagus. By doubling the gross yield, thereby increasing the total income, the expense is not necessarily doubled, and the net results may then reach a fairly profitable figure.

How can one double the yield? One of the best answers can be found in the recorded facts of a grower who has doubled the above yield. The grower, Joseph Humphries & Sons, Danbury, Connecticut, has produced more than 5,000 pounds of asparagus per acre in each of the last two years, 1929 and 1928.

A brief description of the methods employed are as follows:

The variety selected — Martha Washington, is a high producing, rust resistant sort, of good quality.

The seeds were sown in 1922 in nursery rows 12 inches apart and from one-half to one inch apart in the row. A very liberal supply of a 4-8-10 fertilizer was used on this nursery stock; also two applications of nitrogenous fertilizer as a side-dressing were given during the growing season. The results—large sized, healthy, vigorous plants and roots!

Good Cultural Conditions

The farm offers a choice of soil and slope which has resulted in using a quietly sloping southeastern exposure, the soil of which is a fine sandy loam. The top soil had been improved by a previous good farm rotation so that it is 9 to 10 inches deep.

In 1923 the bed, one acre by measure, was set out using the above mentioned, home raised plants. The rows are five feet apart and 248 feet long. Plants are spaced closer in the row than the general practice, that is, 10 to 12 inches apart. Close spacing results in earlier, heavy yields. The

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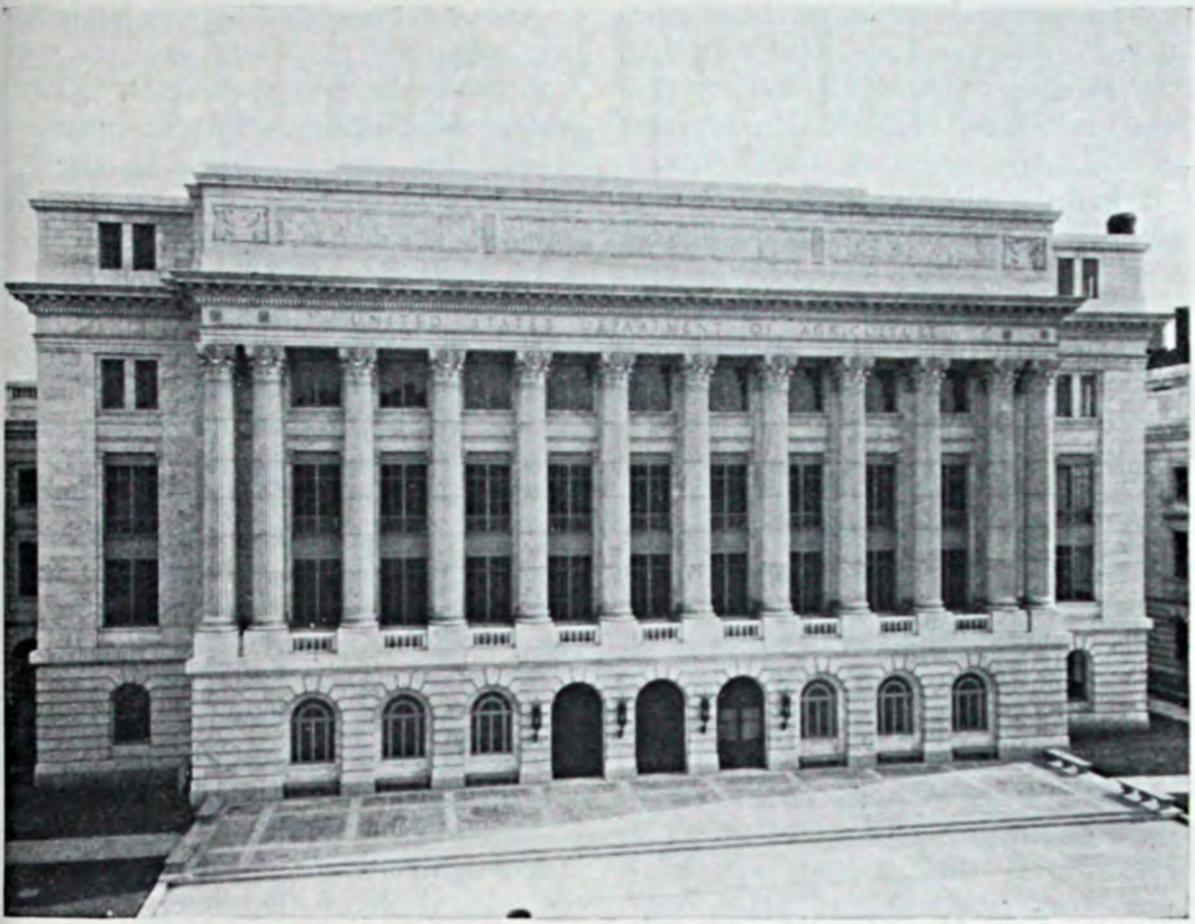

A New Palace of Agriculture

By U. V. Wilcox

Washington, D. C.

"TAMA JIM" WILSON, Secretary of Agriculture, under whose leadership the new Department of Agriculture Building had its initiation was a canny Scot. He asked Congress for an appropriation for the erection of a new structure to house the personnel of the Department. Congress granted a certain amount of money, but not enough to meet his expectations.

Mr. Wilson, though disappointed, accepted the money, and used it for the construction of two large stone wings with a great hole in between them. He wanted to force Congress to appropriate funds to build in the hole—a central building. This central building is now completed, after the first start made in 1905 by Secretary James Wilson.

The location for the first part of the building, the two wings, was selected in a romantic manner. President Roosevelt and "Tama Jim" Wilson were walking over the premises to secure a place for the erection of the two disjointed wings. While they were walking along, President Roosevelt struck his walking stick on the ground, turned on his heel, and said, "Lay the corner stone there!"

"The central structure now completed is the most beautiful edifice of any kind in the world," declares Emmet A. Steece, construction engineer in the Department of the Treasury. "It has the most correct proportions and best setting of any building in the world. Its pleasing harmony of proportions provides the spectator with the satisfaction he could obtain from the contemplation of a symmetrically conceived structure."

Harmony With Utility

In addition to its harmony of parts, the new central portion is a delight to farmers and others who visit the Capital city. A large court is found inside the main building. This is the palm court which is used for a conference room, exhibition hall, and general meeting place. Plant specialists of the Department, who know the effect of daylight on the growing of plants, have made it possible to produce iris on Thanksgiving and Christmas and poinsettias on the Fourth of July, within this court.

The inner court is two stories high and at the third story floor level it has been topped with a roof of glass. On the second floor level a corridor surrounds the palm court. At each side of the inner court two "Juliet" balconies have been built.

On the first floor level, the inner court is surrounded by a corridor from which descent is made into the court itself down three steps. The floor here is constructed of ear-resonant travertine marble with a cream-colored hue. This deadens the sound of footsteps and gives a sense of quietness. A fountain bubbles in the center of the court.

On one wall there is a huge doorway with an arched top where there is placed the Department's World War Memorial. This is of white marble. On one side is a life-sized soldier and on the other a life-sized sailor, each in marble. In between are the names of those men of the Department who went to France and did not return.

Other facts regarding this home for agriculture's purposes, indicate the pains taken to give the utmost in harmony with utility. Fifteen different kinds of marble are found in the interior trim, but the exterior is Georgia and Massachusetts marble. There are two great bronze doors leading into the main entrance lobby which cost $15,000. The carved marble stairway leading from the entrance lobby to the second floor is framed in mural wall paintings.

The main office is 20 feet wide by 45 feet long. This is the Secretary's office. Flanking this, right and left, are rooms almost as large, which are now occupied by the Secretary's assistant and staff.

Soft diffused lighting illuminates the interior. Daylight is softened by the glassed second story roof over the court, and above this are set powerful flood lights spaced at intervals on the exterior walls of the court.

As originally planned the central portion of the building was to have been four stories, with a dome surmounting the fourth story to harmonize with the New National Museum of the Smithsonian Institution, not far away. This plan had to be changed in order to give the fullest amount of room for working purposes. Now instead of the dome there is a fifth story on the facade. On this is erected an entablature.

Quotations Inspire

In order to secure appropriate mottoes for the facade, Secretary of Agriculture William M. Jardine, under whose term the work started, asked the land grant colleges and farmers' institutions throughout the country to suggest phrases to be used. The three which have been selected and now appear are from St. Paul, George Washington, and Abraham Lincoln.

On the left, is the quotation of St. Paul, which says: "The husbandmen who laboreth must be first partaker of the fruits." In the center, Lincoln is

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A Bright Idea

By R. W. Donaldson

Extension Agronomist, Massachusetts Agricultural College

A few bolts and sixteen old tire rims make a pasture harrow.

FRED A. COOMBS of East Bridgewater, Massachusetts, has discovered a practical use on his farm for old tire rims and has solved the problem of a harrow costing little or nothing which he uses to break up and distribute manure droppings on his pasture.

Faced with appreciable waste, both of pasture feed and of manure occasioned by accumulations of droppings on improved pasture fields under intensive grazing methods, Mr. Coombs felt he could not afford the expensive harrows being imported from Europe for this purpose. A bright idea, a few bolts, and 16 discarded tire rims—salvaged from the nearest garage dump—solved his problem. The harrow is made of 16 tire rims of equal size placed four square and bolted loosely together with ½ inch bolts 3 inches long. Extra holes are drilled similar to the one already made for the valve stem, and the rims are then joined together with the bolts and nuts. He finds it advisable to allow an inch or so of play and to batter the ends of the bolts to prevent the nuts from rattling off. A stout pole serves as a cross-bar bolted to one side of the harrow, to which to hitch.

Mr. Coombs used this type of harrow all last season and some of his neighbors who saw it work have made harrows similar to it for use this year. Although it may be used as a two-horse hitch, it will do its best work when drawn at a more rapid rate of speed. Mr. Coombs hitched it behind (*Turn to page 59*)

Above: A home-made harrow used to break up manure droppings on improved pasture.

Right: This harrow, imported from Europe, is used on the pastures at the Massachusetts Agricultural College. Note how the harrow breaks and distributes a dropping, as indicated by the dark area marked by the white cloths.

Four-year Soils Improve-
for Farm

Armund Freitag, Beaver Dam High School, Wisconsin, first-year winner of the 4-year soils improvement contest.

By

Rensselaer Sill

Wisconsin College of Agriculture

WHEN farm boys, a College of Agriculture, and teachers of agriculture in the Smith Hughes high schools, get together and talk shop, much can be accomplished in the way of furthering the adoption of profitable soil management practices. At least that was the experience of the late Professor Griffith Richards, soil extension specialist at the Wisconsin College of Agriculture, who a little over a year ago started some 30 farm boys in 22 counties throughout the State on a four-year soil improvement project.

Through the project, boys are offered an unusual opportunity to learn about various soil improvement practices and to furnish experimental data for use on the farms in their communities. As different kinds of fertilizers are being tested, rotation plans being laid, and the boys are making a rich use of phosphorus and acidity tests, there probably will be some material on soil practices that can be used by county agents, teachers of agriculture in the high schools, the extension service of the state college, and, of course, individual farmers.

In starting the project, the boy is urged to select a field with frontage on the highway, if possible. The field selected should be of average fertility or even one of the lower fertility fields on the farm. If the county in which the farm is located has been mapped by the soil survey, the boy is required to look up and record the soil type found on his field.

The youth rents the field from his father and assumes all financial responsibility. He receives the money from all crops sold from his field and also keeps a complete record of expenditures and receipts. A detailed history of the field and 12 samples each of the surface and subsoil are sent to the department of soils at the state college. Here, the samples are tested and the desirable recommendations forwarded to the boy.

Study the Problem

In planning a soil fertility program, the student uses the results of soil acidity tests, available phosphorus tests, and the history of his field, as a guide in outlining his soil work. He

ment Project Boys

State-wide work teaches soil management and effective use of fertilizers in long-time program

Louis Schlaver, Sparta High School, Wisconsin, found that potash increased his yield of State's Pride oats. The plot above was fertilized with 300 lbs. of superphosphate per acre, but the plot below received 200 lbs. of muriate of potash in addition to the superphosphate. The alfalfa also was better on the plots treated with potash.

also reviews the Wisconsin soil bulletins that help him to obtain a better understanding of the problem, and prepares a soil improvement plan which is submitted for approval to his agricultural teacher and to the director of the project at the state college.

Directions for leaving a check strip in the field, for applying lime, fertilizers, and manure, for planning rotations, and for harvesting and weighing his crop, are given to the boy in addition to suggestions on keeping his accounts and writing the final report.

To encourage participation in the project, $100 in cash prizes were offered last year's winners. The first prize was $30; the second, $20; the third, $15; and the rest of the money was distributed in varying amounts among seven other boys.

Devise a Score Card

The judges of the project felt the need for some kind of score card, so one was outlined along the following lines. Twenty-five points were granted for the boy's plan of his long-time soil improvement project; here such things as the written plan, a diagram of the field, the arrangement of the plots, and their labeling, were considered. Completeness of data received a perfect score of 50 points; under this heading records of yields, amounts of fertilizer applied, amounts of seed sown and the kind, were all given attention. The present condition of the project was rated 15 points; the cultural methods used and freedom from weeds were considered under this head. And the story of the project, which consisted of a narrative with pictures to show the history of the field and the results obtained, was believed by the judges to be worth a perfect score of 10 points.

Show Keen Interest

Perhaps there is nothing of exceptional interest to boys about such a four-year soil improvement project. However, judging from the attractive way the reports were prepared with the maps oftentimes done in water color, and from the way the boys talk about *their* rotations, *their* crops, fertilizers, income, etc., they are not only enthusiastic over the plan, but are looking forward eagerly to the work of the second year. The majority of them have plowed their fields, put their crops in with the right kinds of fertilizers, and another successful year will undoubtedly be realized.

As the $100.00 in prize money looked mighty good to the boys and as there was real money to be made from the crops grown during the four years, the lads rolled up their sleeves and pitched in from the start. They devoted considerable time to the planning and working of their fields and most of them did exceedingly well, according to the late Professor Richards, who was director of the project. It was a great and long looked for day when judging time finally arrived.

The first prize of $30 went to Armund Oscar Frietag, a freshman in the high school, Beaver Dam, Wisconsin. Armund's report is a masterpiece of thoroughness. On his corn he applied two tons of lime to the acre and a 2-16-2 fertilizer used at the rate of 125 pounds per acre, and obtained a yield of 63 pounds per hundred feet of row from the fertilized and limed portion of his field, and 54 pounds per hundred feet of row from the unfertilized and unlimed part, a difference of 9 pounds in favor of the 2-16-2 fertilizer and lime per hundred feet of row. But, perhaps it would be best to let him tell his own story about his first year in the four-year soil improvement project.

On May 17, he says, I started my corn project by planting five acres of Silver King corn. Within a week and a half the corn came up with no difference between the fertilized and unfertilized strips. June 20 the corn was knee high with the fertilized strip having a dark green color and on the average two inches higher than the unfertilized corn, which had a yellowish color.

On October 19, Armund goes on to say, the corn was shredded and yielded altogether 300 bushels. My total credits amounted to $300, while my total expenditures were $234.78, leaving me $65.22 of clear money. His prize money amounted to $30.00, thus bringing his total profit from the five acres up to $95.22.

