BETTER CROPS W

The Pocket Book

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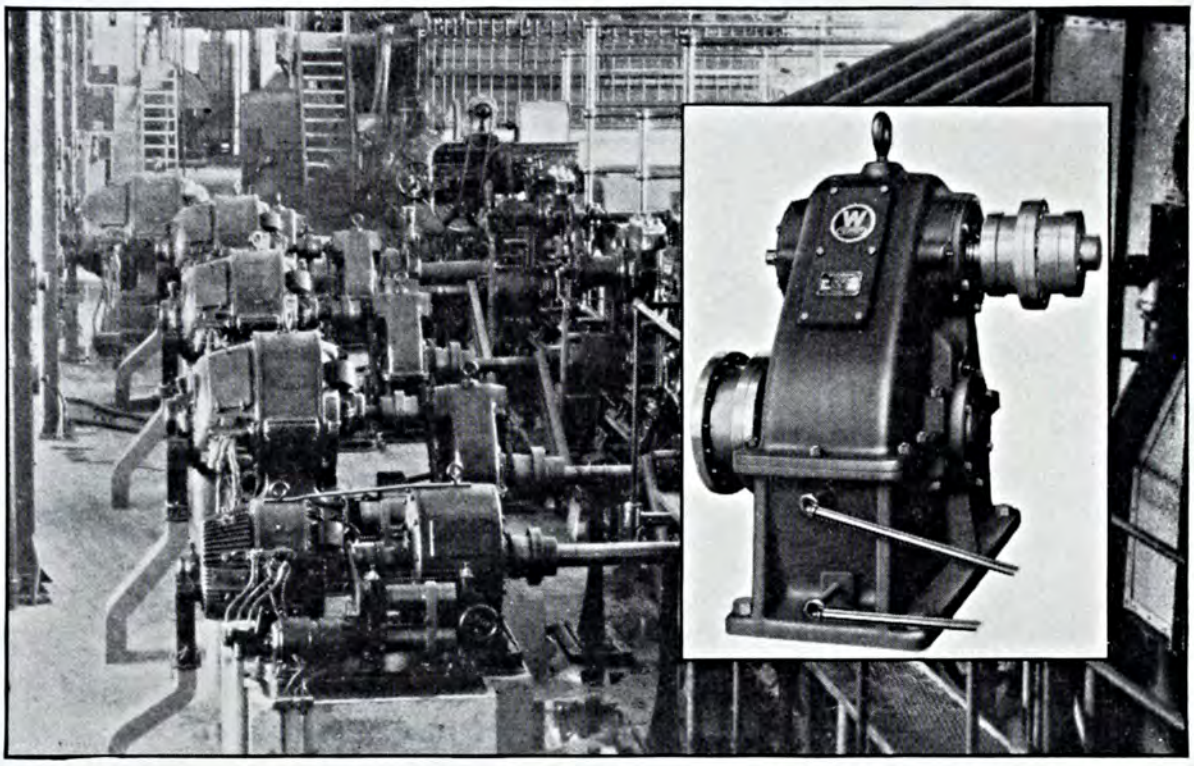
Better Crops with PLANT FOOD

January 1931 10 Cents

The Pocket Book of Agriculture



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The Whole Truth—Not Selected Truth

R. H. Stinchfield, *Managing Editor* Sid Noble, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XVI NUMBER ONE

Table of Contents, January, 1931

Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY., INC.
of Amsterdam, Holland

Directors: J. N. Harper G. J. Callister

Stop! Look! Listen!

ARE YOU LIVING UP TO YOUR NEW YEAR'S RESOLUTIONS?

Better Crops with PLANT FOOD

PUBLISHED MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION, INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK, WITH OFFICES AT 19 WEST 44TH STREET, NEW YORK CITY. SUBSCRIPTION, $1.00 PER YEAR; 10c PER COPY.

VOL. XVI NEW YORK, JANUARY, 1931 No. 1

Jeff Looks into the New Year

Faith, Hope, and ?

By Jeff McDermid

AMERICAN resolutions for 1931 have been published by the House of Hoover, and Congress has been asked to sell the volume to a clamoring clientele. The presidential plot for a return to red hot Americanism and omnipotent optimism gives me a key to try the locked door of the New Year.

Let me try Faith to wash down our slightly burned toast for 1931. No other short word fits the advent of another round of debts and delights quite so potently. Not claiming more than my fair share of Faith, I desire that all should have an abundance of it. It is to be had almost for nothing, and this is said to be the zero hour. We, who are going over the top, salute you!

When we wind our watches at night; when we draw a blue print; when we plant a seed—thereupon we unconsciously subscribe to Paul's definition of Faith. That reformed racketeer of Tarsus, in the light of his sublime awakening, evolved the thought that Faith is "the substance of things hoped for and the evidence of things not seen."

So it goes with our calm confidence

in the life of tomorrow; in our visioned barns and temples; our embryo wheat and pumpkins. It is only when we stop to ask ourselves what Faith and Immortality are that we become fuddled and fussed for an answer. Hence I propose to make some proletariat translations.

HOW easy it is for us to confuse Faith and Hope, and thereby include Charity and her "attic angels" sitting on the old "community chest." I desire to stop for awhile with Faith, best of the three Christian graces. Staunch Missus Faith is like an old aunty of mine who never gave us kids any gingerbread until we had earned it. Faith has a two-fisted, upstanding spirit, a daring-do, self-reliant, clean-cut tone to her—with none of the humble-pie, boot-licking, scrap-taking attributes. Faith is like going out, rough and ready, for a round or two of stump pulling in the tap-root, hard-pan slashings, where it takes a dozen army mules, a stiff vocabulary, and a keg of tri-nitrotoluoll to do a good job before breakfast.

Faith is what my neighbor, the sporting archer, displayed going after a prong-horn buck this winter, which he shot out twenty miles from everywhere with his home-made bows and arrows. The state law said he mustn't use anything but a gun, and his friends told him he couldn't hit a deer even with a gangland gatling—but he chose Faith for his partner, and vanquished his venison.

I dare say we all like the other two girls, Hope and Charity, but in the dance of life most of us prefer to pick them for the shuffle in the order named by the apostles of old—Faith in her kitchen apron, Hope in her Sunday clothes, and Charity with her nurse's uniform.

As Paul says, Faith is the substance of Hope. I think he meant that the former is confidence and conviction, while the latter is vague dreaming and listless waiting. In some things connected with Faith, there is considerable mystery as to the mainspring and source of it, especially that which pertains to the life beyond.

Avoiding all theology and metaphysics because of snares and complexity, we common folks somehow cling to rudiments of Faith which belong to our own confidence and self-respect. In this avenue there is no mystery.

Into the mundane bailiwick wherein I dwell, there came last month a father temporarily out of "gainful occupation." He gladly took a job washing storm-windows and cleaning eaves-troughs. Prior to his knock at our door he had interviewed a clubby neighbor lady, who graciously reminded him that the welfare budget at the city hall provided for such needs as his.

"Then of course," she added, "there is always the Salvation Army."

But old Missus Faith and her sister Hope stood at my frayed friend's side to nudge him in the ego. Having a well-developed ego, vitalized by years of decent wage earnings, he considered Charity a third rater and would have none of her. So the ex-mechanic became the odd-job man rather than a standee in the bread line.

IN America this winter we seem to have courted Charity and let good old dependable, homespun Faith wait awhile unwooed. Faith built our present day national assets and earned every cent we have ever secured. When Faith gave us a boost, Hope took courage and gave us a beckoning welcome. It has been that way ever since the Founders came to our country.

They had Experience and translated it into Action, with Faith as the silent partner. They had Vision furnished by Hope—after Faith opened their eyes. Not until we found some people among us who lacked Faith (for various reasons) did we require the aid

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On these alfalfa plots at Whenal Farm, Greenland, N. H., the investment in potash was returned four-fold.

Long-lived Alfalfa

By Ford S. Prince

Specialist in Soils and Crops, University of New Hampshire

THE greatest need of dairymen in the Northeastern states is a cheap source of home-grown protein. It seems quite natural for them to undertake the culture of alfalfa, a long-lived, high producing hay crop, as rich in protein as many commercial dairy feeds now being sold on the open market.

The New Hampshire Experiment Station, in 1926, laid out an experiment which was designed to answer many questions already in the minds of the farmers of the state about alfalfa. Can it be grown on worn-out hay lands? What fertilizers can be used to stimulate yields of this important crop? What system of fertilizing will best contribute to the length of life of the alfalfa stand? These problems appeared to be fundamental to the spread of alfalfa growing to a point where it would on many farms, supply all of the roughage necessary to feed the dairy herds.

As there was no suitable land on the University farm for such an experiment, we were forced to carry on the work in some community where alfalfa could be successfully grown.

A field in Greenland, New Hampshire, which had been untouched by the plow for about 15 years was chosen for the test. The yield of grass on the field had fallen so low that in 1926, measured, unfertilized areas yielded less than 400 pounds of hay to the acre. The soil is an open shaly loam, underlaid by gravel, one which is not retentive of either plant food or moisture.

On such a field we decided to try

alfalfa. Predictions and prophecies were much against the success of the venture. Most farmers thought the land should be cropped to corn or other cultivated crop for two or three years before seeding with alfalfa. But as this point was one upon which an answer was desired, it was decided to plow and seed to alfalfa immediately.

Lime we knew would be necessary, and so after plowing in the fall of 1925, we began in the spring of 1926 to get ready by liming the entire area at the rate of two tons per acre. Certain plots received four tons. As the fertility of the piece was at a low ebb, a uniform application of 20 tons of manure was applied per acre. Certain plots had an additional application of 20 tons. Fertilizers were applied before seeding upon those plots which were to receive them. No fertilizer was applied in 1927, but the plots receiving fertilizer have been top-dressed annually since 1927.

The field was seeded in June, 1926, but no harvest was made that year. Two cuttings have been made annually since 1926 so that we now have four years' yield records on the field, eight cuttings in all. A total of 12.7 tons of alfalfa hay per acre have been harvested during the four seasons. This is the average yield of all the treatments.

Potash Gives Greatest Returns

On all but the heavily fertilized plots the yield of hay is on the decline. The check plots which averaged to yield over three tons per acre in 1927, gave us but 1½ tons in 1930, while on the most heavily fertilized plots, those which had extra manure and lime plus a complete fertilizer, the yield of hay was slightly greater in 1930 than it had been in 1927, being over 3½ tons per acre in both cases.

Of the elements used in fertilizing the alfalfa in this experiment, potash has given the greatest increase and the best financial returns.

As I stated before, the plots were fertilized before seeding and have been top-dressed annually since then except in 1927, so that the plots receiving potash have had a total of 600 pounds of muriate of potash per acre.

The plots which have had potash alone as compared with the check plots have averaged 1,267 pounds more hay per acre annually than the checks. Stating it in another way, one ton of muriate of potash has increased the yield of hay at the rate of 8.5 tons in this experiment. The hay from this test has been sold on the ground in the field at an average of $22 per ton. Our investment in potash has been returned to us about four-fold, which even in times of prosperity is a good rate of interest.

Potash Maintains Yields

The gains recorded for these potash plots are on the increase, varying from about 700 pounds per acre the first year to 1,700 pounds in 1930. Perhaps it would be truer to say that the yields from the check plots are falling off more rapidly than are the yields from the plots receiving potash.

The increases recorded from the treatment of potash alone are just as high as from the application of 20 extra loads of manure per acre, applied in the beginning of the experiment. It would seem, that on this soil, at least, potash is quite deficient for maximum yields of alfalfa, and that the response secured from manure is probably due to the potash therein more than to any other factor.

Where more manure was used, adding potash as a top-dressing has so far not stimulated the yield quite as much as with the lower manure application, although the increases have been bountiful and significant even on the heavily manured plots.

Neither phosphorus nor nitrogen has given such a good account of themselves as has potash, although both have increased the yield. Comparing the plots which have had superphos-

phate alone with the check plots, there is an increase of about 1,600 pounds of hay for a ton of superphosphate. Phosphorus appears to be more effective in those cases where other materials were added, returning about 1.5 tons of hay per ton of superphosphate where it was used with the high lime application over high lime alone, giving an equally good response where manure was added to the high lime treatment.

Nitrate of soda has been used in certain treatments. The increase from this material where used alone, over the check plots, has been at the rate of 7,500 pounds of hay for one ton of nitrate of soda. Nitrogen appears to be slightly less effective where it is used on high manure plots, although it is quite likely that this statement would have to be reversed should the experiment be carried on for several years without plowing or adding more manure. Increased yields from nitrogen appear to be about the same year after year, while gains from phosphorus and potash are on the increase.

Top-dress with Potash

From the standpoint of economy, neither nitrogen nor phosphorus has paid as good returns as potash in this experiment, although the yields are all in the right direction. There appears, from this test, no reason why a farmer should not top-dress with potash. Just how much nitrogen and phosphorus he can afford to buy seems to hinge upon two factors, how badly he needs the hay, and whether he wants to hold his stand for a considerable period.

Since the yields on the complete fertilizer plots which have been heavily manured are the only ones in this experiment which are being maintained, it naturally follows that if a farmer wants to hold his field in alfalfa, cutting profitable crops the while, it would be good business to use fertilizer carrying all three elements. Whether he needs the hay and what it is worth to him after he gets it certainly have their bearing on the matter. The appearance of grass in the stand should also be taken into consideration with application of nitrogen.

The amounts of fertilizer we are using, as well as the carriers themselves, have not varied in this test. It is quite possible that larger quantities, particularly of potash, might be used to advantage. It may be that different carriers of phosphorus and even of nitrogen might be more effec-

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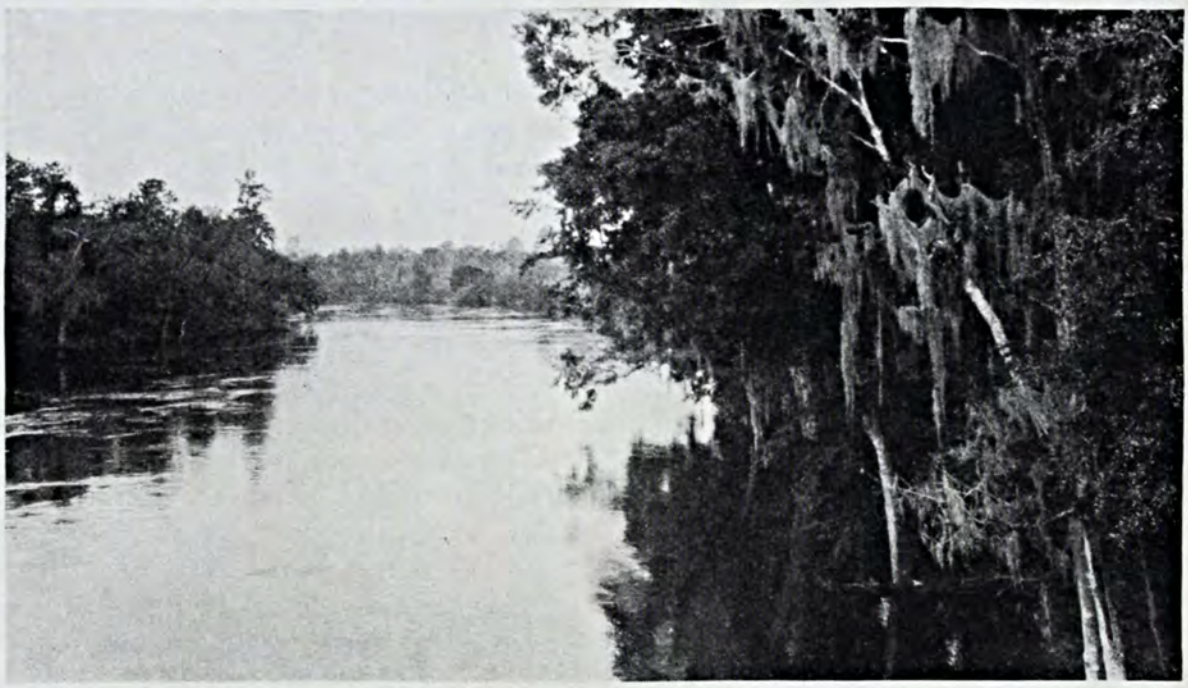
A general view of the alfalfa plots at Whenal Farm, Greenland, N. H.

The Suwanee River Country

By J. Francis Cooper

Editor, Florida Agricultural College



Way down upon the S'wanee River, far, far away,
Dere's wha my heart am turning ever, dere's wha de old folks stay.

All up and down the whole creation, sadly I roam,
Still longing for de old plantation, and for de old folks at home.

THOSE words, the opening stanza of Stephen Collins Foster's immortal Southern folk-song, "Old Folks at Home," have caused the placid little Suwanee River to be known and sung around the world. This sluggish, meandering stream, whose banks are lined with moss-draped trees, rises in the Okefenokee swamp in southern Georgia and wends its way through Florida to the Gulf of Mexico. Its sole claim to undying fame rests in the fact that Foster included its name in his folk-song. It has no commerce, is not bordered with thriving cities, and is surpassed in both length and breadth by many other rivers throughout the world. Curiously enough, if fairly credible legend is to be trusted, Stephen C. Foster never saw the stream which he immortalized.

Although the name of the river is known far and wide, very few people outside of Florida and Georgia know anything about the agriculture of the country surrounding this stream. And at the beginning, it must be stated that the Suwanee is not bordered with fertile valleys, as are the Mississippi, the Nile, and other well-known rivers. Yet, the country near, if not immediately adjacent to, the Suwanee has made contributions of no little importance to the agriculture of the United States.

Fortunately for Foster, whose songs were written before the Civil War, there were colonial farms and mansions in the Suwanee country, some of them, whose remnants are yet standing, on the very banks of the river. However, these bat-infested, old mansions are but reminiscences of a former glory, when "the old folks at home" were surrounded with slaves and the forests not far distant were roamed by Indians. Much of the Suwanee country is yet forested, and abounds in game, while the stream is still a fisherman's paradise. But it is the paleface conqueror and not the dusky Seminole redskin, long ago driven to the vastness of the Florida Everglades, who stalks his prey there now.

Although the Suwanee flows across the State of Florida, noted for its citrus fruits and winter truck crops, the farming carried on in the immediate Suwanee country is of a general nature, such as is found in any Southern state. Some counties in the area advertise themselves as "hog and hominy" counties. Cotton, corn, tobacco, peanuts, hogs, dairy and beef cattle, and poultry are among the principal commercial crops. Just a few miles to the south begins the citrus and trucking area.

Recent years have seen a noteworthy improvement in the cattle of the Suwanee country. With the eradication of the cattle tick from one of its last strongholds, improved dairy and beef animals have been brought to the farms of counties bordering the Suwanee and their farmers have enjoyed a fuller measure of prosperity as a result.

The land "boom" experienced by Florida in the past decade is not the first one occurring in the state by any means. Part of the Suwanee county, around Gainesville, was the center of such a boom about 1885, 35 years preceding the most recent Florida boom. Five or six years after the transfer of Florida to the United

An old well in the land of "the old folks at home."

This granite monument to the memory of Stephen Collins Foster stands on the banks of the river at Fargo, Ga. It was unveiled by the people of South Georgia on October 27, 1928. Scene shows it just after the unveiling ceremony.

States, in 1819, pioneers began to come into the Gainesville area from adjoining states. Indian wars broke out in great violence in 1835 and white settlers were temporarily forced back. At the close of the Indian wars, rapid agricultural development of the area occurred.

Long staple sea island cotton was a profitable industry of the area in its early development, although sugarcane, tobacco, rice, corn, and sweet potaoes were grown. Citrus growing, also, was started in the area in 1859.

After the Civil War, many of the soldiers, pleased by the climate or attracted by the resources of the region, returned to make it their home. Sea island cotton continued to be the principal industry until a caterpillar, perhaps the fall army worm, became destructive, and some localities abandoned the culture of this crop. Attention then was turned to citrus growing. The orange groves were productive and profitable. About 1880 truck growing also was assuming importance.

That both citrus and truck were proving profitable resulted in the "boom" of this area, in which the wildest speculation in Florida lands ensued.

However, the "big freeze" of February, 1895, killed many of the orange trees. Another freeze exactly four years later still further cramped the citrus industry, which was moved to more southern parts of the state. Attention was again turned to sea island cotton, which was produced in abundance until the advent of the boll-weevil. Since sea island is a late maturing cotton, the boll-weevil again put this industry out of business.

Although the farming of the Suwanee country is general in nature, this area has been instrumental in the introduction of new crops into the South which are now enjoying widespread distribution and which are adding thousands of dollars to the income of Southern farmers every year. The Florida Experiment Station at Gainesville is only 35 miles from the Suwanee River, and has served as the focal point for these plant introductions, which have been made by the United States Department of Agriculture and the Florida Station.

The early farmers in the Suwanee country, as did those throughout a large part of the humid South, cleared some "new ground" every year, farmed it for a few years until its fertility was depleted, and then abandoned it. With forest lands plentiful, loamy, fertile "new grounds" were obtainable for the clearing. When timber lands became scarce and valuable, naturally one of the first things which should engage the attention of

farmers and those interested in farming, was the finding of methods for rejuvenating worn soils and keeping others from becoming depleted. Leguminous crops, which produce such abundant growth on poor soils, offered a promising possibility.

In the South, which has a warm, humid climate, bacterial action, tearing down the organic matter in the soil, takes place over a large part of the year, and the rains tend to leach out of the soil the plant foods thus made available. Leaf mold, animal manures, and other forms of organic material can be used to replace the depleted organic matter. However, the legumes have brought about the practice of "green manuring"—a leguminous plant is grown and turned under green. If part of the plant is harvested for forage, still the stubble and many leaves remain to be turned under for the benefit of the soil.

Turn to New Crops

Cowpeas were early accepted as one of the desirable legumes for the South. However, other legumes making more rank growth and suitable for use as both forage crops and soil improvers have come into general use throughout the South. Among these are soybeans and velvet beans.

The velvet bean has been introduced to the South by the Florida Experiment Station, and is one of the most notable contributions of the Suwanee country to Southern agriculture. The first planting of the velvet bean at the Florida Station was made in 1895. The seeds were sent to Director Oscar Clute by a resident of central Florida, who called the plant a "pea." No information could be given as to the origin of this plant, but it was stated that it had been used in that section for 20 years as a covering for trellises and unsightly places. The name "velvet bean" seems to have been used first in Bulletin 35 of the Florida Experiment Station, published in 1896. As with many other crops now largely used, it was considered poisonous to stock.

Shortly after the Experiment Station began work with it, the velvet bean came into extensive use in Florida. The long growing season necessary for the production of seed, however, restricted its use to that state at first. The original variety, now known as the Florida Speckled, requires from 175 to 190 days to mature seed. In 1907 seed of an earlier maturing variety, the Lyon, were introduced from the Philippine Islands by the United States Department of Agriculture. The first introductions, unsuccessful, were followed by others which gave better results. Early maturing varieties arose spontaneously, and hybrids were developed, and for the last 15 to 20 years the velvet bean has been grown extensively in the South.

The velvet bean is a rank-growing leguminous plant, producing heavy yields. It can be mowed for hay, although its viney nature makes it difficult to handle. Bunch velvet beans

Velvet beans, showing vining habit of growth and tremendous production.

have been developed, which are not so troublesome from this standpoint. Most of the varieties have tough pods which do not split open even when left in the fields until late winter. This quality makes the velvet bean an excellent plant for winter grazing, and it is often planted in corn fields, the corn is harvested, and then cattle are turned into the fields to graze the beans and corn husks through the winter. The velvet bean, high in protein content, makes an excellent balance for the carbohydrate feeds.

After the velvet bean came Crotalaria, another leguminous plant which makes a tremendous growth on poor soils, but which, unlike the velvet bean, is not a good forage crop, that is, the species of Crotalaria now grown are not relished by animals. Species with finer stems and sweet to the taste, like alfalfa, which will be relished by cattle, may be a development of the very near future. If they come, they will provide the sandy lands with a forage crop similar to the one now flourishing in the richer, limestone clay soils.

The first plantings of Crotalaria were made at the Florida Experiment Station in 1909. For years very little was done with it, but since 1920 it has come into widespread use in Florida and the Southeast as a soil improving crop which grows well on poor, sandy lands. It is another notable contribution which the Suwanee country has given to Southern agriculture.

(A full discussion of Crotalaria is contained in the May, 1930, issue of BETTER CROPS.)

Turning aside from the legumes, the Suwanee country is now making another noteworthy contribution to the agriculture of the Southeast. The new crop, tung oil, is enjoying widespread interest and popularity, indicating that it will soon take its place as a cash crop in the southern part of the Gulf Coast states. It is estimated that approximately 15,000 acres will have been set to tung oil by the first of March, 1931, and no doubt thousands of acres will go in each winter for some time.

Tung oil is produced from the seeds of the tung-oil tree, a native of the interior of China, which was first introduced into the United States in 1905 and has since been tried at various places throughout the southern half of the United States, from California to Florida. However, it has found its best adaptation in the Gulf Coast region.

First plantings were made on the grounds of the Florida Experiment Station in 1912. Those trees are still flourishing, and have been the nucleus around which has developed the American industry. The first acreage of any consequence was in Alachua coun-

(*Turn to p.* 59)

Club boys in the Suwanee River Country are now rais'ng fine dairy cows.

Fertilizer Facts for Sandy Soil Farmers

By G. E. Langdon

Wisconsin College of Agriculture

SUPPLYING sandy soils with a well-balanced diet of plant food calls for judgment on the part of the farmer as well as a knowledge of what such soils need.

After 10 years of experimental work with sandy soils, Mr. A. R. Albert, who directs the Hancock-Coddington Branch Experiment Station of the Wisconsin College of Agriculture, has a number of practical suggestions to offer on the subject of fertilizing light soils.

In the suggestions which follow, Mr. Albert has assumed that livestock farming is carried on and that sands and sandy loams are being used:

"Use higher nitrogen and higher potash mixtures when manure has not been used, and when no legumes have been grown, or when the soil is very light.

"Select lower nitrogen formulas, but keep the potash high on the dark to black colored sands.

"Use lower nitrogen formulas following legume green manuring and higher when rye is used.

"Use the higher phosphoric acid formulas on grain crops and other crops whose maturity need to be hastened or fruiting encouraged (such as cucumbers).

"Buy higher phosphorus and lower nitrogen and potash mixtures as more manure is being produced.

"Use less potash on the sandy loams than on the sand."

For "complete balanced fertilizers" such as 5-8-7, 4-8-6, 6-12-9, 4-8-8, and 15-32-15, Mr. Albert suggests the following uses:

"For potatoes in rows at 300 pounds to 500 pounds on any sandy soils with manure or clover sod or both and where previous good management suggests a good supply of organic matter.

"For potatoes on sandy soil without clover sod or without manure but well supplied with humus, at 750 to 1,000 pounds an acre, one-third in rows and the balance broadcast or as side-dressings at cultivation.

"For corn on impoverished soil without manure or clover sod turned under at 400 to 500 pounds an acre,

FOUR FERTILIZER FACTS

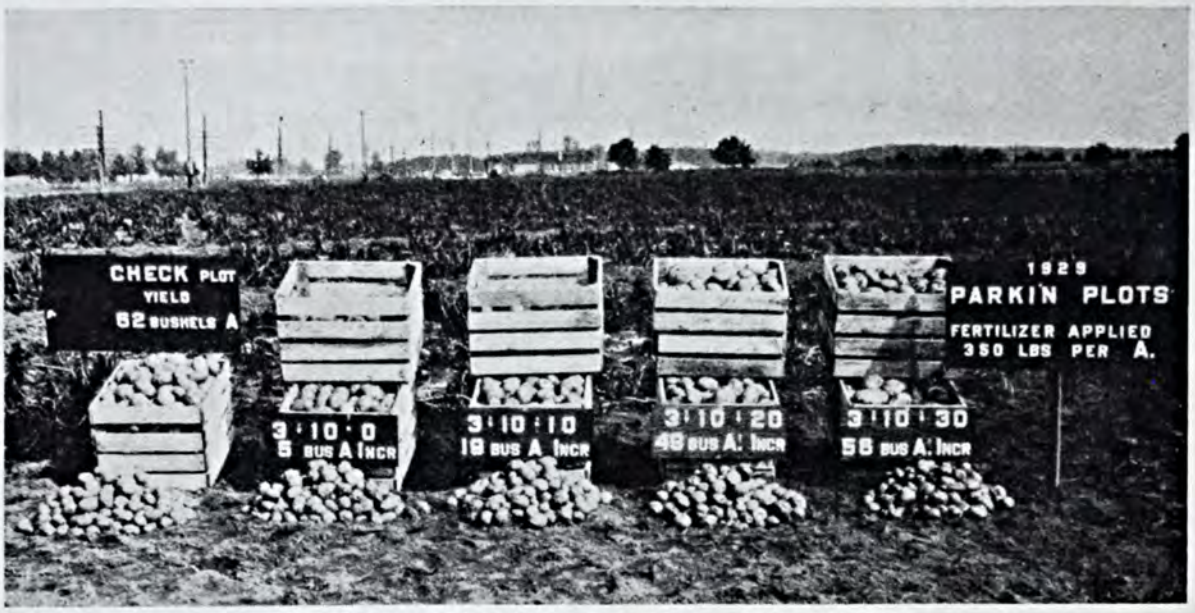
"The fertilizer must be in the root zone of the plant and in moist soil to be most effective.

"Fertilizers should never be plowed under except when they must be applied with manure, and when broadcast on meadows several weeks before plowing.

"Fertilizers should be applied as near to the time of use by the crop as practicable, and ought never be exposed to the danger of blowing or washing off.

"The concentration of the fertilizer near seeds and young plants must not be very high or germination and growth may be retarded or prevented."

—A. R. ALBERT.



EFFECT OF FERTILIZERS ON RURAL NEW YORKERS

These were grown in check rows in 1929 on unmanured alfalfa sod. Fertilizers were side-dressed and applied at the rate of 350 pounds per acre. This 1929 experiment showed bushel increases per acre of the following amounts: Check, 62 bushels—3-10-0 fertilizer, 5 bushels an acre increase; 3-10-10 fertilizer showed increase of 19 bushels an acre; 3-10-20, an increase of 49 bushels an acre; while 3-10-30 showed an increase of 56 bushels an acre.

either all broadcast after plowing or one-fourth to one-fifth in hills and the balance broadcast just before or after planting or side-dressed.

"For rye on light sands, when not in rotation, at 250 to 300 pounds an acre broadcast in the spring and worked in.

"For cucumbers at 500 to 1,000 pounds an acre with a moderate application below or around the hills at planting and the balance broadcast around the hills or applied before planting.

"For truck and small fruits on sandy soils at 1,000 to 1,500 pounds an acre applied as best suits the nature of the crop and as often as needed."

For the fertilizers which are low in phosphate and high in potash such as 0-8-32, 0-9-27, 0-7-30 and 0-15-30, Mr. Albert has found that certain uses are most desirable. For instance:

Use such mixtures on light sands for grain which is to be seeded to legumes when the land was manured or had clover sod turned under, or both, for corn or potatoes. Apply 300 to 500 pounds an acre in the spring to grain, but vary the amount somewhat according to the amount of manure applied and the length of rotation.

Use for all legume seedings without nurse crops, legume crops, or legume green manures on light sands at 200 to 400 pounds an acre.

Use for potatoes on light sandy soils where plenty of nitrogen has been supplied both by green manuring and the use of manure. Use at 300 to 500 pounds in rows.

Use for top-dressing alfalfa two or three years' old on sandy fields, or farms which are managed as livestock farms, at 400-500 pounds.