Keep Cost Records

In keeping cost records of their projects, the boys figured labor at about 25 cents an hour; and the cost of using the equipment, the rental of their fields, freight charges, hauling, insurance, the cost of the plot signs, seed, and fertilizers, were all given a place on their accounts.

Armund's rotation is corn, barley, alfalfa, alfalfa. So this year he is seeding his field in barbless barley and certified, inoculated Grimm alfalfa.

Then there is George Brehmer, freshman in the Clintonville high school, who says the soil on their farm is of the blow-sandy nature. After plowing, he states, the sand drifts to such an extent that it covers the fence posts in some places. The neighbor across the road had to build a new

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Umm—Good Melon!

By E. R. Lancashire

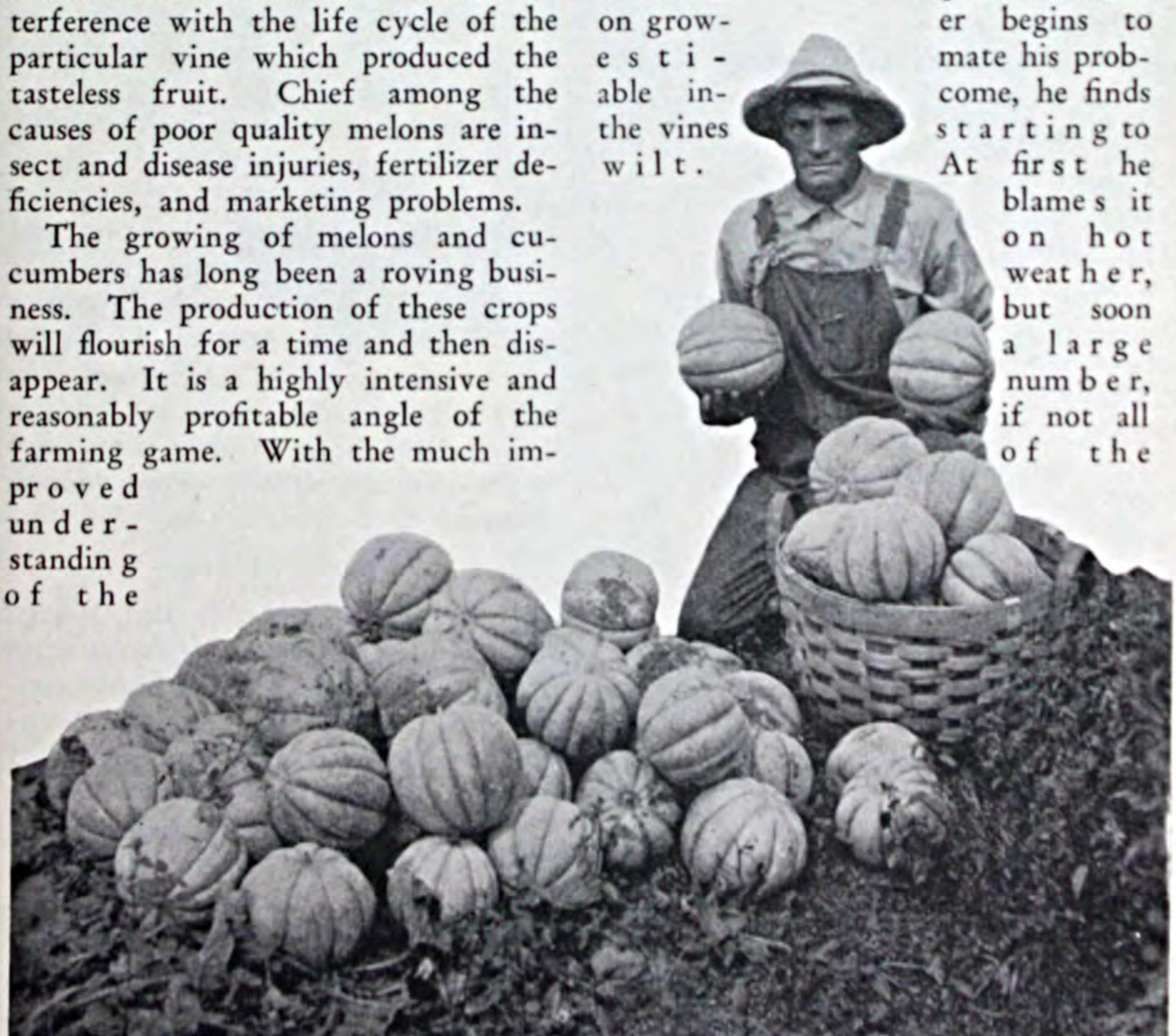
Vegetable Specialist, Ohio State University

SUCCESS in the business of producing melons of desirable quality involves careful attention to each step from the planting of the seed to the marketing of the crop. If somewhere in this cycle, the melon farmer hesitates, even a little, the elusive flavor of the melon is lost. How to put flavor into a melon is largely a matter of knowing how to prevent its escape.

Melons do not taste like pumpkins of their own accord. A flat tasting melon is the result of some outside interference with the life cycle of the particular vine which produced the tasteless fruit. Chief among the causes of poor quality melons are insect and disease injuries, fertilizer deficiencies, and marketing problems.

The growing of melons and cucumbers has long been a roving business. The production of these crops will flourish for a time and then disappear. It is a highly intensive and reasonably profitable angle of the farming game. With the much improved understanding of the causes of failure, it is now possible to grow melons where melons would not grow before. Failure can be wiped out, and success can be set up in its place. Proof of this fact is found in the numerous instances of successful melon production in parts of the country where the job once was given up as hopeless.

It is now a well-known fact that a melon vine unprotected from the striped cucumber beetle will wilt and die before fruits can be normally matured. Just as a melon grower begins to estimate his probable income, he finds the vines starting to wilt. At first he blames it on hot weather, but soon a large number, if not all of the



vines, are dying, and then he knows something else is wrong.

The facts are that a disease, known as bacterial wilt, was carried over winter in the stomach of the striped cucumber beetle. As soon as the melon vines are above the ground in the early part of their growth, these beetles find them. All they have to do is wave their antennae in the air. By so doing nature makes it possible for them to fly directly to a melon patch even though it be located at a considerable distance. Man with his radio is just beginning to catch up with the cucumber beetle.

The beetle chews on the stems and leaves of the melon plants and deposits its droppings on them. The bacterial wilt organisms are thus transferred from the body of the beetle to the melon plant. First and foremost among the practices of the successful melon grower is the control of the beetle.

Methods of Control

The cheapest and most efficient way of controlling these beetles at the present time is that of dusting the vines with a mixture of one part of calcium arsenate and twenty parts of gypsum or land plaster. The dust is applied as soon as the seedling plants have reached the surface of the soil. The same dust is applied every five days and after every rain until the vines are well grown and the beetles are controlled.

A dust gun which enables the melon grower to direct a blast of the calcium arsenate-gypsum dust at the under sides of the melon leaves is one of the working tools of those who are listed as successful growers. Thin layers of the dust applied frequently are necessary if the grower wants to keep the melon flavor in the fruits. The least let-up in the business of controlling the beetles usually results in a poor quality of fruit.

A well-mixed dust can be made by the grower. An old revolving wooden churn can be used or the ingredients can be mixed together in a steel drum fitted with a piece of coarse wire netting to act as a breaker. Some men use stones or short lengths of chain in the drum instead of the wire breaker.

At least one other insect causes serious injury to the melon crop. The little plant louse, called the melon aphis, need not become a serious pest if taken in time. A home-made nicotine dust can be prepared by mixing together three pints of 40 per cent nicotine sulfate and 50 pounds of hydrated lime. The nicotine is poured on the lime and mixed as in the case of the dust for beetles.

Freshly mixed dusts are preferred because they are stronger. This dust is directed at the lice which eat on the under sides of the leaves. The cheapest and most efficient time to apply this dust is during the hottest period of the day and as soon as the lice first attack the melon leaves. One or two dusts will control if applied early enough.

A third dust mixture is also needed. This one is made as were the others. The ingredients are 15 parts of monohydrated copper sulfate and 85 parts of fresh superfine, hydrated lime. This lime will pass through a 300-mesh screen. About the time the vines begin to run the foliage diseases appear, and this dust is applied. Every five to seven days and after every rain are usually often enough to make such applications.

To Get Flavor

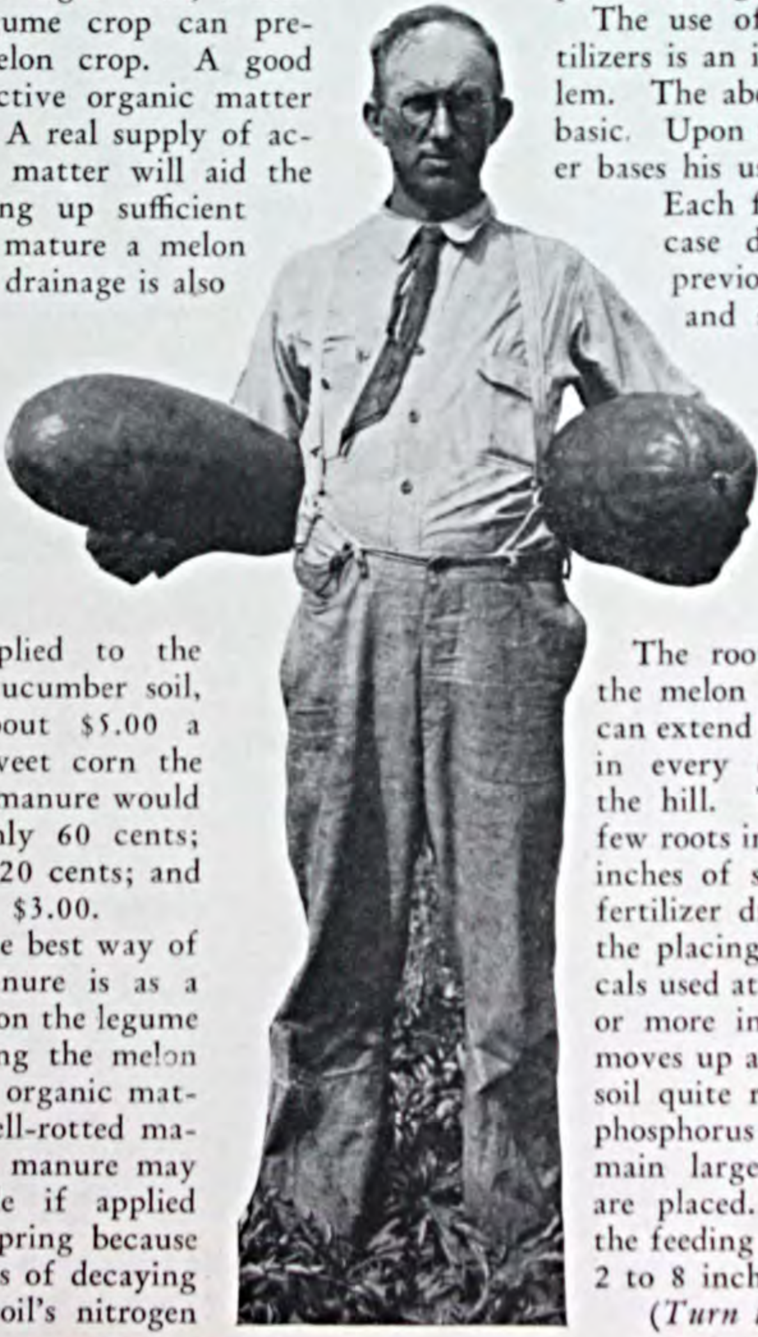
A combination beetle and foliage disease dust can be made by mixing together 5 pounds of calcium arsenate, 15 pounds of monohydrated copper sulfate, and 85 pounds of hydrated lime. Any dust containng copper and lime is most efficient if applied soon after the dew is on the vines in the evening. This copper-lime dust in the presence of water will form bordeaux mixture if fresh superfine lime is used. The copper lime-dust is directed at the under sides of the leaves.

The melon grower who follows such a dusting program and who rotates his melon crop and keeps weeds under control is usually able to offer fine flavored melons to his market. The melon business has come to that phase of its existence where it is next to impossible to grow a good flavored product without using this program of insect and disease control. It is a case of controlling insects and diseases or of giving up the production of melons where these troubles are common.

Flavor in the melon depends also upon the proper balance of fertilizer elements. To begin with, a soil-building legume crop can precede the melon crop. A good supply of active organic matter is essential. A real supply of active organic matter will aid the soil in storing up sufficient moisture to mature a melon crop. Good drainage is also essential.

A fast growing vine is desired in the case of a melon. Well-rotted manure, properly applied to the melon and cucumber soil, is worth about $5.00 a ton. On sweet corn the same ton of manure would be worth only 60 cents; on cabbage, 20 cents; and on tomatoes, $3.00.

Perhaps the best way of applying manure is as a top-dressing on the legume crop preceding the melon crop. Active organic matter means well-rotted manure. Fresh manure may cause trouble if applied late in the spring because in the process of decaying it uses the soil's nitrogen supply.



As to commercial fertilizers, in Ohio and under similar conditions a 4-12-4 is practical on any light colored soil. A 2-14-4 is used on all dark colored soils except mucks and peats, where an 0-12-12 is best. These complete, balanced fertilizers are applied broadcast with a wheat drill at the rate of 1,000 pounds per acre. If row application is used only 500 pounds per acre is needed.

Top-dressings of available nitrogen are also profitable. From 30 to 50 pounds per acre of available nitrogen are applied along the rows in one application made three weeks after the plants start growth.

The use of chemical fertilizers is an individual problem. The above analyses are basic. Upon them the grower bases his use of fertilizers. Each field is a special case depending upon previous treatment, and so each grower will need to deviate from the basic recommendations as he finds it profitable.

The rooting system of the melon is such that it can extend 15 feet or more in every direction from the hill. There are very few roots in the upper two inches of soil, and so the fertilizer drilling calls for the placing of the chemicals used at a depth of two or more inches. Nitrogen moves up and down in the soil quite readily, but the phosphorus and potash remain largely where they are placed. The bulk of the feeding roots are in the 2 to 8 inch levels.

(*Turn to page* 61)

Fertilizing Good Alfalfa Land

By S. D. Conner and R. R. Mulvey

Department of Agronomy, Purdue University

IF you had a field that had produced an average annual yield of 7,417 pounds of alfalfa hay for 13 successive years, without any lime, fertilizer or manure, you would no doubt say that it was good alfalfa land and did not need anything. You would be confirmed in this opinion if the thirteenth year without treatment gave you 8,580 pounds of good cured hay on two cuttings. Now this is exactly what has happened on the continuous alfalfa plots on the Wilson farm of the Purdue Station at Lafayette, Indiana. The soil is a medium dark soil which is mapped as Brookston silt loam.

If none of the plots in this experiment had been treated in various ways with lime, phosphate, and potash, we might just dismiss the subject and say that it was not necessary to add anything to this kind of land for alfalfa. Let us see what has happened where this land had one application of three tons limestone per acre. For the first 10 years the limed alfalfa averaged only 160 pounds more than the unlimed. This is a slightly acid soil and often in answer to the question do you know of any acid soil that does not need lime? we would answer, yes, and then cite this experiment.

In 1926 we plowed the old alfalfa sod under and reseeded in August. The unlimed plot was distinctly inferior to the limed land and for the three years 1927, 1928 and 1929, the lime which was applied in 1916 gave an average increase of 843 pounds of alfalfa per acre per year. This was profitable and it can no longer be said, we have acid soil which does not respond to lime for alfalfa.

Phosphate is recommended generally as almost as important as lime for alfalfa. Precipitated bone, furnishing 40 pounds P_2O_5 per acre per year at a cost of \$2.80, was used on one plot in addition to lime. This phosphate gave an average increase of about 100 pounds per acre per year, which was not profitable. In the thirteenth year, however, some of the plots had been refertilized, so that potash, lime, and phosphate could be compared to potash and lime. This comparison showed an increase of 710 pounds of alfalfa per acre for phosphate, which was profitable.

Needs Plenty of Potash

During the 13 years there has been a comparison of lime and phosphate with lime, phosphate, and potash. Where potash was applied at an average rate of 12½ pounds of K_2O per acre per year, the potash has increased the annual yield 540 pounds per acre. Twenty-five pounds of potash have given an increase of 862 pounds of alfalfa.

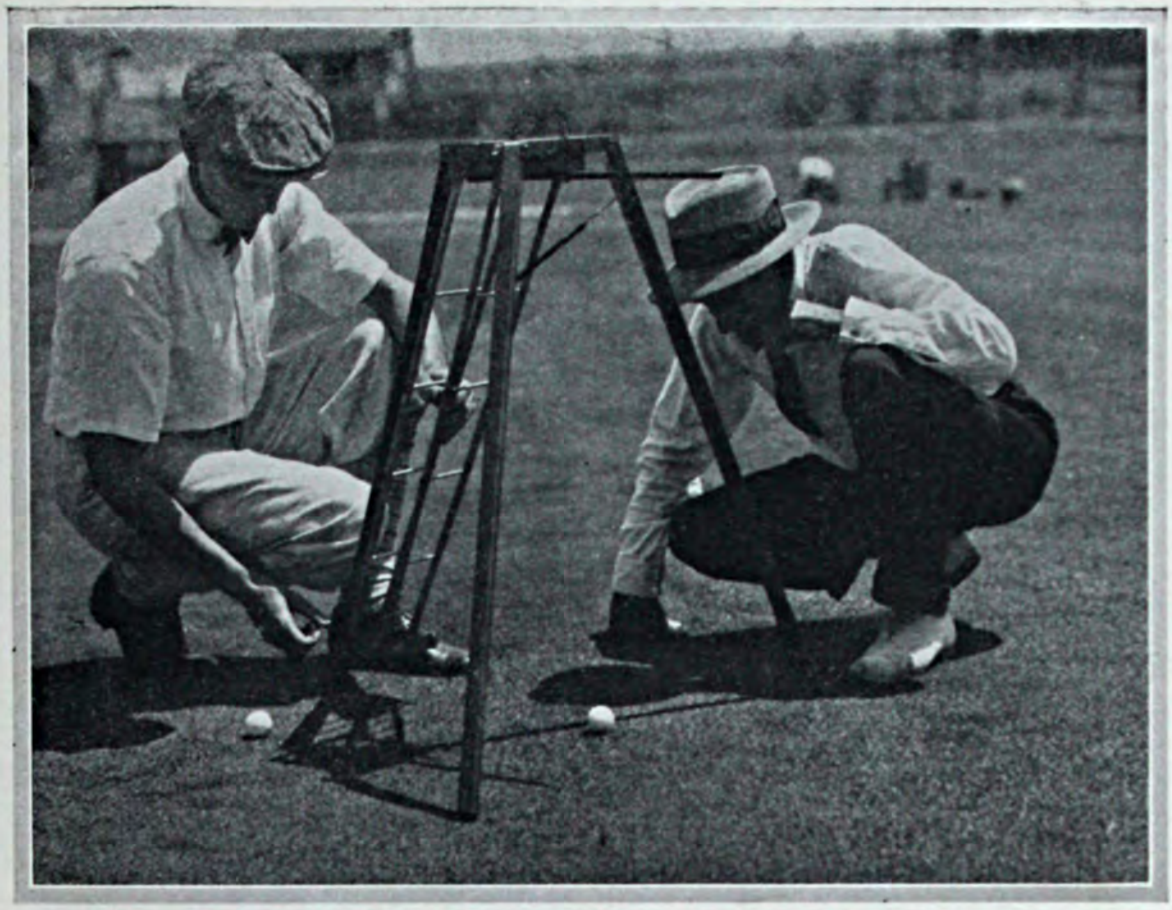
With alfalfa at \$12 per ton and potash at 6c per pound, which certainly are fair farm prices, the 12½ pounds of potash costing \$.75 brought in \$3.24 worth of alfalfa with a net profit of \$2.49 per acre per year. The heavier application of potash cost-

(*Turn to page 59*)

THE TOURIST

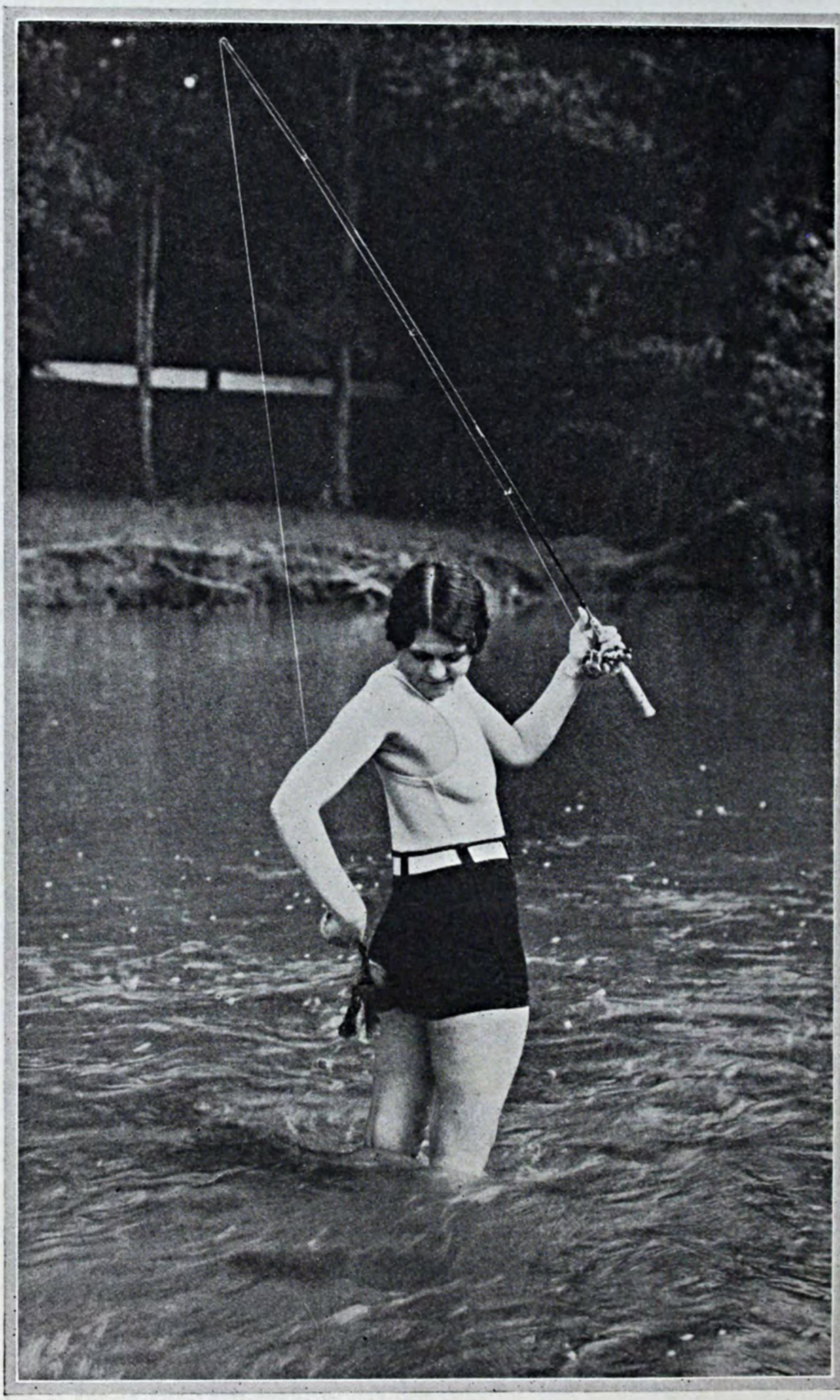
PICTORIAL

GOLF, FOR EXERCISE

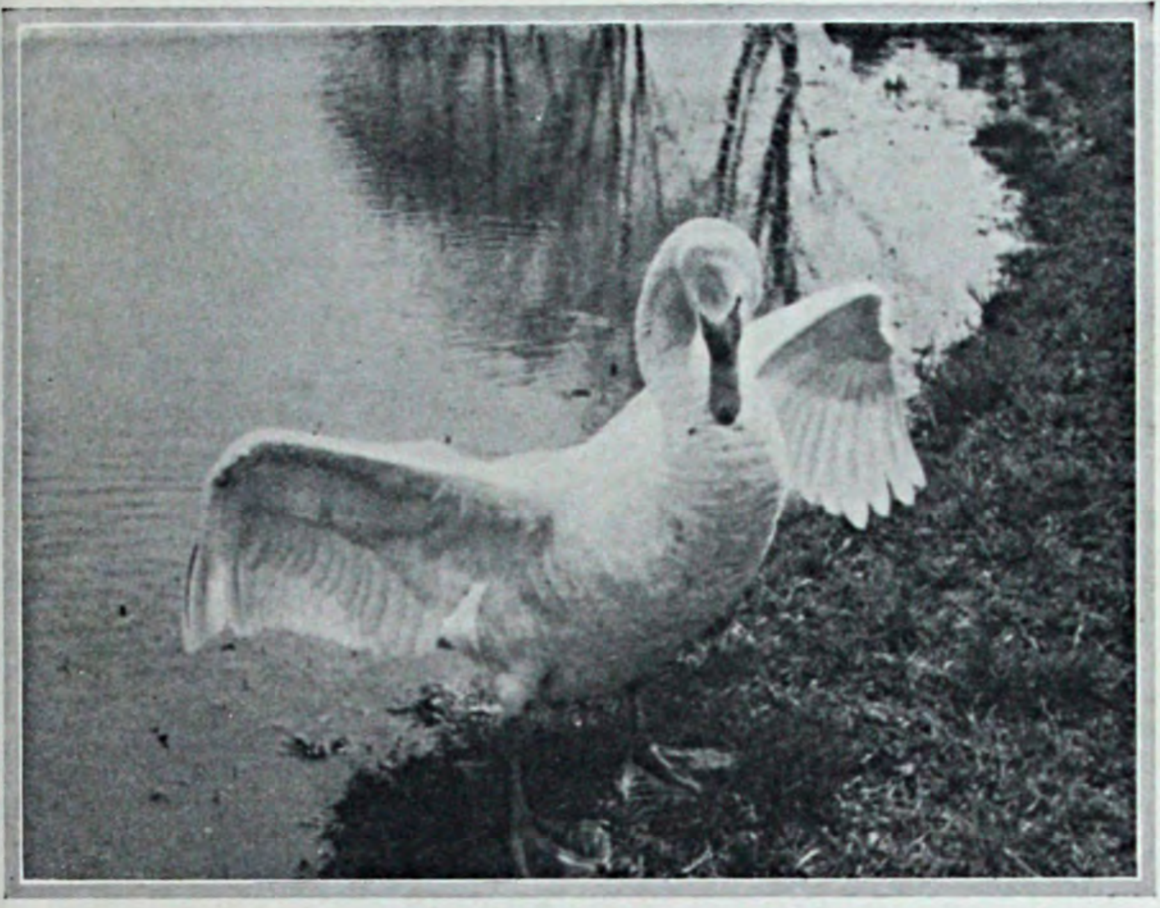


This putting machine tells the difference in suitability of different kinds of grass and different lengths and conditions of dryness or wetness. The arm swings pendulum fashion and always strikes the same blow. The distance the ball travels tells what effect the grass has on it.

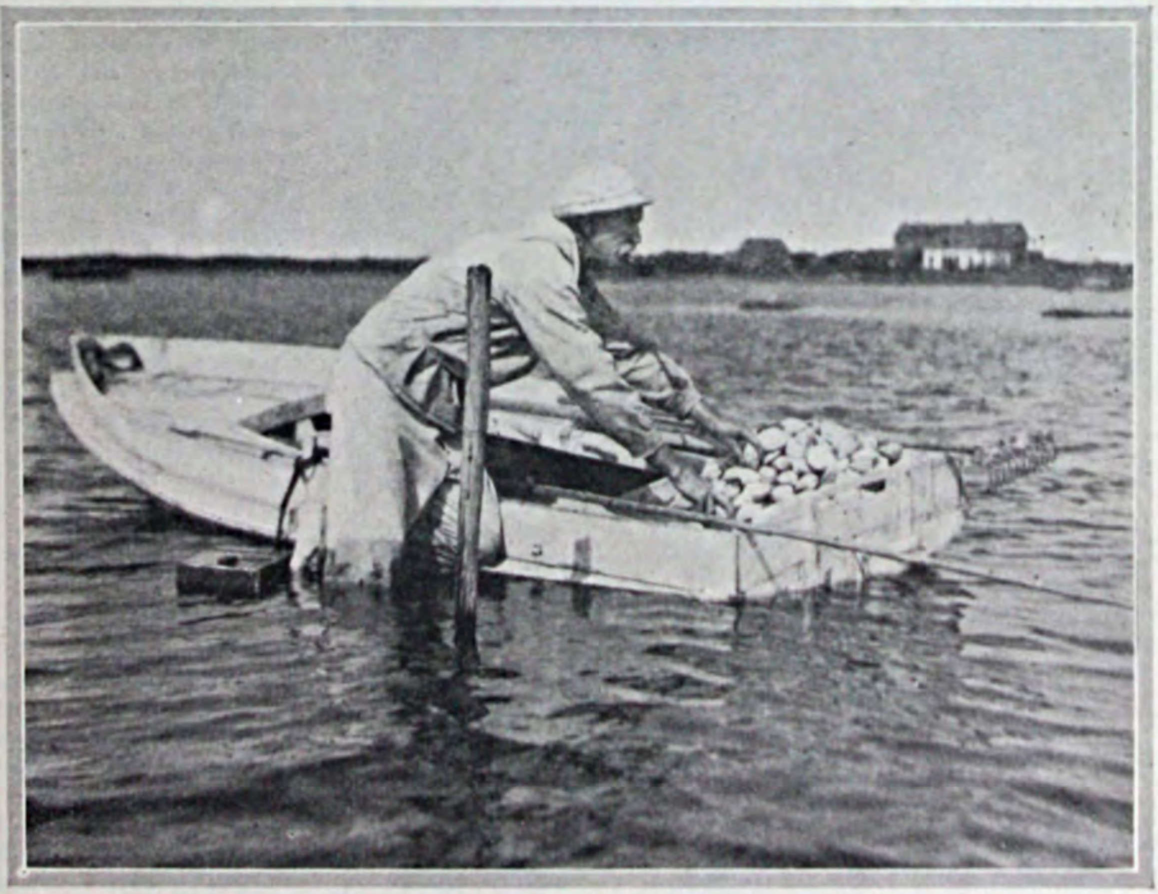
Picking beans interplanted with parsley, Lake county, Florida. These people have no need to golf for exercise, for a few hours at this kind of work, or any kind of gardening, are enough to "keep in shape." Farm folks' favorite summer recreation is motoring.