In using fertilizers having about equal amounts of phosphate and potash (such as 0-12-12, 0-14-14 and 0-20-20), Mr. Albert advises that on the whole these may be applied in nearly the same manner as the low phosphate and high potash fertilizers on sandy loam soil, or on well-managed dairy farm light sandy soils, with but two exceptions. The first is that on light sandy soils, alfalfa top-dressings should be a high potash mixture when manure is not used, and second that these mixtures are not so suitable for row applica-

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TEXAS

Agricultural Experiment Station

By A. D. Jackson

Editor of Texas Station Publications

THE Texas Agricultural Station, through 53 years of activity, has consistently shaped its endeavors to serve in the development and in the better utilization of the vast domain of Texas embracing approximately 168,000,000 acres of land. The organization of an Agricultural Experiment Station to serve an extensive area of such diverse conditions has resulted in the establishment of 19 divisions of effort at the Main Station, supplemented by a system of regional stations or substations, 20 in number, to provide for the study of regional problems.

It is the well-defined policy of the Texas Station to conduct experiments of statewide application at the Main Station, and to use the regional stations or substations for the conduct of experiments pertaining to the particular agricultural region and allied areas. Thus the problem of the storage quality of eggs as influenced by feeds, or the problem of contagious abortion, and similar problems of statewide application can be carried out at the Main Station; whereas problems of a regional nature, such as water and soil conservation in a well-defined agricultural region embracing certain soil and climatic conditions, must be studied at a regional substation. Likewise, the projects concerned with citrus production or rice production must necessarily be studied at regional stations where these crops are adapted.

A. B. CONNER

Director since 1926, has been on the station staff since 1904, has had a leading part in the selection and development of crops and livestock best suited to the various regions of the state, and has instituted a vigorous program of research and a station organization that is serving every phase of agriculture in the state.

Such regional studies at substations, nevertheless, have their definite alignment and placement with the particular division of the Main Station concerned with the particular regional problem. In this way research with the laboratory and field experiments is so placed that the experiments can be most advantageously correlated and conducted and made to yield the most trustworthy results.

The diversity

of soil and climatic conditions in Texas exists through a series of geological formations, ranging from some of the newest to some of the oldest soils. Moreover, these soil belts are further affected by variations in altitude ranging from the near sea level in the southeastern part of the state to an altitude of approximately a mile in the northwestern portion; and with the rainfall ranging from 65 inches in the southeastern portion of the state to 10 inches in the extreme west; from a sub-tropical temperature in the extreme southern portion of the state to Central Great Plains conditions in the northern part. These conditions greatly complicate and multiply the numerous agricultural problems that confront the farmer, and it is believed that the present system of stations provides an effective and systematic means of studying these multiple and complex problems.

The several divisions of the Texas Station have under investigation 165 specific projects, embracing work at the Main Station and at substations. As a result of previous work, some outstanding and valuable information has been secured and published, and is now being used by farmers and ranchmen through the assistance of county agents and other disseminating agencies. A few examples will suffice to illustrate the nature of these accomplishments:

Studies were begun in 1923 to determine the cause of loin disease in cattle, a disease of serious nature resulting in considerable losses to stockmen in the Gulf Coastal Plains region. In the course of six years it was determined that this disease is caused by a toxic substance produced in fresh bones and carcass material, which, when consumed by animals in sufficient quantities, brings the animal down and results in death unless extraordinary attention and care are given. The removal of such bones and carcass material from the range has resulted in the elimination of the disease; and, in the course of the experiment, it was found that the feeding of sterilized bone meal would supply the animals on the range with the lime and phosphate which they could get otherwise under range conditions only by chewing the bones; also that the feeding of bone meal not only prevents the animals from picking up the bones, but as well brings about a marked increase in the growth and weight of the animals. By a systematic removal of fresh bones and carcass material from the range and the use of bone meal to supply needed elements, the disease was not only brought under control, but better developed animals have been secured. Although the isolation of the organism has not yet been effected, a means of control has been determined

A flock of Angora Kids. Texas has 83 per cent of the Angora goats and produces 86 per cent of the mohair of the nation and, of course, leads in the production of chevon. The kid boxes in rear are about 12" x 12" x 12". Until a kid is several days old, the mother is not always able to select her own from a random group. The kid accordingly is staked near one of these boxes which furnishes a retreat from the scorching sunshine or biting winds, and when the doe returns from grazing, she can readily select her own kid. The kids in the picture are able to take care of themselves and find their mothers.

The administration building of the Texas Agricultural Experiment Station and other suitable buildings house the indoor laboratories and the offices of the station staff.

and the ill effects of the disease are being eliminated.

Another contribution of the Texas Agricultural Experiment Station to the development of the resources of Texas has been in connection with the testing out of a large number and variety of cottons at the regional stations in what is now the northwestern cotton region. It has been determined that the cotton plant is inherently a drought-resisting plant, and, in the main, fully as reliable a crop under dry-land conditions as are the grain sorghums, notable for their production under these conditions. Accordingly, there has followed a development of a new cotton region, much of which is beyond the limits of infestation by the cotton boll-weevil and by cotton root-rot disease. This new region embraces from 12,000,000 to 15,000,000 acres of land suited to cotton, and is now the second largest cotton producing region in the state.

The grain sorghums, of which Texas produces approximately one-half of the nation's crop, have been found to be as reliable as a grain crop throughout the western part of Texas as is corn in the eastern half of the state. These findings have been very largely the result of research work,

More than 40 per cent of the grapefruit plantings of continental United States are in Texas where this popular citrus fruit attains an excellence of flavor and quality not found elsewhere.

and the development of strains particularly suited to the region has progressed to the extent that practically every variety of grain sorghum grown in Texas today has been introduced or developed by the Texas Station and the United States Department of Agriculture in cooperation. Moreover, the result of feeding work by this and other stations has established the fact that grain sorghums have nearly the same feeding value as corn, pound for pound, whereas 25 years ago this grain was considered to be worth only about 80 per cent as much as corn for fattening and finishing livestock. The significance of this finding is obvious when it is realized that Texas sends to other states annually 1,000,000 head of feeder cattle for fattening and finishing which might, in a large measure, be finished on Texas feeds.

The finding of a suitable and dependable grain crop and the determination of the fact that the region has unusual opportunities in the economic production of cotton, supplementing the utilization of the land for growing wheat and for grazing purposes, has been followed by revolutionary changes which have resulted in greatly increasing the efficiency of production. Among these improvements have been the use of improved farm machinery, such as tractors, power cultivators, combines for the harvesting of wheat and grain sorghums, and progress in the development of cotton harvesting machinery; and in these fields the Station has contributed much in the way of the development of information through projects relating to these different phases of economic production.

Leads in Wool Production

Texas has 83 per cent of all the Angora goats in the nation and produces 86 per cent of the nation's mohair crop, according to the bulletin of the National Association of Wool Manufacturers' Annual Wool Review for 1929. It is also the leading state in wool production. These industries are confined very largely to a region of approximately 20,000,000 acres known as the Edwards Plateau region. In this section, through the Ranch Experiment Station located in the region, the Station has rendered a valuable service to the sheep, goat, and cattle industry through its work in diversified grazing and the proper balancing of the different classes of livestock in the better utilization of range land and range vegetation. The work has progressed to an extent that throughout the Edwards Plateau region the practices followed represent a high degree of efficiency in the utilization of range land.

Other Industries Growing

Texas is a factor in the production of citrus fruit, having at this time 40 per cent of the total plantings to grapefruit in the continental United States. The Texas Station has contributed to the development of this industry and to the vegetable industry through its station located in the lower Rio Grande Valley, particularly in matters relating to information and practices that aid in the efficiency of production and the quality of products. The Station has determined that the Lower Rio Grande Valley grapefruit is of especially high quality, therefore acceptable to a wide range of markets.

Texas is rapidly developing a fig industry in the eastern part of the Gulf Coastal Plains region, and, through the Station located in that region, has developed and is developing useful information in connection with the production and value of this crop. It has been determined that the fig can be picked when it is fully matured and before it is ripe without losing any of the food value, a matter of importance both to the growers and to the consumers of the product.

The Texas Station has developed much valuable information in connection with the conservation of rain-

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Weeds Can Be Killed *with* KAINIT

By George R. Cobb

Salisbury, Maryland

ALTHOUGH the encyclopedia tells us that Noah Webster was a lawyer, it is evident that he either farmed or at least had a home garden, for he defines a weed as a "useless and positively troublesome" plant.

The strawberry growers on the Del-MarVa Peninsula—several thousand of them—are firmly convinced that sheep sorrel (Rumex acetosella) is the plant that Webster had in mind when he so aptly defined a weed.

Professor H. C. Rather of the Michigan State College, in a recent issue of the *Journal of the American Society of Agronomy,* discusses the weed problem and states that it is attracting new and rather wide attention on the part of several interests. Other authorities, in the same issue of this publication, cite cases where sodium chlorate has been used, more or less successfully, in eradicating weeds such as quack grass, bindweed, and Canada thistles.

In the olden days farmers were told that sheep sorrel was an acid-loving plant and would not thrive in a sweet or neutral soil. The remedy, therefore, was very simple, just apply lime. That this advice was incorrect has been proven time and time again as farmers have applied lime very consistently, yet the sorrel still persists.

The use of kainit to eradicate charlock (Raphanus raphanistrum) has proved satisfactory in Germany, Great Britain, and Nova Scotia. Tests with kainit on other weeds have been more or less successful.

Realizing that kainit contains a valuable plant food, potash, and that it had given good results as a weed eradicator, arrangements were made with J. Frank Parker and Reuben Esham, extensive strawberry growers, residing near Pittsville, Maryland, to cooperate in tests with kainit as applied for the eradication of sheep sorrel.

The rows on the right were treated with kainit, 400 pounds per acre, before the strawberry plants were set. Note the large clumps of sorrel on the untreated plot at the left.

Before the treatment with kainit—note the dense covering of sheep sorrel. This is the same field as that pictured below.

Incidentally Pittsville, Maryland, is one of the largest strawberry shipping centers in the United States. The town of Marion, in Somerset county, Maryland, leads the country by virtue of shipping about 600 carloads of berries annually. Other very important shipping points on the DelMarVa Peninsula are Selbyville, Delaware, and Fruitland, Maryland. Therefore, with many acres of land on the Peninsula devoted to the cultivation of strawberries, weed control assumes a place of prime importance in the industry.

A popular rotation among strawberry growers brings berries after a corn crop. The constant cultivation given to the corn crop in the early season has a tendency to keep down weeds to some extent, but later on in the season cultivation ceases and weeds are in their glory. If the weeds can be killed during the corn crop season, the land will then be in much better condition to receive the strawberry crop the following spring.

Mr. Parker applied 500 pounds of kainit, per acre, on two acres in a large field, leaving the remaining acres untreated. The land was plowed and

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Early in the spring, before the land was plowed for the corn planting, 500 pounds of kainit per acre were applied. Only a few small clumps of sorrel survived.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

"IN our grasp for knowledge we have tried to substitute science entirely for sentiment forgetting that the really essential things of life cannot stand close analysis because they are held together by faith."

So spoke the late Herbert Winslow Collingwood eminent agricultural editor and author of the uplifting and inspiring Hope Farm Notes of the Rural New Yorker. He believed that while the future of our land lies in the hands of the little children who are playing on the city streets or in the open country, the success of their work will depend chiefly on the pictures which are being printed on their minds and souls. It was his idea that the future will be safer if the children are imbued with poetry and imagination, as well as the multiplication table.

These were the sentiments and wholesome philosophy of a man who, as a boy, knew real privation and had to struggle up in a stern and loveless environment. They were evolved in the inner consciousness of one who, throughout the greater part of his life of usefulness, sat in the solitude and silence of deafness, as behind a great black cloud, yet found in its darkness a silver lining out of which he shed rays of cheer, hope, and comfort on all around him.

Herbert W. Collingwood was born on a farm near Plymouth Massachusetts on April 21, 1857. His father volunteered, and was killed at Fredericksburg, in the Civil War, leaving behind him his wife and five little children, with practically no material resources.

As was the custom at that time, the boy was "lent out" to an old farmer, whose place was situated near the "neck" of Cape Cod. There the lad was brought up, on the little rocky farm. In summer he hoed among the stones and in winter pegged shoes, braided straw, made husk mats, and worked at other similar jobs. The sawing and splitting of firewood was also a winter task and a "stent" was set out for him each day.

Learned to Value Sunshine

He would not have minded the work so much had not the stingy old farmer made him do it on the cheerless, frosty, northern side of the barn, while the cow, hens, and sheep always stayed on the southern sunny side, which represented the comfortable and bright side of life. The farmer argued that if the boy worked too much on the sunny side, he would stop to look at the passers-by, feel some of the joy of living, and stop working to absorb some of it.

To Herbert, it seemed strange that the farmer failed to understand that the sunshine which made the hens lay well would also stimulate him to do better work. Thus early he learned to moralize and philosophize and he made up his mind to imbue his own life's work with sunshine. He vowed, too, that if he ever had a chance to influence or direct the lives of farmers,

he would do his best to have them live and work on the sunny side of the barn. This wise resolve he fully carried into effect, when opportunity offered in his later life.

In winter, he went to the district school, until not quite fourteen; then he spent two terms in the high school. But his studies ceased at that stage; for he was put to work in a Boston book-store, where, happily, one of his duties was to run errands for the authors who frequented the place. Among these were Longfellow, Whittier, Emerson, and other great men, who made Boston famous in those early days.

He saw many episodes of their lives not apparent to the public, and they took an interest in the errand boy who learned from them to read worth while books. Thus he acquired the reading habit, which he came to regard as his salvation; for it caused him, as a lone boy in a big city, profitably to employ his idle hours, avoid temptations, and "walk straight." He read Shakespeare, the old British poets, Dickens, Scott, and their noted contemporaries, before he was twenty, and although he did not understand all they wrote, the perusal of their works made him a book lover.

Found Inspiration in Men

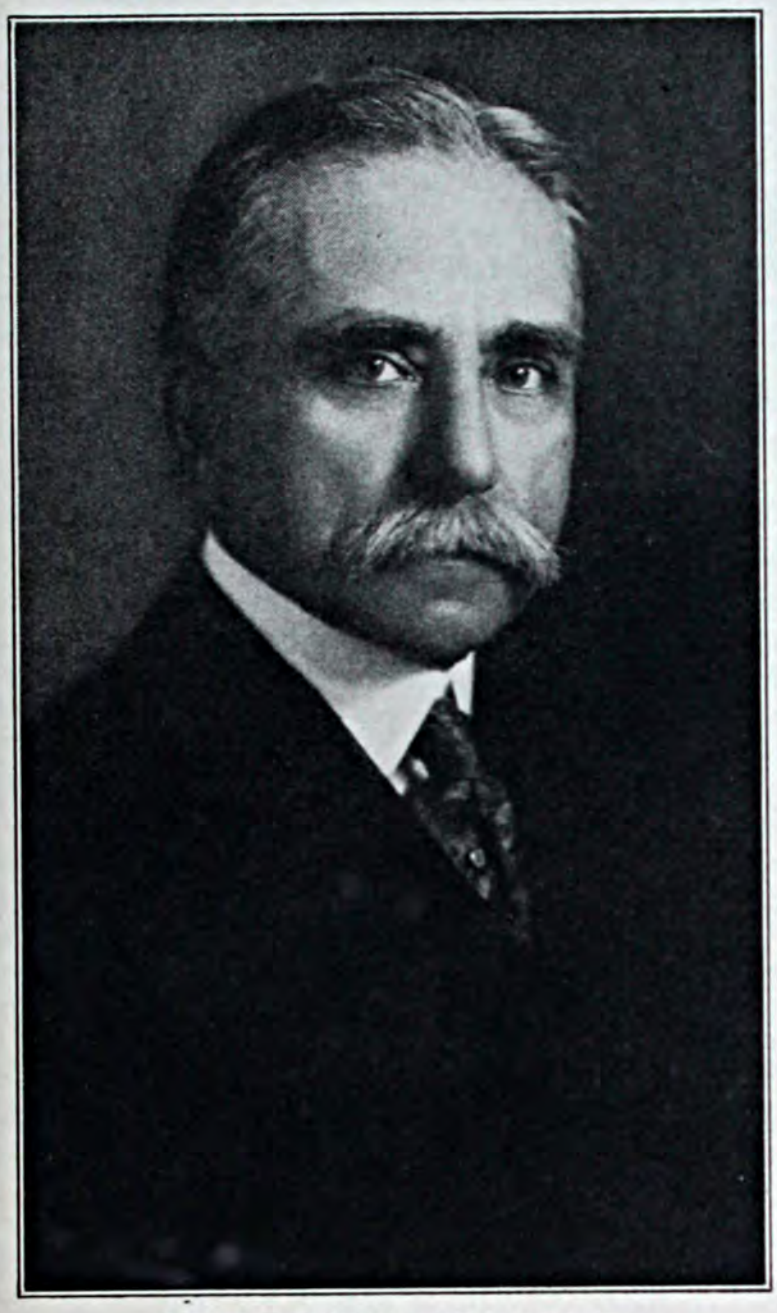
The great men with whom he was privileged to converse were also an inspiration. Always, he recognized and prized these early influences. Of that period he wrote: "I think this part of a man's biography the most important of all; for nine out of ten, the men I know were made or unmade before they were old enough to vote. By that I mean that the influences of their childhood and younger manhood, what they read and thought, and the mental pictures stirred up in them, were the things which made their lives."

The developing young man did not like city life, however, and saw no opportunity there, so he decided to "go West," and landed at Greeley, Colorado, not long after that town was organized. There, he worked as a hired hand, sheep herder, and cattle herder. He had despaired of obtaining a college education, but when a graduate of Michigan Agricultural College assured him he might work his way through that school, he "hopped a freight," and managed to enter the institution.

He confessed later that probably he did not pass the entrance examination, but believed the good old men at the head of college affairs in those days recognized his earnestness, distinguished honest desire from ignorance, and accordingly allowed him "credits." Anyhow, they let him in, and he succeeded in working his way. It was fortunate, he thought, when he was actually permitted to milk the college cows for eight cents an hour. Later, he celebrated the occasion when he "struck a Saturday job at ditching," for which he was paid the munificent sum of twelve cents an hour. Teaching district school and working in lumber camps during winter also helped pay his expenses.

The plodding student did not claim that he stood high in his classes. Indeed, he said the records probably were against him. Nor did he think the college course of those days really superior to that of a good high school today. But of priceless value to him through life was the example and inspiration he received from such great men as Dr. Abbott, Dr. Kedzie, Dr. Beal, and his other eminent teachers who, since then, have gone to their reward.

When the young graduate left college, the problem facing him was what to do with an education which had not fitted him for anything in particular. At that time there were only a dozen or two silos in Michigan, and the cream separator was practically unknown. Throughout his entire college course, the word bacteria was not used over twenty times, and no one knew how clover obtained



HERBERT WINSLOW COLLINGWOOD

its nitrogen. Not a pound of butter was made at the college during his stay there, except by the wife of the farm foreman. In despite of his "scientific training" nobody seemed to need or want young Collingwood, and so he resumed work as a farm laborer and later worked as a fruit farmer. In 1883 he was appointed editor of the Southern Live Stock Journal, and gained experience in that position until, in 1885, he became editor of the Rural New Yorker, in which situation he labored strenuously until the time of his death, at Hope Farm, Woodcliff Lake, New Jersey, on October 21, 1927.

It seems needless to tell how the deaf farm-philosopher built up the paper of which he became the main spring. It just grew and grew in the number of its readers and in influence, as a guide and inspiration for better farming, better living, better thinking and upright, honest citizenship. Collingwood never bragged about himself, for he was eminently modest. All I knew him to say about his efforts was:

"I have been working all these years as best I could with such problems as seem to be within our reach. I do not know that we have accomplished anything in particular. I certainly do not feel that I have personally, and all that I can lay claim to legitimately is a sort of bulldog tendency to hang onto the thing after most of my friends think there is nothing left in it. I have just taken up the thing that came to my hand, and stuck to it. There has been no great art about it, certainly no great science; nor do I feel that there have been great results. But I have lived to learn that he who goes through life searching for the results of his own labor will never find them, for should he reach any, or should he ever do anything that is worth while, they will present themselves all in good time without his hunting for them."

Yet honors came to H. W. Collingwood. In 1906 Michigan Agricultural College added the LL.D. degree to the B.S. it had conferred upon him in 1883, and the Wisconsin College of Agriculture gave him its honorary

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Green Manures *and* Vegetable Production

By J. W. White

Professor of Soil Technology, Pennsylvania State College

SUCCESSFUL vegetable production depends primarily upon the maintenance of a liberal supply of soil organic matter throughout the growing season. The excessive decay of organic matter brought about each year as the result of intensive soil cultivation, together with the nitrogen removed in crops and lost in drainage water, lead to rapid depletion of the fertility of the soil. Perhaps the most serious problem confronting the vegtable growers today, as far as economic production is concerned, is that of replenishing the organic matter and nitrogen lost from the soil and finding means of conserving that left at the end of the growing season.

We all must admit that a liberal application of good farm manure, say for growing celery, is one of the best treatments available. No, I don't mean available, for it is no longer available—let us say the most desirable. The vegetable growers may just as well face the problem of manure shortage for it is becoming more difficult each year to secure a supply of this age-old source of organic matter. Now the golf greenkeeper is fast becoming a keen competitor. Farm manure is being dried, ground, and sold for use as a compost.

Manure shortage is, however, not by any means a modern problem. It extends back to the beginning of agriculture. Varro, over 20 centuries ago, wrote as follows: "A field is not sown entirely for the crop which is to be obtained the same year, but partly for the effect to be produced in the following; because there are plants, which when cut down and left on the land, improve the soil. Thus lupines, for instance, are plowed into a poor soil in lieu of manure." Columella in the first century A. D. wrote as follows: "Some of the leguminous plants manure the soil and make it fruitful while other crops exhaust it, and make it barren; lupines, beans, peas, lentels, and vetches are reported to manure the land. Where no kind of manure is to be had, I think the cultivation of lupines will be found the readiest and best substitute."

Annual Loss of Soil Nitrogen

These century-old statements simply show that there is really nothing new under the sun and that agriculture has always faced a manure shortage and has recognized the value of green manures as the only substitute at hand.

Before we consider the relative values of green manures as a means of conserving residual soil nitrogen and supplying fresh easily available humus, let us consider the amounts of nitrogen lost from the soil each year as the results of leaching and cropping. Results of the lysimeter studies at the Cornell Experiment Station serve well to illustrate the loss of nitrogen in the first instance. These data show that a soil under a fallow system, but cultivated at intervals, lost by leaching in five years a total of 445 pounds of nitrogen per

ANNUAL REMOVAL PER ACRE OF NITROGEN BY CROPPING INCLUDING 20 POUNDS LOST BY DRAINAGE (ESTIMATED)

Crop rotation	Pounds per acre removed	Equivalent to pounds 4-8-4 fertilizer
Early cabbage (10 tons) and celery (15 tons)	162	4,941
Lettuce (5 tons) and cauliflower (3 tons)	67	2,044
Beets (5 tons) and kale (7 tons)	99	3,020
Carrots (7½ tons) and cabbage (10 tons)	119	3,630
Kohlrabi (5 tons) and beets (5 tons)	78	2,379
Sweet corn (3 tons) ears	52	1,578
Sweet corn (3 tons ears and fodder)	100	3,035

acre. At the same time the soil in a four-year grain rotation lost 27 pounds. In a rotation of oats and four years of grass there occurred a loss of only 15.7 pounds of nitrogen per acre, 80 per cent of which was lost the first year in oats, leaving a total loss of only 3.2 pounds in four years of grass.

These figures illustrate what may happen in case of land unprotected by roots such as between rows of certain vegetable crops, and the land lying fallow after harvest. These data also show the value of growing crops as a means of reducing the loss of nitrogen through drainage waters.

In addition to the drain on the fertility each year as the result of that lost by leaching, there occurs an even more serious loss, so far as nitrogen is concerned, in that removed in the heavy yields of vegetable crops harvested. In order to give some idea of the extent of this loss, the writer has computed the annual removal of nitrogen in relation to several vegetable rotations.

A study of the above figures serves to emphasize the heavy nitrogen loss in vegetable production and should impress the vegetable growers with the urgent necessity of taking immediate steps to replace that removed in

A heavy growth of sweet clover such as shown above will when turned under supply organic matter equivalent to at least 29 tons of barnyard manure.

crops and lost by drainage. The estimated loss of 20 pounds per acre by drainage no doubt would be greatly exceeded in certain cases where heavy fertilization is practiced.

Nitrogen Conserved by Cover Crops

Reference to the figures given earlier pertaining to the Cornell lysimeter experiment will show that oats reduced the average annual loss of nitrogen from 89 pounds to 13.6 pounds per acre and during the four years of grass the annual loss was less than one pound per acre. In order to gain further information concerning the relative value of the common green manure crops in checking the loss of nitrogen, the author has computed the amounts of nitrogen contained in the tops and roots of these plants on the basis of definite yields.

These data are necessarily an approximation of the actual nitrogen that may be returned to the soil when the several crops are plowed down. The information is presented with the hope that it may further stimulate the use of green manuring crops which have many functions in relation to the conservation of soil fertility and the promotion of rapid growth of vegetable crops.

These figures emphasize the fact that green manure crops are capable of replacing farm manure as a source of organic matter. To furnish the organic matter supplied by the above crops would require the following amounts of average barnyard manure in relation to each crop: Sweet clover, 13.4 tons, wheat 14.8, oats 14.4, buckwheat 9.9, and rye 11.7 tons manure. The heavy yield of sweet clover (12 tons) supplies organic matter equivalent to 29 tons manure. Grant that the above relationship is true, then what are the comparative values of organic matter from the two sources?

Farm Manure vs. Green Manure

One of the many important functions of green manures is to supply available nitrogen during the height of the growing season. The comparative values of green manures and farm manure in this respect may therefore serve as a means of measuring the comparative values of these two sources of organic matter. Some years ago the author conducted an experiment in which various leguminous and non-leguminous green manures were studied in relation to their relative values in supplying soluble nitrates, active humus, development of soil acidity, and rate of decay. An equal quantity of barnyard manure was also included. Each material was applied to the soil at a rate sufficient to furnish the equivalent of 10 tons

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VALUE OF GREEN MANURES IN CONSERVING SOIL NITROGEN AND ORGANIC MATTER

Nature of Cover crops	Green weight of crops per acre		Total nitrogen recovered per acre	Pounds organic matter added	Nitrogen equivalent to pounds of Nitrate of soda	Nitrogen equivalent to pounds of 4-8-4 fertilizer
Sweet clover	6	tons	138	5,352	897	4,209
Wheat	6	"	100	5,928	650	3,050
Oats	6	"	90	5,760	585	2,745
Buckwheat	6	"	89	3,960	579	2,715
Rye	6	"	78	4,704	507	2,379
Sweet clover	12	"	229	11,520	1,489	6,985
*Rye or wheat	1.66	"	40	....	260	1,220
*Oats	2.66	"	61	....	397	1,861

* Plants about six inches high.

Taking the SOIL'S PULSE

By J. C. Patterson

Iowa State College

"FIFTY-ONE fifty-two, fifty-three——

And the old family doctor gazed at his big gold watch which he held in his hand while he felt the wrist of Johnnie who had eaten too many green apples or Mary who had caught a cold.

Taking the pulse of the soil can hardly be done in that manner, but F. B. Smith, Professor of Soils at Iowa State College, Ames, Iowa, has found a way of getting information about the bio-physical condition of the soil which has the same value in doctoring it as finding the rate of heartbeat of the ailing human being has in doctoring him.

A milk wagon was remodeled for the equipment with which Professor Smith took the respiration of the soil. With this outfit he has found that the productivity of the soil is directly related to the amount of carbon dioxide it produces.

Professor Smith's method is taking its respiration. "Soils breathe," he says. "They may become choked, asphyxiated, or they may even have halitosis. They inhale oxygen and exhale carbon dioxide just as the human being does, and within reasonable limits the greater the respiration the more productive they will be."

For a long time specialists have been able to determine the amount of carbon dioxide in the air within the soil; they merely pushed a tube into it, pumped out some of the air and analyzed it. But this told them little about the physical condition of the soil.

The important point is to determine how fast carbon dioxide is produced. The only way to find out is to measure the amount escaping as well as the amount in the soil. This is what Professor Smith has succeeded in doing.

He inverts an apparatus which looks like the reflector of an automobile headlight, called a bell, over the soil. This bell has a three-inch rim around the edge which is forced into the soil to prevent any air from entering from the sides. The air which is escaping from the surface of the soil under the bell is then pumped through a tube to a measuring instrument which Professor Smith hauls about in a specially prepared wagon. The carbon dioxide is removed from the air by a lye solution and the percentage of it in the

escaping air is computed. From this the number of pounds escaping per acre per day are calculated.

In a plot which had been manured, he found the production of carbon dioxide to be 118 pounds per acre per day. One which had both manure and lime applied to it produced 332 pounds per acre per day. A check plot which received no fertilizer produced 48 pounds of carbon dioxide per acre per day.

The average yields of corn on these plots for 10 years were 44.9, 49, and 36 bushels, respectively. The production of carbon dioxide was apparently closely correlated with this productivity.

In one experiment it was found that two plots each had .6 per cent carbon dioxide in the escaping air. By inserting a tube into the soil it was found that plot No. 1, which had not been fertilized, had 1.5 per cent carbon dioxide in the air within it. In plot No. 2, to which superphosphate had been added, the carbon dioxide content of the air under the surface was found to be 3.4 per cent. The corn yield on plot No. 1 was 53 bushels. On plot No. 2 it was 66.5 bushels.

Although plot No. 1 had less than half as much carbon dioxide within it as plot No. 2 the gas was escaping just as fast from the surface, indicating a greater production of carbon dioxide in the soil of plot No. 2 than in plot No. 1. Again the larger crop yield was secured on the soil that produced the larger amounts of carbon dioxide.

Soils Are Like Humans

"The soil is much like the human body in many respects," says Professor Smith. He has spent many years studying it and has risen to the rank of assistant chief of the soils department at Iowa State College.

"Soils eat," he says. "Unless they are well fed they become weak and run-down. They must have balanced diets just as a dairy cow must have a balanced ration. They have digestive systems in which raw materials are changed into plant foods which become corn and beets and cotton instead of milk and fat and wool as in the case of animals.

"Just as there are enzymes in the human or animal digestive system which act on the food eaten, there are micro-organisms in the soil which act on the material fed to it.

"Soils have physical structures as different from each other as Farmer Jones is from his neighbor Farmer Brown, and we must consider these if we are to get the maximum returns. The experiments on carbon dioxide production bring this out more clearly than ever.

"Giving our soils manure, lime, phosphorus, potash, and other fertilizers is not sufficient. If the physical condition of the soil is unhealthy, their efficient functioning is greatly handicapped."

Reasons for Poor Health

Professor Smith suggests several things that may be responsible for an unhealthy condition in the soil if the respiration — production of carbon dioxide—is found to be below par.

Working the soil when it is too wet, causing puddling, will shut off both the chance to inhale and exhale. The gases will not be allowed to escape and the undesirable ones which should be freed will cause "halitosis," or they may even asphyxiate the soil. Incoming oxygen will be shut off, and the soil may become choked.

Plenty of organic matter should be added. This will hold the elements which produce the carbon dioxide and other desirable gases.