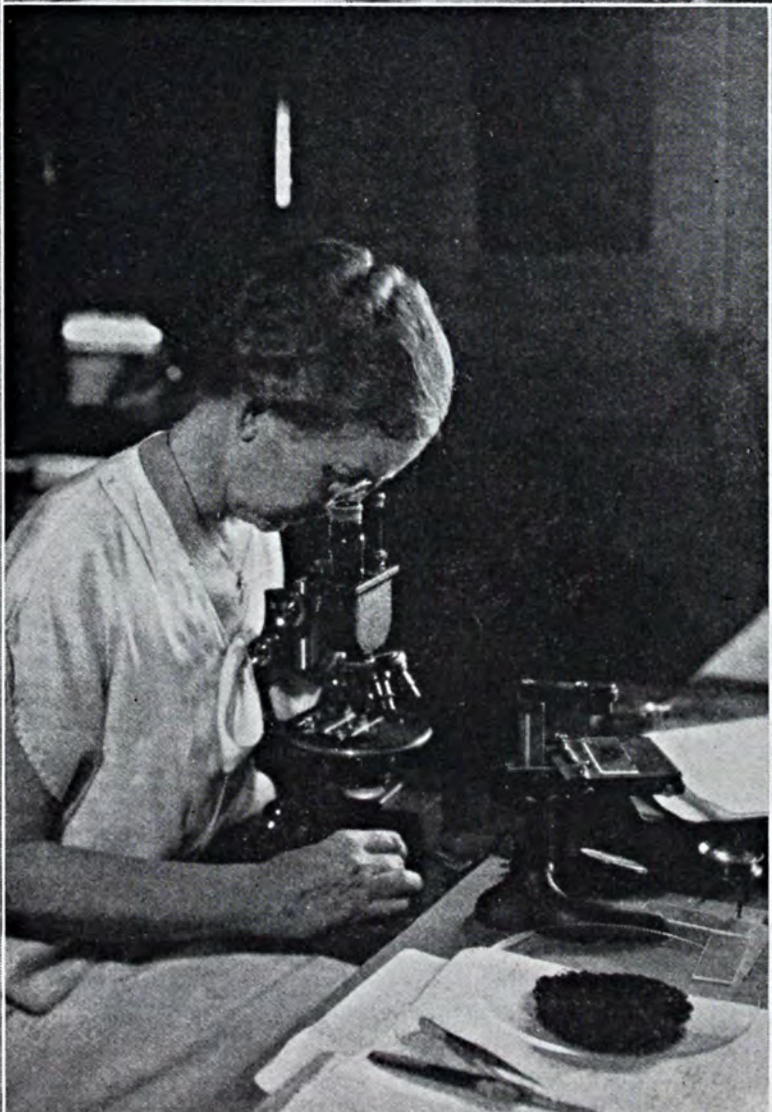
UNFORTUNATELY CAST



In fighting mood! The beautiful swans which grace our parks have never been more than half-domesticated. There is only one large swannery in existence—located at Norwich, England—where the young, called cygnets, are fattened for the table. Cygnets are highly esteemed as food.



A typical scene in any of the bays along the northeastern Atlantic coast. During certain seasons of the year, thousands of people engage in the clamming industry. The clams are raked from the soft ooze, carefully washed, sorted, packed in ice, and dispatched to near-by markets.



Above: Frederick Wingate, who scored 98.7 per cent, and Carolyn Boyle, who scored 99.3 per cent, recently were chosen as the healthiest boy and girl in the State of Indiana. Wingate is 19 and Miss Boyle is 15 years of age. They will compete in the national health contest to be held in Chicago in the fall. The eating of fruits and vegetables, meat once a day, plenty of sleep and exercise, and the drinking of milk were given by the couple as contributing factors for their near-perfect states of health.

Left: A number of women scientists are included among the large number of technical workers in the United States Department of Agriculture. Dr. Alberta Read is senior microanalyst in the Food, Drug, and Insecticide Administration. She is using a photo-micrographic outfit, which makes photographs through the microscope.

The Editors Talk

Soil Science Congress

Three years ago the first International Congress of Soil Scientists met in Washington and afterwards made a tour of some 10,000 miles in the United States. This international meeting is held every three years. This year it is being held in Russia.

Delegates and others, many from agricultural colleges and experiment stations, are leaving now on the long journey to the coming meetings in Russia. A similar plan will be followed after the meetings; tours through typical agricultural regions of Russia will be arranged.

Whether or not one fully agrees with the teachings of the Russian school of soil scientists, at least their work has created a definite stimulus in soil science; has given the subject a new impetus and a new lease on life to which the world of soil scientists has not been indifferent.

Whether the coming Congress will clarify the problems and in any way correlate the very divergent ideas of this science, remain to be seen. It is to be hoped that it will. At least everybody will look forward to the return or our friends and will be glad to hear what has been said and what has been accomplished.

For the present we wish all who are going Godspeed and a safe return.

Economics and Retail Prices

Many companies selling fertilizer materials quote the wholesale prices of such materials to fertilizer manufacturers. Wholesale prices are important, but farmers do not buy fertilizers at wholesale prices. They buy at retail prices. Thus, it is the retail price that is of primary importance to the consumer, and likewise is the major factor that affects the distribution of fertilizers.

Wholesale prices of fertilizer materials are available—something is known about such prices.

On the other hand, very little is known about the retail prices of either fertilizer materials or mixed fertilizers. Since most of the plant food consumed in the United States is used in mixed fertilizers, an economic study of distribution and prices necessarily involves the retail prices of mixed fertilizers, as well as the retail prices of materials.

This problem of retail prices is one that needs much more systematic study than it has received.

Some of the questions that should be answered by such a study of retail prices are as follows:

Regarding fertilizer materials—

1. What is the margin between the wholesale price and the retail price of different fertilizer materials? How much is added to the whole-

sale price of each fertilizer material by the time the farmer buys it? Is this margin getting larger or smaller? What are the economic causes of any changes in the margin?

2. Is the use of straight fertilizer materials increasing or decreasing? Are there economic causes for such changes?
3. Is the margin between the wholesale price of fertilizer materials and the retail price the same for all materials or greater for some than for others? Is the cost of distribution of some materials excessive as compared with the cost of distribution of others?

Regarding mixed fertilizers—

1. What effect do the changes in the wholesale prices of different materials have on the retail prices in the complete mixed goods?
2. How do changes in the retail prices of complete fertilizer per unit change in ammonia, phosphoric acid, and potash content compare with each other?
3. What effect do changes in wholesale prices in materials have on the prices of mixed fertilizers?
4. What is the cost of manufacturing and distributing mixed fertilizers? Is this increasing or decreasing?
5. What part of the retail price of mixed fertilizers is the cost of materials?
6. What are the retail prices of mixed fertilizers? Are they increasing or decreasing?
7. What is the relationship between the analysis and price of mixed fertilizers? What are the factors affecting the retail price of mixed fertilizers?

Modern economics and statistics are becoming as scientific as chemistry or any other science. They are just as helpful in solving the problems of industry as are the other older sciences. In short, the job of modern economic studies is to aid the judgment, to take much of the guess out of industrial problems, and certainly a great deal of guess needs to be taken out of the problem of retail prices of fertilizer.

Cornell World Host

Representatives from 15 foreign countries and the United States are expected to attend the international conference of agricultural economists at Cornell University, August 18-29. This is the second conference growing out of a great movement to get a world viewpiont from related interests pertaining to marketing, agricultural statistics, farm management, agricultural credit, prices, land economics, taxation, etc.

The first conference was held at Dartington Hall, Devon, England in 1929 and was attended by representatives from 12 countries including about 15 persons from Canada and United States. This group requested the Cornell representatives to organize a similar conference at Ithaca this year.

The movement is highly commendable. America has its agricultural problems. Other countries have similar problems. In some of these countries progress has been made toward solutions which may apply here. Some of our results may apply in other countries. It is indeed fortunate that the meeting comes to the United States this year when farm relief is so prominently before the public mind.

In addition to the foreign representatives and official representatives from the United States Department of Agriculture and various educational institutions, economists from several large industries closely allied to agriculture, will attend the conference. The Ministry of Agriculture in England has already provided eight traveling fellowships for the 1930 conference and promises other representatives from England and Scotland.

Our Changing Agriculture

An excellent article by F. H. Jeter on another page points out in a most interesting manner some of the changes that are taking place in our agriculture, in this case in North Carolina. The State is famed far and wide for tobacco and cotton. Everybody knows about these two crops, but who would expect to find the largest Jersey calf club in the world, with 175 boys and girls owning purebred heifers, located in North Carolina. The milk and milk products of the State produced last year were valued at $20,000,000. There are now 20 buttermaking plants or creameries buying butterfat from 11,000 farmers. In the mountains of northwestern Carolina a new industry is springing up in the shape of cheese factories.

As the author points out, it is not alone with dairying that a change in agriculture is apparent—North Carolina farmers are going after the poultry business also. Hog-feeding and shipping are getting to be quite an industry.

Better farming means getting away from single cropping systems. It means the use of the land for which it is best fitted. The fertilizer industry can well take note of these changes taking place in Carolina. It sells most of its materials for three or four crops—cotton, tobacco, potatoes, and truck crops. It has good and bad years, according to whether these crop prices are good or bad. The fertilizer industry needs to learn diversification as much as does the farmer, and a good place to get an example is North Carolina.

Getting On

"Getting on" is of universal interest because we all want to get there. Some know more definitely than others, for some have a goal and others have merely the desire, but we all want to get there—to "get on."

Classic literature from the Bible to Ruskin and writers of the present day have told us how to do it. But apparently each generation has to learn for itself all over again, because each generation is wiser than the previous one or at least thinks it is, which is the same thing, when it steps out on the road to "getting on."

Eventually we discover the truth so simply stated ages ago,—that the more we think of "I" in getting on, the less progress we make; the more we think of others, the greater the progress to the desired goal.

Look around anywhere at the "I" man, pushing, forceful, claiming credit for all and sundry, satisfying his wants and his desires. What is his progress? Good for a time, yes! He dominates and progresses. Then his world, small or large, gets tired of him. By middle age he is making less progress. A few years later his enemies see to it that he less and less gets his own way. His troubles accumulate. He blames the world, circumstances and other people. He becomes soured and tyrannical. He never reaches the goal.

Better and of a higher type is the "we" man. He works for himself and his group. This is the standard aimed at among trained bodies of men in schools, colleges, armies, fraternities, etc. Self to some extent is suppressed. The "we" man thinks not only of himself, but of others to the extent of thinking of his group, cooperating with them, acting with them in his own and their interests—but still not much beyond his group. His is a group interest. The "we" man is a higher type. He gets on better. His friends are more loyal. His opportunities are greater. As the world goes, it is a fairly high standard to attain.

Finally, then, is the "you" man. Self at this stage is almost entirely suppressed. His motive for action is "What do you want? What do the customer, my friends, the other man want?" He reaches his goal. The world, his world, is ever behind him, pushing and supporting him, but his numbers are small for he is a genius.

I—we—you—look around and learn. Discover if it is not true. Getting on is pretty largely in proportion to the ability to forget self.

The Growing Southwest

We are hearing much more from the Southwestern States agriculturally than we used to. This story is told by E. B. Ferris in another part of this magazine. While North Carolina, the largest fertilizer-using State in the Union, doubled her fertilizer consumption between 1921 and 1928, Mississippi increased hers five-fold and Texas seven-fold in the same time.

As Mr. Ferris points out, with a rapid increase in fertilizer consumption in the Southwestern States, the tendency has been to use single plant foods or combinations of two or more of these that lack proper balance. Since the extension of the use of fertilizers has usually preceded any definite information as to the real needs of the soils, it has been only natural that the plant foods that show the greatest tendency to increase size of plant growth have been the first to be introduced and used. Potash particularly was not used in the early years. The author points out some excellent instances of typical practices, but subsequent experimental work, as that conducted at Holly Springs Experiment Station, Mississippi, has shown remarkable increases for potash when added to other fertilizer elements. In later years this lack of potash has manifested itself in the appearance of rust, wilt, and leaf diseases of cotton generally, to such an extent that cotton growing in some sections was unprofitable.

This all goes to show that in the long run the agronomic facts will assert themselves in spite of any other influences. There is no way of escaping the facts over a period of years. Therefore, it is the soundest policy to make every honest and determined effort to try and find all the facts in the first place.

Many times farmers are losing most of the profit on certain fields because they fail to spend a few dollars on commercial fertilizers and make effective use of their barnyard manure. A fertilizer experiment on a small portion of the farm will be an inexpensive aid in determining fertilizer needs.

—*The Extension Service News—State College of Washington.*

AGRICULTURAL DEVELOPMENTS

By L. C. Farle

PURCHASES FARM

A 160-acre farm in the eastern panhandle of West Virginia was recently purchased by the State Agricultural Experiment station of West Virginia for experimental work chiefly on fruits. Lying in the heart of the important fruit and general farming section of the Eastern Panhandle, it will be of particular service in the upbuilding of that section, but much of the work will also have State-wide interest and value, according to F. D. Fromme, director of the station. Its establishment is a step in the fulfilment of the policy of carrying the University of West Virginia to the people of that State.

OVER 2,450 EXPERIMENTS

An indication of the range and extent of applied agricultural research carried out by the Experimental farms and stations of the Canadian Government Department of Agriculture throughout Canada is given in a recent official report. This report states that when it was issued there were 2,453 active experimental projects in operation, ranging in application from Agrostology to Tobacco. Horticulture heads the list with a total of 641 active experimental projects; followed by animal husbandry with 421; botany, 295; field husbandry, 282; poultry husbandry, 168; agrostology, 149; cereals, 124; chemistry, 105; illustration stations, 76; tobacco, 69; bees, 63; and pathology, 25. The benefit of this research work is enjoyed by the general public in a variety of ways.

Some of the greatest contributions to agriculture have been made by the Canadian Government Experimental Farms. At the Central farm at Ottawa Marquis Wheat was developed, a variety that extended the wheat growing area to a northerly latitude that 25 years ago was thought to be impossible. More recently the same farm introduced Garnet Wheat, which can be grown successfully farther north than Marquis. Still another variety, Reward, also a development of the Canadian Government plant breeders at Ottawa, may ultimately eclipse Marquis and Garnet. It has only been on the market three years, yet last December, Joseph H. Smith, Wolf Creek, Alberta, won the world's wheat championship at the International Grain and Hay Show, Chicago, with a sample of Reward.

TRADE ON MAIN STREET

American hamlets and small villages may be destined for the discard, but towns of from 1,000 to 10,000 population are doing more business than ever, in the opinion of Dr. C. J. Galpin, Bureau of Agricultural Economics, United States Department of Agriculture.

"Although the general trend," he says, "has been for farmers to shift their buying from stores at country crossroads, in hamlets, and in small villages, to larger retail trading centers, the shift in farmer buying to towns ranging from 1,000 to 10,000 in population is increasing the trade area of these towns and increasing the trade."