Straws and manures with considerable bedding should be placed on the ground long before a crop is to be planted so they have time to decompose. Otherwise they stimulate the growth of those organisms which compete with the crop for available plant food. Green manure crops and heavy

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Determining the ripeness of apples in the laboratory by means of a pressure tester.

RESEARCH SOLVES PEST CONTROL

By T. J. Talbert

Professor of Horticulture, University of Missouri

THE earliest authentic record of the use of sprays for the control and prevention of injury to plants by insect pests and plant diseases is given by Pliny in his Natural History written about 2,000 years ago.

In discussing "Medicaments for Trees," Pliny states: "Many people kill both ants as well as moles with Amurca (an extract from olive) and preserve apples from caterpillars, as well as from rotting, by touching the top of the tree with the gall of a green lizard. To prevent animals from doing mischief by browsing upon the leaves, they should be sprinkled with cow dung each time after rain. Another method, again, is to pound lupines in oil and anoint the roots with the mixture. The fig trees are sprinkled with ashes; as also with rue, to keep away worms, and to prevent the roots from rotting."

Since the days of superstition, darkness, and doubt of Pliny's time, a great advance has been made in the warfare waged against plant pests. The transition has been rapid. Progress as to time and growth has paralleled the steady advance and development of the Agricultural Experiment Stations and the establishment of agricultural research.

The use of scientific methods and practices in spraying, dusting, and fumigating plants has come about during the past 40 to 50 years. Some of the factors which probably helped materially to stimulate progress in

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Weighing and measuring plant food materials in the research laboratory.

A New Corn Contest

By C. T. Gregory

Purdue University Agricultural Extension Department

THE merchants and bankers of Elwood, Indiana, have a new kind of corn contest that has proved to be both popular and instructive. With this contest they are fostering better farming in their community, and it costs the merchants about $10.

First and foremost, the county agricultural agent and vocational teacher must assist. They will be quite willing because this contest is one of the best types of work to further their corn projects. The plan of the contest is this:

The county agent or vocational teacher obtains 50 or 100 good looking ears of seed corn from two or more farmers. A modified rag doll test is started on Saturday and the ears are immediately placed in some convenient store or bank where they can be examined by the farmers who wish to enter the contest and pick out the good seed ears.

Cards or pads of paper are furnished with pencils. Each sheet has the numbers of the ears printed on it. Opposite each number the farmer indicates if the ear, in his estimation, is good for seed. Then he signs his name and address and deposits the card in a suitable receptacle. The ears are left on exhibit for one week.

On the following Saturday the final meeting is held, at a time most convenient to the farmers and to the merchant or banker where the ears have been exhibited. The rag doll tests of the ears are brought out. The ears represented in each doll are laid out as that doll is read. The good and bad ears are separated with explanations from the county agent as to the reasons why each is discarded. A blackboard can be used to list the numbers of the good and poor seed ears, so that farmers may examine the ears after the contest.

Then, a committee, previously appointed, will examine each of the cards and the farmer guessing the largest number of ears correctly will be awarded a prize. These prizes are donated by the merchants and may be as many as desired but I would suggest three, for example, five, three, and two dollars.

The rules of this contest should be somewhat like this:

1. Any farmer of ———— county is eligible.
2. Vocational students are not eligible in the adult contest.
3. Each farmer is allowed to examine the ears in any way he desires, but he can remove only one kernel from each ear for examination.
4. Each contestant must list on the sheet provided after the number of each ear the words "good" or "bad" according to his estimate of the value of the ear as seed corn.
5. Each contestant agrees to attend the final meeting on Saturday when the rag doll tests are read.
6. The ears of corn in the contest shall be obtained from two or more different farmers in order that no one man may have an unfair advantage.

The newspapers should be enlisted in this project and should carry announcements of the contest. They should also carry the announcements of the winners, stating what percentage of the ears they guessed correctly.

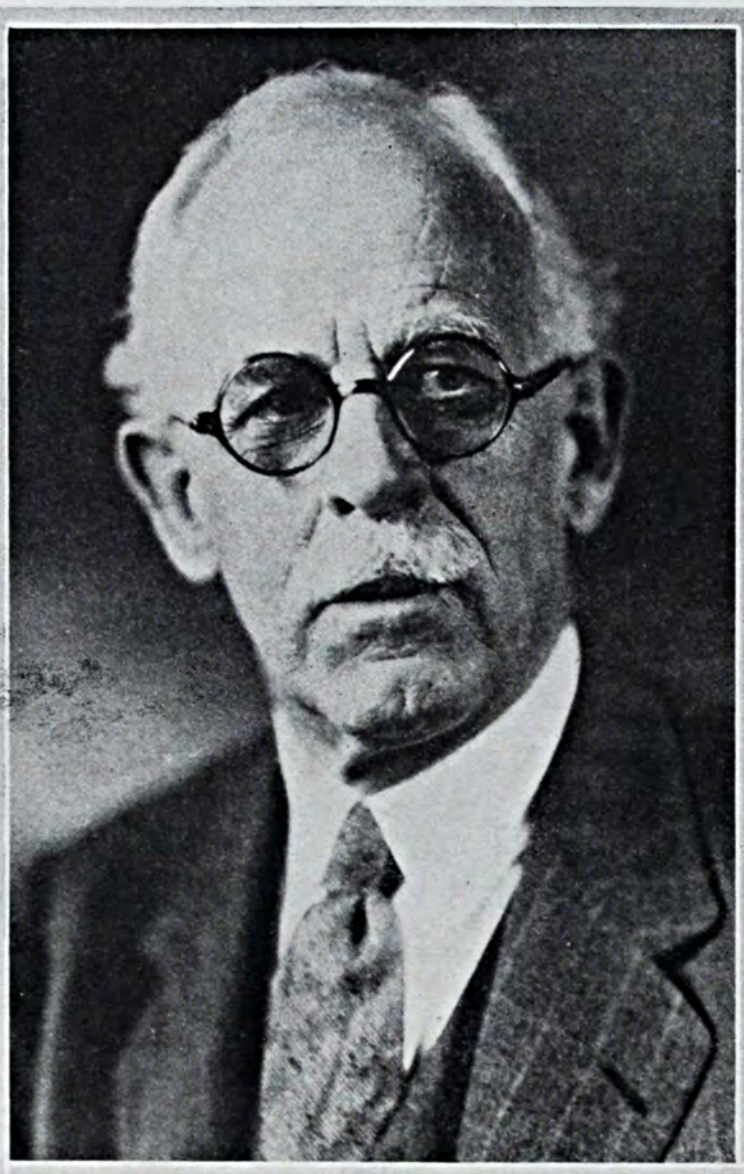
(*Turn to page* 50)

Pictorial

HURRAH FOR 1931

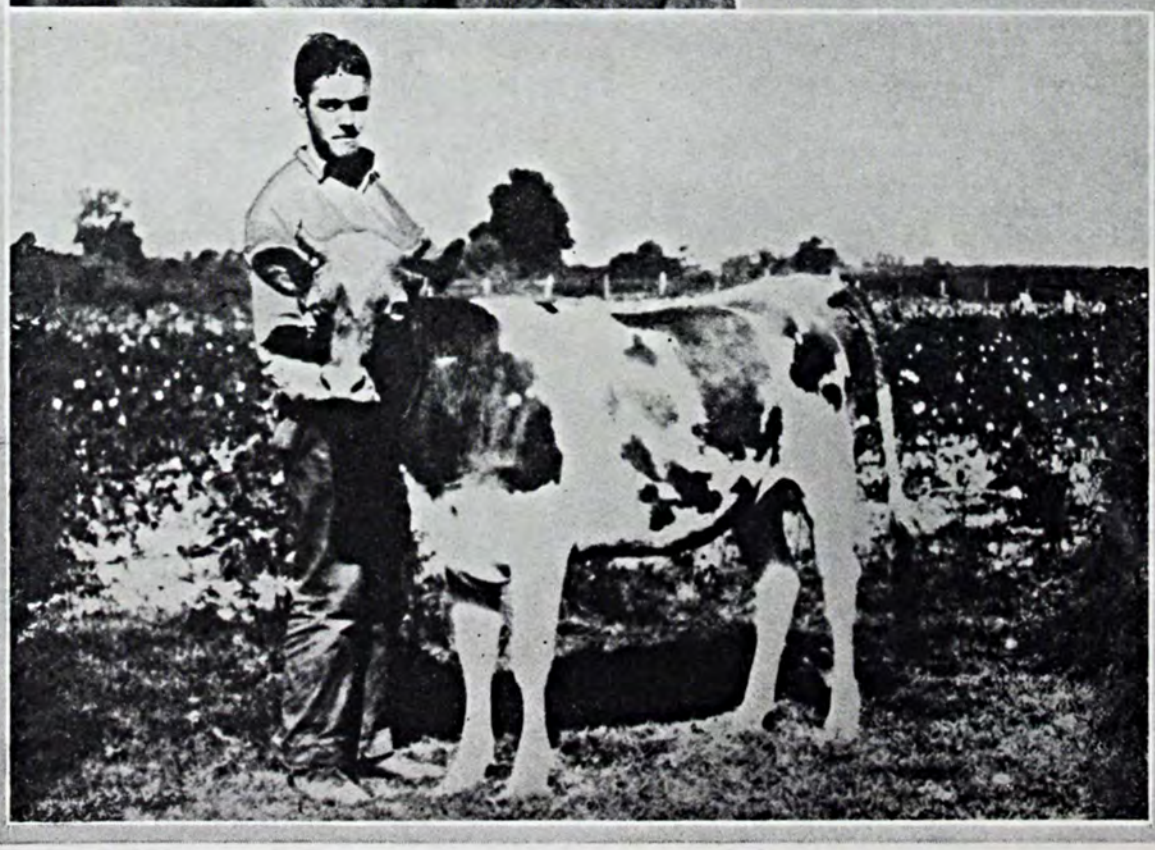
The pictures on this and the opposite page show potato culture in Cuba. Above: The slowness of plowing with oxen is counterbalanced by the number of teams used. Below: Planting is carefully done by hand.

Above: Fertilizer is applied in the row. Below: The growing crop makes the landscape look like Aroostook, Maine. These pictures were taken November 20, 1930, on the estate of Senor Juan Chardiet, Province of Cuba.



Left: Dr. David Fairchild, head of the Office of Foreign Plant Introduction, U.S.D.A., has been awarded the George Robert White medal, highest horticultural award in America and bestowed annually by the Massachusetts Horticultural Society. The award was made in recognition of Dr. Fairchild's work in introducing more than 80,000 varieties and species of plants into this country.

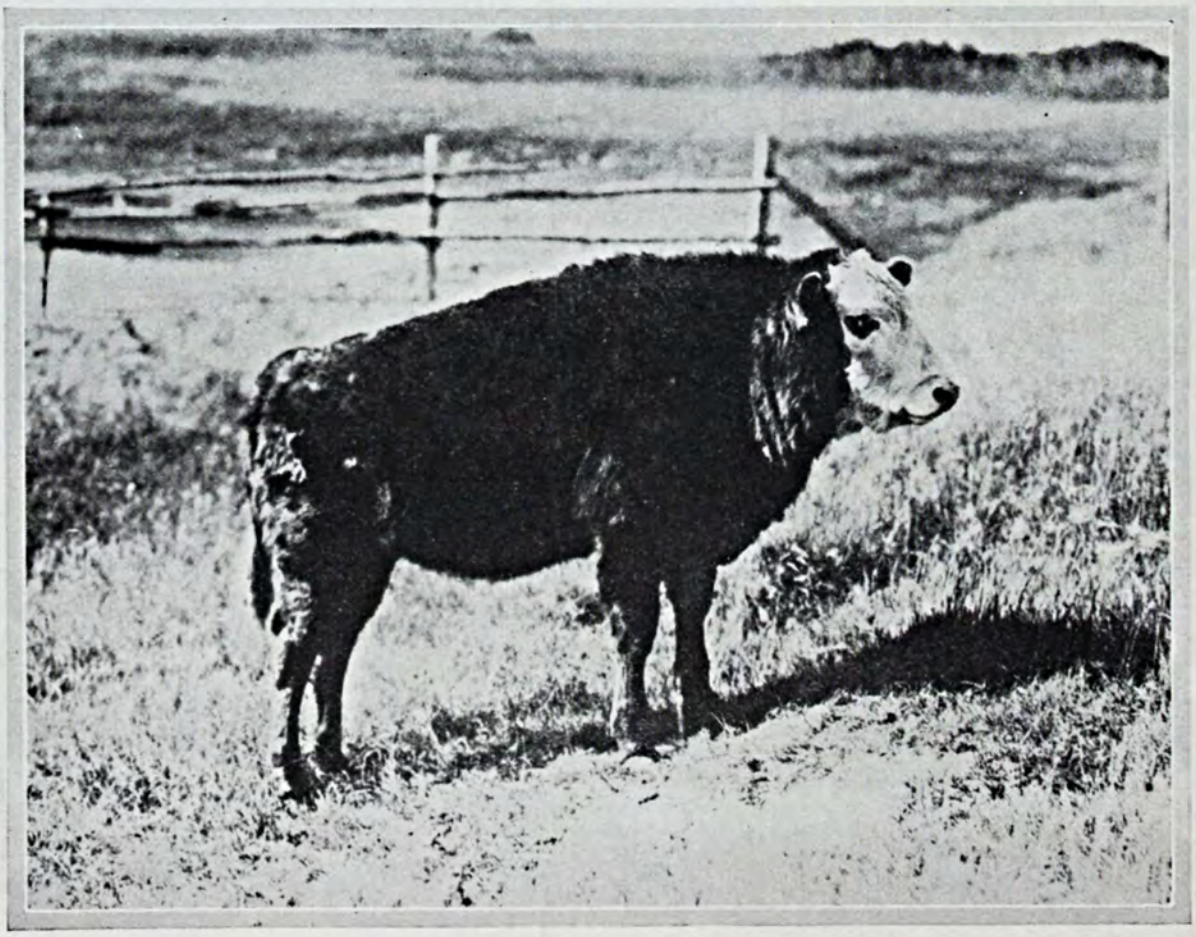
Below: J. Willard Colebank, of Germantown, Tennessee, a national winner in the 4-H club achievement contest, was awarded one of the Sir Thomas Lipton trophies at the Ninth National Boys and Girls 4-H Club Congress. Although only 18 years old, he has completed 35 project years of work in dairy calf, pig, corn, and soybean projects. He is shown here with one of his prize dairy heifers.



Right: Karl Pankop, Corunna, Indiana, has been declared Indiana's champion in the Five-acre Corn Club project for 1930 with his official yield of 129.6 bushels per acre, in spite of the harm done by the drought. The corn was grown on muck soil, broken the year before for an onion crop. He used 500 lbs. of 2-8-16 commercial fertilizer per acre on the onions and this year, 200 lbs. of 0-10-10 per acre in the corn rows, and 2½ tons of manure.

Below: Herbert C. Watson, of Tipton, Indiana, is the National Corn King of 1930. He produced 102.7 bushels per acre on his five-acre plot, from which he selected his winning 10-ear sample. "For years my Father and I have followed a soil improvement program," he says, "using a crop rotation of corn, wheat, and clover, and we now include soybeans. I used 175 lbs. of 0-15-7 commercial fertilizer, drilled in the corn row."

Above: Mike and Ike, who look alike, are Rambouillet lambs that made their first appearance in the world at the recent International Livestock Exposition. Below: Neither cow nor buffalo, but a "cattalo" is the result of crossbreeding between domestic cattle and a buffalo sire by Canadian government scientists.



The Editors Talk

The Agricultural Outlook

Looking ahead with the idea of formulating an agricultural program for the new year is, perhaps, going to be more difficult than at any time during the past ten years. One writer has aptly said, "1930 was a bad year for both profits and prophets." With this experience one hesitates in making a forecast for 1931.

The reason for the low batting average of forecasters last year was the failure to recognize that with a decline of prices in the United States, we were also entering a world-wide depression which is now considered by some to be the worst in over 100 years. However, as Colonel Leonard P. Ayres of the Cleveland Trust Company stated at the recent annual meeting of the American Statistical Association in Cleveland, economists must go on forecasting business conditions to the best of their ability, constantly seeking to improve them by more intensive research work.

Reviewing agricultural events of the past year, the Bureau of Agricultural Economics of the United States Department of Agriculture says that "the year 1930 proved to be one of rather bewildering developments. A great drought reduced corn, hay, and pasture to the smallest crops in many years. A major industrial depression curtailed the market for cotton, meat, milk, and various other products. A precipitous, world-wide decline in general commodity prices put further pressure especially upon raw materials, including farm products. An accumulated supply of wheat added to the distressed market position of that important crop. Even among bad years, 1930 stands unique.

"Agricultural production, as a whole, declined in 1930. Total crop production was about 5 per cent less than in 1929. In 1930 the total output of the principal crops was 7 per cent less per capita than in 1929 and 13 per cent less than the previous 10-year average. Notwithstanding drought and feed shortage, the total slaughter of meat under Federal inspection in the first 10 months (amounting to 10¾ billion pounds), was about 4 per cent less this year than last.

"The amazing thing, from the farmers' standpoint, was the sweeping decline in prices. The crops of 1930 had an aggregate value of $6,274,000,000, based upon average farm prices December 1. This compares with a total value of $8,675,000,000 a year ago. Thus, the 5 per cent smaller crops of 1930 had a December value about 28 per cent less than in the previous year."

December farm prices were the lowest since 1915. The aggregate farm income for 1930 as estimated by the United States Department of Agriculture will be $9,950,000,000, or 16 per cent less than that of 1929. Faced with this situation, farmers must meet the greater necessity of reducing production costs if there are to be profits in 1931. Forced to operate under conditions of low-priced farm products and a relatively high level of wages and charges, every effort must be put forth by farmers to cut costs by using only their best land, improved equipment, productive stock and seed, and by intelligent fertilization and careful planning of work.

One note of optimism may be found in the well-established fact that prices

of farm products reflect changed conditions more quickly than either wholesale or retail prices and if there is any recovery during 1931, we may logically expect prices of farm products to be among the first to show improvement.

New Sources of Income

Within a few months planting time will be with us again, and on account of more or less depressed agricultural conditions, the farmer will be in search of new sources of income. Too often the American farmer has been misled into blind alleys rather than into the open road that will put him on a sound footing. In areas like the wheat and cotton belts where it is the practice to devote most of the acreage to one crop, the first thing we hear when a depression comes is *Diversification.*

Certainly, diversification is all right provided it is confined to producing enough feed for the livestock and enough food for the farm families. Beyond this point diversification is probably just as hazardous as growing only wheat or cotton. It requires a considerable amount of money for, say, a cotton farmer to change over to growing bright tobacco. The farm help is not familiar with tobacco culture or how to fertilize, properly grade, and market the crop. Tobacco growing is a more intensive type of farming. The cost of building tobacco barns for curing, and equipping these with furnaces, is no small item of cost for a cotton farmer. What will become of the idle land? Up will go the cry to sow it with legumes, but it requires capital to buy seed to invest in a project that gives no direct monetary return. Bankers are reluctant to give credit for eight months, much less for two years.

Too often the agricultural advisers and bankers realize that the cotton farmer is "cotton sick," discouraged with producing low-priced cotton. These advisers know he is wanting a change. It is easy to say—grow tobacco—but have the advisers counted the cost of the change? Do they realize that more skill is required to grow, cure, handle, grade, and market tobacco? Have the advisers properly surveyed the tobacco in storage to see whether the outlook for future prices is any better for tobacco than they are for cotton? Have they a plan whereby the farmer can secure the money to make the change?

Some advisers will insist that they mean livestock rather than crops when they say "diversification." Certainly more livestock could be raised profitably in the cotton belt of the South. Let us say the four-horse farmer of the South who in 1930 planted 80 acres to cotton and made 40 bales (and there are many such farmers in the South) wants to go in for dairying. Generally speaking, such a farmer would own about 220 acres and have one tenant farmer who is either a renter or a cropper. Just fashion this farmer going into his county seat to see his banker to make a loan of $3,000 to buy 15 dairy cows, build a barn, and fence a part of his land. If you don't believe it would be a hard job, just try it. But suppose the farmer has the cash. This, then, is pretty good evidence that his present system doesn't need changing if he has $3,000 in cash.

Granting the change were made, who knows but that cotton-minded tenant would become impatient and discouraged when faced with milking cows twice a day for seven days in the week. You might say, that's just the trouble with the South. Well, it may be, but it is a condition the man in the cotton belt who goes into the dairy business has got to face.

Then the problem of a year-round market for the milk is not so easy to

work out in actual practice as it is on paper. In the winter when pastures are shy, milk will find a profitable market in most of our towns and cities, but when the spring brings its luxuriant covering of grass and clover, the flow of milk increases to a point where the surplus sets the price and results in no profit to the producer.

The trouble with some farm advice is that it does not come from people who have themselves been actually confronted with the same production or marketing problems that the farmer has to meet. The result is that these well-intentioned advisers do not face the conditions as they actually exist on the farm, nor do they take into consideration that any change or readjustment that the farmer makes frequently requires more money than he can easily obtain.

Wouldn't it be much more helpful to the farming industry as a whole, and the farmer in particular, if advisers would encourage improvement in methods of handling and production of the crop that the farmers are already growing? In other words, wouldn't it be better to encourage the farmers to grow 1-inch staple cotton worth 11 cents a pound rather than continue to grow ¾-inch cotton worth 9c per pound? Wouldn't it be better for advisers to encourage cotton farmers to use 800 to 1,000 pounds of high-grade fertilizer per acre and produce a bale per acre, rather than use 400 pounds per acre and produce 1/3 bale? Would it not be better to help the farmer do his present job more efficiently rather than have him change to a new type of agriculture with which he and his farm labor are unfamiliar—crops that probably over a period of years do not offer a better return—crops that are probably not as well adapted to his land?

Mr. Banker, why not summon John Smith in and say to him, "John, you have been planting 80 acres of cotton making 30 bales. Your cotton is only ¾-inch staple and brings only 9 cents. Don't change from cotton, other than to grow feed for all your livestock and enough food for you and your farm families, rather plant only 45 acres of cotton with seed that will produce 1-inch staple. Space it thick on the ground and fertilize with 800 pounds of a high-grade fertilizer. Be sure to poison the weevil lest he rob you of all your labors as well as your capital. As to the other 35 acres that you had in cotton last year, plant it to whatever crop you can use on your own farm, such as hay or small grain. Such a program will bring more permanent relief than trying to hit the high markets for this or that crop, and in addition it will avoid many costly changes which will not make your farm more profitable."

High Prices

Casually considering prices for products grown or manufactured, one is apt to conclude that the higher they go, the better for those immediately concerned. Those of us who grow cotton naturally feel that the prices prevailing in 1919 would be a permanent blessing to the industry. But would this prove true in the end?

If such prices were to prevail for any great length of time, activities in developing substitutes for cotton would be stimulated, and in due time many who now buy cotton goods would be using such substitutes. Besides, other countries and other people would find it profitable to produce cotton, and our Southern growers might be poorer in the end as a result.

A few years ago it began to be realized in the timber sections of the South that we were using this timber about four times as fast as it was being grown. It appeared in the long leaf pine belt, especially, that products of this pine timber, lumber, turpentine, and rosin, could never be cheaper than the peak prices then prevailing.

Unlike cotton and other annual crops, it is impossible to increase our supplies of timber in any reasonable length of time. What has been the result? At higher prices it became profitable to manufacture substitutes for these pine products. Experience in so doing enabled the producers of such substitutes to greatly cheapen production costs and thus to lower selling prices. Thus, when lumber became high enough to make the production of wall board profitable, this began to be made out of the wastes of the pine, the bagasse of our sugar mills, and other by-products of our several industries. The same has been true of turpentine and rosin. So what seemed an assured fact a few years ago, that products of the pine could never go lower, ends in some of them, at least, selling now at prices lower than prevailed before the World War.

Price ratios are many-sided in their applications. Granting there could be no substitute for a given product and no way of extending its production to other fields, too high a price would defeat itself in lessening markets because the trade would not be able to consume such quantities as would be the case if prices were lower.

So those of us who complain that the price of cotton is lower than the cost of production have this consolation, that it puts a premium on intelligent production, and if continued for any great length of time, will in the end shut out the inefficient producer, greatly extend the markets for cotton goods, and bring about its own adjustment.

Unclaimed Mail

Each month there are returned a small number of copies of the magazine stamped by the post office "Unknown," "Unclaimed," "Moved—left no address," etc. We have been taking these names off our mailing list. Occasionally we receive letters from our readers asking why they have failed to receive the magazine.

In a recent issue of "The Official Record" published by the United States Department of Agriculture, we find what undoubtedly is the solution:

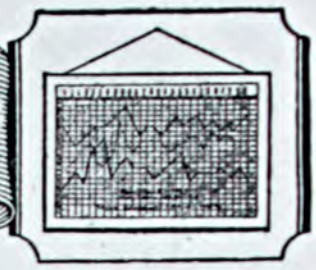
"HELP STOP UNCLAIMED MAIL

"The Office of Information receives daily, through the Government Printing Office, many pieces of mail that have been forwarded from official headquarters to places where field employees, as well as experiment station and agricultural college workers, may be stationed for only a short time. Missing the addressee, this mail, stamped 'unknown,' 'unclaimed,' 'moved—left no address,' etc., is returned to Washington.

"Field employees and others on the department's mailing lists can put an end to such unnecessary work, expense, and delay, as well as possible failure to receive publications, by requesting the postmasters to hold all but first-class mail while they are away on temporary assignments."

We trust that our readers who are anxious not to miss a copy of the magazine will advise the post-office of an absence or advise us promptly of a change of address.

AGRICULTURAL DEVELOPMENTS



CANADIAN BLUEBERRIES

Northern Ontario has other sources of revenue than its farm lands and rich mineral deposits. One of these is the crop of blueberries, which grow bountifully in that part of the country. This year about 140,000 bushels were shipped from Northern Ontario to Toronto and other centres, where, because of the high quality of the berries, they found a ready market. During the height of the season as many as 1,100 baskets were shipped daily from North Bay by express. While principally famous for mining Northern Ontario is also a very productive mixed farming area, and has great resources in forests and water power.

GOOD SAMARITANS DON'T PASS UP FOREST FIRE

Are people becoming more concerned about forest fire losses in the United States?

One of the United States rangers on a western national forest is telling a story that indicates a changing public attitude toward forest fires in the last six years.

One day in 1924 the ranger got a report of a fire on his district. On arrival he found plenty of smoke rising from the duff. Standing out of sight from the road, he kept an eye on developments.

"An auto came by," he says. "The driver stopped to put water in the radiator, saw the smoke, stepped on the gas, and went away from there.

"Another auto came by, driven by a local man. He stopped, got out, kicked around the fire for a minute or so, took a drink from a canteen, poured the balance into the radiator, lit a fag, and he, too, went away from there. Later he reported that he had put out a fire for me. Thanks a lot.

"Another auto came by, slacked up, got an eyefull, stepped on the gas, and went away.

"The next car stopped. Three men got out, took a look and a drink, and they went away from there. There were no Good Samaritans for a forest in distress. Fourteen cars had passed, and I thought I had a good cross-section of the public's concern for forest fires by the time I put the fire out. Not one of those fellows had a shovel or any inclination to put out the fire. I kept this story to myself for five years."

This season, about six years later to the day, a fire broke out near the same spot. Rangers, when they arrived, found 15 people already there, working with rakes, shovels, sticks, hands, and feet, building a 10-foot fire line around the burning area.

"There was great excitement," the ranger relates, "with more people arriving every minute and showing an inclination to get into the fight."

MEDIUM SIZED POTATOES PREFERRED BY PRODUCE TRADE

Eastern-consuming markets prefer potatoes ranging from 2¼ to 3 inches in diameter according to the Bureau of Agricultural Economics, U. S. Department of Agriculture, after a survey of market preferences in Boston, New York, Philadelphia, Pittsburg, Baltimore, and Washington.

Investigators found that dealers who supply hotels and restaurants

want potatoes ranging from 2¾ to 3½ inches in diameter and weighing from 10 to 14 ounces. Dealers also reported that good-sized tubers are best for filling orders for French fried and shoestring potatoes, since these dishes require fairly long pieces and that there is less waste in using the larger tubers for mashed potatoes.

The very large size of tubers, weighing more than 14 ounces, which are termed "bulls" or "lumpers" by tradesmen, are not wanted by any class of trade and many dealers object to accepting very large potatoes in U. S. No. 1 stock.

Considerable objection was expressed to lots of potatoes that show a large percentage of small potatoes, that is, under 2¼ inches in diameter. However, many independent retailers were found to be carrying so-called "seconds"—potatoes ranging usually from 1½ to 2 inches in diameter—for certain classes of trade. These retailers said that many people buy the small potatoes for making potato salad or for creaming, and that there is some demand for this low-priced stock from people who cannot afford or do not care to pay market prices for average U. S. No. 1 size.

An effort was made to ascertain dealers' preferences for potatoes produced in various sections of the United States. Of a total of 416 dealers interviewed, 192 indicated preference for Maine potatoes. Fifty-five dealers, most of them located in Philadelphia and Baltimore, indicated preference for Pennsylvania Rural-type stock. Prince Edward Island potatoes ranked third, and Long Island potatoes fourth. Seventy-eight dealers said they had no choice but prefer to buy from whatever section furnishes the best potatoes at reasonable prices.

Dealers in Boston and New York prefer the Green Mountain variety as a winter potato, and the Irish Cobbler in late summer and early fall before Green Mountains are available. Philadelphia dealers prefer Green Mountain, and as a second choice the Russet Rural; but Philadelphia retailers named the Russet first and the Green Mountain second. Green Mountain is the choice in Pittsburgh; Green Mountain first and Russet Rural second in Baltimore; Green Mountain first and Russet Rural second in Washington. It was learned that few consumers ask for potatoes by the variety name, although many ask for potatoes produced in a certain state.

NEW VARIETY OF TOMATO PRODUCES WELL IN STATE

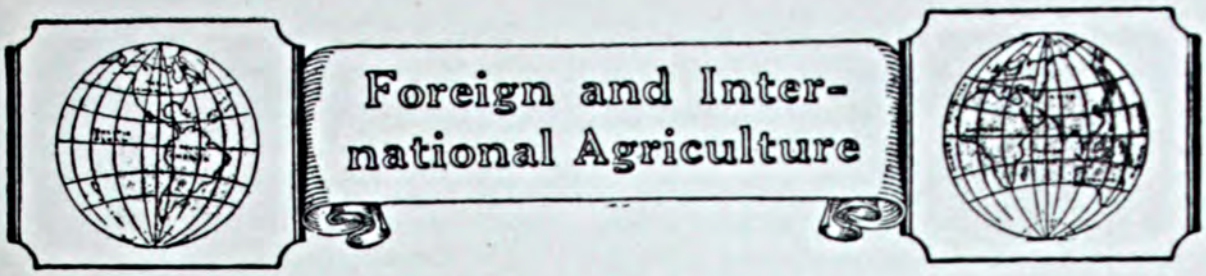
L. M. Goodwin, specialist in canning crops for the University of Maryland Extension Service, says that the Marglobe variety of tomato, recently developed and introduced by the U. S. Department of Agriculture, has shown very favorable growth and production in the state during the past summer and promises to be a profitable variety for the many tomato growers of Maryland.

Because of the unusually dry season the variety has not produced a normal crop, but it has withstood the blossom-end-rot disease better than any other kind of tomato grown in this section, it is stated.

As a result, the Marglobe variety is being lauded by both canners and growers, since it is particularly desirable, due to its smooth shape and superior quality. *Extension Service News, University of Maryland, November* 1930.

DRY BEANS

The United States produces approximately 20,000,000 bushels of dry beans a year on about 1,900,000 acres. The crop is produced in 14 States, led by Michigan and California with an annual production of 6,000,000 and 5,000,000 bushels, respectively. Last year the total crop had a farm value of $73,000,000.



Ormskirk, England

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College

NORTH and east of Liverpool, England, is located the quaint, picturesque, old town of Ormskirk. It still retains its very old custom of street marketing. In fact, I was told by the Mayor of the town that this old street marketing with booths has come down through the centuries from the oldest records of Ormskirk and that means as old as anything is known of that north England country. All about this town in the big county of Lancashire are found acres and acres of potatoes. Almost one-tenth of the total English potato acreage is found here, approximately 30,000 acres.

Of the arable lands in this region, out of every 100 acres, 18½ are used for potato raising. Only two other sections of England excel in this particular. They are Lincoln and the Isle of Ely, both in the middle eastern section of England. But neither these two sections nor any other anywhere in England and Wales have excelled Lancashire county in the last 10 years as regards yield per acre. The yearly average for the 10 years is seven English tons per acre, (2,240 pounds in an English ton). This is equivalent to 261 American bushels of 60 pounds each.

The soil about Ormskirk is a light, sandy loam overlying sand. It is about 125 feet above sea level. The soil is abundantly rich, through years and years of good cropping methods and additions of fertilizers. The climate is a cold, long season type with ample rains, ideal for the best production of potatoes.

With this large, very productive acreage, problems in potato raising must be very prominent. In order to answer these problems, a local experiment station, or as the English call it a research station, has been placed in their midst. A farm of average soil for the area of 10 to 12 acres, equipped with a suitable greenhouse, dwelling, barns and sheds is available and used. It has become a great necessity because under the English law any one planting potatoes susceptible to the wart disease (a very destructive disease of potatoes) is liable to fine of so much per acre and to have his crop destroyed.

The Law Is Enforced

The Ministry of Agriculture is empowered to strictly enforce this law and does so. Each one growing potatoes must know then whether or not they have the correct, allowed variety of potatoes. The experiment station enters here. I saw on visiting this station hundreds of varieties of potatoes or strains of potatoes being subjected to wart disease in order to determine their susceptibility.

On the report of the station, the growers plant the variety recom-

mended. Much of this work is carried on within the greenhouse. Here all of the factors for rapid development of the disease are under the operator's control, thus if a variety is susceptible, it is determined very quickly. The method used is that of pinning to each potato in the eye, a section of potato wart disease. With the proper heat, moisture, and air the disease will grow if it can on the particular variety. The Ministry of Agriculture desires to encourage the breeding of new varieties and also the determining of whether or not these new sorts are wart-free. A large number of new varieties, (seedlings) are sent to the station each year for testing.

In addition to the great work of wart control and what varieties to plant, there are field tests on maturity and yield of main crop potatoes. It is generally found that late maturity of foliage is correlated with heavy yield and early maturity with low yield.

There is, however, reason for believing that certain varieties of which the foliage matures comparatively late, may produce a considerable bulk of marketable produce at an early date.

Another trial called "The Lord Derby Gold Medal Trial" is laid out with the object of determining which, if any, of the new varieties of potatoes, each being certified by the Ministry of Agriculture as being immune from wart disease, give evidence when grown at the station of possessing outstanding merit. Where their performance justifies it, such varieties are awarded gold medals which are presented by the Earl of Derby.

Other trials of value are:

1. Resistance to virus: In which 30 tubers each of 6 to 10 varieties are planted in alternating rows with a stock of one variety in the odd row which is infected with leaf roll. The trial is made in an endeavor to acquire some knowledge of the resistance of potato varieties to leaf roll.

2. The possibility of obtaining healthy stocks by rogueing. A variety is chosen that is very susceptible to virus diseases. Three lots of it are planted: one lot not rogued; the second lot rogued; the third lot seed is saved only from healthiest plants. It shows advantages for rogueing.

3. Demonstration plots of virus diseases. A number of varieties and different forms of diseases are on hand to show to visitors, thus teaching them first-hand.

When the time approaches for Lancashire first early potatoes to reach the market, practical growers are invited to inspect the plots at frequent intervals. Later, at other specific times, invitations are sent out to all growers. The growers all are interested as they directly help support the station and work by a small assessment per acre on their crop. A farm superintendent or director has full charge of the work aided by practical farm help. There is a board of managers or council which has the general charge of all the matters pertaining to this station in cooperation with the Ministry of Agriculture. This potato station has proved over and over its value, both to the individual farmer and to the economic situation in England.

BALTIMORE HAS NEW PRODUCE TERMINAL

The new Baltimore and Ohio Railroad perishable products terminal, at 209-231 West Camden Street, Baltimore, Maryland, was formally opened on October 1. Citrus and deciduous fruits, formerly sold at the Baltimore Fruit Exchange, are being handled at the new Baltimore and Ohio auction sales building.

This building is 90 feet wide by 565 feet long, and has a platform 8 feet wide along one side. It has floor space for the contents of 90 cars. One large auction salesroom has a seating capacity for 200 persons. There is also a special platform for private sales, and a large team track delivery yard. —*U. S. D. A. Marketing Activities.*

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

"Inspection and Analysis of Commercial Fertilizers; Spring, 1930," Agr. Exp. Sta., Columbia, Mo., Bul. 292, Oct., 1930, F. B. Mumford and L. D. Haigh.

"Relation of Nitrogen Fertilizer to the Firmness and Composition of Strawberries," Agr. Exp. Sta., Wooster, Ohio, Bul. 466, Nov., 1930, J. S. Shoemaker and E. W. Greve.

"Official Report on Feed Stuffs, Commercial Fertilizers, and Agricultural Lime and Limestones," Dept. of Agr., Columbus, Ohio, Spring Season, 1930.

"Fertilizer Report 1929," Dept. of Agr., Harrisburg, Pa., Gen. Bul. 495, Aug. 1, 1930, J. W. Kellogg.

"Mechanical Analysis of Finely Divided Natural Phosphates," U. S. D. A., Washington, D. C., Tech. Bul. 212, Nov., 1930, Lyle T. Alexander and K. D. Jacob.

Soils

"Soil Survey of Hancock County, Indiana, Part 1," "The Management of Hancock County Soils, Part 2," U. S. D. A., Washington, D. C., No. 23, Series 1925, W. E. Tharp, C. S. Simmons, A. T. Wiancko, and S. D. Conner.

"Soil Survey of Keith County, Nebraska," U. S. D. A., Washington, D. C., No. 14, Series 1926, M. H. Layton and W. H. Buckhannan.

"Soil Survey of Sauk County, Wisconsin," U. S. D. A., Washington, D. C., No. 29, Series 1925, W. J. Geib, M. J. Edwards, E. H. Bailey, A. C. Anderson, T. J. Dunnewald, J. F. Fudge, O. L. Stockstad, and Homer Chapman.

"Soil Survey of The Wheatland Area, Wyoming," U. S. D. A., Washington, D. C., No. 13, Series 1926, E. J. Carpenter, E. G. Fitzpatrick, T. J. Dunnewald, and Carl Pearson.

"Soil Erosion—a local and national problem," Agr. Exp. Sta., Madison, Wis., Res. Bul. 99, Aug., 1930, C. G. Bates and O. R. Zeasman.

"Irrigation Requirements of the Arid and Semiarid Lands of the Columbia River Basin," U. S. D. A., Washington, D. C., Tech. Bul. 200, Oct., 1930, Samuel Fortier and Arthur A. Young.

Crops

Four annual reports of state experiment stations, as well as the report on all of the agricultural experiment stations, 1929, by the United States Department of Agriculture and the report of the Secretary of Agriculture for 1930 are among the bulletins which have come into circulation during the past month. These important resumés of a year's work contain much of value to everyone watching the progress of scientific work in agriculture. An annual report of a state's agricultural experiment station is, of course, of particular interest to the extension worker in that state, but every farmer who wishes to keep abreast with the times also should have it for ready reference. The interest in a national report on agriculture is almost unlimited.

"Forty-second Annual Report, Fiscal Year Ending June 30, 1930," Agr. Exp. Sta., Fayetteville, Ark., Bul. 257, Nov., 1930, Dan T. Gray.

"Cherry Culture in California,' Univ. of Calif., Berkeley, Calif., Cir. 46, Oct., 1930, Guy L. Philp.

"Georgia Extension Service Report 1929," Ga. State Col. of Agr., Athens, Ga., Bul. 393, Jan., 1930, J. Phil Campbell.

"The Cherry Industry in the Lewiston Orchards with Cultural Recommendations," Univ. of Idaho, Moscow, Idaho, Bul. 171, June, 1930, Earle C. Blodgett.

"Annual Report for Fiscal Year Ending June 30, 1929," Agr. Exp. Sta., Ames, Iowa, C. F. Curtiss.

"Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XIII, No. 2, Nov., 1930.

"American Potato Journal," Potato Assn.

of America, East Lansing, Mich., Vol. VII, No 12, Dec, 1930

"The Bimonthly Bulletin," Ohio Agr Exp. Sta., Wooster, Ohio. No. 147, Nov.-Dec., 1930.

"Garden Roses," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, Bul. 95, Aug., 1930, Alex Laurie.

"The Home Flower Garden," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, Bul. 99, Victor H. Ries.

"Growing Vegetable Plants," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, Bul. 103, July, 1930, E. B. Tussing and E. R. Lancashire.

"Rate of Planting Potatoes with Some Reference to Sprouting Habit and Size of Plants," Agr. Exp. Sta., Wooster, Ohio, Bul. 462, Oct., 1930, John Bushnell.

"Some Rotation Experiments at the Ohio Agricultural Experiment Station, Wooster, Ohio," Agr. Exp. Sta., Wooster, Ohio, Spec. Cir. 31, Aug., 1930.

"Director's Biennial Report—1928-1930," Agr. Exp. Sta., Corvallis, Ore., Sept., 1930, J. T. Jardine.

"Forty-second Annual Report, 1929," Agr. Exp. Sta., Knoxville, Tenn., C .A. Mooers.

"A Quarter Century of Dry-farm Experiments at Nephi, Utah," Agr. Exp. Sta., Logan, Utah, Bul. 222, Nov., 1930, A. F. Bracken and Geo. Stewart.

"Department of Agriculture Immigration of Virginia," Richmond, Va., Bul. 276, Dec., 1930.

"Horticultural Exhibitions," U. S. D. A., Washington, D. C.. Misc. Pub. 85, Sept., 1930, Furman Lloyd Mulford.

"Lantern Slides and Film Strips of the United States Department of Agriculture," U. S. D. A., Washington, D. C., Misc. Pub. 72, (Rev.) Oct., 1930.

"Report of the Chief of the Bureau of Plant Industry," U. S. D. A., Washington, D. C., Aug. 30, 1930, Wm. A. Taylor.

"Report on the Agricultural Experiment Stations, 1929," U. S. D. A., Washington, D. C., Oct., 1930, W. H. Beal and H. M. Steece.

"Report of the Secretary of Agriculture, 1930," U. S. D. A., Washington, D. C., Nov. 15, 1930, Arthur M. Hyde.

"Apple Aphids in Ohio," Agr. Exp. Sta., Wooster, Ohio, Bul. 464, Oct., 1930, C. R. Cutright.

Economics

An analysis of the changes which have taken place in the agriculture of Indiana during the past 40 years is presented in Bulletin No. 342 of the Purdue University, Agricultural Experiment Station. In making this analysis, the authors, E. C. Young and F. F. Elliott, divided the state into 11 types-of-farming areas. Changes in each area were then studied in order to furnish bases upon which to recommend further changes. Such information as is contained in this bulletin should be of local value in determining the most profitable long-time systems of farming, and also of value in interpreting the annual agricultural outlook reports. To those of other regions who are interested in the problem of adjusting the type of farming to changing conditions, this bulletin should be of value because of its presentation of the method involved.

"An economic Study of the Agriculture of the Connecticut Valley," Conn. Agr. Col., Storrs, Conn., Bul. 165, Sept., 1930, C. I. Hendrickson.

"Regulations of the Secretary of Agriculture Governing the Inspection, Grading, and Certification of Tobacco," U. S. D. A., Washington, D. C., Sept., 1930.

"Rules and Regulations of the Secretary of Agriculture for Carrying out the Provisions of the Perishable Agricultural Commodities Act, 1930," U. S. D. A., Washington, D. C., Oct., 1930.

"Farm Bulk Storage for Small Grains," U. S. D. A., Washington, D. C., Farmers' Bul., 1636, Oct., 1930, M. A. R. Kelley and E. G. Boerner.

"Trading in Corn Futures," U. S. D. A., Washington, D. C., Tech. Bul. 199, Oct., 1930, G. Wright Hoffman.

Diseases

"The Control of Celery Blights," Agr. Exp. Sta., Wooster, Ohio, Bul. 461, Oct., 1930, J. D. Wilson and A. G. Newhall.

"A Tuber Rot of Irish Potatoes" Agr. Exp. Sta., Knoxville, Tenn., Cir. 32, Oct., 1930, J. A. McClintock.

"Seed Treatment for Controlling Covered Smut of Barley," U. S. D. A., Washington, D. C., Tech. Bul. 207, Oct., 1930, R. W. Leukel.

Insects

"The Organic Mercury Compounds for the Control of Scab and Rhizoctonia of Potatoes," Conn. Agr. Col., Storrs, Conn., Bul. 164, July, 1930, B. A. Brown.

"Anyone who finds a thought which brings us closer to nature's eternal secrets partakes of a great grace."

—*Albert Einstein.*

A high-yielding, pure line strain of Blackhul Kafir has been developed by the Texas Station. Texas produces 47 per cent of the Nation's crop of grain sorghums, having exceeded 80 million bushels per annum and averaging for 10 years 63 million bushels per annum.

Texas

(*From page* 18)

fall and the prevention of erosion in the western portion of the state, thus increasing the stability and permanency of production of crops in that section; and, subsequently, has instituted, through cooperation with the United States Department of Agriculture, two additional erosional stations, one located in the blackland belt and one in the sandy soils of East Texas. This work is of primary importance to the preservation of the soil and to the utilization of the land and the agricultural resources of the state.

The Station owns and controls 7,285 acres of land, and property the total value of which is $1,354,576.82. The available funds from all sources for the year of 1929 amounted to $743,344.09.

Texas is a large state of abundant resources, many of which are as yet undeveloped. The citizenship generally regards the work of the Experiment Station as a necessary investment in the development of these resources and in the contribution of knowledge for the benefit of the people through the A. & M. College and all other institutions and agencies engaged in the dissemination of reliable agricultural information.

Our Extension System

THE magnitude of our agricultural extension work is impressed on the reader of the recently published book, "The Agrictultural Extension System of the United States," by C. S. Smith and M. C. Wilson (John Wiley & Sons, Inc., New York 1930, $3.50). The 5,700 employees and nearly 2,000,000 active cooperative workers in our agricultural system indicate a large and far-reaching organization, but we doubt if even with

these figures, it is realized how intimately the extension system is associated with our agricultural people, individually and as a group.

The farmer is given information and help on improved and more profitable farming and marketing systems; the farmer's wife is shown economical and attractive meals, clothing, rooms and homes; while the children through boys and girls clubs are interested in the various phases of rural life from the viewpoint of making their life on the farm more attractive and profitable. With all this work, the social and cultural side of life is given its due share, thus making a well-rounded program.

The above gives only an inkling of the many ramifications of this great force. Affecting a large and vital part of our population, it is worthy of study by all interested in the welfare of the country. Previously no collected and readily available discussion of this extension work was available. Thus the authors have performed a service in preparing this thorough, interesting, and instructive book on our extension system.

Workers within the extension field will find much helpful information on conducting the various phases of extension work. Moreover they can work better and more efficiently in the organization if they are fully acquainted with it. Farmers will probably be surprised to learn how much help they can get from this organization upon knowing how much it has to offer. In addition, all who have any business and social contacts with the farmer directly and indirectly will be able to deal more intelligently with their problems if they understand the forces that contact and influence him.

It is fitting that Dr. Smith and Professor Wilson should have been the authors of this book. Both have been a part of the agricultural extension system for a number of years and have studied and directed its work in a most sympathetic and productive manner. The authors are to be congratulated on having prepared an excellent and readable account of one of the greatest educational forces the world has ever known.

Potash and Quality Cotton

By H. E. Crawford

Agricultural Teacher, Gueydan, Louisiana

COMMERCIAL fertilizers containing potash increased the yield of cotton and gave an average return of $4.95 for each dollar's worth of potash applied in a fertilizer experiment conducted on the Gueydan High School Agricultural Farm, Gueydan, Louisiana.

This experiment was conducted by the class in vocational agriculture under the direction of the instructor. In this experiment, 14 plots each containing 1/20 of an acre were used. On seven plots, the seven fertilizer combinations were used at the rate of 100 pounds of nitrate of soda, 200 pounds of superphosphate, and 50 pounds of potash per acre. Each of the seven plots was fertilized as follows: Nitrate of soda alone; superphosphate alone; potash alone; nitrate of soda and potash; nitrate of soda and superphosphate; superphosphate and potash, and nitrate of soda, superphosphate, and potash (a complete fertilizer). The second group of seven plots was fertilized with the same fertilizer combinations but with the rate of application doubled.

The seed cotton from each plot was carefully picked and weighed. After all the results of this experiment had

been tabulated, an average of all the plots receiving a fertilizer carrying potash showed a return of $4.95 for each dollar's worth of potash applied. The greatest return resulting from the use of potash was from plots receiving a complete fertilizer and the lowest from plots upon which only potash and superphosphate were used.

Another interesting feature of the experiment was the variation in the weight of bolls taken from plots receiving potash and those taken from plots receiving no potash. One hundred bolls were taken at random from plots receiving potash and from plots receiving no potash. The 100 bolls from plots receiving no potash in the fertilizer mixture weighed 25.6 ounces, while those from plots fertilized with mixtures containing potash weighed 28.9 ounces.

The results of this experiment show very conclusively that most of our old cultivated cotton lands will be greatly benefited by liberal applications of potash or potash carrying fertilizers.

"BUTTERCUP" IS NEW SQUASH

A new squash has been originated and named "Buttercup" by Professor A. F. Yeager, of the North Dakota Agricultural College. Professor Yeager has been experimenting since 1923 with the variety which was the result of a chance crossing of the Essex Hybrid squash with the Quality variety. This season the Buttercup has reached the peak of perfection and a small quantity of seeds is available for planting.

Outstanding features of the new squash are its weight of between three and four pounds, just a nice family size; thick meat section; cavity for seeds; low moisture content, thereby eliminating watery squash; a skin that peels off smoothly and easily after baking; a characteristic button at the blossom end; and full maturity during a short summer season.

RUBBER FROM POTATOES

That a new use may be found for potatoes is indicated in a recent dispatch from the Firestone Tire and Rubber Company to the effect that the base of a new rubber product discovered by a German chemist is potato starch. "The synthetic product contains no latex or plantation rubber. It is made by mixing the starch with chemicals which coagulate into a gum-like substance that is said to differ from rubber only that it is less elastic."

20,000,000 ACRES SURVEYED

More than 20,000,000 acres of land in 27 States were mapped in the last fiscal year by the soil survey division of the United States Department of Agriculture. Dr. Henry G. Knight, Chief of the Bureau of Chemistry and Soils, under whose direction the work is done, says: "The soil survey has peculiar value at present and in the immediate future, because of the readjustment taking place in agriculture. It supplies the information upon which the Nation's inevitable land classification must be based."

FROZEN GRAPE JUICE

Solid frozen grape juice is reported as being manufactured at the rate of 30,000 gallons a day in a new quick-freezing plant recently completed at Lodi, California. Refrigeration engineers regard this as the beginning of a large trade in frozen fruit juices of all kinds, to be held in low temperature warehouses until needed, then thawed and bottled as the market demands.—*U. S. D. A. Marketing Activities*, Nov. 19, 1930.

Colored Doctor: "Well, Ah's knocked de fever outen yo' husband."

Mandy: "Den he's gwine to get well?"

Doctor: "Not a chance; but yo' has de satisfaction o' knowin' he died cured."

Taking the Soil's Pulse

(*From page* 28)

stubble should be plowed under in the fall.

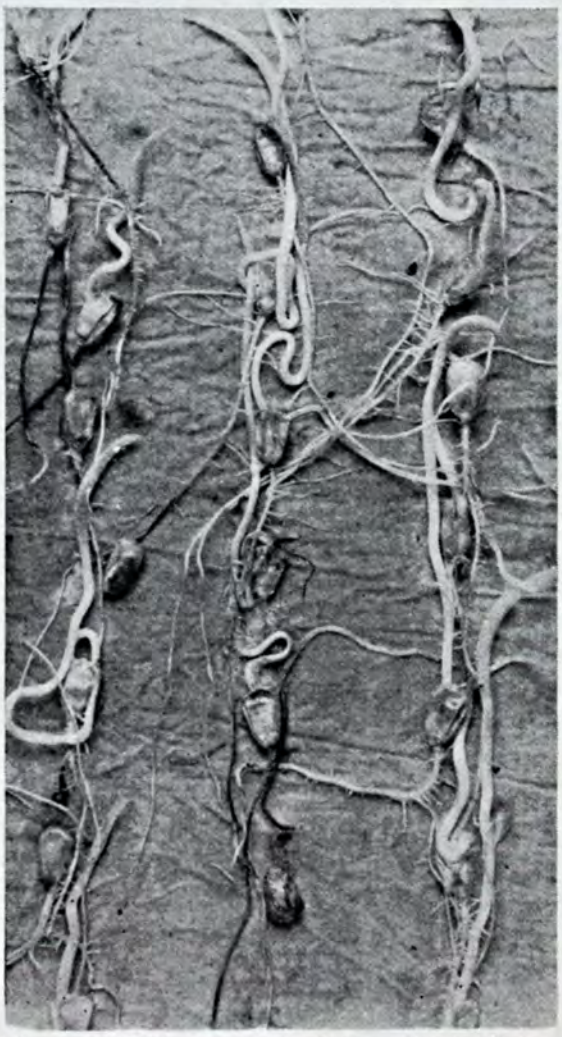
Lime will improve the tilth, and a soil in good tilth is in good physical condition. Lime causes the soil particles to aggregate into crumbs, improving soil structure and soil aeration.

Fertilizers added to the soil which is in good physical condition stimulate the production of carbon dioxide and increase respiration, and these Professor Smith has shown, are closely correlated with fertility.

A New Corn Contest

(*From page* 30)

The merchants of the town can assist greatly by becoming acquainted with the rag doll testing station and the test. They will quickly be convinced of the value of this test as a means of eliminating weak and diseased ears. When they realize that the use of vigorous, healthy corn seed will increase the yield per acre about 10 bushels, the possibilities of increasing the farmers' income will be seen. Not only this, but more vigorous seed also improves the quality of corn thereby increasing its feeding value.



The rag doll is one of the best methods of separating the good corn from the bad. It finds the invisible defects that the eye cannot detect.

Our experience with this contest is that it will show farmers that on the average they cannot expect to pick more than half the good seed ears, the other half will be weak or diseased. In the Elwood contest the best man picked 78 per cent right. He would have had 22 per cent of weak, poor corn in his field. Such corn cannot do justice to the soil, and it may account for the large percentage of barren stalks.

The merchants, bankers and other business men can do much to establish the slogan among farmers, "Test every ear of seed corn and use nothing but the best." To further this idea the business men can go one step further and urge farmers to plant a couple of rows of the poor seed in their field to prove to themselves that the good seed is best. Perhaps the Rotarians and Kiwanians or Lions or some other busi-

ness club would sponsor this and give a prize to the man showing the greatest improvement in yield and quality by the use of good seed only.

In conclusion let me point out that corn root rot is largely a question of weak plants attacked by the fungi or bacteria. A strong plant will escape the trouble where a weak one succumbs.

Research Solves Pest Control

(*From page* 29)

agricultural research in the control of pests of horticultural plants were the threatening ravages of insects. Noteworthy among these were the Colorado potato beetle, in its destructive effects upon the potato industry, and San Jose scale, in its prevention of the extension of fruit growing. With the invention of the light weight steam and gasoline engine, producers generally were quick to accept these improvements which not only saved labor but supplied machinery possessing power and endurance far in excess of the dreams of the most optimistic.

It was agricultural research that gave to the grower of field crops the life history and habits of the chinch bug, making it possible to control this pest through the cooperative burning of bunch grass and other winter hibernating quarters of the insect. Likewise, agricultural research pointed the way to the successful control of the Hessian fly, often considered the most injurious insect with which the wheat grower deals.

As with the control of other pests, investigations not only brought about the adoption of measures which reduced damage to the minimum, but the researchers gave new knowledge that has enabled the producers of wheat to not only control the Hessian fly but increase the yield of wheat at the same time.

Research and practice go hand in hand in building up the spray and dust schedules for the control of insects and diseases injurious to field crops and horticultural plants. All the workable information of the horticulturist, entomologist, and pathologist is being used by the better growers. Practices in some sections may differ from those in others. This does not necessarily mean, however, that the growers of one region are better informed than those of another. The differences are generally due to environmental and market conditions.

The element of chance plays such an important role that under some conditions and during some years the spraying and dusting practices of a rather poorly informed grower may actually prove to be more profitable than similar practices of a better trained grower. The most capable producers cannot always be certain that their spraying and dusting operations are the best possible.

Our fund of horticultural information is constantly changing. What is true today regarding insects, diseases, spraying, and dusting may not be true next year or the following year. Every year brings contributions of the agricultural experiment stations and the manufacturers of spraying and dusting machinery and chemicals. Since this is true, the more progressive and forward-looking growers recheck their methods and practices and in some instances make at least slight adjustments in spraying and dusting materials and schedules almost every year.

Through the combined efforts, therefore, of the scientific and practical workers, dependable and valuable spraying and dusting schedules have been built up. Agricultural research has helped to solve the pest control problems through other means such as early and late planting, the use of re-

sistant varieties, employment and encouragement of natural parasites, the rotation of crops, the use of better culture including applications of fertilizers in order to grow more resistant and vigorous plants, and the shaping of garden, orchard, and farm practices along lines unfavorable to the development and spread of the particular pests concerned.

Green Manures and Vegetable Production

(*From page* 26)

of organic matter per acre. The following figures show the rate of nitrate formation of several of the green manure residues as compared to barnyard manure.

A study of the data below shows conclusively the superiority of green manures over barnyard manure in supplying nitrate nitrogen during the process of plant decay. The green manure residues have supplied through the nine months of the experiment 59.6 per cent more nitrate nitrogen. A study of the soils at the conclusion of the experiment showed that 43.7 per cent of the barnyard manure organic matter underwent decay as compared to 66.6 per cent for green manures. The green manures supplied 5,200 pounds of active humus per acre in excess of the untreated soil compared to 4,400 pounds recovered on the soil treated with barnyard manure.

The cause of this difference in the behavior of these two sources of organic matter is due primarily to the fact that a large proportion of easily digestible organic materials originally contained in the feed from which the manure is derived has been utilized by the animal. The organic matter in farm manure, therefore, resists decay to a much greater degree than is true of succulent green manure residues.

Contrary to the general belief, green cover crops when plowed down undergo very rapid decay. The rate of disintegration depends upon the nature of the plant residues and also upon many soil factors, such as available nitrogen, phosphorus, presence of lime, moisture, temperature, aeration, etc. Immature cover crops, such as young clover, rye or oats (about a foot high) undergo very rapid decay and soon disappear from the soil. Mature crops, however, which contain a greater proportion of resistant cellulose materials, high in carbon content and low in nitrogen, resist decay to a much greater extent.

The succulent leafy parts of the plants are the first to undergo decomposition. This is due to the fact that this part of the plant contains a higher proportion of nitrogen in relation to

POUNDS PER ACRE NITRATE NITROGEN FOUND IN SOIL AT DIFFERENT PERIODS.

	1 Mo.	3 Mos.	5 Mos.	7 Mos.	9 Mos.	Average
Check soil	26.5	40.8	40.9	57.5	62.7	45.7
Canada peas	51.1	115.9	127.0	115.0	140.0	109.8
Soybeans	46.0	70.8	136.2	137.0	143.1	106.6
Alfalfa	26.5	111.1	131.4	161.0	169.5	119.9
Oats	27.5	81.7	118.7	134.2	153.2	103.1
Wheat	76.4	138.0	147.2	238.5	207.5	161.5
Average of						
Green manures	45.5	103.5	132.1	157.1	162.7	120.2
Barnyard manures	51.1	53.8	79.5	84.7	107.3	75.3

the carbon (narrow-nitrogen-carbon ratio). The rate of decay of the roots and stems is controlled largely by the amount of available soil nitrogen, though as already indicated, many other factors have a controlling influence.

The influence of nitrogen as a factor in the decay of the "woody" tissues is taken advantage of in the preparation of artificial manure from straw and other plant materials with a wide nitrogen-carbon ratio.

Process of Plant Decay

The decomposition of crop residues is brought about by soil micro-organisms which use organic materials as a source of food and energy. The process is in reality one of digestion quite similar to that which takes place in the digestive tract of animals. These soil organisms including both bacteria and fungi ("molds") increase in number very rapidly in the presence of green crop residues.

A recent experiment conducted by the U. S. Bureau of Chemistry and Soils showed that within four days after vetch had been mixed with the soil, the soil micro-organisms increased in number from 10 to 60 million per gram of soil. On a similarly treated soil to which limestone had been added the organisms increased to 140 million. In a second test on an acid soil, rye turned under caused in seven days an increase in number of microorganisms from 20 to 60 million. Applications of limestone stimulated an increase in the soil micro flora from 20 to 210 million per gram of soil.

We realize then that a most remarkable thing happens below the soil surface in this laboratory of micro-organisms. The influence of lime in stimulating the activity of these soil flora is clearly shown from the results of this experiment. The rate of decay of crop residues depends upon the number and activity of these soil micro-organisms. These data serve to impress the reader with the fact that the soil is in reality a living thing, perhaps the most animated medium in existence, extremely sensitive to changes brought about by the application of various materials. We do not always realize that any soil treatment that stimulates a healthful and vigorous growth of soil micro-organ-

A yield of 10 tons of cabbage will remove at harvest 70 pounds per acre of nitrogen, equivalent to that contained in over one ton of a 4-8-4 fertilizer.

isms will in time produce a vigorous growth of the higher economic plants above the ground.

These soil micro-organisms which take part in the organic decay of crop residues are divided into many groups each performing a definite function, the sum total of which is the final preparation of available plant food for the growing vegetable crop. We have already seen that green crop residues greatly stimulate the formation of soil nitrates upon which the fast growing vegetable crops are dependent.

Now when green manures are in the process of rapid decay, during the first few weeks after being incorporated with the soil, these nitrates are utilized by certain groups of micro-organisms in order that they may break down the cellulose and other carbonaceous plant materials, more resistant to decay. This is due to the fact that all soil flora contain in their living tissues both carbon and nitrogen and therefore can not multiply and function in the absence of this source of food or energy. Keeping this fact in mind, let us see just how this utilization of soil nitrates by micro-organisms may affect the higher plants.

During this period of rapid decay there actually exists keen competition between the plants below the surface (soil micro-organisms) and those above the ground for every trace of available nitrate nitrogen. For the first few weeks the soil organisms win out and the vegetable crops may suffer for lack of nitrogen. This is often shown by a yellow or light green color of the leaf which may be mistaken for disease or lack of water.