Dr. Galpin gives it as his opinion that the decline of the hamlet and small village is the result both of a decreasing farm population and of the higher standard of farm living in recent years. He said that although the farm population has decreased by 4,000,000 persons since 1920, the gross cash income from agriculture of the 27,000,000 of farm population today is the same—$10,000,000,000 a year—as that of the 31,000,000 of farm people 10 years ago.

CANADA'S AGRICULTURAL WEALTH

The gross agricultural wealth of Canada for 1929 is estimated at approximately $7,978,633,000. Last year the total revenue from agriculture was $1,667,218,000, of which Ontario accounted for $509,434,000; Quebec, $320,422,000; Saskatchewan, $309,308,000; Alberta, $228,589,000; Manitoba, $134,095,000; British Columbia, $55,235,000; Nova Scotia, $43,558,000; New Brunswick, $39,854,000, and Prince Edward Island, $26,723,000. The two principal items which go to make up the total of agricultural revenue are field crops, valued at $979,750,000, and dairy products with an estimated value of $290,000,000. Farm animals are third with a value of $210,437,000 and poultry and eggs fourth with a value of $109,346,000.

THE PRICE OF FARM LAND

According to the Bureau of Agricultural Economic, United States Department of Agriculture, farm real estate values as of March 1, 1930, show a decline of one per cent below the preceding year, as a Nation-wide average.

Maine, Connecticut, Wyoming, Colorado, New Mexico, and Oregon each show a small increase in values for the year. Declines are reported for all other States, notably in the Middle Atlantic, East North Central, West North Central, and South Atlantic groups.

Values in 1920 reached 170 per cent of the 1912-14 average; they were 127 per cent in 1925; 124 per cent in 1926; 119 per cent in 1927; 117 per cent in 1928; 116 per cent in 1929; and 115 per cent in 1930.

SAVE THE FERTILE ACRES!

Our national loss due to soil erosion is $200,000,000, according to estimators of the United States Department of Agriculture. Figures do not mean much to most people, but anyone interested in the welfare of American agriculture realizes the seriousness of soil erosion. A recent session of Congress appropriated $160,000 to meet the expenses of an investigation of the subject and the support of every one affected by the problem was urged. It was pointed out that it was better to save the fertile lands of the nation than to let them wash away while seeking waste lands to bring into cultivation at high cost to the taxpayers.

FERTILIZER is a good thing if used in the right place, believes Edgar Hinze, a 4-H Club boy living in the Shroeder community in Nueces county, Texas. He made a net increased profit of $8.64 per acre from a small sandy plot on which 12-4-4 commercial fertilizer had been applied at the rate of 300 pounds to the acre. But on a near-by black land plot an application of 200 pounds of a 12-2-2 fertilizer gave no increase. This is in line with experience throughout the Blackland Belt of Texas, but this boy has furnished a good illustration of the need for fertilizer in the sandy soils commonly found in and adjacent to the Blacklands.—*W. H. Darrow, Extension Editor, A. and M. College of Texas.*

Foreign and International Agriculture

In Old Macedonia

By Frank W. Ober

Honorary Secretary, Agricultural Committee, Near East Foundation

LIKE American county agents, six Greek speaking farm production instructors in old Macedonia are building better agriculture. On the battlefields of the centuries where Philip, Alexander, Caesar, and the Turks fought and Paul preached, these six "county agents" are leading in a battle for bread and more bread, healthful living, and a fuller life for a downtrodden people.

Macedonia is receptive to constructive ideas on agriculture. Some 133,000 refugee families are rebeginning on the reclaimed battlefields with farms of from 5 to 15 acres given each family on easy terms. Already 1,250,000 acres are settled. The Government has supplied 75,000 plows, and $43,000 has been spent in seed. Each family has been given a cow, sheep, and a few tools to start anew. More than 1,650 new villages have been created and as many old reoccupied. Some 42,000 mud-brick, tile-roofed houses, costing from $250 to $350 each, have been built.

The refugees are of good mental, physical, and moral stuff. A church, school house, good roads, and a cem-

Here an instructor is discussing with farmers the use of commercial fertilizers for tobacco. Macedonia is famous for its production of the best Turkish tobacco, a cash crop upon which the refugees rely for their livelihood

etery are their first demands. Deportation, starvation, despair are behind them and hardship, struggle, hope are ahead. Government agricultural experiment stations and model farms have been established.

A great need for American agricultural teaching on the Smith-Lever plan, 4-H Clubs, etc. is felt. The Near East Foundation is doing a remarkable work in projecting evening farm-extension courses in 36 villages, furnishing pedigreed stock and choice poultry for two experiment stations, and also in furnishing able leaders to supervise agricultural teaching.

A Greek speaking leader teaches and supervises work in six villages. The mayor, school teacher and priest comprise a local committee. There is no costly equipment, the instruction being given in school buildings and fields.

There is a nucleus of former Near East Relief orphanage boys of character and capacity in each village. These become dependable leaders in health, recreation, and morale, and in a true sense they are "Soldiers of the Soil." The year's salary and expenses of a leader of six villages average $1,000 and it is figured that every $1,000 thus invested should add $2,000 in increased food production besides better homes, health, goodwill, and well-being.

The Agents Report

A recent report of the six Macedonia "county agents" is an enlightening picture.

1. Demosthenes Economou in the Kilkis Area, before starting his second group, made definite arrangements for three experiment projects *for better farm methods* in each village. A frontier garrison of soldiers (80 per cent. farm born) raised $100 worth of vegetables and attended farm talks given by him last season.

2. Dionissios Tzoghas has begun work on *school gardens* near Berea (spoken of by St. Paul) in all six of his villages, and is to assist the people of Soubasa in planting 25 acres of fruit trees which they themselves will buy. The secretary of the village very aptly stated they would be a good investment for the younger generation of the village.

3. Georgios Papadopoulos has made a name for himself in using his army veterinary training to cure animals in his villages and is also doing an outstanding bit of work with their *village recreation and improvement work.* He conducts physical training in village schools. He and his sister are Near East Relief orphans and are real community leaders in their home town.

4. Haralambos Petropoulos has a very difficult group of villages in which to work because of location, difficulty of getting from place to place through the ever present winter mud, and the general backwardness of the people. Nevertheless, he has already contributed something toward the *uplift of the communities* by his *visiting peasant homes,* and by his readiness to share in all local activities.

5. John Loucopoulos has already helped organize a *Boys' Club* in Tcherepiani with 30 young men as members. They are pledged to attend his meetings, remain away from coffee houses, and to improve themselves morally, physically, and mentally. It is similar to a *local Y. M. C. A.* They have rented a room to be used for meetings and study and have asked for our cooperation with athletic supplies and suitable books. The village priest and school teacher are active with him.

6. Haralambos Zylamoughlou has done the most outstanding piece of work in giving *talks to children* in the village schools on *nature study.* He seems destined to be a most worthy member of our staff of teachers. The priests of the villages, who are also farmers, attend the evening lectures on agriculture.

That soil fertility has already been accorded a place of importance in the

(*Turn to page 54*)

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, Crops, Crop Diseases, and Insects. 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

Apple growers the country over have had sad experiences from the ill effects of one-sided fertilization on the health and bearing quality of their fruit trees. That apple trees, not unlike other farm crops, remove large quantities of the essential plant food elements which must be replaced by direct application of these elements in commercial fertilizers, is convincingly shown in Bulletin 269 of the Virginia Agricultural Experiment Station.

Summarizing the results of long-time orchard experiments in Virginia, supplemented by statistical analysis of data recorded by the horticultural authorities in New York, Pennsylvania, and West Virginia, Dr. F. W. Hoffman, the author, makes the following comments:

Significant gains in trunk circumferences and yields for cultivated orchards treated with nitrogen, phosphoric acid, and potash, are recorded. Most pronounced gains in yield show up in general for nitrogen alone, but the highest gains show up for a combination of the three essential plant food elements in the cultivated apple orchards of the limestone belt.

He further states that for higher yields and for better quality fruit, applications of phosphoric acid and potash in a correct balance with nitrogen must not be overlooked, even though nitrogen may show the most pronounced gains.

Of significance is his statement that from the standpoint of maintaining at least a reserve for fruit needs, it should be profitable to restore at least the amounts of these essential elements as have been shown to be removed in the picked fruit.

Regarding ratio of the essential elements, it is pointed out that although a 7-2-5 ratio is suggested for minimum needs, it may be desirable also to provide against the elements tied up in the wood, for removal in pruned wood, and for special cover crop needs. To provide for these additional needs, a 7-6-5 analysis for soils not planted to legumes or low in nitrogen, and a 4-8-5 analysis for those planted to legumes, or well supplied with nitrogen, are suggested.

It would appear that this new concept of orchard fertilization is far more logical than any one-sided system that might be in vogue.

This bulletin should prove of immense value to practical orchardists and investigators.

Soils

Failure to test farm soils for acidity to determine lime requirement for optimum crop growth is costing American farmers millions of dollars in poor crop yields and money wasted by guessing at the amount of lime needed. In an effort to simplify soil testing and to effect a saving of money, the Illinois Agricultural Experiment Station has published Circular No. 346, the title of which is "Test Your Soil For Acidity." C. M. Linsley and F. C. Bauer are the authors. This bulletin should prove immensely helpful to farmers who have not made the grade by the "Guessing Route."

"Liming Massachusetts Soils," Agr. Ext. Serv., Amherst, Mass., Ext. Leaflet 134, *Jan.,* 1930, *A. B. Beaumont.*

"Soil Survey of The Oroville, Area, California," U. S. D. A., Washington, D. C., No. 4, *Series* 1926, *E. J. Carpenter, A. T. Strahorn, T. W. Glassey, and R. Earle Storie.*

"Soil Survey of Carroll County, Iowa," U. S. D. A., Washington, D. C., No. 5, *Series* 1926, *A. M. O'Neal and R. E. Devereux.*

"Soil Survey of Chickasaw County, Iowa," U. S. D. A., Washington, D. C., No. 1, *Series* 1927, *C. L. Orrben and F. R. Lesh.*

"Soil Survey of Warren County, Iowa," U. S. D. A., Washington, D. C., No. 12, *Series* 1925, *A. M. O'Neil and R. E. Devereux.*

"Soil Survey of Nuckolls County, Nebraska, U. S. D. A., Washington, D. C., No. 17, *Series* 1925, *Louis A. Wolfanger, R. D. Wood, and A. N. Huddleston.*

"Soil Survey of Hyde County, South Dakota," U. S. D. A., Washington, D. C., No. 18, *Series* 1925, *J. A. Machlis and B. H. Williams.*

"Soil Survey of Willacy County, Texas," U. S. D. A., Washington, D. C., No. 3, *Series* 1926, *H. W. Hawker, and C. S. Simmons.*

"Soil Survey of Calumet County, Wisconsin," U. S. D. A., Washington, D. C., No. 16, *Series* 1925, *W. J. Geib, A. H. Meyer, J. A. Chucka, and H. H. Hull.*

Crops

"Intensive Grassland Management" is the title of a new Massachusetts bulletin, No. 262, in which the authors, R. C. Foley, E. J. Montague, and C. H. Parsons, record the results of a two-year demonstration on pasture improvement. In spite of two extreme seasons, the first wet, the second dry, excellent results were obtained from the use of concentrated fertilizers. The grazing season was lengthened and the carrying capacity of the pasture increased, thus lessening the amount of barn feeding necessary. The bulletin contains valuable information for any livestock farmer who would lessen his production costs.

An important new bulletin which came into circulation during the month is Bulletin 500, "Legumes as a Source of Available Nitrogen in Crop Rotations," by Dr. T. L. Lyon of Cornell University. The experiments discussed in the bulletin were undertaken for the purpose of studying the effect of certain kinds of legumes and their place in the rotation on the yields of all the crops in a number of five-year rotations. The experiments in which alfalfa was followed by cereals through a period of several years, and in which timothy was followed by the same crops, showed that, while alfalfa activated the soil nitrogen and thus caused larger yields of the cereals immediately following the legume, yet the activity wore off as succeeding crops were grown, and there was a tendency for yields following the alfalfa and the timothy to become equal during the course of several years. The experiments suggest the advisability of repeating the use of a legume in the crop rotation at sufficiently short intervals to prevent the nitrogen from losing its activity at any time. The yield of alfalfa hay averaged three-fourths of a ton more to the acre annually where a fertilizer consisting of superphosphate and muriate of potash was applied, than where none was used. Not only was the yield of dry matter increased by fertilizing, but the actual quantity of nitrogen produced was considerably augmented, although the percentage of nitrogen in the crop was not larger in the fertilized than in the unfertilized alfalfa. These are a few of the important conclusions reached by Dr. Lyon. Agriculturists interested in the place of legumes in rotations will want this eminent authority's new bulletin.

"Prune Culture in California," Agr. Ext. Serv., Berkeley, Calif., Cir. 41, *March,* 1930, *A. H. Hendrickson.*

"Peach Culture in California," Agr. Ext. Serv., Berkeley, Calif., Cir. 42, *March,* 1930, *E. L. Overholser and W. P. Duruz.*

"Olive Thinning and Other Means of Increasing Size of Olives," Agr. Exp. Sta., Berkeley, Calif., Bul. 490, *April,* 1930, *Harry E. Drobish.*

"Fifty Years' Index 1877-1927," *Agr. Exp. Sta., Storrs, Conn., Bul.* 309, *Dec.,* 1929, *E. H. Jenkins.*

"Herbaceous Perennials for Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 57, *Jan.,* 1930, *J. V. Watkins.*

"Vegetable Crops of Florida," State Home

Demonstration Dept., Tallahassee, Fla., Bul. 8, March, 1930, A. P. Spencer.

"A Study of the Root Systems of Some Important Sod-forming Grasses," Agr. Exp. Sta., Gainesville, Fla., Bul. 211, Feb., 1930, A. S. Laird.

"Results of the 1929 More and Better Cotton Per Acre Contest," Ga. State College of Agr., Athens, Ga., Vol. XVIII, Bul. 383, Feb., 1930, Edison C. Westbrook.

"A Comparison of the Transpiration Rates of Twenty-one Deciduous Fruit Species," Agr. Exp. Sta., Urbana, Ill., Bul. 341, Feb., 1930, Victor W. Kelley.

"The Inheritance of Germless Seeds in Maize," Agr. Exp. Sta., Ames, Ia., Res. Bul. 121, Feb., 1930, John B. Wentz.

"Annual Report of Extension Work," La. State University, Baton Rouge, Ext. Cir. 139, March, 1930, W. B. Mercier.

"American Potato Journal," The Potato Association of America, Lansing, Mich., Vol. VII, No. 4, April, 1930.

"Winter Wheat Varieties—Importance and Culture," Agr. Ext. Div., Univ. of Minn., St. Paul, Spec. Bul. 127, Oct., 1929., R. E. Hodgson and H. K. Hayes.

"Report of the South Mississippi Branch Experiment Station," Agr. Exp. Sta., A. & M. College, Miss., Bul. 274, Dec., 1929, W. R. Perkins, W. S. Anderson, and W. W. Welborne.