This period of nitrogen depression is fortunately of short duration, for as soon as the crop residues reach a stage of advanced decay, the nitrogen-using organisms which contain organic nitrogen in their body tissues are utilized by the nitrifying organisms which results in the liberation of large quantities of nitrate nitrogen. Reference back to the nitrate figures will show that the soil treated with alfalfa residues supplied nitrate nitrogen in the following progressive order: 26.5, 111.1, 131.4, 161.0, and 169.5 pounds per acre.

Significance of Carbon Dioxide

In the process of plant decay there is generated a considerable volume of carbon dioxide gas which is the final product of organic decay, that is, so far as carbon is concerned. This carbon dioxide gas passes into the atmosphere by the process of soil respiration. A measure of the amount of carbon dioxide given off from a definite volume weight of soil furnishes the chemist with a means of determining the rate of plant residue decay.

Carbon dioxide is also given off by the roots of growing plants. When this gas combines with the soil water, carbonic acid is formed which has a significant value as a means of dissolving mineral plant food, thus rendering it available for vegetable and other plants. When carbon dioxide passes from the soil into the zone occupied by the growing plants, it is rapidly absorbed by the green leaves by a process known as photosynthesis. In this manner the plant manufactures its starch and cellulose materials from the carbon dioxide of the atmosphere.

Experiments have been conducted which have proven that the growth of plants can be hastened by introducing carbon dioxide into the leaf zone in excess of that normally present. From this we may learn that carbon dioxide is an important factor in the rapid development of leafy plants or those which produce considerable starchy materials such as potatoes, beets, etc. Green manures no doubt have a great value, therefore, in supplying additional carbon dioxide, a fact which is not fully realized.

It is surprising to learn that to produce a crop of 400 bushels of potatoes requires that the green leaves of the

plants absorb 9,600 pounds of carbon dioxide gas necessary to produce the starch found in such a yield of tubers. In addition to carbon dioxide required to manufacture the starch in the tubers, there are required also 6,000 pounds of carbon dioxide necessary to produce the cellulose found in the leaves, stems, and roots of the potato plants.

In other words, to produce a 400-bushel crop of potatoes actually requires that approximately 15,600 pounds of carbon dioxide be absorbed by the potato plants. To produce this much carbon dioxide would require the complete decay of 18 tons of farm manure. Based on the normal carbon dioxide content of air, it would require over 45 million cubic feet of air to supply this weight of carbon dioxide gas.

These figures are presented, not that you may do anything about it, but merely to point out the fact that green manure decay may have a value in this respect which has been given very little consideration. The writer believes that in a case of heavy yields of grain and vegetable crops carbon dioxide often becomes a limiting factor.

In regard to the type of cover crop to use, it should be emphasized that non-legumes have a far greater value in relation to leguminous crops than has been realized. After harvest of the late vegetable crops either rye or vetch may be seeded, which greatly reduces the loss of soluble nitrogen during the fall, winter, and early spring months.

This means of nitrogen conservation by cover crops together with the added value of the crop residues returned to the soil may be emphasized as the ultimate value of the practice of green manuring. Green manures in an intensive system such as followed in vegetable production will not actually build up soil organic matter, but will go a long way in replacing that lost as the result of excessive decay.

Long-lived Alfalfa

(*From page 7*)

tive than those we have used. Varying the ratio from a 2-10-10 which we have used might also help. These matters will form the basis of certain future work which we hope to undertake with this important forage crop.

The use of higher quantities of lime than were carried by the basic application in this experiment has been distinctly disappointing. While we have no doubt about the need for lime for alfalfa culture on this soil, the original pH of which was around 5.2, the use of two extra tons per acre over the two tons carried by the check plots has served to slightly depress alfalfa yields. This depressing effect is probably not due to the lime itself, for the soil on the more heavily limed areas approaches neutrality more closely than it does on the check strips, but to the indirect effect of rendering the potash in the soil less available for the alfalfa.

While we have very little evidence from New Hampshire supporting this theory, that which we do have indicates that the use of lime renders soil potash less available for crop needs. This may be one of the reasons why alfalfa responds so readily to potash, particularly as farmers have tended to apply an excess of lime upon seeding alfalfa "to last it through its long life." I am not sure but that many farm advisers have been guilty of advocating this practice. Even so, it may be sound if proper fertilization is resorted to at seeding and later in top-dressing. From the other angle, however, it is now possible to buy

both phosphorus and nitrogen carriers with lime in their make-up, which might be used for top-dressing should the initial lime treatment have been small.

At any rate this field has served to demonstrate that alfalfa can be successfully grown on old hay lands if they are adapted to it, provided proper attention is given to feeding the crop. In some ways such fields are more favorable than more heavily cropped land as they do not present the menace from weeds and perennial grasses found there. And aside from the facts learned in this four-year test about lime and the three important elements, which have been discussed above, maintaining the yield in the more heavily fertilized plots for even that length of time on such a soil is of much practical interest.

Weeds Can Be Killed With Kainit

(*From page* 20)

planted to corn to be followed by strawberries the next season.

"The sorrel was a regular mat," Mr. Parker stated, "and I could not plow it under. It just stood up on edge and I was really ashamed of that job of plowing, but it couldn't be helped. There are hundreds of acres just like that in this neighborhood and if kainit will kill the sorrel then it will save us growers many dollars."

This field was watched very closely and during the corn season practically no sorrel appeared. At the end of the year only a few small plants could be found on the treated acre. The illustrations with this article show the treated and untreated land as they appeared the latter part of April, when sorrel, in this section of the country, has made considerable growth.

Mr. Esham set strawberry plants in the treated field following the application of kainit, while Mr. Parker, as noted above, planted corn. However, the same results were apparent in that practically no sorrel appeared on the land where the kainit was applied. Only 400 pounds of kainit per acre were applied by Mr. Esham. In the future Mr. Esham will use a lime spreader for the operation instead of hand labor, as he feels he can do just as efficient a job with the machine.

The very enthusiastic reply that Mr. Esham made when asked his opinion regarding the use of kainit for killing sorrel indicates the results that have been secured and the benefits that will arise from the control of weeds in

Another view of the strawberry bed where 400 pounds of kainit per acre were applied to the land in the foreground and none was applied to the land in the background.

strawberry growing areas of the country:

"You can see by looking at this field that I have no sorrel anywhere except along the ditch bank where I could not apply the kainit. I am so well satisfied with the results that I have ordered enough kainit to spread over 10 acres on that farm over there that I have just bought. I am ready to tell anyone that kainit has got rid of sheep sorrel on my fields."

On the dark spots of this field in Germany, the charlock was destroyed by an application of kainit.

Another problem, or rather one of two problems, now presents itself—that of killing the sorrel while growing among plants already in the field. Obviously some remedy must be used that will not injure the strawberry plants, and for this purpose it is planned to use a finely ground form of kainit (almost a powder) and apply this with a hand duster or blower. This method is the one employed by experiment stations in Europe and Nova Scotia. The kainit is applied to the plants, preferably in the early morning, before the dew is off and when the air is calm.

Among other weeds that infest the strawberry fields are chickweed (Alsine media) and Crane'sbill (Geranium pratense), both very persistent and as Webster says "positively troublesome." An application of kainit was applied in the spring of 1930 to fields infested with these two weeds, by Mr. Parker, and results should appear during this growing season.

Thousands will, or can be saved, by strawberry growers on the Peninsula as a result of these tests or demonstrations conducted by Mr. Parker and Mr. Esham as the eradication of sorrel will increase yields and quality of the berry as well as cut down cost of cultivating. Another important fact is that with the eradication of sorrel and other weeds the growers will be enabled to carry over strawberry fields for several years whereas at present two years is about the limit of profitable production without renewing the beds.

The Inquiring Mind

(*From page* 23)

recognition certificate. But better than University honors is the place he earned in the hearts of those with whom and for whom he worked. Thousands of farm folk waited weekly with keen anticipation to read his Hope Farm Notes, and from them gained new courage to meet their problems, fight the battles they confronted, do right, deal honestly, and practice kindliness and generosity, in the spirit of Christianity, with reverence of God and respect for His Holy Book.

Herbert Collingwood could not hear the singing of the birds, the whisper-

ing of the breeze in the tree tops, the rippling of the brook, or the merry laughter of little children; but he dwelt inwardly with the treasured memories of the sounds and songs of his youth and delighted in the open country and all of the wonderful works of the Creator. To him there was charm in the rosy cheeks, smiling lips and robust bodies of healthy children, with whom he surrounded himself, and to whom he opened his home and welcomed at his table and fireside. Mrs. Collingwood and their daughter also loved the "red-heads and tow-heads" and their hospitable home, pleasantly situated among fine gardens and orchards, gave many a thankful child a happy, well-directed start in life. The man who, as a boy, was made to work on the frosty side of the barn saw to it that those of his family circle lived and laughed in the beneficent sunlight of love and good will.

Fought for Farmers' Rights

In addition to these kindly attributes, and the humor, poetry, and sentiment which characterized this tender-hearted "neighbor," who "lived by the side of the road and was a friend to man," the sage of Hope Farm could, when occasion demanded, fight valorously for the right, with all the courage and hardihood of a crusader. He hated dishonesty, graft, and evil-doing in high places, and ever defended the farmer against his foes. He strove mightily in opposition to legislation that antagonized the farmer's best interests and strived to effect the passage of laws that would aid and protect him in his life and work. His indefatigable labors in this direction no doubt contributed largely to the redress of certain wrongs, and the thousands of farmers who weekly read his paper and mourn his loss looked upon him as a champion of their rights, a fearless, honest leader and a counselor whose advice always was wise and well intended.

John J. Dillon, who for well on to forty years worked with Mr. Collingwood as business manager of the Rural New Yorker, said of him:

"Charity, kindness, and sympathy were his dominating traits; yet when occasion required, he could whet a pen until it cut like a razor. He used no bludgeon, and when foes were vanquished, he never pursued them. He fought men only when they obstructed the way to public good. His natural mission was peace, not strife. He had talents and qualities that qualified him for success in a more remunerative career than that of farm journalism. They invited him. He rejected these. He loved the work of his choice. He took his duties seriously and joyously as an advocate of farm interests and a champion of farm rights."

Nature His Companion in Silence

Then William W. Higgins, who was his working associate for twenty years, and who is today the successful managing editor of the Rural New Yorker, depicted another phase of his Chief's character in the following words:

"He possessed the finer instincts of poetry and sentiment. He loved the farm and all things and people growing there—the green of spring, the newly turned furrows, the cornfield, the strawberries, the ripening peaches, the clusters of red apples, the lichens on the stone wall. His trees were companions."

And so, you see, a deaf man can achieve fame, earn a wonderful reputation, wield a trenchant pen for good, and have a splendid influence.

One great secret of his success is, I think, told in these fine words of this friendly, kindly, Christian gentleman, taken from his notable book "Adventures in Silence":

"A firm trust in God and a sincere belief in His power and mercy should be 'as the shadow of a mighty rock in a weary land'—of silence. We must have the best possible moral support."

And so say all of us!

Side-dressing potatoes at the first cultivation is becoming more common.

Fertilizer Facts

(*From page* 14)

tions on potatoes.

These fertilizers are also suitable on black sandy soils for grain. When a seeding is to be established in the grain use 400 pounds; and for grain use 250 pounds.

The experience of the soil experts at the Coddington station indicates that fertilizers low in nitrogen, such as the 2-8-5, 2-8-16, 2-12-6 and 3-10-10 mixtures, are suitable upon grain crops which are to be sown to legumes upon ground not previously or only lightly manured for corn, or where it is thought more nitrogen should be supplied for grain. The amount used should be between 300 and 500 pounds an acre.

Mr. Albert is of the opinion that clear, superphosphate fertilizers have no place in sandy land farming except as they might be used as a supplement to manure and be applied with it. He is convinced that potash applications are required for new seedings. In some instances, where the farmer is reasonably sure that his soil is well supplied with phosphorus, clear muriate of potash applications as top-dressings for alfalfa are satisfactory. This plan permits phosphate applications with the manure spreader and the potash can be nicely and rapidly applied by hand instead of by special fertilizer spreading machinery.

The Suwanee River Country

(*From page* 12)

ty, near Gainesville and less than 30 miles from the Suwanee River. Now some small to considerable acreages are found through central and western Florida, south Georgia, south Alabama, south Mississippi, and in Louisiana.

The fruit of the tung-oil tree, which somewhat resembles an apple in shape but which carries a worthless husk similar to black walnuts, contains, usually, five seeds. The seeds contain oil which tends to make varnishes water-proof, and is used to the value of $15,000,000 annually in the manufacture of American paints and

varnishes. Importations from China are unsatisfactory, and hence the manufacturers are anxious to see an American supply established.

The Chinese methods of extraction are crude and wasteful. However, a modern power expressing machine, the first of its kind in the world, has been recently erected near Gainesville, Florida, and is manufacturing American-grown tung oil on a small commercial scale. The plant can be expanded as the needs of the industry demand.

The plant is an adaptation of similar machinery used for expressing oil from peanuts, cotton seed, and other oil-producing seed. The whole tung-oil fruit is poured into the hopper, where it is husked and partially shelled, and then crushed and pressed. The husks are delivered to one basket, the pomace to another, and the oil to storage tanks.

With the placing in operation of this crushing mill, the greatly increased acreage which is coming into bearing each year, and the widespread interest in the industry, the American tung-oil industry seems to have "arrived." And it has radiated from the Suwanee River country.

So much for the new crops which this area has contributed to the United States. By stretching the imagination slightly to include Quincy, Florida, in the Suwanee country, this country can be credited with having contributed a cultural practice which has been adopted by cigar-wrapper tobacco growers wherever cigar-wrapper tobacco is grown in the United States. Connecticut was the first state to adopt the practice after it was developed in Florida. The practice in question is the growing of cigar-wrapper tobacco under partial shade.

About 1895 Mr. D. A. Shaw, a tobacco grower of Quincy, was experimenting with different types of cigar tobacco. In the course of the experimentation he observed that plants grown under the partial shade of trees near the edge of the field seemed to produce thinner leaves which were better suited for cigar wrappers than were the leaves of plants grown in the open. In 1896 a partial shade was constructed over one-fourth acre of land. A decided improvement in the quality of leaf produced was the result, and the construction of shades began immediately in the Florida tobacco district. By 1900 the practice was beginning to be adopted in Connecticut. The originator of the process died at Gainesville, Florida, during 1930.

And so, in the course of time, the Suwanee may become as famed for its contributions to American agriculture as it is for its leading part in a popular old folk song.

Faith, Hope, and ?

(*From page* 4)

of Madame Charity. We sent for her because the deacons said she was Love in disguise.

Charity came in as a sort of hired girl—someone to look after the delinquents and the misfits. I presume the original aborigines here did not employ her very much. She is one of our Caucasian innovations.

But like all hired hands who get an inch in edgewise, Charity soon took a mile. She used to eat at the second table or in the kitchen, but now she sits at the head table with Dad and Mom, and gets the first helping of the goose and gravy. We take what's left to feed ourselves and find that reliable Missus Faith sits outside with Lazarus, gnawing the cat scraps.

Somehow we have overlooked the edict of experience through all the ages, that prevention beats cure. We utilize prim Miss Charity in the guise of Love, whereas if we applied a little

more of Missus Faith's homeopathic remedies to begin with, perhaps Mr. Hoover wouldn't have to write a Thanksgiving proclamation with one hand and a survey of the jobless with the other.

I REALIZE that I am quoting Paul in one breath and discounting him in the next one. He said, you remember, that the "greatest of these is Charity." But again, somebody later on remarked that "Charity begins at home."

That's just the ticket! If we had used a little more Faith in ourselves and a little more Love on everyday problems, we would be as happy now in the midst of super-power as our elders were by candlelight. Charity is great in an emergency, but we must use Faith to prevent emergencies.

Another reason why our Faith is weaker in spots is simply because we have overworked her on the credulous. Bogus prosperity claims, fevered newspaper propaganda, proclamations followed by denials, charting our courses by ticker-tape—these elements of the business barometer have put Faith out on the door-step and given us Charity as the star boarder.

Charity may mean that somebody is benevolent, but it also often signifies that somebody has blundered. Let's hope that America will be the first to get out of the Blunderbund.

If you had a neighbor with more money in the bank than he knew what to do with, and supplied with a surplus of victuals on a flooded market, and he starved some of his children—would you call the police or the poor relief agents?

Yet here stands our benign old Uncle Sammy in that very same position, hoping that Legge can hold back the wheat planting in Kansas and trusting that the bread-lines won't be too long in Detroit.

I met my friend, the Master Farmer, yesterday over at the implement shop. He was buying a new disk, three-bottom plow for the spring turn-over. Regarding his act as a supreme show of faith and "evidence of things not seen," I asked him if he thought farmers, as a rule, had as much faith or perhaps more of it than big business or the industrialists.

After he had pondered awhile and we had both run it through our small-town minds, we arrived at an agreement respecting Faith and the Farmer. We took our first cue from near-by economics. The implement house had been selling tillage equipment at fairly normal rates of trade, but a machine tool house that stocks factories was shut down completely.

Ergo, the farmer buys tools for replacement purposes by the signs of the seasons, as far as he is able. The industrialist gauges his purchases by the signs of the time as charted by human elements. His purchases bear little relation to his actual buying power at such times, while the farmer's chief limit is usually his buying ability.

THAT is, the farmer deals with hazards that are not human and are largely uncontrolled, at least in his main business of production. Facing climatic uncertainty and being ready for a feast or a famine, he must needs come into the seed time fully prepared to do his bit. He doesn't know whether there will be hail or a halo for him; he must meet the freaks of fortune. Nature has been more generous with farmers in our section than abusive or contrary, and what's poison for grain may be pie for corn. Living with the elements at his elbow, a farmer gets to be almost like the birds and fur-bearing animals. He goes the round of the seasons with calm precision, doing his customary duties and making his seasonal arrangements.

Hence the farmer has inbred Faith by generations of soil contact. He lives by no other rule, and this in itself may be irritating to some orderly minds who want farmers to change over and act like industrialists. We concluded that in his own personal,

individual moods and methods the average up-to-date farmer is a true disciple of Paul in matters of Faith; but here we sidetracked a little and considered the farmer in a collective way, in his organization aspects.

We decided that just as soon as the farmer came into direct contact with human elements and perverse streaks in human nature, as he more often does in politics or organization work, his Faith weakens to a point where it is sometimes less effective than the Faith of the industrialist.

TAKE two of my mutual friends, one a Radical and the other a Standpatter, and both farmers. Neither one has joined the anvil chorus knocking agriculture, and both operate high-class farms. Both have undying Faith in their calling and they can agree over the plow handles on technical agriculture. But the Radical lacks Faith in present-day capital, and the Conservative sees no good in the promises of political reformers. The perplexing moods of Dame Nature do not shake their Faith. They have confidence in their ability to deal with stubborn soils and noxious weeds, with storms and drought. Even when they are licked, there is "always another season coming."

But the Radical is annoyed at the claims of the middlemen and the deals of the grain exchanges, while the Conservative smiles in derision at the hopes erected by legislation.

In their crop and livestock management, they go on the sane basis that Faith is guarded by tasks done right at the right time. Failures they are willing to blame on tasks done wrong. But at the point in their working lives when self-reliance and deep thinking ceases to aid them, and they must mingle with other outside forces, we notice that their Faith snaps and breaks down. Missus Faith simply won't leave the old farmstead.

It would do little good to advise the Radical to join the Rotary club or the Conservative to become a Unionite, even though some attractive bait could be found to tease them thither. And even though they listened long to Babbits or Townleys respectively, they wouldn't be quite sure that thus and so was right; and anything that isn't right cannot command their Faith.

On the other side of things, the average citizen's general regard for agriculture is high. It checks with what we have described, because the average citizen's Faith in the farmer diminishes in direct ratio with the amount of political organizing done by the grangers.

IF cooperation is going to achieve one thing worth while it is going to enable farmers to learn human relations among themselves and then enter pitch and toss into the broader contacts of world commerce.

By this I mean they are going to take old Missus Faith out of the farm kitchen and take her to a cooperative rally or "sociable," introduce her to wider horizons by gentle degrees, help her to get wise to the parlance of modern barter, and teach her that even Alexander Legge and Jim Stone abhor dress suits, but wear them if necessary at a ten-course financial function.

I am sure that cooperative forces can do this successfully without robbing Faith of her high regard for truth-in-advertising. In fact I feel that with a careful treatment of this nature administered to Missus Faith by her allies on the farms, we could make her just as aggressive in the city as she is in protecting the hen-coop at home.

In the meantime there are plenty of forces that would prefer to see farmers keep Faith at home with the pigs and chickens, and depend on Hope and Charity when they drive to town. But if this agricultural fairy tale has its proper ending, we shall see Cinderella Faith marry Prince Charming and let the other two sisters sit by the

dying embers.

For the present I see in the youth movement on farms a powerful push for Faith. The 4-H youngsters meet in state and national reunions and grow up in frequent contact, barring creed and prejudice. This means that they are studying the new styles in dresses and bonnets for Aunt Faith, and intend to drag her right out where her good works won't be hid under a bushel of apologies.

It will give them incentive to primp her up if we name some of the good works she has already accomplished.

Some forty years ago the railroads got rampant and up rose the farm phalanx and sat down hard on them, after a doughty tussle, in which Faith took hold with a hammerlock. Railroad rate regulation, and elimination of rebates, and passes resulted.

Agriculture insisted that science and instruction be regularly offered to farm folks. So by degrees we have the Morrill, Hatch, Adams, Smith-Hughes, and Purnell laws to the credit of Faith.

Regulations were needed within the industry, and so Faith jumped in with the farmers and secured certain active departments, both state and federal.

Finances needed more stretching and rebound in the agricultural zones. In due time we had the Federal Farm Loan, the Agricultural Credit Act, and the Intermediate Credit banks.

Scattered creameries and shipping associations became aware of their natural enemies and united power, and behold we had the Cooperative Bureau at Washington and the Federal Farm Board in 1929!

The lesson in this lies in the fact that when farmers found out that Faith was pretty much the whole works, they quit pitchforking and began to saw wood. They have cut off quite a few nice chunks already. If it's too green they may smoke somebody out. But they've waited long enough for the timber to be bone-dry, and the sparks are flying now.

So at the New Year I have little doubt in my heart about the good intentions of farmers, providing they stick to their Faith and lead her out on the big parade ground.

I have got around quite a bit lately, even as far as Chicago, since the Dismal Davids began howling. It seems to me that we have had more squawking on the boulevards than we ever heard on the bush roads. When the farmer was sickest, he hired somebody to do his grunting and groaning for him. For himself, he was too busy courting Faith and paying taxes.

I guess that we all ought to resolve to use the anvil and the hammer for construction work, to forge stronger national links. Hitherto many of us have used them for knocking only.

And if we do that right along, we can install Faith permanently in the superintendent's office and keep Hope and Charity for ornamental purposes.

FORE!

Four golfers were resting at the ninth green which was behind a mound, when a battered ball came over the rise and rolled into a sandy trap. The player was not in view.

"Let's make him think he did it in one," said one of the golfers.

So they picked up his ball and put it in the hole.

Presently a weary player walked over the mound and looked about for his ball. The four men rose at him, shouting, "Did you hit that ball? Bravo! You've done it in one, old man. Look! It's in the hole!"

The player looked bewildered.

"Here's how it rolled," they said, tracing a course across the green.

"A perfect shot! The right angle and the right strength! Bravo!"

The weary player pulled out a tattered scorecard.

"Good," said he, "that makes it 30 for this hole!"

Beneath the spreading chestnut tree
The smith works like the deuce,
For now he's selling gasoline,
Hot dogs and orange juice!

Brevity is the soul of modern journalism. A budding journalist was told never to use two words where one would do. He carried out this advice in his report of a fatal accident in the following manner:

"John Jones struck a match to see if there was any gasoline in his tank. There was. Age, sixty-five."

CONTAGIOUS

Tim: "Going to the doctor?"

Tom: "Yes, I don't like the looks of my wife."

Tim: "I'll go with you. I don't like the looks of mine either."

On the eve of their execution, an Irishman, a Scotchman and a Jew were asked if they would like any special delicacy. The Irishman voted for Irish stew, the Scotchman for a bottle of whiskey, and the Jew fancied strawberries and cream.

"But," protested the warden, "strawberries are not in season."

"Vel," replied the Jew, "I can vait."

—*Judge.*

Parson: "Does your daughter trust in God, Brother Jones?"

Brother Jones: "She must, judging by the company she keeps."

KNEW THE BREED

Little Mary Jane and her next-door neighbor, Billy, were engaged in an absorbing conversation.

"What are anarchists?" asked little Mary Jane.

Then Billy swelled with wisdom.

"They want everything any one else has got, and they never wash themselves," he replied.

"Oh, yes," cried little Mary Jane, with enthusiasm. "I see—they is just little boys growed up."

—*Peacock Feathers.*

He made his pasture his best-paying land

H. E. ROBERTSON of York, Pa., is a successful dairyman. The prize-winning Robertson Farm Holstein herd is one of the highest producing herds in the Northeast.

Mr. Robertson prospers because he is alert and eager to find new methods of increasing the efficiency of his farm and lowering his production costs. This is proven by steps he has taken to make his pastures pay him a real profit.

Milk at Lower Cost

Although he had a good pasture he became convinced that a fertilized pasture would enable his herd to produce milk at lower cost. Last March he fertilized four acres with 600 pounds of early potato fertilizer per acre. He compared milk production on that area with production on nine acres of unfertilized pasture.

The fertilized pasture furnished grazing 11 days earlier. This early grazing saved $144.08 in barn feeding costs. The fertilizer applied on the four acres cost $49.60. For the pasture season the four fertilized acres produced as much feed as the nine unfertilized acres.

Use Your Potato Fertilizer

Without fertilizer, Mr. Robertson had one of the best pastures in Pennsylvania. With fertilizer, he converted it into the best-paying land on his farm.

It will pay you to grow good, cheap, green feed on a fertilized pasture and let your cows harvest it. This increases milk profits by reducing barn feeding and labor costs. Six weeks before you usually turn out your cows, use at least 600 pounds of a pasture fertilizer or a high grade potato fertilizer per acre on your pasture.

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February 1931 10 Cents

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The Whole Truth—Not Selected Truth

R. H. Stinchfield, *Managing Editor* Sid Noble, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XVI NUMBER TWO

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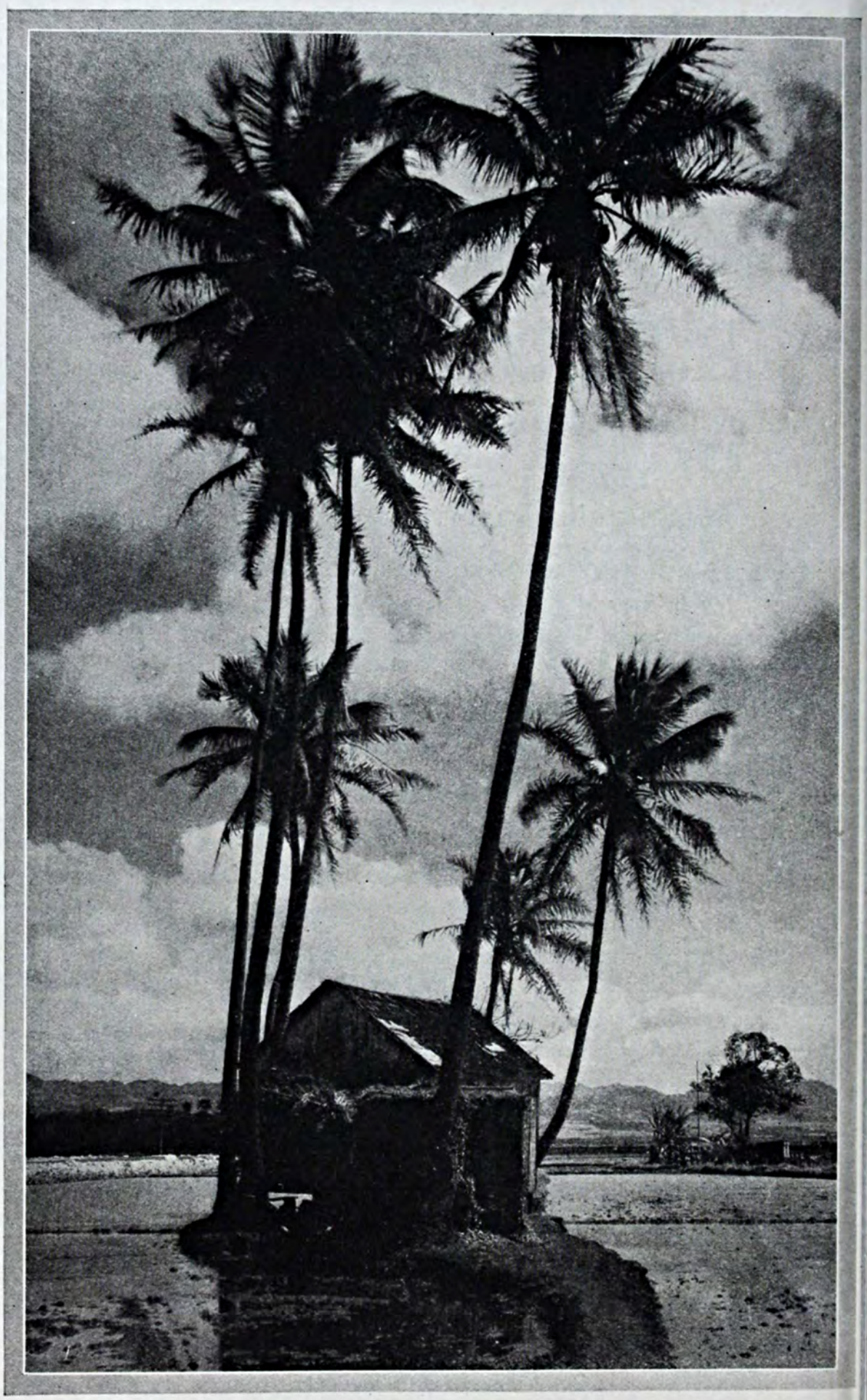
Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY., INC.
of Amsterdam, Holland
Directors: J. N. Harper G. J. Callister



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VOL. XVI NEW YORK, FEBRUARY, 1931 No. 2

Is Your Mind Open to—

Veritas

By Jeff McDermid

IN these days of propaganda, competition, and facial calcimine, hunting for the truth is as difficult as nailing the lie that George Washington never told. The only invulnerable truth that I am positive of is that my suit is shiny and taxes are due tomorrow, plus the comforting truth that I am still married to the original girl who took me for worse and made me better.

How we used to laugh at those Irish fairy tales which often ended some extravaganza of fancy concerning the brownies and "leprecauns" by saying: "And the truth of what Patrick saw is easily proven by looking at the very same knot-hole in the self-same linden tree where he saw the little folks come forth, between nips on the same old jug that's standing right there ferninst ye!" But with a constitutional taboo extant against the vintage route to visions, many of us are letting our imaginations get prohibited, too. Pure imagination may actually serve as the usher-in of truth, the mental John the Baptist crying for mankind to make room for Greater Things.

Copy-books and well-meaning maiden aunts have been responsible for sadly mixing up the essence of pure imagination with the decoction of miserable lies. It's mostly all in the same bottle now, and infant minds are warned strongly against imbibing it.

NOW that it's all blended together in the old family medicine chest, we occasionally see the victim of sly swigs of it, and suffer much by his palpable effrontery. I have such an acquaintance who has quaffed deep from this mixed dosage since his youth. Nobody told him the difference between a white lie and a vision. He never harms anyone; but he simply chatters on, building his air-castles and trying to make you believe he lives in one of them and rents the rest. Instead of getting nicely exhilarated, his mind is completely soused. Somebody mixed his mental draught for him.

They used to tell me that the chalky specks on my finger-nails were caused by telling white lies. I didn't believe that the system worked to perfection because if it had there would have been no pink whatever beneath my nails; but they never took much pains to point out what the outward signs of a decent imagination consisted of.

How any of our best poets and artists, scientists and inventors ever escaped the homeopathic antidotes against an active imagination, after they had bootlegged some of the pure quill, is beyond me. It's lucky they did, or we would still be devouring Uncle Tom's Cabin by kerosene lamplight while somebody satisfied our musical sense by money-musking on a squeaky catgut.

Strange, isn't it, that the same Sunday-school teacher in mitts and ringlets who could have explained that maybe Jonah didn't explore the whale was never shrewd enough to point out that poetry and imagery are what help make the Bible the world's best seller? If she had given us some of the pure juice instead of so much mixed liquor, maybe we wouldn't be too cross-eyed to recognize the truth when we stumble over it.

A dash of imagination in history has been used with discretion. Take G. Washington again. Last summer I spent a day doing Mount Vernon with a party of eighth graders from my native heather. Fresh from legendary history, these boys looked madly but in vain for the stump of the cherry tree, that emblematic but fabled monument of a boy's love of truth. One eager lad, bent upon discovery, rushed up from the bank of the Potomac and said with breathless zeal, "That river is half a mile wide at least; and if General George ever threw a rock across it, there were some mighty good fellows hired to lie for him."

AND yet, after all, I am like a lot of us mellow chaps who have come to the conclusion that if there is any real hard-boiled "de-bunking" to do let us respect the memories of our heroic dead and turn our attention to the rascals who are making history now. I can stand a heap of veteran tales of the hard-tack and long marches of the Civil War, or the grandsire stories of pioneer difficulty —salted to suit, but swallowed with a smile. But when somebody tries to unload travesties and monstrosities of present-day conduct on my narrow-gauge line of thinking, it's almost more than the traffic will stand. With or without Bill Thompson of Chicago, we can resolve in February (although a little late) to do our daily dozen in keeping the history of 1931 as straight as we can keep it. Bill seems to think all the trouble about history and its distortion is in the text-books, but I think the citizens are more to blame than the professors.

It's the living lie rather than the

(*Turn to page* 60)

Potash Insures Tomato Quality

By J. L. Baskin

Atlanta, Georgia

"THINGS are changing here in Georgia," remarked A. R. Royal, manager of Seaboard Farms at Ambrose, one day as he supervised the harvesting, hauling, grading, and packing of some six to eight hundred crates of tomatoes.

"We don't farm as we used to, and many of the changes we have made have been a matter of necessity rather than choice."

He waved his arm out in panoramic fashion over the broad field representing upward of 300 acres of tomatoes now being harvested, and said, "Ten years ago all this land was growing cotton year in and year out. I suppose it would be growing cotton today had the boll-weevil not come along and made cotton growing more hazardous and less profitable for most of us.

"But there are thousands and thousands of farmers throughout Georgia, and the South for that matter, who are continuing to put most of their 'eggs' in the cotton basket. The failure to adjust farming to this new and changed condition is the primary cause for many Southern farmers' condition today. I do not wish to say that Georgia and the South have not made great strides during this period of readjustment, for they have. For instance, Georgia farmers are now growing upward of 100,000 acres of bright tobacco on fields that were temporarily laid waste by the boll-weevil. Then, too, many Georgia farmers have made great progress in fighting this billion-dollar bandit to a point where cotton

This wagon-load of tomatoes in picking baskets on the way to the packing shed is from a field which received a final application (side-dressing included) of approximately 1 ton of 8-4-10 (PNK).

growing is profitable under a program of intensive fertilization and cultivation.

"This 300-acre field that you see here today represents a part of our answer to the oft-propounded question, 'What are you going to do about the boll-weevil?' I think you will agree with me that we have answered it rather well, not in mere words but in a practical way that has brought greater profits on our investment than cotton growing ever did."

After visiting the packing shed and observing the train of wagons and teams constantly plying back and forth between the fields that were now being harvested and the packing shed, and after carefully observing every phase of the process that took place—from the delivery of the fruit from the wagons into the huge grading bins, thence over the grading and sizing belts where they fell in assorted sizes and were wrapped and packed into Georgia six-basket carriers—I was convinced that Mr. Royal was a good executive as well as a good superintendent.

The packing shed was of daylight construction admitting plenty of light necessary for the graders and packers that were at their posts of duty ready to take care of the constant stream of fruit that was passing over the belts and falling, assorted, into bins. As we came out of the packing shed, Mr. Royal chanted a few words to the negro drivers who always welcome a chance to "loaf" while the wagons ahead unload. His remarks were as effectively carried out as would be the orders of a sergeant-major in the British army.

The Whole Story

At this moment Mr. Royal excused himself, but the writer, anxious to get the whole story, followed him. He approached the wagons waiting at the shed to be unloaded, each wagon having approximately 50 field baskets, glanced over them with his trained eye and instructed his field foreman to give Numbers 11, 19, 27, and 42 more careful instructions about picking. The pickers, 150 strong, have numbers and when they fill their field baskets they place their number on top in plain view. By using such a method it is easy to locate who is picking the small ones or the green ones or is failing to do sufficient field culling.

The thing that impressed me was the fact that Mr. Royal not only knew every phase of tomato growing from plant bed to tacking on crate covers, but he knew the all-important and seldom-mentioned knack of how to get the most out of labor and at the same time keep them happy and contented.

High noon with its usual dinner hour was fast approaching. I knew the farm well enough to

A Georgia six-basket carrier, expertly packed with smooth, solid fruits, are sure to arrive on the market in prime condition.

know that farmers and farm labor never get too busy to eat, and so I hastened to get "the meat of the cocoanut" as it were, covering the how and why of tomato growing. Right here I borrowed some of Seaboard Farms' time, for I led Mr. Royal down south of the packing shed to a point where some empty crates were stacked. By temporarily diverting his mind from the near-by operations of picking, hauling, grading, and packing, I managed to get the following story.

Heavy potash feeding encourages early and heavy fruiting.

"We have been in the tomato business on a commercial scale for eight years," he related. "At the start we tried to grow tomatoes as we had grown cotton—with little fertilizer, little attention, but large acreage to more or less make up for our other shortcomings.

"For two years we didn't stake our tomatoes. We soon found that it was not a matter of how many tomatoes we produced, but how many of good enough quality to stand up on the market and bring top prices. We do not claim that our method of growing tomatoes is based on any secrets, rather it is merely a combination of all the factors that have helped us grow better tomatoes each year. We have tried many varieties, methods of cultivation, and fertilizing programs and have abandoned them because they were unsatisfactory. What you find us doing today can be improved upon I'm sure, but in its present form it will produce large yields of merchantable tomatoes that will give the grower a good chance to make a profit.

"We grow our own plants in hotbeds. Sometimes we drill the seed into spotbeds directly, using large amounts of 8-3-5 (PNK) well mixed with the soil. We always try to have, and in the past have had, a superabundance of strong, well-rooted, partially hardened plants to go to the field about April 15.

"Two weeks prior to setting, we apply 1,200 pounds of 8-3-5 fertilizer in the row and make a slight ridge because our soil is flat and the water furrow will take care of heavy rains. We plant in five-foot rows, spacing plants 24 inches apart in the row. This requires, 4,440 well-grown plants per acre. As soon as the plants are well established and a full stand is obtained by a small amount of resetting, we use a 32-inch split pine stake to support each plant. Immediately after staking and before the plant grows sufficiently high to 'lop over' we tie it to the stake as far up the plant as

possible. We continue to re-tie as the plant grows. We practice rigid and continued pruning, removing all suckers that appear in the axil of the leaf above the fruiting bands.

"Soon after staking and at the first working, we side-dress with 400 pounds of 8-3-5 per acre, and in a few weeks we side-dress with a mixture of 100 pounds of soda and 200 pounds of muriate of potash which gives us a 300-pound application of 0-6-33. This is pretty high in potash, but we have found that to grow the greatest yields of best quality tomatoes we must keep the nitrogen to a minimum to get the desired growth and use just as much potash as we can so our young fruits will develop normally and free from wrinkles and folds into solid, smooth fruits of good size and appearance.

Potash Gives Extra Quality

"We do not mean to say that nitrogen isn't valuable for it is. We use a lot of it, but we necessarily watch our nitrogen to prevent the production of puffy, ammoniated fruits that will in some instances be too large and will therefore be undesirable for shipping. Our customers buy more and more on how well they were pleased with our shipments last season, and naturally we want our fruit to stand up and have finish. Potash gives this finish and extra quality. We intend to use even more potash on our richer lands next year.

"The tomato, as you know, has a very local feeding area and is dependent on the plant food and water near its roots. We use all our fertilizer either in the drill or side-dressing and we work the dirt toward the vines to conserve all moisture possible. We plant the selected Gulf Coast Market which is a very prolific variety that fruits early. On account of its prolificness, it must be fertilized liberally. Our fields finally get, all applications included, approximately one ton of an 8-4-10 per acre. We are convinced that some of our soils should have more and we are going to see that they get it next season.

"We consider that an average yield of from 275 to 300 crates per acre is a good yield and will return a handsome profit to the grower. Of course, this is small as compared to some of our acres, but in growing early tomatoes, we talk in crates where growers of canning tomatoes talk in tons. When it comes to talking in dollars per acre, we have the growers of canning stock beat a mile, and it is the dollars we are after.

"Our lands are not improved, for we have to rotate rather often. Worms cause us to throw out more culls than all other causes. We spray with a solution of bordeaux-arsenate, but some years we still lose a great many fruits from worms. However, spraying helps a great deal.

"These farms are owned by H. B. Macklin and his associates. They operate under the title of 'The Georgia Vegetable Growers' and ship all their products under a label bearing their name. In past years the Georgia Vegetable Growers have furnished a number of farmers everything necessary to tomato growing, including plants, seed, hotbed material, and fertilizers. When it comes harvest time, the profits are divided on a 50-50 basis. Harvesting costs, including wrapping, crating, grading, packing, and labeling, are borne equally by grower and shipper. By such a method we have made money for farmers as well as for our firm.

Are Growing Into Business

"We plan to carefully select a few more good farmers each year and grow into business cautiously as fast as the markets demand and are willing to pay for our products. We have tried growing other crops that fit in with tomato growing and have met with limited success. The Georgia Vegetable Growers now operate in Ambrose, Tifton, Douglas, Willacoochee, and Fitzgerald."

The Georgia Vegetable Growers now own and operate 18 large trucks having a capacity of 300 crates or the

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Making the Farm and Home Gardens a Cash Asset

By F. C. Gaylord

Purdue Agricultural Experiment Station

This backyard garden 20′ x 30′ returned $50 worth of vegetables.

BRIGHT-COLORED catalogs with their ever-thrilling story of crisp, succulent vegetables are the harbinger of spring and the advance warning that it is time to begin planning for a real farm or backyard garden. With dollars scarce, labor plentiful, and an abundance of fertile soil as a foundation, why not have a garden to brag about? In Indiana alone we have something like 190,000 farms. Every one if inhabited by a family ought to have a real garden. In addition, we have thousands of city and town folks everywhere who have or can secure a backyard or vacant lot which with plenty of hoe-handle exercise, good judgment, and careful planning will return ample interest for the time and money expended.

But let us stop generalizing and theorizing and consider the garden as a cash asset. Let's forget for the time being the joy of watching fruits, vegetables, and flowers growing, of enjoying crisp, juicy, high-quality products, of healthful exercise, and consider the home and farm garden on the cold, matter-of-fact basis of hard cash returns.

There's E. E. Baker of Veedersburg, Fountain county, Indiana, who had a 60 x 60 foot garden, about 1/12 of an acre. Here's what he grew: four kinds of tomatoes, peas, beans, lima beans, endive, carrots, beets, spinach, cauliflower, besides other common garden crops. He had an abundance for family use—fresh, crisp, succulent, direct from his own handiwork. He sold $41.02 worth, or at the rate of $492 per acre. This with the value of the vegetables used returned him an equivalent of more than $1,000 an acre. Besides he dressed up the lot

at the ends and in amongst the vegetables with zinnias, marigolds, dahlias, salvia, calendula, ageratum, and other flowers.

Now, that much for small gardens. Here's Wm. Smith at Williamsport with a garden between ¼ and ½ acre; that's a farm garden. He grew an abundance of peas, beans, lettuce, onions, carrots, corn, cabbage, peppers, turnips, radishes, tomatoes, spinach, swiss chard, and potatoes for use during the summer, and stored 16 bushels for winter. He also sold $100 worth of vegetables. There you are, $200, on less than a half acre. I have dozens of examples of Hoosier gardeners both in country and town, all showing same results—an abundance of high quality vegetables for summer, fall, and winter with cash sales of the surplus.

The prescription for success is the same for either town or country garden, in Indiana or elsewhere, and the formula is simple. Take Baker, at Veedersburg—his method is typical for the small gardeners, those with limited ground. On his 60 x 60 foot lot he used a two-horse wagon full of manure last year and repeated with two wagons full for 1931. He plowed 12 inches deep and used two sacks of complete, high-grade commercial fertilizer. A fertilizer carrying from 2 to 4 per cent nitrogen, 10 to 12 per cent phosphoric acid, and 6 to 10 per cent potash is best for most crops. He planned his garden and used long rows, repeated plantings to give long harvesting period for peas, beans, corn, tomatoes, etc., and lots of hoe-handle exercise to keep out weeds. Sounds simple, and good seed of right varieties planted on liberally fertilized soil, with good culture, will about 9 times out of 10 return a bountiful garden.

In general the application of two two-horse loads of manure per 50 square feet each year will help insure a real garden. This should be supplemented with a heavy application of complete fertilizer. For a permanent farm garden a good plan is to have an acre plot one-half in garden each year and the other half planted to soybeans, or other legumes, which are plowed under in the fall in preparation for next year's garden.

In addition to stable manure or turning under of green manures, use 750 to 2,000 pounds of a complete fertilizer analyzing from 2 to 4 per cent nitrogen, 12 to 14 per cent phosphoric acid, and 6 to 10 per cent potash. This should be spread over the whole surface and cultivated or raked into the top three inches of the soil. Where manure cannot be secured, the application of the above complete fertilizer at the rate of 2,000 pounds per acre will help insure a real garden.

RATE PER A. EQUIVALENT TO APPLYING ONE POUND TO GIVEN AREA

1	pound	per	44	sq.	ft.	or	10 x 4.4	ft.	=	1,000	pounds	per	acre.
1	"	"	48	"	"	"	10 x 4.8	"	=	900	"	"	"
1	"	"	55	"	"	"	10 x 5.5	"	=	800	"	"	"
1	"	"	62	"	"	"	10 x 6.2	"	=	700	"	"	"
1	"	"	72	"	"	"	10 x 7.2	"	=	600	"	"	"

To find amount in pounds of fertilizer needed for individual garden for any definite amount per acre, multiply length in feet by width and divide result by number of square feet given above for any given rate.

Nitrate of soda or sulphate of ammonia are two common nitrogen fertilizers. These may be used to advantage to hasten the growth of leafy vegetables such as lettuce, spinach, and cabbage. Dissolve one-half ounce in each gallon of water and sprinkle around the plants.

Lime is of particular value in the case of acid soils and heavy clays. Most gardens will be benefited by the application of from 15 to 30 pounds of ground limestone or hydrated lime

to the square rod. Lime sweetens and lightens the soil and by chemical action helps make certain plant foods more available.

Thorough, deep plowing or spading is necessary for proper development of high quality vegetables. The soil should be thoroughly worked as deep as plowed, and a fine, clod-free seedbed prepared. Shallow cultivation after planting gives best results.

Repeat Plantings

The outstanding faults of both the old gardens and those of today largely lie in the fact that vegetables come and go and little effort is made in making repeated plantings to lengthen out the season of our favorite vegetable nor is enough attention paid to growing an ample and varied supply of root crops for the winter.

Such early vegetables as radishes, lettuce, carrots, early turnips, cabbage, kohlrabi, early Irish potatoes, peas, onion sets and seed, beets, parsnips, salsify, spinach, and parsley should be planted as soon as the soil can be worked. Do not delay until late in the spring to plant these crops as they are cool-season crops and cannot be expected to produce high quality under adverse hot weather.

A trial planting of Golden Bantam sweet corn may usually be planted just after the first planting of peas, radishes, and lettuce. Suppose it does freeze, the loss is little, and if it gets by, just think of those juicy ears on the cob along about July 1st. Sweet corn should be planted every week to ten days until July 4, to insure a continuous supply until October frosts. Repeat on peas, planting after Alaska such early varieties as some dwarf sweet type.

Two weeks after the first planting in the garden, string beans may be planted with reasonable safety. Stringless green pods are best and repeated plantings of these every 10 days will lengthen out the bean supply.

It should be remembered, however, that tomatoes are a warm-season crop and will stand but little cold weather. Every year thousands of enthusiastic gardeners lose much money by planting early tomatoes, peppers, and eggplants before the ground has warmed and the danger of frost is past. They are warm season crops and instead of hastening the ripening period, too early planting results in a decided checking of their growth even if they are not killed.

Just as soon as the weather and the ground warms up, peppers, lima beans, sweet corn, pole beans, cucumbers, squashes, pumpkins, and sweet potatoes, as well as melons, should be planted. To plant them earlier is merely wasting seed and time.

For the farm garden the melon

Showing one method of training tomatoes in a vegetable garden.

patches are by far too few in number. Every boy and girl likes sweet juicy cantaloupes and red ripe watermelons and a small plot in the corn field or edge of the garden, liberally fertilized irrespective of the soil type, will produce abundantly. High-grade seed is essential and some of the best varieties of cantaloupes for home use are *Emerald Gem, Lake Champlain, Hearts of Gold,* and *Tip Top.* As to watermelons, *Kleckly Sweet* and *Halbert's Honey* are early, thin-skinned varieties of exceptional quality.

For the small city garden, stick to root crops like carrots, beets, sweet corn, tomatoes, peppers, cabbage, celery, and similar crops that produce a large supply on limited space.

Small gardens can be made to utilize the space to best advantage by practicing companion and succession cropping.

Companion Cropping

In companion cropping, two crops occupy the land at the same time. One of these is usually a small growing, quickly maturing crop; the other requires more space when full grown and has a longer growing season. The smaller and earlier maturing crop is harvested before the other plants become crowded by it. The main crop then has the use of all the space until it matures. Examples of companion cropping are: transplanted lettuce plants alternating between early cabbage and cauliflower in the same row and between the rows; a row of spinach, green onions from sets, or spring radishes planted between early cabbage, cauliflower, or parsnips; a thin sowing of spring radishes made with the parsnip seed. Many other combinations of companion crops may be made. Care must be exercised in selecting such crops and in harvesting the early maturing one before it damages the main crop. In large farm gardens, the gardener is not justified in practicing much companion cropping, because of the difficulty in controlling weeds and conserving moisture.

By the proper use of succession cropping in the garden plan, idle ground may be avoided. In succession cropping, one crop is harvested and the ground again prepared and planted to a second crop. In planning a succession crop, one needs to know the approximate time of harvest for the first crop and the proper planting dates for the second. Most succession cropping combinations have an early maturing spring crop, such as spring radishes, green onions from sets, spinach, lettuce, or early peas for the first crop, with late potatoes, beans, eggplants, late beets, or late turnips for the second crop.

For the succession crops or those for summer, greatest care must be taken in planting suitable varieties. For instance head lettuce, only Los Angeles, New York, or Wonderful will stand the drought and heat sufficiently to mature solid heads under corn belt conditions. To extend the season of peas, the use of tall growing varieties for late May planting is fatal, but by planting such dwarf varieties as Thos. Laxton, Little Marvel, or Blue Bantam, a profitable crop will be secured for late July and early August. Long White Vienna or White Shasburg is a good bet for a summer radish. Edmand's Early Columbia and Black Red Ball varieties of beets are recommended for summer plantings, and "All Seasons" cabbage is best for summer, while Greater Baltimore is the main crop of tomatoes for fresh fruits and canning. Attention to suitable varieties will help both the country and town gardener in getting both quantity and quality.

When to Use Mulch Paper

The greatest value of mulch paper in the home garden probably lies in its ability to practically eliminate weeds and help in the conservation of the moisture supply. The greatest disadvantage of mulch paper is its relatively high cost. This is not so im-

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Clippings from equal areas of unfertilized pasture (left), fertilized once (center), and fertilized twice (right). The yields demonstrate that generous fertilization of pastures pays.

Invest in Pastures

By C. A. Le Clair

St. Louis, Missouri

FARMERS know that corn, wheat, and cotton are not sold by the acre but by the bushel or pound. They realize that frequently the quality of their crops is in direct proportion to the yield, the bigger the yield the better the quality of the harvest. Yet, when it comes to the matter of growing pasture, which covers more acres than any other crop produced in America, too few appreciate that the same natural botanical law operates.

Hence, we hear remarks something like this: "I've got plenty of pasture and can rent more for a few dollars per acre when needed. Why invest in fertilizer for pasture?"

The man who talks like that fails to realize that it would require 30 acres of the kind of grazing he has in mind to maintain a single cow. She'd be forced to travel 25 miles a day to get enough food to fill her stomach. The energy required to find it would leave none for milk-pail production.

The fact is that the manner of growth of pasture is identical with the agronomic habits of other farm crops. Furthermore, there isn't another staple crop grown whose nutritive richness so markedly improves in proportion to the luxuriance of its growth. It is likewise the case that few, if any, farm crops respond more noticeably to soil treatment.

The Perfect Food

There are two reasons why the difference between just so much landscape and a productive meadow has for so long directly affected the stockmen's pocketbooks without the stockmen realizing it. The first is that the animals eat the evidence. The second is that ordinarily the poorer and most distant acres from the farm buildings have been relegated to grazing purposes and consequently have had least attention. With few exceptions, even on the best farms, pasture lands have been subjected to continuous cropping with no adequate return of the fertility removed by the animals. However, in the light of the latest discoveries of agronomists and animal nutrition investigators, the

economy of effecting a systematic pasture improvement program on every dairy and stock farm will soon be generally recognized.

No one has yet, nor perhaps ever will find a substitute for pasture as a means of economically making milk and meat. The mineral, fat, carbohydrate, protein, and vitamin content of good quality pasture is about in the same proportions as these essential nutrients exist in milk. Hence, it is not surprising that pasture has been found to be so efficient in the production of milk—the perfect food.

Researches indicate that whereas a dairy cow can produce as high a production as 30 pounds of milk a day and maintain her weight at the same time when given access to good pasture, it is impossible to get the same results with the same animal under a system of barn feeding. In fact, in the absence of pasture during winter feeding, high-producing animals are unable to maintain their milk flow except at the expense of the elements stored in their bodies, no matter how well they are fed. Only when the essential elements are supplied in pasture can sufficient of them be assimilated so as to permit a maximum yield of milk without depleting the reserve strength and body tissue of the animal.

Pasture provides more digestible nutrients per 100 pounds for herbivorous animals than is available from any other crop, alfalfa not excepted. Further, it costs less to feed stock the same amount of nourishment in the form of pasture than in any other way. This is because the animals harvest the crop themselves.

What Is Pasture Worth?

Fifty times as much grass in one clipping was harvested from the fertilized portion of a Kewanee county, Wisconsin, pasture six weeks after treatment. That is the equivalent to getting 49 acres of pasture for $16.00, the cost of the treatment. Yet this is not all. The feeding value of the treated crop was materially better. In fact pound for pound it was far more efficient in producing meat and milk. Furthermore, the sod of the fertilized portion of the pasture was improved to such a degree that residual benefits from the treatment will accrue in succeeding seasons with added profits from the treatment.

The remarkable results described above were obtained on a meadow that had been fertilized initially in 1929 with a complete fertilizer at the rate of 375 pounds to the acre. During the first year, analyses of clippings from the treated pasture revealed that 373 pounds more protein per acre were produced and that the phosphoric acid and lime content of the herbage were increased 90 and 395 per cent, respectively. In the spring of 1930, the same area was again dressed with a similar application of complete fertilizer. It was when comparing the production of the twice-treated area this spring with the yield of the same sod not so treated that it was found how the returns of pasture dressings pyramid.

The Cows Answer

In considering the effect of fertilizer on meadows, it should be remembered that the condition in which perennial grasses go into winter materially affects the productive life of a pasture. Under heavy grazing, top-dressing with commercial fertilizer enables the grass and clover to go into winter in a more healthy condition. Hence, repeated fertilizing of pastures produces increased returns over those obtained from a single dressing.

By maintaining small enclosed areas of pasture from which clippings can be weighed and measured, any farmer can determine the optimum frequency and most profitable rate of application for subsequent treatments.

Proof of the appreciation of animals for the better quality herbage produced by fertilizer is evidenced by the way they feed on the treated por-

tions of a meadow when given an option. Complete fertilizer produces many times more nutritious and palatable pasture than is produced by animal droppings. This is indicated by the fact that cows will pass up the latter even in preference to herbage where no droppings have been made, while on the other hand, they will seek out the heaviest fertilized areas of the field and browse these down as close to the roots as possible. This has been observed many times. Cows turned into a fertilized pasture will seek the spots in the field where the spreader hopper was filled and where plant food has been spilled in greatest quantities.

When it is considered that milk can be produced with cows on pasture at one-fourth the cost of barn feeding, pasture profits attain a new significance. Cows are the hardest workers on the farm and they respond generously if the same care is taken in the management of their pastures as is given the corn and grain fields. It is easily possible to quadruple pasture profits by proper fertilizer treatments. This has been done by the Massachusetts Agricultural Experiment Station and others.

Agricultural scientists of many nations have demonstrated that pastures markedly respond to proper plant food treatment. Chemical analysis of the well-fertilized herbage invariably reveals a much higher percentage of both vegetable nutrients and essential minerals than unfertilized herbage contains. However, what the animals themselves say about fertilized pastures naturally impresses farmers most. The writer has seen animals suffering from extreme mineral deficiency, by reason of being forced to subsist on inferior crops produced on depleted soil, completely recover, gain weight, and increase their milk flow when browsing on the same acres following a single application of as little as 500 pounds of commercial fertilizer.

There are vast areas in this country climatically adapted to livestock husbandry where the industry doesn't pay at present for the sole reason that there is insufficient available plant food in the soil to produce crops of a quality adequate for the needs of the stock. Farmers in these localities are purchasing feeds by the thousands of tons without any permanent improvement of the condition being effected.

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Worthy cows on spacious pastures, yet they are starving for lack of minerals the scant herbage fails to provide them.

Knowledge Is Power

Experiments on Ontario Farms Demonstrate

By Henry G. Bell, B. S. A.

Associate Professor of Chemistry in Charge of Fertility Extension

WITHIN the past two years the Department of Chemistry of Ontario Agricultural College, Guelph, has inaugurated cooperative fertilizer demonstrations throughout the province of Ontario. The main aim of this work is to demonstrate that properly chosen fertilizers used in sufficient amounts pay good return on the money invested. There is no claim that this is a discovery, for the place of fertilizers in farm economics has been clearly established in successful agriculture in Europe for almost a century, in Eastern United States for half that time, and on not a few farms of this province for at least two decades.

Fertilizers must be suited in formula to the type of crop upon which they are used. Moreover fertilizers must be suited in formula to make up for the characteristic weakness of the soils upon which they are to be used. With these basic principles in mind and the purpose of demonstration clearly before it, the Department of Chemistry inaugurated a series of plots in 1929 which it enlarged to the number of 325 in 1930. This means that demonstrations were established on 325 farms throughout Ontario from Windsor to Ottawa—from Lake Erie to Thunder Bay District. In all, 1,200 plots were laid down totaling over 300 acres of actual field demonstrations.

The crops included potatoes, sugar beets, turnips, wheat, oats, barley, corn, beans, peas, meadows, alfalfa, pastures, apples, grapes, peaches, and certain vegetable crops. The plots fertilized in each test ranged from 1/10 acre to 1/2 acre. Fieldmen of the Department laid out the demonstration plots, applied the fertilizers, and harvested the crops. This procedure insured a high degree of accuracy.

Typical of the field meetings was this one held for potato study at Alliston, Ontario, July 24, 1930.

One of the interesting developments in connection with the system of demonstrations was the popularity of evening field meetings and day meetings, in centers where in their own communities farmers could visit and study two or more demonstrations.

Fertilizer tests on sugar beets were conducted on the farm of Harry Wilson, Chatham, Ontario, during 1930.

Assemblies, varying from a couple dozen farmers to over 150 and keeping the field specialists busy many a night till darkness, concluded what the farmers termed highly helpful meetings.

Many interesting results are recorded. They will be discussed under the following crop headings:

Potatoes

In all, 32 demonstrations were carried out in Southern Ontario, involving 135 plots. Some of the outstanding returns are as follows:

A HIGH RATE OF POTASH PAYS BEST ON LATE POTATOES

Fertilizer Used	Rate Per A.	No. of Tests	Average Yield in Bus. per A.	Largest Yield per A.
Check		28	178	
4-8-4	500 lbs.	1	179	179
4-8-6	" "	9	201	248
4-8-10	" "	37	250	398

These results show a progressive increase from the use of additional potash. The findings of 1930 corroborate those of 1929, viz., that on late potatoes, high-potash fertilizers pay best. Since the potato stores large amounts of starch, and since potash in liberal amounts is essential in the building up of starch, these results are quite in line with expectation.

Relative to most profitable quantity of fertilizer to use per acre, results obtained are listed in the following table. Under present field conditions these data would indicate that peak increases in yield from fertilizers is reached between 1,000 and 1,500 lbs. per acre.

MOST PROFITABLE AMOUNT PER ACRE

Fertilizer Used	Rate per A.	Yield per A.
2-12-6	500	218
	1,000	226
	1,500	203
4-8-10	500	251.6
	1,000	299
	1,500	266

These figures are confirmed by previous findings of this department. In this work Dr. R. Harcourt, Professor of Chemistry, Ontario Agricultural College, reported as follows:

2-12-6 FERTILIZERS ON POTATOES

Lbs. Fertilizer per Acre	Cost of Fertilizer	Aver. Yield per A. Bus.	Gain in Bus. per. A.
....	....	151	....
200 lbs.	$ 4.37	216	65
400 "	8.74	248	97
600 "	13.11	263	112
800 "	17.48	282	131
1,000 "	21.85	295	144

Sugar Beets

During the past summer nine comprehensive demonstration-experiments were conducted in the sugar beet area

of Ontario. Thirty-six plots received individual treatment. Some notable gains have been made, not only in tonnage but in per cent sugar.

In six experiments 0-12-15 at 250 lbs. per acre gave an average yield per acre of 14.7 tons carrying 15.8% sugar. When this same fertilizer was increased to 750 lbs. per acre, the yield was increased to 16.8 tons with a sugar content of 15.3%. When 0-12-15 applied at 250 lbs. per acre was supplemented with a side-dressing of 200 lbs. per acre, the yield was increased to 16.2 tons per acre and 14.7% sugar. When the same mixture was applied at the rate of 750 lbs. per acre the tonnage was 17.7 and the sugar content 16.1%.

The popular fertilizer among sugar beet growers in Ontario has been 2-12-6. In two tests where this fertilizer was applied at 250 lbs. per acre, the yield was 14.5 tons per acre and the sugar content was 16.7%. It was felt that this was not sufficiently high for potash, hence a test was laid down where 2-12-6 at 200 lbs. per acre was supplemented with 200 lbs. of sulphate of potash. This gave a yield of 18.1 tons per acre and 15.8% sugar.