"Blackberries for New Hampshire," Univ. of N. H. Ext. Serv., Durham, N. H., Ext. Cir. 104, Dec., 1929, L. P. Latimer and H. A. Rollins.

"Agricultural Experiments—1929," Agr. Exp. Sta., Durham, N. H., Bul. 250, Feb., 1930, J. C. Kendall.

"Better Lawns," Agr. Exp. Sta., New Brunswick, N. J., Ext. Bul. 76, Jan., 1930, H. R. Cox.

"Development and Ripening of Peaches as Correlated with Physical Characteristics, Chemical Composition, and Histological Structure of the Fruit Flesh: 111. Macrochemistry," Agr. Exp. Sta., New Brunswick, N. J., Bul. 494, Feb., 1930, G. T. Nightingale, R. M. Adoms, and M. A. Blake.

"Experiments with Turf Grasses in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Bul. 497, March, 1930, Howard B. Sprague and E. E. Evaul.

"Varietal Experiments with Soybeans in New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 491, July, 1929, R. G. Wiggans.

"Pollination and Other Factors Affecting the Set of Fruit, with Special Reference to the Apple," Agr. Exp. Sta., Itahaca, N. Y., Bul. 497, Dec., 1929, L. H. MacDaniels and A. J. Heinicke.

"Paper Mulch for the Vegetable Garden," Agr. Exp. Sta., Wooster, O., Bul. 447, March, 1930, Roy Magruder.

"Carnation Culture," Agr. Exp. Sta., Wooster, O., Bul. 449, March, 1930, W. W. Wiggin.

"Better Pastures for South Carolina," Agr. Exp. Sta., Clemson College, S. C., Cir. 67, Mar., 1925, Revised Jan., 1930, S. L. Jeffords.

"Vegetable Gardening," Agr. Exp. Sta., Clemson College, S. C., Bul. 72, Feb., 1926, Revised 1930, C. C. Newman.

"Annual Report of The South Dakota Agricultural Experiment Station for Fiscal Year Ending June 30, 1929," S. D. State College, Brookings, S. D.

"The Effects of Various Legumes on the Yield of Corn," Agr. Exp. Sta., Knoxville, Tenn., Bul. 142, Feb., 1930, C. A. Mooers.

"Lantern Slides and Film Strips of the United States Department of Agriculture," U. S. D. A., Washington, D. C., Misc. Pub. 72, March, 1930.

"The Wonderful Variety of Pomegranate: Composition, Commercial Maturity, and By-products," U. S. D. A., Washington, D. C., Cir. 98, Jan., 1930, E. M. Chace, C. G. Church, and H. D. Poore.

"The Production of Lily Bulbs," U. S. D. A., Washington, D. C., Cir. 102, Feb., 1930, David Griffiths.

"Flax Cropping in Mixture with Wheat, Oats, and Barley," U. S. D. A., Washington, D. C., Tech. Bul. 133, Sept., 1929, A. C. Arny, T. E. Stoa, Clyde McKee, and A. C. Dillman.

"Information for Virginia Fruit Growers," Va. A. & M. College, Blacksburg, Va., Bul. 114, Jan., 1930.

"Department of Agriculture and Immigration of Virginia," Richmond, Va., Bul. 269, May, 1930.

"Soybeans for Silage and for Hay," Agr. Exp. Sta., Morgantown, W. Va., Bul. 227, Feb., 1930, T. E. Odland.

Economics

Abandonment of farm land in New York has been going on for many years. During the 45-year period, 1880-1925, there was a decrease of more than 4,500,000 acres of land in farms in this commonwealth. The reduction in land in farms was most rapid from 1920-1925. Often idle farms are sold and the new buyers waste both time and money which they should be spending on better land. In sections where some land has been abandoned, some people, especially the owners, continue to farm even though the returns are much less than on better land. The process of abandonment is a very slow and painful process. Much of this abandoned land, however, is suitable for growing trees. The owners of such land cannot reforest because they have only a small amount of property and cannot make long-time investments. The State is in a better position to do such work. A new bulletin, No. 490, "Abandoned Farm Areas in New York," by Lawrence M. Vaughan of Cornell University, is a study of some 15 abandoned farm areas in the State of New York. In each of these areas data are presented on the livestock, machinery, real estate, condition of buildings, the people, absentee owners, utilization of the land, farm operations, taxation, and contribution of the agriculture of the area.

"Factors Influencing Living Conditions of White Owner and Tenant Farmers in Wake County," Agr. Exp. Sta., State College Station, Raleigh, N. C., Tech. Bul. 37, March, 1930, W. A. Anderson.

"Apple Varieties: Prices, Yields, and Acreages," Apr. Exp. Sta., Ithaca, N. Y., Bul. 495, Dec., 1920, G. P. Scoville and T. E. LaMont.

"Estimated Income From the Ohio Agricultural Industry," Agr. Exp. Sta., Wooster, Ohio, Bul. 450, March, 1930, V. R. Wertz.

"Questions and Answers," Federal Farm Board, Washington, D. C., Cir. 1, March, 1930.

"Agricultural Survey of Europe, Hungary," U. S. D. A., Washington, D. C., Tech. Bul. 160, Jan., 1930, Louis G. Michael.

"Taxation of Farm Property," U. S. D. A., Washington, D. C., Tech. Bul. 172, Feb., 1930, Whitney Coombs.

"Statistics of Oats, Barley, and Grain Sorghums," U. S. D. A., Washington, D. C., Sta. Bul. 29, Feb., 1930.

"Historical Study of Prices Received by Producers of Farm Products in Virginia, 1801-1927," Agr. Exp. Sta., Blacksburg, Va., Tech. Bul. 37, March, 1929, Arthur G. Peterson.

"Adjusting Agricultural Production and Distribution in the Beckley Area to Meet Home Market Demands," Agr. Exp. Sta., Morgantown, W. Va., Bul. 226, Jan., 1930, W. W. Armentrout.

"Adjusting Agricultural Production and Distribution in the Wheeling Area to Meet Home Market Demands," Agr. Exp. Sta., Morgantown, W. Va., Bul. 228, Feb., 1930, W. W. Armentrout.

Diseases and Insects

"Protecting Orchard Crops from Diseases and Insects," Agr. Exp. Sta., Ithaca, N. Y., Bul. 498, Dec., 1929, C. R. Crosby, W. D. Mills, and W. E. Blauvelt.

"Water Soluble Arsenic in Spray Material," Agr. Exp. Sta., Wooster, O., Bul. 448, March, 1930, H. C. Young.

"Tree Hoppers and Their Control in the Orchards of the Pacific Northwest," U. S. D. A., Washington, D .C., Cir. 106, March, 1930, M. A. Yothers.

What's Happening?

(*From page* 19)

But here is another thing. The cattle tick has been completely and definitely eradicated from the tidewater section of the State. Down there is a strip of land running from 20 to 60 miles back from the coast and extending the width of the State containing vast areas of good pasture land. A good purebred bull used with native cows will produce an excellent beef animal. These beef animals can and do make high gains on the native pasturage of that section. They do still better on planted pastures and there are only two months in the year when they must be brought in and fed. Think of that! Even then, the mild climate and good soil of that eastern country will permit nearly any kind of legume to be grown for hay, and so the feeding problem is simple.

So these few facts may be given to show a changing agriculture. We shall keep our king and his chief minister, but the staff will be enlarged and numerous aides are being rewarded for efficiency. Governor O. Max Gardner has brought many of these things to the attention of the general public since he has occupied his present position. His support and cooperation have been heartening to those interested in better farming.

Apple Cankers and Their Control

By T. J. Talbert

University of Missouri

1—Fire blight canker on a pear tree trunk, showing dead sunken bark.

2—Fire blight exudation teeming with blight bacteria oozing out on the bark.

CANKERS in apple trees are a constant and dangerous source of disease. This is true because the cankers persist from year to year and may in time cause the death of branches and trees. Moreover, if cankers remain in the orchard, diseases are likely to spread rapidly and the life and profitableness of the trees may be markedly reduced.

The term canker generally indicates "sores" on the trunk or limbs of apple trees. These affected portions may result in dead areas. In some cases the outer portions of the bark only are affected, while in others the disease may have penetrated to the heartwood. The casual observer distinguishes cankers by their ugly, roughened, browned, or blackened appearance. The diseased portion may be very well defined by a distinct line or crack marking the area where the diseased or dead bark has shrunken and pulled away from the adjoining healthy tissue.

A large percentage of all cankers are caused by fungi, tiny microscopic plants which do not possess the green coloring matter found in higher plants. Since the fungi lack this green coloring matter, they are unable to manufacture their own food. As a result, fungi live upon organic matter already made available. Such plants as molds, mildew, and mushrooms are examples of common fungi and related to the fungi that cause cankers and other plant diseases.

All the cankers discussed herein are due to fungi with the exception of Fire Blight, which is a bacterial disease, and Winter Injury, which is due to cold weather. Bacteria are also plants. They have been called germs, microbes, bacilli, and micro-organisms.

The Dependent Habit of Diseases

The dependent habit of living is characteristic of both fungi and bacteria. There are, however, many dependent plants that do not belong to

Blister canker on large apple branch, showing the "nail heads" persisting after most of the bark has fallen off.

either. Such fungi as toadstools, puff-balls, and mushrooms live upon decaying plant and animal materials, and are called saprophytes. Some dependent plants live upon living plants or animals, as in the case of a tree-destroying canker or fungi, and some bacteria like Fire Blight. These are called parasites, and the organism which furnishes the food material is the host. Fungi and bacteria are the dependent plants with which this discussion will deal.

In the United States there are several different kinds of cankers on apple trees. Some of the most important, however, are: Blister Canker, New York Canker, Fire Blight Canker, Frost Canker, and European Canker. In addition there is a superficial bark canker which is very common and present on not only apples but on pears and quinces. As a rule, however, it does not do material damage.

The various kinds of cankers are to most orchardists somewhat similar in appearance and in general effect on the tree. The maladies involve primarily the bark of the tree, rarely penetrating the wood to any great extent. The New York Canker and Blister Canker, however, are exceptions as both these attack the wood. In the case of the Blister Canker the disease may penetrate the limb, branch, or trunk to the heartwood very quickly after infection and remain there for several years without making notable or serious progress if the tree is vigorous and healthy.

Blister Canker

Symptoms.—Blister Canker is generally confined to the trunk and larger limbs of the apple trees. The disease enters the tree, almost without exception, through abrasions in the bark such as are made by removal of limbs. The disease so often enters through wounds that it has been termed or called a wound parasite.

Appearance.—The diseased bark is at first brown and slightly sunken and may show healthy portions of tissue scattered within the general diseased area. Later stages showing a much roughened and blackened bark are common. The bark may fall off in irregular patches exposing the wood. On the dead areas are developed the fruiting parts of the fungus, which are large and black or brown and stand out prominently. These fruiting bodies give the appearance of a blister, hence the name, Blister Canker. The blisters, or raised portions, also resemble nail heads and are known to fruit growers as "nail-head" patches. When the fruiting bodies or "nail-heads" are found, one may be sure that the trouble is Blister Canker.

New York Canker

Symptoms.—The New York Apple-
ree Canker disease is found on the
mbs and trunk as a canker, on the
ruit as a black rot, and on the leaves
s a leaf spot. This fungus disease
ollows frost, fire blight, and other
njuries. It is also readily spread from
ne part of the tree to another. Since
he disease is found on many wild
lants and may pass from these to
he apple, its control is made more
ifficult.

While the canker gen-
rally forms on the
rger limbs and trunk,
et the smaller branches
nd twigs are often af-
ected. Like Blister
anker, infection most
ften occurs in wounds
r abrasions of the bark.
he losses from this dis-
ase are usually much
reater than generally
elieved.

Appearance.—The af-
ected portion is at first
reddish brown color
nd slightly sunken. It
ay increase in size and
ecome darkened after a
w weeks. The disease
ay die out at the end
the growing season,
ut in severe cases the
ots spread or enlarge
nd may extend several
et. Affected bark ad-
eres tightly to the wood
r a year or more before
reaking away.

The spots on the fol-
ge appear most abun-
antly with the opening
the leaves in the
ring, in fact, it is one
the earliest diseases to
tack the foliage. The
jury on the leaf is at
st a minute purplish
eck, enlarging to about
/8 of an inch in diameter and changing to a brownish color. In severe cases the leaves turn yellow and fall during the latter part of July or August.

The disease may also attack the fruit, often causing the blossom-end rot. The entrance may be made through spray injury. In severe cases the fruit may be reduced to a black mummy. When this occurs it is covered with postules, as described for the canker form of the disease.

Left: Black rot canker surrounding an injured apple twig. Right: Black rot canker on the lower part of the truck of a young tree.

Fire Blight Canker

Symptoms.—Fire Blight is a bacterial disease. The entire life of the organism is passed within the softer tissues of the bark, cambium, or new wood of the living plants. It passes the winter in hold-over cankers mainly on the pear trees, although a few varieties of apples like Jonathan, York, and Transparent may develop hold-over cankers in the spring and early summer, which afford a place for the disease to pass the winter.

In the spring the bacteria become active, multiply rapidly, and affect the adjoining healthy tissues. A sticky exudation teeming with bacteria may ooze out on the bark. This bacterial ooze is a source of infection. Raindrops may spread the disease by spattering the sticky exudation to the leaves, twigs, and branches. It may also be carried from tree to tree by insects, especially the sucking types.

Appearance.—Fire Blight causes the bark to wither and separate from the green, live tissues. The point of separation may be indicated by an open crack or line, called the line of demarcation. The sunken areas and the lines separating live and dead bark may appear as water-soaked and assume a blackish or brownish color.

Frost Canker

Symptoms.—Frost cankers are often mistaken for Fire Blight. These affections may be easily distinguished. Frost cankers are usually manifested early in the season by the injury on the trunk, in the crotches of the large branches, or at the base of the tree trunk. Winter injured trees may start into growth and later die. The foliage of such trees generally shows a uniform browning and rarely will one find the injured areas sunken and surrounded by a definite line between healthy and injured portions. Furthermore, no exudation or sticky substances ooze from the canker or injured places, as in the case of Fire Blight Canker. No water-soaked appearance is observed on the trunk or branches, and there are no blight twigs as is true with fire blight.

Appearance.—Frost Cankers m be followed by fungi that irritate a extend the wound. The cankers for mainly on the trunk or at the crotch of the main branches. At the base the crown of the tree similar injur may also occur. Such injury is call collar rot, crown rot, etc. In all t above instances the injured bark b comes discolored, dead, and loosen from the tree or branch. It oft sloughs off and exposes the wood.

European Canker

Symptoms.—The European App tree Canker begins as a slight discolo ation on the bark, and very soon t area affected is sunken. Later marked swelling may appear just b low and above the affected part. Af a few months the bark may fall aw and a callus be formed about the ma gin of the canker. The callus see to prevent for a time the progress the disease. It is generally pen trated, however, and the injury th enlarged. This process of checki and later extending the injury cau the development of layers of cal on the wounds.

Appearance.—The appearance the disease is that of several conce tric rings which are folds. The cank has no doubt caused the tree to peatedly attempt to heal over wound and each time the fungus h during its season of rapid growth, e tended its sphere of injury.