It was felt by some that 16% phosphate was not well balanced, hence a fertilizer analyzing 2-16-6 was tested on two areas. In one case a similar area received 200 lbs. of 2-16-6 plus 200 lbs. sulphate of potash per acre. The 2-16-6 yielded 15.5 tons of beets carrying 15.4% sugar. The 2-12-6 plus sulphate of potash yielded 15.6 tons carrying 16.2% sugar.

The average yield of checks in all of these tests was 13.4 tons carrying 15.7% sugar.

All of these tests show a splendid return on investment in fertilizers. It is apparent that the ratio of the N, P, and K has an important bearing on results in sugar beets and on net profits. High potash along with high phosphate and a fair supply of nitrogen produce best results. It should be explained that growers in 1930 were paid a flat rate of $7.00 per ton at the factory for their beets, and a bonus of $1.00 per 2% above 14% sugar in the beets. Figuring results on this basis the net returns for increase over check are approximately as follows:

INCREASED POTASH DOUBLES PROFITS

Fertilizer	Rate	Investment per A.	Average Tons per A.	Average % Sugar	Inc. over Check Tons	Inc. over Check % S.	Value of inc. per A. over Check	Net Profit from Fert.
Check			13.4	15.7				
2-12-6	225	$4.73	15	16	1.6	.3	$11.35	$6.62
2-12-6 $+K_2SO_4$	200 200	10.20	16.8	16	3.4	.3	23.95	13.75

Alfalfa

It was alfalfa that furnished the greatest surprise in 1930. Six experiments were conducted in an equal number of good alfalfa sections. When well established this crop was generally believed to be sufficient unto itself. Being a legume it had its own means of gathering nitrogen. Famed for its deep roots, it was generally supposed to be able to find sufficient mineral nutrients.

A demonstration experiment was planned on half-score plots, top-dressing certain plots with 2-12-6, and an equal number with 0-12-15. Here are the results: in 5 tests 2-12-6 alone at 400 lbs. per acre gave an average increase over no fertilizer of 1,266 lbs. In 6 tests where the nitrogen was dropped and the potash of the fertilizer was increased 2½ times, the net increase from fertilizing with 0-12-15 at 400 lbs. per acre was 6,737 lbs. of alfalfa. High-potash fertilizers gave a gain of 45.2 per cent in yield over

unfertilized areas; while the low-potash fertilizers gave a gain of only 26.4 per cent in yield. It is well known that alfalfa is a heavy user of potash, hence the logic of using phosphate-potash fertilizer on this crop.

Tomatoes

Five widely separated demonstration tests were conducted on tomatoes. The check plots averaged a yield of 54.9 bus. per acre; 0-14-6 yielded 137.9 bus. per acre; 2-12-6 yielded 151.3 bus. per acre; 3-10-5 yielded 180.3; and 4-8-10 yielded 193.1 bus. per acre, when all were applied at rates varying from 500 to 750 lbs. per acre. When 1,250 lbs. of 3-10-5 were applied the yield was 303 bus. per acre. Where 4-8-10 was applied at 1,250 lbs. per acre it yielded 243.5 bus. Necessarily variations in soil types accounted for variations in yields, however a close study of results obtained will show the necessity of a medium high-grade fertilizer with tomatoes, emphasizing potash on light soils, but not over-emphasizing nitrogen.

Tomatoes were fertilized with 3-10-5 on the farm of Smart Bros., Collingwood, Ontario. Note the unfertilized rows at the left.

Tobacco

During the past two years extensive tests of fertilizers of varying composition have been made with flue-tobacco in Norfolk county. Over 30 combinations of N, P, and K have been tested. Both sources and quantities of potash in tobacco growing are being tested. The 1930 crop has been cured and graded, and some interesting results are appearing. Naturally, the Department of Chemistry wishes to confirm its findings by more extensive tests before reporting on same.

Certain other demonstrations have raised problems requiring investigation. These will be studied individually. The hearty cooperation of all growers has had a large part in the success of this work, as has the keen interest of farmers in the vicinity of the demonstrations. The Agricultural Representatives in the counties where the tests were conducted have taken a personal interest in the work.

Taking the Information to the Farmer

It is one thing to obtain results and another to put them in understandable form and take them to the farmer. When Ontario Agricultural College opened its doors in 1874 it was for the purpose of training young men in the sciences and art which together lead to successful farming. The rich fund of information now on tap for student and farmer alike was not in existence in that day. The field was new. Outside of a few fundamental facts in pure science, the faculty of this new kind of institution had a rather sparse store of information to draw upon. But Ontario Agricultural College focussed its attention on the idea of obtaining information for the great industry—Agriculture.

Of recent years President George I. Christie has enlarged the vision. His clear-cut concept of taking information to the farmer on the farmer's own farm has taken the form of an extensive cooperative field-demonstration system. The Ontario Experimental Union, whose history is closely bound up with that of the early days of the College, distributes varieties of grains and other crops throughout the province for test. The Department of

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The Rots of Corn

By E. N. Bressman

Associate Professor of Farm Crops, Oregon Agricultural College

CORN is comparatively free of plant diseases. Entire losses of the crop are unusual. There are, however, several diseases which in the aggregate cause considerable trouble and in certain years heavy losses of the crop. Leading investigators estimated a loss in the United States of 125,000,000 bushels in 1919 from the root, ear, and stalk rots, a group of diseases known as the rots of corn.

The Illinois Experiment Station has stated that there is a 20 per cent loss in yields of corn in Illinois where diseased seed is used. This loss includes losses from smut and rust as well as the rots. Further, according to the statement, rot of corn not only reduces the yield of the crop but also reduces the stand, vigor of plants, quality, and ease of harvesting. General symptoms of the rots are blighting of the plant or seedling, firing, lodging, yellowing of the leaves, barrenness, and other factors which reduce yield and quality.

It is not uncommon to find moldy ears of corn. Until recent years these moldy ears were not looked upon as an important diseased condition of the crop. One worker says that dry rot of corn has been known since 1834. Most of the attention, however, has been from the standpoint of its effect upon livestock, rather than its effect upon the corn crop.

The first investigation of the many molds on corn was made in 1909 by Burrill and Barrett of the Illinois Experiment Station. In 1921 the Delaware Station reported that these rot diseases are as old as the corn crop. The fungi that cause them, however, only recently have been identified. Also, that it has been only since 1916 that the ear rot fungi have been associated with seedling wilt, root, and stalk diseases.

It has been shown recently that the losses from the rots are due not to the fungi alone, but to a combination of causes. These causes are parasitic organisms, unbalanced conditions of soil fertility, unfavorable environment, and inferior genetic constitution of the plant. All of these conditions, therefore, must be studied, and the problem is a complicated one. The large number of references to the rots in the last few years indicate that the diseases are being studied and progress is being made in not only determining the organisms, but also their control.

Organisms Causing the Rots

There is a large number of parasitic organisms which cause the various rots of corn. Among these diplodia zeae attacks all parts of the plant, but the most common point of attack is the node. The Iowa Station reported a serious outbreak in the fall of 1921 because of hot, wet weather. It is usually described as a dense, white mold and is often found on the butt end of the cob. This organism has been known for many years and has been reported in many states. It flourishes only when temperature and rainfall are high.

The Fusarium group of rots is a large one. Many of the species have been reported in the corn disease

studies. They are among the most harmful rot diseases. This group is common in Tennessee and Kansas, and is found in Missouri. The Kentucky Station finds that *F. moniliforme* appears to be more active then *Gibberella sp.* when they are associated on rotting corn-stalks. They believe that *F. moniliforme* will probably prove to be the most common cause of root and stalk rots of corn. The Nebraska Station as early as 1904 found this rot on corn in Nebraska and was of the opinion that it caused death in cattle.

The black bundle disease, *Cephalosporium acremonium,* has been described in detail. This disease blackens the bundles in the stalks and sometimes in the leaves. Many of the plants infected with this disease become purple or red, sucker, and are barren or produce nubbins. This disease is often overlooked in the germinator. The infected kernels have blanched, white tips.

Rhizopus spp. are common on corn in the germinator. This organism appears to be associated with Scutellum rot. Corn with scutellum rot is low in yielding ability and is subject to attacks by other organism. It is well to eliminate all seed which shows infection by this organism in the germinator.

Gibberella saubinetii, the organism which causes wheat scab, produces seedling blight in corn. There is an important relation, therefore, in the sequence of wheat and corn and this organism. Seedling blight of corn is caused only at low temperatures, and wheat scab is caused at higher temperatures, according to investigators. This organism is found on small grains and has been particularly common on barley in the Midwest.

The five organisms discussed above appear to be the most widespread and harmful, according to most of the reports. In 1920 two species of *Aspergillus* on corn were reported from Texas. One was called black mold and the other yellow mold of ear corn.

Corn-stalk testing is an increasingly popular method of determining whether the corn plants have been fertilized adequately with nitrogen and potash. The method consists of applying chemicals to cut plants in the field as shown in the picture. Fertilizer information is readily obtained. These tests have been made in all parts of the corn belt, and the importance of using more potash is being discovered in many new localities.

Varietal resistance was noted. These molds have been found on corn in other places.

Penicillium was found in 1927 in seed corn at Wisconsin. The writer found *Verticillium* in many ears of moldy corn in western Oregon.

Helminthosporium has been reported as causing seedling blight in corn at temperatures of 20° C. and high moisture content of the soil.

Pythium is a root rot of corn under cold, wet soil conditions, according to investigators. It rots the embryo, causes seedling blight and rots the roots.

A bacterial rot of corn has been reported by several workers. It is a serious disease in Arkansas.

In 1919 a stalk rot of corn due to a species of *Physoderma* was reported. It has been found in the Southeast quarter of the United States. In moist, hot weather it appears first as a rust on the leaves, then turns darker. The disease is known as brown spot of corn. There are other leaf sheath rottings.

Basisporium dry rot of corn was found to be prevalent in Iowa in 1923. It caused a damage of 50 to 60 per cent, according to the Iowa Station. Large amounts of moisture at time of maturity favors the disease. It is chiefly an ear rot, but may attack any part of the plant.

In 1928 the effect of *Sclerospora* (Downy mildew) on corn was reported. It acts as a seedling blight, and although it has been found only twice on pop corn in Iowa, it may become a common rot of corn.

Throughout the corn belt, the corn crop responds well to fertilization. In many areas the fertility of the soil has been greatly depleted of one or more of the important plant foods. When these conditions of unfavorable soil environment are due to either a lack of potash or phosphoric acid the corn plants suffer severely from root rots. Consequently, the correction of these plant food deficiencies results in large increases in yields in the areas where the root rots are credited in causing the greatest damages to this crop. Soil temperatures and time of planting are important because early planting of corn is greatly reduced in yield when seed infected with *Gibberella Saubinetii* and *Diplodia* are used. High moisture content in the soil was also unfavorable to corn infected with disease organisms. Fusarium-infected seed showed that the fungus grew more rapidly where there was a lack of aeration. Corn plants from good seed were not as severely affected by these adverse conditions as from poor seed.

Much work has been done to show the effect of iron accumulations in the joint tissues and aluminum salts in the soil on the various rots. It has been shown that lime is of little value in overcoming these troubles except as used with phosphoric acid and potash.

Crop rotation and crop sequence appear to be important environmental factors in affecting the various corn rot diseases.

Inheritance of the Plant

It has long been noted that certain plants are able to withstand attacks of the various rots. This ability to function normally under these conditions is without a doubt due to genetic factors contained by the plant. Various workers have illustrated the ability of different strains of corn to withstand attacks of smut. Some strains of corn are susceptible to *Gibberella saubinetii* while others are resistant. Some strains respond more than others to added plant foods.

In regard to their resistance to these rot organisms corn should be grouped as to whether it is open-pollinated or inbred. The Illinois Station points out that resistant strains are found in both and that in open-pollinated varieties resistance can be maintained by constant selection. In general, resistance to these diseases appears to be a dominant character. If so, the problem will be simplified in the new method of corn breeding which takes advantage of the F_1 hybrid vigor shown in

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

DOWN in southern Chile, Dillman Samuel Bullock, of Michigan, has cast his lot and found noble life-work to do.

Conscience, and not consideration of cash or selfish advantage, took him there. Since October, 1923, he has had charge of the "El Vergel" agricultural school, at Angol, for the Board of Foreign Missions of the Methodist Episcopal Church. That town is located but 70 miles north of the Araucarian Indian Mission, at Temuco, where, from 1902 until the summer of 1912, Mr. Bullock was missionary instructor in agriculture.

D. S. BULLOCK

In 1906, he met and married Miss Kathrine J. Kelly, Canadian by birth, and a missionary in the same school. She is equally conscientious and as devoted and satisfied with missionary work as is her husband. They have no children of their own, but enjoy working with young people and consider the life they are now living less selfish than it might otherwise be.

In 1912, Mr. Bullock resigned his position at the Araucarian Indian School, and became head of the County Agricultural School at Marinette, Wisconsin. There, he rendered eminent services as a teacher, and engaged energetically in county work. He organized and successfully acted as secretary of the Marinette County Order of the State Experiment Station Association. He also organized and conducted a system of buying and bringing into the county many high-class dairy cows and quantities of pure seed grains.

Beginning in July, 1916, he worked jointly for four years as extension representative for the University of Wisconsin, and the State Livestock Breeders' Association. During that time he organized and had charge of a pure-bred bull campaign from which later the National "Better Sires; Better Stock" was modelled.

In June, 1920, Mr. Bullock received

the Degree of Master of Science from the University of Wisconsin, the subject of his thesis being "A History of Holstein-Friesian Cattle in Wisconsin." This degree rounded out his academic honors, for in 1902 he had earned his B.S. from Michigan Agricultural College, with a thesis on "The Relation of Insects to the Pollination of Pears and Apples," and in June, 1911, was made a Master of Agriculture by his alma mater.

But South America called him again. He had learned to speak and write Spanish like a native. In July, 1920, he accepted a position as Commissioner with the U. S. Department of Agriculture, with headquarters at Buenos Aires. He arrived there in January, 1921, and studied the livestock of Argintina, Chile, and Peru until he returned to the United States in March, 1923.

Resigning his position with the Government in January, 1924, he became Director of "El Vergel" mission school at Angol, Chile. Since that time he also has been pastor of the local church, and in 1926 was made General Director of the Mission. Recently, he has been on furlough in the United States, but he expects to resume his work, in Chile, in March.

Mr. Bullock was born at Elba, Lapeer county, Michigan, November 25, 1878, on the farm taken up by his great grandfather in 1837. After preliminary training in the district school, he graduated from the high school at Hadley, and in January, 1898, attended the first short course in livestock given by the Michigan Agricultural College. Later, he took the regular course in agriculture.

An Inquiring Mind

From his earliest boyhood days Mr. Bullock has been a collector. In him the "inquiring mind and the seeing eye" are most strongly developed. His collecting propensity has borne good fruit. He has given Michigan State College a large collection of birds and mammals from Chile. In Chile he has a collection of bird skins representing nearly all the species found in the region around Angol, in addition to several thousand insects and many Indian curios. He also has made collections for the British Museum and the American Museum of Natural History, New York. For the past six years he has been sending insects to the National Museum at Washington.

Fifteen new specimens of insects and two new genera have been described from his collections, and he has many more new species which, as yet, have not been described. In addition to these accomplishments, he discovered in Chile one new species of fish and a new moss. The latter belongs to a genus never before found west of the Andes. Five new species have been dedicated to him by the scientists who described them.

When working in Wisconsin, Mr. Bullock made and presented to the University Museum what Mr. Frank Collins Baker, author of "The Fresh Water Mollusca of Wisconsin," pronounced "a most valuable collection of Wisconsin material which has provided many records for the State that would otherwise be missing." The collection added four species to the fauna of the State not found in any other collection, and one of them is new to science.

In 1924, Mr. Bullock published an illustrated pamphlet in Spanish on the birds of Angol, and another on those observed on a trip across the coast range west of Angol. Wherever he goes, he keeps his eyes and ears open for something new, and returns from nearly every trip with many interesting curios.

When this industrious naturalist left the Araucarian Mission in 1912, he feared his work had been somewhat unsuccessful from an agricultural standpoint. For almost 10 years he had tried to get the Indian boys to plant and care for fruit trees, but not one of them did so, although he supplied trees at half price and gave prizes

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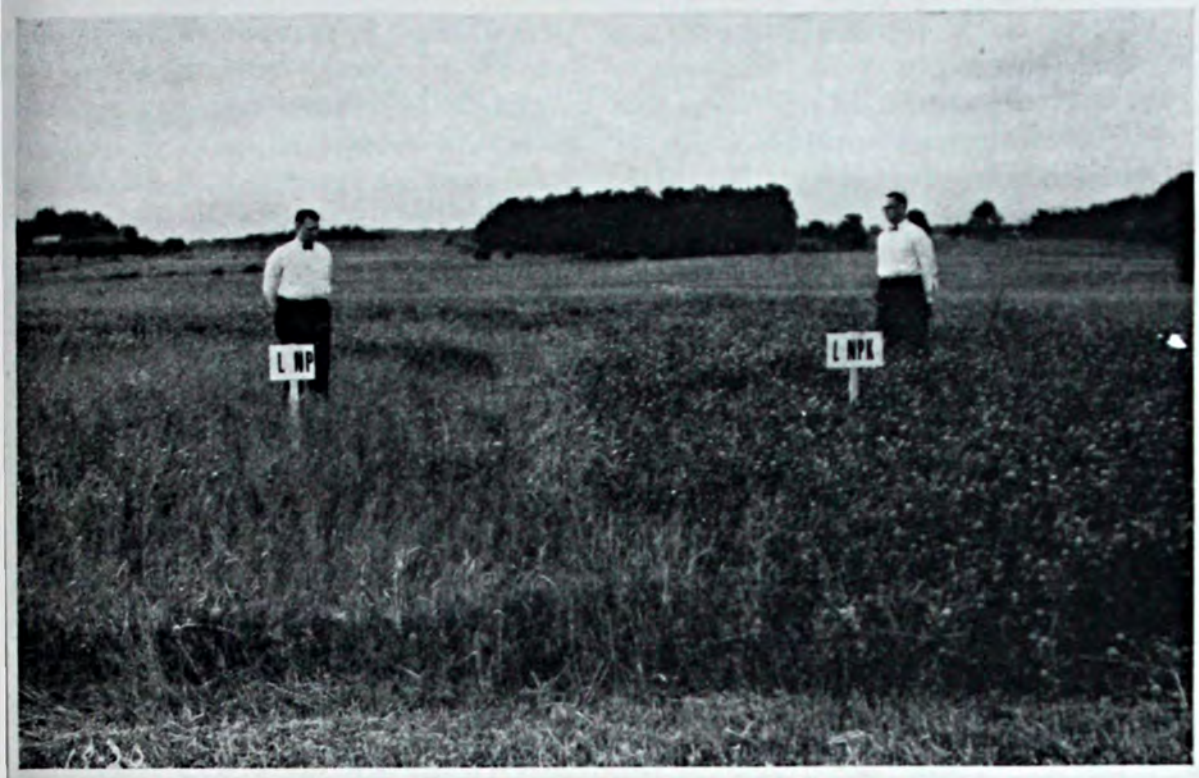

Clover Needs Potash

By A. G. Weidemann

Soils Department, Michigan State College

THIS is a story of experimental work on the farm of R. V. Tanner in Jackson county, Michigan, started in 1926. Jackson county is in southern Michigan and the soil on the Tanner farm, a yellowish gray, slightly rolling Hillsdale sandy loam, is representative of a large area, principally in this and adjacent counties. The data show that after such a soil is limed and the seed is inoculated, it yet requires potash to give the young clover the resistance to withstand the rigors of winter and the drought of summer.

But to go back a bit. Previous to starting the experiment, clover farmers often told of how they used to grow bountiful crops of clover but how utterly impossible it seemed to do so of late. Such stories are told even yet, but the secret to success has been exposed, at least in part.

Nearly every farmer seemed to realize the value of clover both as feed and as a soil builder. Apparently the change from clover to no clover was occasioned by the disappearance of something from the soil that was originally there. Generally this change had taken place on the lighter soil types although there are large areas of heavy soil on which it is quite impossible to grow sweet clover and alfalfa without replacing in the soil the things that have been removed by cropping and by natural forces.

With the introduction of the practices of liming the soil and inoculating the seed it had been generally supposed that the hazards associated with growing red clover had been reduced or eliminated, yet failures continued.

Before the experimental work was started, the soil was acid showing a pH of from 5.5 to 6. When it was first cultivated, it grew profuse crops of June (medium red) clover whenever the seed was sowed. Then for a considerable period of years the farm was badly run, not wilfully, but as a result of lack of knowledge in handling such soils.

The main point under examination was the reliability of a four-year rotation consisting of corn, oats, wheat, and June clover. By June clover is meant what is commonly called "medium red clover" in most parts of the country.

The Methods Used

In order to facilitate getting results on every crop in favorable as well as unfavorable years, the experimental area was divided into four strips thus making possible the growing of each crop of the rotation every year. There were 16 different plots in each series of treatments, and each series was duplicated on an equal area adjacent, making 32 plots devoted to the growing of each crop each year.

Thus the yields of corn, oats, wheat, and clover were secured each year under 16 different treatments. The clover seed sown each spring in wheat is invariably inoculated although very few farmers who sow June clover ever inoculate the seed.

There were three check plots in each series. The rest got a basic application of limestone screenings at the rate of two tons per acre at the beginning of the experiment. There were plots with lime only, and with several combinations of nitrogen, phosphorus, and potash, as well as barnyard manure, as shown in Table 1.

Where nitrogen was included, it was used at the rate of 100 pounds of nitrate of soda every year except on the clover; where phosphorus was used, it was applied at the rate of 200 pounds of 20 per cent superphosphate every two years; where potash was used, it was applied at the rate of 100 pounds of 50 per cent muriate every two years. Manure applications were made every two years at the rate of eight tons per acre. Phosphorus, potash, and manure were applied in preparation for wheat and corn. Sulphur was applied at the rate of 100 pounds per acre only once (at the beginning of the experiment). Where phosphorus, potash, and manure were used together, only 100 pounds of 20 per cent superphosphate and 50 pounds of muriate of potash were used with the manure.

The treatments along with the clover yields are given in the following table:

Table 1.—*Yield in pounds per acre of June clover hay on a Hillsdale sandy loam soil in Jackson County.*

Treatment	Yields, in pounds of dry hay per acre 1929	1930
None	674	....
L	438	....
L-NPK	3,915	1,987
L-NP	346	....
L-NK	3,696	1,490
None	428	....
L	417	....
L-N	808	....
L-K	4,037	1,145
L-P	317	....
L-P and Sulphur	864	....
None	518	....
L	720	....
L-PK	4,380	2,208
L-PK and manure	4,099	2,108
L and manure	4,664	2,039

L—lime; N—nitrogen;
P—phosphoric acid;
K—potash

The year 1929 was much more favorable for clover than 1930. This accounts for the fact that all of the plots made some hay in 1929. In general, those plots on which there was no potash in the treatment produced a

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Weedless Pastures

By O. C. Lee

Purdue University Agricultural Extension Division

REMEMBER way back when grasses in the pasture grew so luxuriantly that it was almost impossible to put enough livestock on to keep them from becoming too coarse for forage? This condition at present exists only in a few of the newer and less farmed areas. Again the "good old days" are gone forever. There should be no questioning of this statement, as our permanent pastures have gradually and surely declined in carrying capacity. Moss, daisies, cinquefoil, plantains, and other poor-land plants have replaced the clover and bluegrass. The problem of bringing back the good old pastures is one that can be solved only when that which has been taken out is put back.

Livestock is an asset to every farmer, and without pasture livestock cannot exist, at least not on a profitable basis. It then develops that pasture improvement and livestock go hand in hand. It has been estimated that milk can be produced on pasture at one-fourth the cost of milk produced on manger feeding. The average pasture period in general is five months. There is hardly any need for further evidence as to the magnitude of our grass land and pasture problem. The livestock population of the world represents more than a billion and a half animals, and is an economic resource only in so far as it can be efficiently fed and maintained.

Before describing the remedy for the faulty, weedy pastures, let us get at the cause of the trouble. Some farmers will argue that the weather is at fault, but the records of the Weather Bureau show practically no change in climate during the past century. The real reason for the condition is the lack of sufficient fertility to encourage grass growth and crowd out weeds. We must keep in mind that grass, like other crops, needs the essential plant food elements.

Let us see what has happened during these years of intensive pasturing.

A good pasture and good livestock go hand in hand.

Suppose you have a pasture of 60 acres in area, then try to estimate the amounts of minerals, principally phosphorus and potash, that have been removed by the livestock that has been sold from that pasture during the time of grazing. Add to this the minerals that have been taken out by the milk. Then add the lime that has been lost by leaching, and you will begin to realize the amount of materials that have been removed.

It is evident that the soil bank has been robbed, and that the land has gradually lost its fertility. Weeds have taken the place of grass, because weeds are nature's attempt to cover up sterile places. The process of elimination by the survival of the fittest gives weeds the advantage over crop plants. Very seldom is land so poor that it will not support weeds of some kind. You will see them growing on railroad beds, on cinder paths, and on the thinnest types of soils.

Fertilize for Weed Control

In the last analysis, to eradicate the weeds it is necessary to do away with the cause. This can be done by applying fertilizer as ammunition, and the most effective, based on recent experiments, is lime and a complete fertilizer, such as a 5-10-10. Again and again demonstrations and experiments as well as the experiences of many farmers point to these facts. Tests have shown that the addition of fertilizer and a few tons of ground limestone per acre on poor, weedy pastures has in many instances doubled and even tripled the land's carrying power.

On one of the Purdue experimental farms, located near Bedford, Indiana, the addition of two tons of ground limestone per acre gave an increase of 2,430 pounds of green weight pasturage per acre. Furthermore, the grass grew so luxuriantly that the weeds were practically crowded out.

Broom sedge is one of the most common of poor land weeds. The effect of fertilizer on this pest was demonstrated on a pasture in Perry county, Indiana. Superphosphate was applied in alternate strips and within two years the weeds were replaced with bluegrass where the fertilizer was applied. The unfertilized strips continued to leave room for the weeds, forming a marked contrast.

"Seeing is believing" and every farmer owning a weedy, run-down pasture should at least give fertilizers a trial. First the soil should be tested for acidity and if it needs lime, sufficient amounts to neutralize the soil should be added. Then about 500 pounds of 5-10-10 per acre should be

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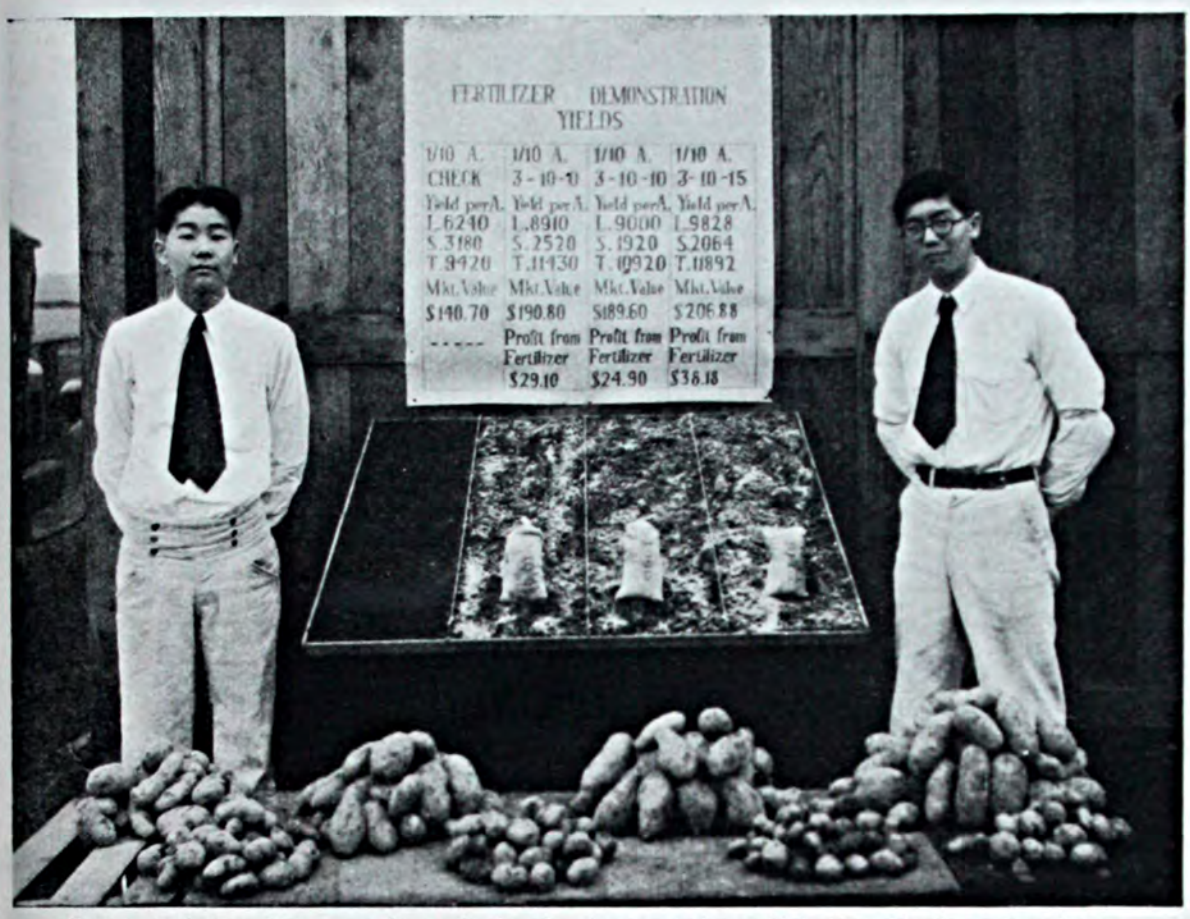
A weedy, run-down pasture merely offers exercise for the livestock.



George and Sam Egusa, ready to begin the demonstration which brought them first honors.

A First-prize Show

By M. E. McCollam

Puyallup, Washington

THE Boys and Girls 4H Club in Pierce county, Washington, created unusual interest with their demonstrational work during the past season. Drawing the greatest attention was a fertilizer demonstration conducted by George and Sam Egusa which not only won out in the county elimination contest, but competed and took first prize at the State Fair. This honor entitled the boys to compete at the Pacific International at Portland, Oregon, where their demonstration again took first honors.

The demonstration and the manner in which it was presented follows:

Geo.—Hello Sam, how are you?

Sam.—Hello George, I'm just fine. (Shake hands).

Geo.—I guess it's been about two years since I saw you, isn't it Sam?

Sam.—Yes, I guess it has been that long all right.

Geo.—Are you still raising potatoes?

Sam.—Yes, I'm still raising them.

Geo.—Well how did they turn out this year?

Sam.—They didn't turn out very good this year.

Geo.—What was the trouble?

Sam.—My soil was kind of sandy and I did not get enough moisture so they just dried up on me.

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Little Aroostook

By Ford S. Prince

Specialist in Soils and Crops, University of New Hampshire

IN northern New Hampshire not far from the Canadian line lies New England's little Aroostook, an area of narrow valleys and broad, sweeping hills the soils of which are ideally adapted for potato growing. The high altitude and climate of this section favor high potato yields and even the production of certified seed stock.