General Canker Control

There are many differences in organisms which cause cankers. T appearances of the cankers also diff The development of no two is ali The general method of treatme however, is much the same, and general suggestions which follow m help very materially in the cont of all:

1. Cut out and burn all affec twigs and branches which can spared. In so doing the grower m

able to rid the orchard of the urce of the disease. Make cuts from x to eight inches below the canker ea, if possible, in order to be sure eliminating all the infected parts.

2. Where the branch is too valble to cut, or in case the canker ot is located on the main trunk, the seased tissues should be removed out four to six inches above and bew and from two to four inches the side.

3. A thorough dormant spray, usg a strong fungicide like lime-sulphur or bordeaux, is valuable if applied just as growth is starting or slightly before to coat over infected areas and to cover parts through which entrance of some of the cankers might be gained.

4. Practice the best orchard culture known for your locality. Vigorous, productive trees resist to a marked degree injury by all cankers. No two orchards are alike but all respond to good care and timely attention.

Asparagus

(*From page* 20)

ants were placed at the bottom of plowed trench, approximately on p of the subsoil, 9 inches deep; only to 1½ inches of soil covered the ots; then fine manure 1 to 2 inches ep was spread over the soil. The anure prevented soil drying, thus ding plant shoot growth and adding me plant foods.

Heavy fertilization has been the actice each year. At first a ton of 8-10 was used. This has changed late years to an 8-16-20, about 000 pounds per acre. All is broadst. During the last three years all e poultry manure from 200 hens s been spread on the bed. In the ultry manure is some superphosate, only enough to keep it dry hile on the dropping boards in the nhouse. In addition the ash from cords of hardwood burned in the me is spread on the asparagus bed nounting to approximately 350 to 0 pounds high in lime and potash. rely there is enough fertilizer here grow a bumper crop of tops, therere, a most complete root system ith large food storage resources. It the large root storage that means g crops the following year. Ferizer then is considered by the umphries to play a very important part in root formation and storage. Ample lime has been used to insure correct soil reactions.

A little help on fertilizing, but more on keeping down the weeds and bugs is obtained by allowing young chickens, 500 to 700 to run over the bed. The bed is kept clean of weeds by these chickens aided by few cultivations. Pests are not numerous, mostly bugs which are easily controlled by spraying and later by the chickens. Rust has not arrived nor will it because the variety used is rust resistant, being Martha Washington.

Let us look at the cutting and yields. In 1923 the first growing year, of course nothing was cut. Big growth of tops and roots was obtained.

In 1924 because the bed is a closely planted, heavy fertilized type, it was cut somewhat this year. The yield obtained amounted to 830 pounds.

In 1925 the yield increased to 2,425 pounds or about 300 per cent increase over the previous year divided as follows—in April 50 pounds, in May 1,550 pounds, in June 825 pounds.

In 1926 the yield increased to 3,832 pounds or about 470 per cent over 1924 and about 40 per cent over 1925. The cutting received was di-

Totals cut A1 and sold by months and years
In pounds per acre

One acre	1924	1925	1926	1927	1928	1929	Average
April	0	50	0	4	0	0	For 2 years onl 27 pounds
May	385	1550	2110	2232	2112	2532	For 6 years 1820
June	445	825	1531	2381	2410	2727	For 6 years 1720
July	0	0	191	221	853	0	For 3 years onl 422
Total	830	2425	3832	4838	5375	5259	3760

See the yearly average for the 6 years—3,760 pounds. That's mo than many wider spaced (old fashioned method) beds produce in the banner year.

vided thus—in May, 2,110 pounds, in June 1,531, in July 191 pounds.

In 1927 an increase of 600 per cent over 1924 was obtained, 100 per cent over 1925 and 23 per cent over 1926. The total sales were 4,838 pounds. This was harvested and sold as follows—in April 4 pounds, in May, 2,232 pounds, in June, 2,381 pounds, and in July 221 pounds.

During 1928 the yield increased about 640 per cent over the first year of cutting in 1924; about 122 per cent over 1925; 40 per cent over 1926; 11 per cent over 1927. Sales were 5,375 pounds of A No. 1 "grass." Of this yield 2,112 pounds were produced in May, 2,410 pounds in June, and 853 pounds in July.

This year, 1929 gave an increase over all of the preceding years except 1928, but because of dry weather cutting was discontinued on June 28. At the daily rate of cutting the bed if cut as long as in 1928 would hav outyielded 1928 by almost 1,00 pounds. Notice in table above th the total yield for 1929 with cutting only in May and June is almost large as the total yield for 1928 whic had cuttings in May, June, and Jul The total yield for this year is 5,25 pounds, being produced 2,532 pounc in May and 2,727 pounds in Jun Both of the yields are more tha yields in the same month in previou years.

The results are tabulated above.

After the cutting season is over th fertilizer is applied broadcast and har rowed in. The largest, broadest, mos thrifty colored foliage is strived fo and obtained. In late fall, growth killed down by frost, the bed includ ing stalks is harrowed and left for th winter. In the spring it is shallo plowed and smooth harrowed, all lev and ready for work again.

In Old Macedonia

(*From page* 44)

programs of the six instructors is evidenced by the fact that each carries with him a specially prepared satchel, containing samples of fertilizer and the usual equipment for testing soil. For ages the peoples of the Near East have been robbing the soil. They have used cow manure for fuel or let it go to waste.

Along many other lines, practic methods of teaching modern agricul ture are creeping into the Near Eas where so much effort is being mad to teach the people to make the mos of what little they have.

Controlling Weeds on Muck Lands

By L. A. Dalton

Agriculturist, Lackawanna Railroad

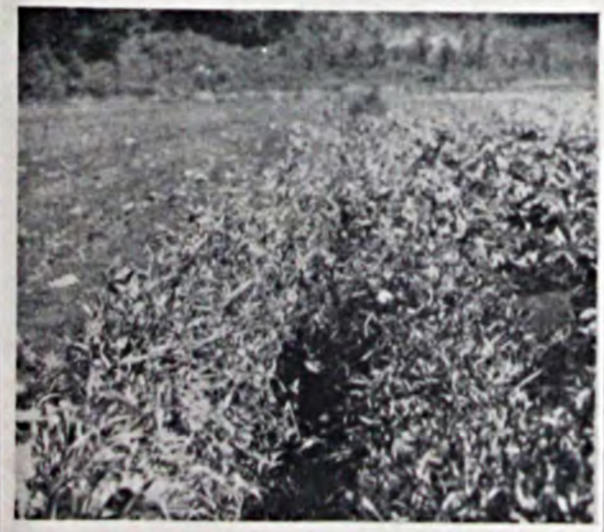
EVER since intensive utilization of muck lands for the production of vegetables began, weeds have been a serious menace to economical returns from these lands. The soils, being very fertile, favor early germination of weed seeds and their rapid growth afterwards. To keep these weeds in check, an enormous amount of hand labor has been required. This is particularly true along the ditch banks. The ditches serve as collectors of weed seeds. They are carried here by wind and other agencies throughout the entire year.

As soon as frost is out of the ground in spring, the ditches are cleaned out and deepened in order to insure drainage. The material taken out of these ditches is placed on the banks, which later are leveled off and worked into the edges of the bed with other soil. With the first warm days, the weed seeds begin to germinate, and before the crops are planted, weeds have come up and made rapid headway. This continues throughout the growing season, unless frequently cultivated or scraped.

On a 20-acre tract of muck land there may be and often is, as much as two miles of ditches. Keeping this amount of ditches free of weeds is very expensive. They must be kept clean to prevent the weeds maturing and spreading over other parts of the farm. In addition, weeds may harbor injurious insects and diseases which attack the crops.

Some of the worst weed pests known infest these muck lands. Quack-grass, thistles, chickweed, smartwood, pigweed and many others are very common. To control these pests easily and economically is an important problem with the farmers.

A chemical compound known as calcium chlorate, tried out last summer has been found to give excellent results. It may be applied in the pow-



Above: A drainage ditch infested with weeds, which are not only an eye-sore but a dangerous source of infection.

Below: The same ditch a few weeks after spraying with calcium chlorate. Note the clean and neat appearance.

dered form by dusting on the weeds when they are wet with dew, or it may be mixed with water at the rate of one pound of the salt to one gallon of water and sprayed on. The latter method seems to be more satisfactory and economical. Six gallons of the solution will thoroughly spray 300 feet of ditch on both sides if done before the weeds have made rank growth. The ordinary knapsack type of sprayer, operated by hand, is well suited for this work.

One man can mix the solution and spray all the ditches on the average muck farm in a day. If the ditches are sprayed in early spring before the weeds are too far advanced, a second application in midsummer is all that is needed. Besides being economical, it eliminates the drudgery which the common method of scraping entails.

Tests were made on the farms of F. J. King and W. H. Bailey, Fulton, New York. Both were highly pleased with the results. Muck land farmers will do well to give this method of controlling weeds on ditch banks a thorough trial.

A 4-Year Soils Project

(*From page* 26)

fence because the cows could step over the old one.

On this kind of land George laid out his field in plots for his improvement work and raised oats. On plot No. 1 he used 132 pounds of 45 per cent phosphate, 150 pounds of muriate of potash, and two tons of lime per acre; plot No. 2 took 800 pounds of lime phosphate, 150 pounds of muriate of potash, and 2 tons of lime to the acre; plot No. 3 was made a check plot with no lime and no fertilizer; and plot No. 4 had 132 pounds of 45 per cent phosphate per acre.

Thus George had land with no fertilizer and no lime; land with just 45 per cent phosphate; some with lime, lime phosphate, and potash; and some with lime, 45 per cent phosphate, and potash.

Plot No. 1, on which lime, phosphate, and potash were used, produced 68.4 bushels of oats per acre; plot No. 2, which had 800 pounds of lime phosphate in place of 132 pounds of 45 per cent phosphate, yielded 31.3 bushels to the acre; plot No. 3, or the check plot, made 19.5 bushels per acre; and No. 4, which had 45 per cent phosphate but no lime, lime phosphate or potash, yielded 29.3 bushels per acre.

Another farm boy, in the four-year soil improvement project is Daniel Larson, student at the Barron high school. The five-acre plot we selected for the first year of the project, he says, had been cropped for 28 years and had never had any commercial fertilizer applied. We took 12 samples of the surface soil and 12 of the subsoil and sent them to the state college for testing. The tests showed that we needed 3½ tons of lime to the acre in order to correct acidity. There were only 17 pounds of available phosphorus in the surface soil per acre and 12 pounds in the subsoil.

On one plot in his field, Dan applied 300 pounds of 20 per cent phosphate per acre; on another he used 3 tons of lime; another plot received 800 pounds of lime phosphate; and still another received the combination of 200 pounds of muriate of potash, 800 pounds of lime phosphate, and 3 tons of lime. There was also, of course, a check plot on which neither lime nor fertilizer was used.

He then planted barley and his yields are as follows: on the check plot

andfather, father, son, and little brother all take part in the 4-year soils improvement project of George Morse, Avalon, Wisconsin.

obtained 22.1 bushels; from the ot treated with 20 per cent phosıate, 28.6 bushels; from that on hich lime alone was used, 24.7 bush-; the lime phosphate plot produced).8 bushels; and the lime, lime phosıate and muriate of potash yielded .2 bushels per acre.

His profit was $29.79, but he now ıows more about the land on his me farm, its requirements, and how build it up, than he ever knew bere.

As an educational project in longne soil improvement work, the fourar soil improvement program for rm boys is most promising. They ve learned considerable about the eds of the soil on their home farms, good deal about soil management ethods, and are enthusiastic over the ork.

This was the purpose of the project, teach the boys how the land can be anaged and built up so as to proce the most profitable returns, not produce record yields. The difrences in yield due to the use of varis kinds of fertilizers were great ough to point the way toward deable practices that should be folwed.

Most of the data collected by the boys are fairly accurate, for they were under the close supervision of their Smith Hughes teachers and Professor Richards. The high school teachers helped lay out the plots, and helped the students harvest their samples to be sent in to the college where they were threshed and yields from each plot recorded.

Neighbors of these boys were curious as to the outcome of the work and, no doubt, learned almost as much as did the boys themselves. And although yields in actual bushels may not have been remarkable in every case, the yield in terms of the advancement of soil education was large.

STICK!

Men fail—because they *begin* something.

Men succeed—because they *finish* a definite thing.

Stick—that is the first law of winning.

Mistakes may mark you back. Men may misjudge you. The halfway spirit may tempt you. The fight may tire you.

But to win—push the thing through, finish it—*STICK!*

Healthy Cotton

(*From page 6*)

Showing a portion of the test plots at the Holly Springs Experiment Station in 1929 where pota was being varied in fertilizer combinations. The check plot here made 758 lbs. of seed cotton p acre, while 600 lbs. of a 4-8-8 made 1,814 lbs.

A summary of this work as published at the end of the year showed the following increases due varying amounts of potash in otherwise uniform fertilizer mixtures, the figures being given in val of cotton per acre over the checks after deducting the cost of the fertilizer:

600 lbs. 6-8-0 $1.66 600 lbs. 6-8-2 $25.93 600 lbs. 6-8-4 $41.47 600 lbs. 6-8-6 $47.
600 lbs. 6-8-8 $55.24

to 900 pounds of fertilizer per acre as follows; on improved soils, 4-8-6, on thinner soils, 6-8-6. Where rust and leaf diseases are prevalent, additional potash should be added."

The Raymond Experiment Station serving the farmers of southwest Mississippi has this to say under the heading "Recommendations:" "It would appear that 600 pounds of a 6-8-4 (N-P-K) fertilizer for general conditions will give good results. Where lespedeza has preceded cotton or where cotton tends to rust, it is advisable to use 8 per cent potash in the formula. On old cotton lands, it will probably be advisable to use a least 8 per cent potash in a fertiliz formula."

The South Mississippi Experimen Station at Poplarville found th where nitrogen and phosphorus alon were used for a series of years, cotto growing later on such lands suc cumbed to wilt, while that on adjoin ing plots with potash added was prac tically free from this trouble. Th same thing has been found to be tru in numerous other instances by prac tical farmers working in several of th States of the Southwest.

A New Palace of Agriculture

(*From page 22*)

quoted: "No other human occupation opens so wide a field for a profitable and agreeable combination of labor with cultivated thought, as agriculture." To the right, from Washington is this: "With reference either to individual or national welfare, agriculture is of primary importance."

The whole, including the extensibl building to the rear, as well as the ne central building and two wings, forn the world's largest housing establish ment dedicated to agriculture. Th Department hopes that at last all th workers that have so long been scattered over the entire city of Washington, will never again be forced out of their quarters. This, however, was the expectation when the first two wings were constructed in 1905 and 1908, but when they were completed, the Department had so grown, that it was impossible to house everyone. Thus all workers never have, until this year, been found in one central place.

The whole building cost approximately $9,250,000. This is not very much money for the construction of such a building.

To see this new home of the Department of Agriculture for the first time, brings an exclamation of delight. It does not appear to be an office structure. It looks like a white marble temple. It is, in fact, an American temple devoted to the prosperity of agriculture and allied arts and industries.

A Bright Idea

(*From page* 23)

his truck where it accomplished an excellent job. The accompanying cut illustrates the harrow and the way it was used. Incidentally he used it successfully as a smoothing harrow on plowed land.

A number of farmers in Massachusetts this year are planning where necessary to supplement their natural pasture acreage with grazing from part of their mowing land. They believe in the principle of letting the cow take the place of the hired man in harvesting her own feed during the pasture season.

To secure maximum results they intend: (1) to fertilize with complete fertilizer to increase the yield and quality of the feed; (2) to use two or more fields as pasturage in order to rotate cattle every week or two weeks, which insures better grazing and less waste; and (3) to harrow pastures several times during the season to spread the droppings so as to secure benefit from the manure and to reduce the amount of tufts which grow up around droppings and which cattle tend to avoid and thus waste as feed.

Fertilizing Alfalfa Land

(*From page* 30)

ing $1.50 produced alfalfa worth $5.17 and a net profit of $3.67 per acre. This gave a net profit of 332 per cent on the first 12½ pounds and for the second increment of potash a net profit of 155 per cent. It should be pointed out that these good potash results were in addition to lime and phosphate. In 1929 where the potash was used in addition to lime alone the increase was only 100 pounds.

Too often the need of fertilizer or lime for alfalfa is judged by a comparison of total failure and a fair crop. We should consider in such instances as this the difference between a fair crop and a much better crop. Alfalfa is a heavy feeder of minerals particularly potash and as time passes it will doubtless be profitable to increase the applications of potash and possibly lime and prosphate on this land.

While potash has shown the largest profits on this land, it would not be safe to leave out any one of the other minerals, because in this experiment neither phosphate nor potash was profitable without the other but when they were used together they were both profitable.

Since Colonial Days

(*From page* 13)

annual production during the 40-year period was accompanied by a decrease of approximately 200,000 in acreage growing the crop. The trend in oats is very similar to that of wheat. The production increased 2,000,000 bushels while the acreage decreased 170,000.

The production of buckwheat jumped from 3,332,900 bushels in 1884 to 4,838,000 in 1924 while the acreage dropped from 228,365 to 224,380. The potato crop has increased almost 100 per cent during the past four decades while the acreage has gained only 25 per cent. Hay shows a trend similar to that of the grain crops. The production increased from 3,559,900 tons in 1884 to 3,871,100 tons in 1924 while the acreage decreased slightly.

Increasing acre yields of these crops account for the greater production on the reduced acreage. This upward trend in acre yields is due to several factors, among them being the more extensive use of high-grade fertilizers, better cultural methods, improved varieties, more effective control of insects and diseases, and the abandonment of marginal land.

	1879	1889	1899	1909	1919
Estimated Tonnage Used by Farmers	103,680	120,880	213,020	309,180	396,270
Total Tonnage Index (1879 equals 100)	100	117	205	298	382
Tons Used per Farm	.49	.57	.95	1.4	1.96
Pounds Used per Acre of Principal Field Crops	27	30	54	81	104
Weighted Index of Productivity of Acreage in Principal Field Crops (1879 equals 100)	100	91	103	110	119

The Inquiring Mind

(*From page* 16)

as a beginner in research work, he had to devise or make most of his apparatus.

In Doctor Babcock's opinion, the young, earnest searcher for the truth in science should not be baffled by lack of apparatus. He should solve his own problems, be possessed of unlimited patience, and be satisfied to plod on and on, despite stumbling, mistakes, and disappointments, with the one goal of ultimate success ever in view as an incentive. He should do so for the love of the work, and for the advancement of science and human knowledge, without an inordinate longing and seeking for personal credit, adulation, and material reward.

Personally, Doctor Babcock is not satisfied to sit supinely and dream in senile weakness of the glories of the past, his personal achievements, and the superiority of his mature experience and wisdom. He walks daily a mile or more to his office and laboratory, in fair weather and foul, and is plodding and puzzling yet, seeking the hidden mysteries of nature. He cheerfully endures the waxing infirmities of old age, laughs merrily as of yore, imbues everyone with his courage, inspires students and co-workers alike with his enterprise and thoroughness, and is setting an example to college men the like of which we have not seen before and never expect to see again.

Doctor Babcock, with all his wisdom, is *humble* today that he knows no more and has accomplished so little.

Umm—Good Melon!

(*From page 29*)

There are few fruits or vegetables more favored than the melon in the matter of flavor. Placing a real quality melon on the market pays exceedingly well. A melon grower can sell his crop for $3.00 a basket if the buyer has confidence in his melons. An unknown grower might not find a market at 50 cents.

Quality is the most important factor in determining the price paid. First, the melon's flavor needs to be kept in the melon by keeping the vines healthy until marketing time, and then, the crop needs to be harvested and sold in such a manner as to lose none of this quality.

The final consumer should be sold only a sound, good flavored, ripe melon. Nothing will cause an overproduction any sooner than a lack of interest on the part of the final consumer. Orders are repeated promptly only when first melons please.

Keeping flavor in the melon is now possible, but only through the medium of the strictest observance of insect and disease control coupled with proper fertilizing of the melon ground and honest marketing practices. Good melons will always find a ready market.

Flavor is doubly important in disposing of large crops of melons.

A Summer Idle

(*From page* 4)

again his share of tan and his assortment of chigger bites. (I find myself rapidly building a strong case for the desk deserters.)

Take up your dog-eared copy of Stevenson and I'll prove to you on page one that a boy's summer idyl is not to be idle. Here we have it once more:

"In summer quite the other way,
I have to go to bed by day.
I have to go to bed and see
The birds still hopping in the tree,
Or hear the grown-up people's feet
Still going past me in the street.
And does it not seem hard to you,
When all the sky is clear and blue,
And I should like so much to play,
To have to go to bed by day?"

Before the days of Boy Scouts, every urchin had to devise his own ideals of summer idyls. Let's become reminiscent.

Somewhere perhaps among my casual readers are those who, like "Stinky" Davis, never belonged to the Little Scorpions' club. Why is it that I think first of the "secret" den we fellows had, instead of conjuring up other enjoyments of my youth in more comfortable quarters? I presume it is the old "call of the wild" that abides in every kid's make-up until he finally surrenders to stiff collars and convention.

Our "den" was shared by five of us lads in the suburbs of a Midwestern "tank" town. We dug into a gravel clay bank and boarded up the walls, leaving a narrow aperture through which we crawled in furtive fashion. We tried building a chimney, but it failed to draw. In this damp and squalid hole we kept a box of piratical perquisites to clandestine camaraderie, but the mold and mildew got the best of it every summer. Here we smoked cigarettes made of "delicious" dried corn silk and crumbly leaves from the base of mullen plants; and a few of the inventive ones tried smoking buggy whip handles with those funny holes in them. There was more than one cough in a carload those days. Finally we experimented with sweet caporals and a brand of smokes that seemed to be named for our conclaves—"sub rosa." The hard-boiled ones filched pieces of spearhead plug, almost as heavy as two-by-fours, and we tried to see who could spit the farthest against the wind.

FOR relaxation when nicotine got the best of us, our gang relied upon Street & Smith, publishers extraordinary to His Majesty, the American Boy. The news-stands today reject "nickel terrors" as far too mild for an age of saxophones and sex appeal.

We pretended that the main reason for hiding out was to peruse the smudgy pages of Liberty Boys of '76, Nick Carter and Diamond Dick. As a matter of record, however, some of our parents read stuff equally innocuous, and the dime novel really sent few boys on the primrose path. But it made our red corpuscles dance to smuggle together over those borrowed villanies, and count the scalps or feel the grip of bony fingers on the hero's larynx.

When Buffalo Bill and his roughriders (and the champion lady wingshot) came to our town, he found a clan of boys who had absorbed enough reference reading on his career to make a sizeable and rapturous audience. Bill carried no elephants to water, but we managed to pry the price from our parents on the plea that it was a "vivid drama of the unfolding of a continent." Strange things are done in the name of History, as well as Art and Religion. So ng did I stare at those bill-boards Bill's that I can remember the date t—August 22, 1901.

In fishing I have learned nothing d progressed not a whit from the ys of my teens. Some of my ends revel in stories of trout fish- g and are equipped with reels, flies, ls, and gadgets—of which I know t the meaning and only guess at eir use. A crooked pole cut from e overhanging willows, some cheap oks and lines, a can of night crawl- dug laboriously by lantern glow, d a faith in certan silent pools, ched by a leaky flatboat—these re- ct my simple rudiments of Walton- n lore. As my imagination was ver robust, you shall not be forced take stock of piscatorial weights d measures.

We freckled fellows were boon npanions of the calico-colored bass sometmes caught, and our shiny ses were replicas of the "shiners" strung on a stick—and threw to e tom-cats on our homeward trail. ter a few experiences scaling our nty trophies on an empty stomach, st of us were content to go home d eat sardines. But what of it? We d absorbed countless vitamins from nshine on bare heads and skinny ulder blades, and we smelled as ny as Jonah himself. So we had h local color and atmosphere!

THE old swimming hole, with its blood-suckers and hard knots in ttails, is so frequently named in thful recollections that another re- l seems trite. President Hoover on Iowa trip two years ago was pre- ted with half a dozen swimming es to which he was supposed to sub- ibe. I fear Oklahoma has lost a d bit of publicity by not being e to provide Will Rogers with that d of a background.

Swimmng holes in my time during nmer holidays were patronized more erally than the old wash-tub on urday nights. The difference that lies between the swimming sport of my youth and the indulgence of the present is two-fold. First, there were seldom any girls present to enjoy the limpid waters with us; and second, I now observe few people jumping around on one leg to shake the water out of their ears. It is not necessary now to sneak out and surprise a bunch of women-folks in bathing. You have to get up early to beat them off the spring-board. The old admonition for girls to "hang their clothes upon a limb and not go near the water" doesn't apply either. They leave their clothes at home and hold most of the long distance records afloat. Yes, after all, I believe the scenery *has* improved since the days of my earliest immersions.

Remember how we used to come home with our hair in slick streaks and fingers wrinkled like a wash-board, trying to hatch up a yarn about falling out of a boat or something? I had a fretful aunt who was forever predicting that I would drown, and was disappointed that I didn't verify her prophecy.

BUT let's get back on dry land now and go flower hunting as of yore. We fellows sometimes hunted flowers for their own sake and to outrival others in finding the earliest specimens. However, I recall that the greatest zest for flower picking excursions came at about the time I began to wash my neck and ears voluntarily and adjust my apparel with care. When Nelly and Judith promised to come out and hunt wild flowers in May time, the old world sang a carol of spring. I went over the scenes beforehand on a personal inspection trip, so that I might know exactly the "bosky dells of pristine enchantment" that would yield those star-eyed treasures which the girls desired above rubies or pickles.

The spring beauties, anemones, shooting stars, and Dutchman's breeches; the trilliums, the violets and the buttercups! No corporation magnate in a modern rush for gold ever had half the delight that possessed me when I piloted the squealing little feminine zealots on the search for woodland treasures. Such practical botany is indeed a litany, and seems so to this very day, when we take trowels afield to add fresh members to our wild-flower nook at home.

Flower pressing in books has gone out of date, but only yesterday I opened a well-thumbed copy of Henty that once was my favorite and found crumbling traces of a wild rose, right on the place where my English hero followed Clive to Hindustan. Thus are conquest and sentiment mingled in a boy's dreams.

ON what the English call "coolish" days we trudged around the fringes of the cattail marshes, and perhaps suddenly got a hunch to fry frogs' legs. Some of us always had matches; a fire was soon kindled; and after several attempts, we secured the French delicacy along the muddy banks and roasted the white meat to a golden brown.

One-old-cat with a tightly wound string ball, a clumsy club, and stones for bases gave us our only taste of "at-e-letics." I recall at school we called the game "promotion first," until one chap got mixed in his terminology and shouted "commotion first" which proved a better title.

June bridal parties gave us keen enjoyment, and called out our best powers of teasing talent. Rice, roses, and solemn vows were no more a part of wedding festivals than the fiendish charivari. On Hallowe'en our noise and deviltry sought no reward, but on charivari occasions the band looked forward to receive something tangible—which they sometimes did with a bridegroom's curse. When I first read the Ancient Mariner's opening lines, it dawned on me how remiss we had been not to borro somebody's bassoon. The instrume was unknown to me, but its na sounded promising and its effect the wedding guest seemed to put it a class by itself.

And so I might wander on throu the mazes of memory, sharing th familiar idyls of an idle boy with y —my old compatriots. But summ is upon us again and finds us spari of our time spent in retrospecti There are weeds to cut, grass mow, and cars to grease. You ca not linger longer to hear the tales y already know. It is not that I ha grown old and mellow, even thou I have flirted with the past. I ha only been trying to square this conundrum of life—the need to bri maturity to see with the eyes youth. Yet the idle youth with idylic existence was debtor to father and mother who really made hopes bear fruit. Patiently throu the summers of his life they provi a haven for his weary legs and b tered feet at the end of each perf day.

Father seldom grumbled at buyi four or five pairs of shoes a seas From his slender store he someh found the price, grinning at me w his usual come-back: "Better to b shoes than pay the doctor." Di shirts and empty cooky jars, muc floors and holey socks were accep benignly by Mother as a duty an privilege.

SO in remembrance of the idyls those idle days we former lads e joyed, let's wind up with a praye found in a children's book. It is tingly dedicated to Father Mother Away from Home. To th devoted friendship I submit it:

"Keep them safe and bring th
home;
Make me good while they are go
So I may meet them when they co
With a shining face."

JUST RIGHT

A negro porter was given a bottle of moonshine by a traveling salesman. After taking a shot of the stuff the negro fell into convulsions of coughing. The traveling salesman asked him how it was.

"Jest right," the negro replied.

"What do you mean, just right?" asked the salesman.

"Well, if it was any worse it would 'a' killed me," answered the negro, "and if it was any better you wouldn't 'a' given it to me."—*Splinters.*

After walking out with Jean for some months Sandy ventured to propose to her, and was accepted. This great fact being reported to Jean's mother, she felt it her duty to call upon the prospective bridegroom in order to discover something about his financial condition.

Being curtly questioned whether he was in a position to keep a wife, Sandy confidently replied in the affirmative, placing the matter beyond all doubt by volunteering this information: "There's hardly a mornin' but a' leave some o' ma parritch; in fact, if a' dinna get a wife soon a' maun get another pig."

THE BRUTE!

Smart Alec (getting on bus): "Morning, Noah, is your old ark full?"

Driver: "Nope. Not one jackass, so far. Come on in."

HISTORY NOTE

The school board visited the school the other day and, of course, the principal put his pupils through their paces for the benefit of said austere board.

"Henry," he asked, turning to the boy, "who signed the Magna Carta?"

"Please, sir, twasn't me," whimpered Henry.

The teacher, in disgust, told the boy to sit down; but old Jed Smith, chairman of the tobacco-chewing board, was not satisfied. After a well-directed aim at the stove, he said: "Call back that there boy. I don't like his manner. I believe he did do it."

If you are planning an auto tour this year, get a large road map. It will tell you everything you want to know, except how to fold it up again. —*Life.*

It was necessary for taxation purposes to decide on which side of the Canadian and United States border a farm which an elderly lady had just purchased actually lay. Surveyors finally announced that the farm was just on the United States side of the border. The lady smiled with relief. "I am so glad to know that," she said, "I've heard that the winters in Canada are often terribly severe."

"Imagine my embarrassment," said Aunt Emma, "when, according to my usual custom, I looked under the bed before retiring. I had forgotten I was in an upper berth."

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