The Colebrook area, as this territory is known in New Hampshire, was formerly so specialized in potato growing that many starch factories were located nearby. With the changed conditions brought about by economic forces during the past 50 years in New England, dairying has come into major prominence in this region and the starch factories have gone out of business. However, potatoes have persisted as a side-line on nearly all farms, being the chief cash crop aside from dairy products.

Station Becomes Interested

The New Hampshire Experiment Station recognized the importance of the potato crop here and in an attempt to carry its work out closer to the farmers of the state located in 1927 a tract of land suitable for experimental work on the potato crop.

The field chosen is on the farm of John Jackson, a man vitally interested in potato growing and marketing and in the results of the experiment now in progress. He is the type of man who can be absolutely depended upon to carry out any field work necessary to be done when those actually responsible for the work are not there. We sometimes feel that he may neglect his own work to help us out on occasion, although he is growing about 50 acres of potatoes himself. As the experiment is located about 200 miles from the Station headquarters at Durham, it seemed necessary to choose a field on the farm of a man like this.

The field was heavily infested with quack or "witch" grass as it is generally called in New England. One of the reasons farmers in the Colebrook area give for not growing more potatoes is that quack grass is too abundant and vigorous. As that seemed to be an obstacle in the way of the potato operations of a good many men, we were glad to undertake the work in this field and have actually carried out a demonstration on the control of quack grass along with the fertilizer work on the potato crop.

Although the rotation generally practiced in this area is a long one, of from 5 to 10 years' duration, our thought was to follow a short rotation, one in which the potatoes would benefit from a clover sod. The field was therefore divided into three parts so that each crop could be grown every year. The rotation that we are following is potatoes followed by oats and alsike clover.

The Best Fertilizers?

Our job seemed to be to find out, not whether potatoes would respond to fertilizers—we already knew that they did—but rather what the best formula for potatoes might be. It appears to be quite important in producing a crop to which a ton of fertilizer is being applied to see that none of

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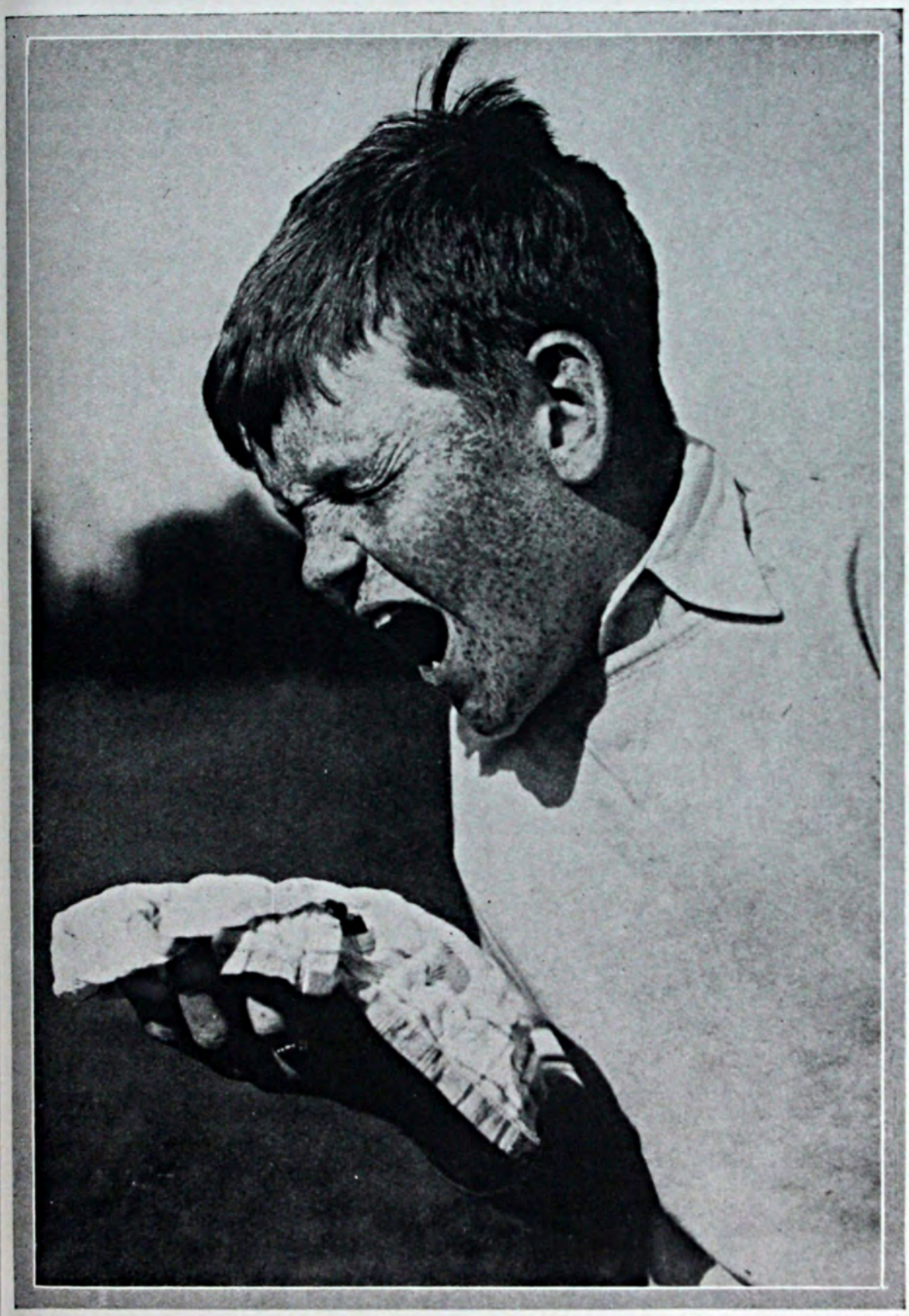


By Ewing Galloway, N. Y.

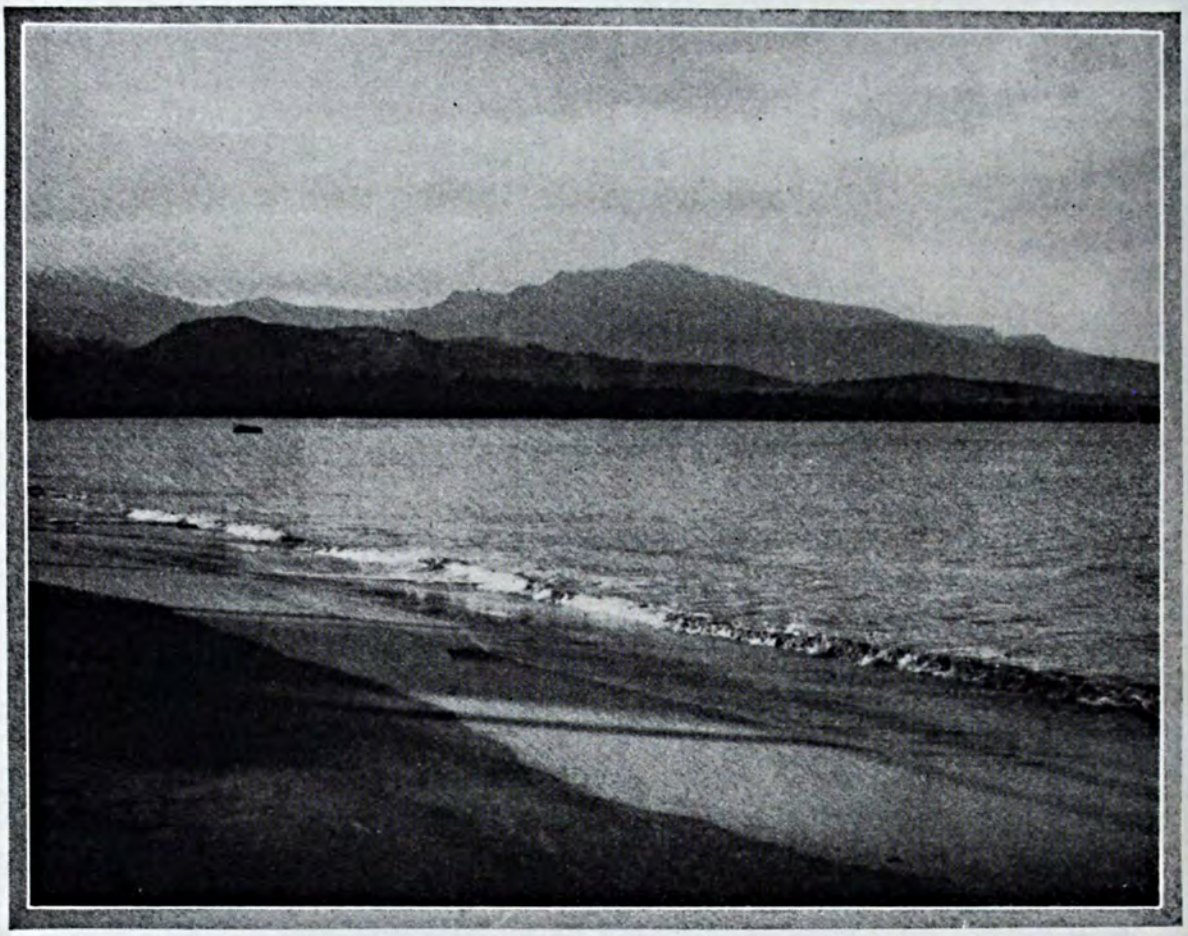
PICTORIAL

Left: Where it is "February" the year round — Mont Blanc, the highest peak in the Alps in Switzerland.

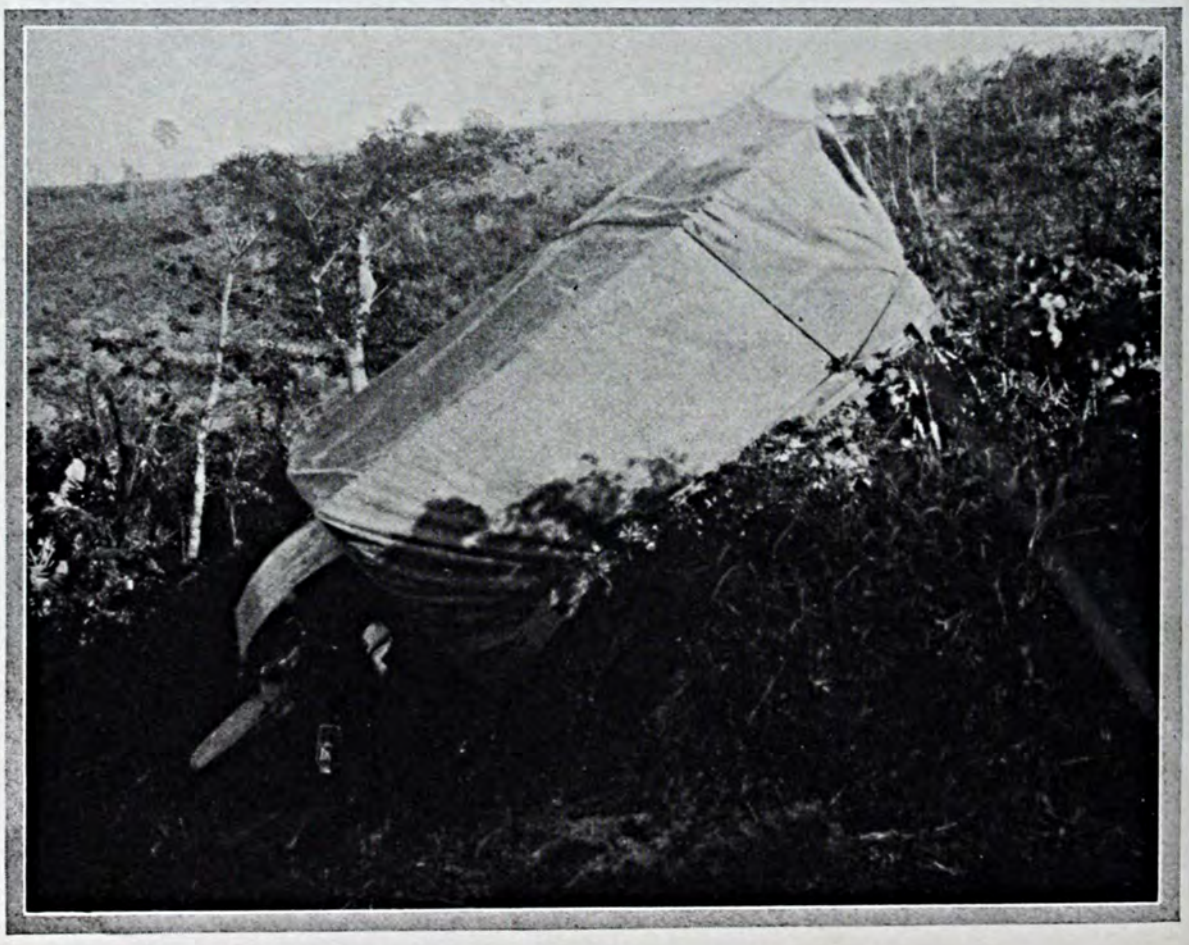
Below: Homeward bound after a busy day—a group of fishermen coming in after a day off the North Atlantic coast.

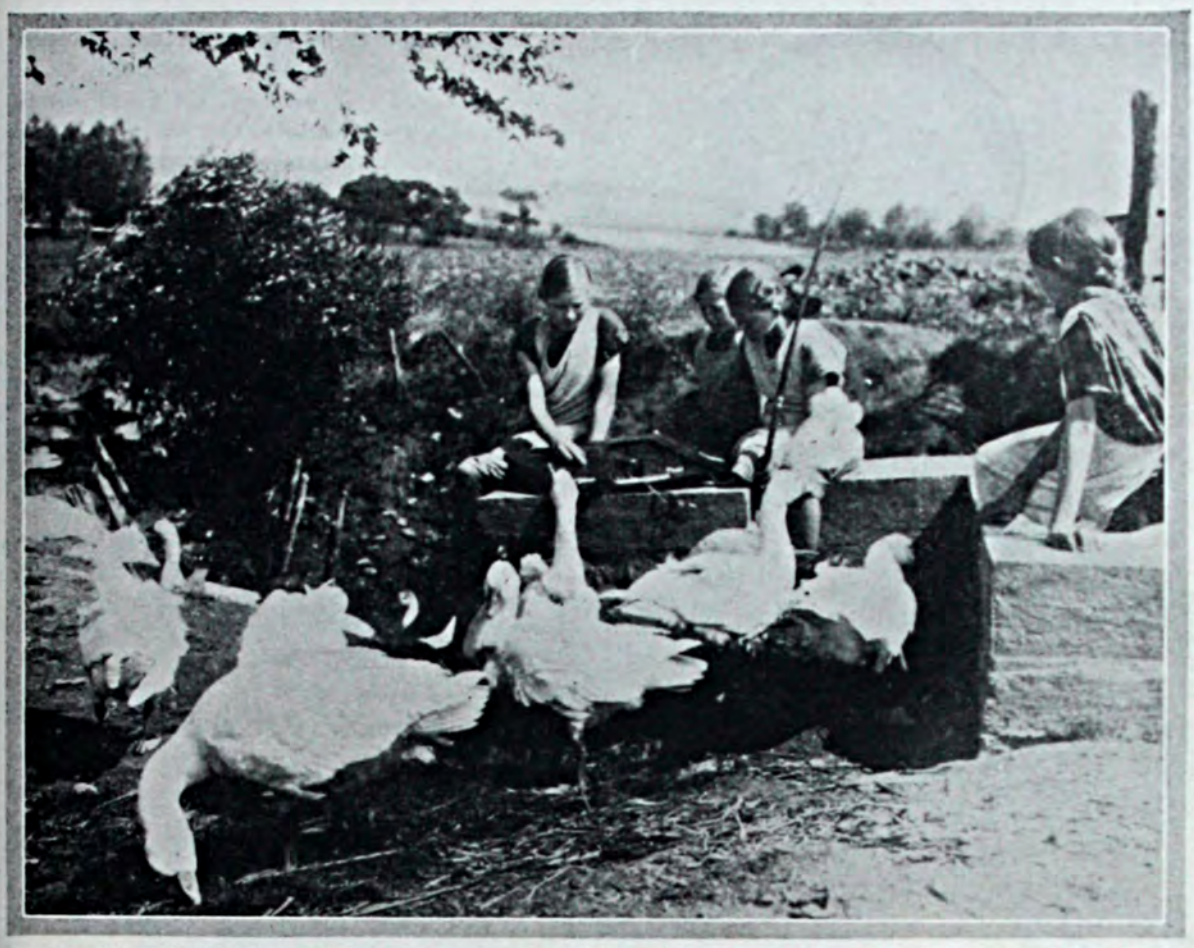
Right: A proud ruler of the high spots in America — the Rocky Mountain goat always wears a heavy "fur coat."

Below: Not a winter scene, but cherry blossom time in Washington, D. C.



Above: El Yunque, 3,483 feet, highest point of the Luquillo mountains of Porto Rico—until recently thought to be the highest elevation of the Island.
Below: A frequent sight on Porto Rico's mountain roads.





Above: These little "goose-girls" of the ancient village of Stroebeck, Germany, follow an old tradition by playing chess while they tend their flocks.

Below: A scene on a hops farm in Germany.

Erastus Parke of Burtt's Corner, New Brunswick, won first on certified Green Mountain seed potatoes, the grand championship for Canada, and the potash trophy at the Royal Agricultural Winter Fair held in Toronto. Mr. Parke's average crop of potatoes is about 9 acres, and this year he got a yield of 466 bushels per acre. He fertilizes with one ton per acre of 4-6-10 for his potatoes and takes a crop off the same ground every third or fourth year.

Mr. Parke has been growing potatoes for 20 years and was one of the first farmers in his district to use fertilizers and the first to try out a potato digger. He says that fertilizers have helped him greatly in building up the worn-out soils of his farm and in the production of high average yields.

(New Brunswick Government Bureau of Information photo.)

The Editors Talk

See More Demand for Farm Products

It is very gratifying to find a distinct note of optimism in the report of the Annual Outlook Conference just issued by the Bureau of Agricultural Economics, U. S. Department of Agriculture. This optimism rests in the prospect for a gradual recovery in the domestic demand for farm products the latter part of this year, and for lower production costs. Except in the case of wheat and pork products, some recovery in foreign demand also seems likely, according to the bureau.

The prospect of improvement is based on the belief that the world-wide economic depression will have run the worst of its course by the summer of 1931 as consumption of many industrial products is now outrunning production. Prospects also will be affected by the volume of agricultural production in 1931.

Although production credit may be curtailed, ample marketing credit is expected. Farm wages are the lowest in many seasons and building materials and fertilizer prices are lower than they were a year ago.

The report states that "wheat growers are faced with rather discouraging market prospects; that unless yields throughout the world should be materially below average, prices are likely to continue to be low. World production has been increasing faster than consumption for some years and burdensome stocks have been piling up so that the world carryover on July 1 next will again be abnormally large.

"Some increase is expected in the commercial consumption of corn in the United States, but foreign demand is not expected to be large unless the production of feed crops in Europe is less than average and the Argentine surplus is small. Prices in the 1931-32 season are expected to average somewhat lower than in the current season, but some improvement in cash corn prices is looked for before the 1931 crop is available. There will be a tendency to increase corn acreage in the Corn Belt to replace reduced stocks.

"There will be a decreased market demand for oats, and livestock producers in the spring wheat area are advised to cut sufficient oats for hay to insure ample forage for feeding requirements, in view of prospective small hay supplies next season. There is indication of less strength in the market demand for barley. Prospect of a slight reduction in hog production this year is regarded as a favorable factor in the long-time outlook for the hog industry.

"Cattle prices the first half of 1931 are expected to average considerably below those of the first half of 1930, but it is believed that prices of most classes and grades will improve during the second half of the year. The livestock industries will have the advantage of relatively cheap feed grain.

"The dairy industry has been expanded to the point where even with the expected improvement in the business situation the bureau believes that the former favorable relations of prices of dairy products to the prices of other

farm products will not be restored this year. Domestic prices of dairy products have declined nearly to the world level, and foreign markets do not afford an advantageous outlet for American dairy products."

With regard to vegetables the bureau says that "increased supplies of potatoes in prospect in the 1931 crop year will more than offset any improvement in demand; a large increase in sweet potato production is expected; cabbage growers in the late States will receive lower prices than in 1930 unless acreage is reduced; lettuce growers must guard against over-expansion in production; production of late onions should be reduced; and the maintenance of the 1930 acreage of tomatoes for canning and manufacture this season may result in excessive supplies."

The bureau says of fruits, "Market prospects justify the maintenance of the present numbers of apple trees in commercial orchards, and possibly some increase; although the trend of orange production is upward, the increase now in prospect does not appear excessive; grapefruit production is increasing in all regions and promises to lead to serious over-production unless consumption should be increased much more than is expected; in most peach-producing areas outside California the prospective changes in bearing acreage are moderate; commercial strawberry acreage for harvest in 1931 promises to be considerably smaller than in 1930. Grape growers face difficult marketing conditions for the next several years.

"The general market outlook for tobacco is less favorable than it was a year ago. The domestic demand for tobacco has weakened, and the foreign demand is only fair. Some decrease in acreage in 1931 from the indicated high total of 2,110,300 acres harvested in 1930, especially in the flue-cured and burley areas, would favorably affect the market outlook for these types.

"Rice acreage in the Southern States can probably be maintained at about the present area without depressing prices below the 1930-31 level. Flax has brought high relative returns as compared to wheat and other small grains the last few years, but these levels are not likely to continue during 1931."

The conference from which the above are only a few of the more than forty farm crops and classes of livestock on which a national outlook was given, was attended by more than fifty leading agricultural economists, extension workers, and commodity specialists from all parts of the United States. Practically every State in the Union was represented and these States are to issue State or regional outlook reports following this national conference, and hold meetings with farmers to give them the results of research upon which they may shape their 1931 production plans.

The prominent place of agricultural economics in present-day agricultural education is seen in the wide interest with which this conference was awaited and in the wide-spread dissemination of the outlook material. Forty States prepared State or regional outlook reports following the issuance of the National Outlook for 1930, and more than 4,000 outlook meetings were held. It is rightly expected that even more interest and attention will be given the careful studies and conclusion summarized at this year's conference.

Successful Diversification

Radical changes are taking place in Cuba's economic structure as the result of the collapse in price of the Island's major product—sugar—so reports Commercial Attaché Frederick Todd in a bulletin issued by the United States Department of Commerce.

This readjustment is of vital interest as showing an instance where a single cropping system of agriculture has of necessity been changed and is being changed. As the report points out, Cuba has been more or less dependent on the status of sugar. When sugar was selling at 23 cents a pound, everything was well, but at the present time the price of sugar is close to one cent. Thus, at the present time the people of Cuba are producing something which can neither be sold at a profit abroad nor exchanged at home for the things they need.

As a cure for this situation, according to the study made by Mr. Todd, Cubans have begun to produce many of the articles that they formerly imported. They are also raising a number of foodstuffs which they formerly obtained from abroad. The Cuban people thus believe that they are entering the first stages of a new economic era in which they will be no longer dependent on one or two products for their income. A surprisingly long list of products which are now being regularly produced in Cuba is given in the bulletin.

Thus, out of this study two points merge—first, Cuba is not necessarily permanently down because they have in the past depended more or less solely on sugar; and secondly, while American agriculture as a whole is highly diversified, there are still regions where dependence is placed very heavily on the price of a single crop. What Cuba is doing will undoubtedly be a great encouragement for her people to strive further in diversified production, and, too, it is an interesting and instructive example for other crop-producing areas.

Fertilizer for Prizes

A novel contest in which commercial fertilizers are to be the prizes is being introduced in Minnesota. According to George W. Kelley, Farm Editor of the Duluth *News-Tribune and Herald*, prizes consisting of commercial fertilizers are to be offered by the crops and soils sub-committee of the Duluth (Minnesota) Council of Agriculture.

The prizes, three to each county of the Arrowhead region of northeastern Minnesota, will be awarded for the best work in variety tests of farm crops under the direction of high school teachers of agriculture. Each premium will consist of commercial fertilizer sufficient to replace the nitrogen, potash, and phosphorus taken from an acre by the crop grown. High school students and farmers are to be eligible. The plan is to add to the data on varieties recommended by the experiment stations and to disseminate knowledge of soil fertility drains by different crops. Potatoes, rutabagas, clover seed, small grains, and grasses are the principal products of the area.

This contest will undoubtedly be watched with much interest as a means of extending information on the use of fertilizers for profitable crop production.

Farm Wages are Lowest Since 1922

Farmers depending upon hired help may be encouraged to find this spring that they can secure good help for less money than at any time since 1922. According to a survey recently made by the Bureau of Agricultural Economics, U. S. Department of Agriculture, a sharp increase in the supply of farm labor, together with a further decline in the demand for farm help has forced the index of the general level of farm wages for January 1, 1931, to the lowest level on record for that date during the period it has been

computed quarterly (1923-1931). The wage index, at 129 per cent of the pre-war level on January 1 this year, was 21 points down from October 1, 1930; 29 points lower than a year ago; and 8 points below January 1, 1923, according to the Bureau.

"Day wages of farm workers not provided with board averaged $1.87 for the country on a whole on January 1, while the division averages ranged from $2.99 per day for the North Atlantic States to $1.25 in the South Central division.

"Wages paid hired farm labor during 1930 averaged lower than in any year since 1922. The weighted average index of farm wages last year was 152 per cent of pre-war as compared to 170 in 1929, and 146 per cent of pre-war in 1922.

"The supply of farm labor, as reported by crop correspondents, averaged 113.8 per cent of normal on January 1, as compared to 109.6 a month earlier, 105.9 on October 1, 1930, and 96.7 per cent of normal a year ago. The increase in the supply is attributed to the long continued decline in industrial employment.

"Although a large number of workers formerly employed in manufacturing industries are now available for farm work, the bureau reports that the demand for farm labor is the smallest in many years as the result of the extremely low current prices of farm products. Demand was reported at 66.6 per cent of normal on January 1, as compared to 68.9 a month earlier, 75.2 on October 1, and 84.2 per cent a year ago."

This condition may be expected to last until there is a material recovery in general business activity. It should operate to the advantage of agriculture.

Good Will Advertising

The wisdom of the famous statesman and orator, Henry W. Grady, who in his New York speech in 1886 said, "We have learned that the $400,000,000 annually received from our cotton crop will make us rich when the supplies that make it are home-raised," has been resurrected to serve as a basis for an advertising program by the International Agricultural Corporation in southern farm papers.

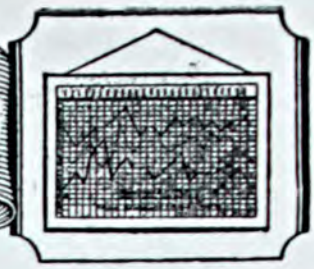
The "Live-at-home" program of Mr. Grady finds application today in the present emergency just as it did forty years ago. A one-crop system sooner or later inevitably meets its Waterloo, and the farmers of the South must make of cotton a "clean surplus" crop.

The advertising of the International Agricultural Corporation is not mere talk. Concrete facts and figures have been cited to prove that the "Live-at-home" program with more than one cash crop is economically safe and sound. We feel sure that progressive farmers, bankers, and business men throughout the South will greatly appreciate the admirable way in which the information is presented.

President John J. Watson and his company are to be thanked and congratulated for their perspicacity in helping to pull the farmers of the South from the "Slough of Despond" to firm economic ground.

Again, this advertising campaign is for good will only and it is calculated to help not only the farmers of the South but also all of those who conduct business in that section. We must, therefore, take off our hats to the International Agricultural Corporation for its generosity and magnanimity in the face of present conditions.

AGRICULTURAL DEVELOPMENTS



COLLECTS NICE SUM FROM HIS FATHER

Emil Jorgenson, county agent of Waushara county, Wisconsin, added $305 to his income last year. Failing to persuade his father, Fred T. Jorgenson of Waupaca county, that commercial fertilizer would prove profitable on his potatoes, Emil offered to buy the fertilizer if his father would give him the increase in selling value brought about by the fertilizer. The offer was accepted, and Emil paid $95 for 3-9-18 fertilizer for nine acres. He got $400 for the extra potatoes. Dad will buy his own fertilizers hereafter.—*George W. Kelley, Duluth, Minnesota.*

HOME-GROWN FOODS CUT HEALTH - PROTECTION COST

"A good cow or milk goat is one of the best investments a family can make to insure a satisfactory food supply," says the subcommittee on nutrition information, directed by the National Drought Relief Committee. "Milk contains the greatest assortment of nutrients of any single food material, and is the foundation upon which an adequate diet can most safely and easily be built. It is particularly important for its proteins of good quality, for calcium, for vitamin A, and for the pellagra-preventing factor."

"Every member of the family should have potatoes," according to these nutrition specialists, "tomatoes, raw cabbage, or other vegetables of green or yellow color." The home garden can be depended upon for all these foods. Some of them can be stored throughout the winter, others canned.

The poultry flock is always mentioned in the "live-at-home" programs of home demonstration agents in the cooperative extension service of the United States Department of Agriculture and the land-grant colleges. As a source of eggs and meat in the diet poultry contributes to the food supply. In some parts of the South, the drouth has played havoc with crops and has greatly depleted livestock, so that there is a shortage of home-grown products and also of ready cash. The committee on nutrition information nevertheless emphasizes the importance of continuing to try to maintain gardens, poultry, and one or more cows, wherever it is possible. Otherwise there is danger that many families will try to get along on too one-sided a diet, with pellagra and other physical disorders as a result.

If vegetables and fruit can not be grown, some of the food money should be spent for them. Canned milk and milk powder may be used in localities where it is difficult to secure good fresh milk, and where ice is not obtainable. Skim-milk has value. If it is the only kind of milk used, it should be supplemented, if possible, by 1 or 2 ounces of cod-liver oil per person per week.

NEW GLUE FROM SOYBEAN OIL

Ottawa, Canada — Experiments, which have been conducted for some time by the Forest Products' Laboratory, of the Canadian Government Department of Interior, give promise of a new glue being developed from a by-product of soybean oil. This new glue is likely to prove very valuable as an adhesive, particularly in the manufacture of ply-woods.

THE VIKING RASPBERRY

The Viking is an excellent new red raspberry, which is the result of a cross between the Cuthbert and Marlboro varieties. The former was used as the female parent and the latter as the male. This cross was made at the Horticultural Experiment Station at Vineland Station, Ontario, Canada. Its popularity has increased by leaps and bounds the last few years.

Because of its hybrid origin Viking has extreme vigor. The canes grow straight and strong and to a height of seven or eight feet. The canes are nearly thornless and hold up their heavy load of fruit without protruding in the row or tangling with the foliage of the new canes. These characteristics make the new variety preferred by pickers.

The large, bright fruit of this variety make it the leading one in markets.

Professor F. S. Reeves of Southport, Canada, who has grown Viking for several years, says, "For the Viking's good appearance the consumers prefer it, for its mannerly habits the pickers prefer it, and for its general all around good qualities the growers prefer it."

Viking is rather resistant to disease and it appears to take mosaic only in a mild form. This variety has been tested in New York and other States. George L. Slate, raspberry specialist in New York, says, "I think if I were setting out a plantation myself, I should prefer Viking to any other variety."—*E. N. Bressman, Corvallis, Oregon.*

CORN BELT MOVING NORTH

Regina, Saskatchewan.—The "Corn Belt" of North America has, in the last few years, slowly pushed its way north and today many parts of the prairie provinces of Canada are producing corn of different varieties and of high quality.

At the fifth corn show under the auspices of the Saskatchewan Corn Growers' Association, one of the finest exhibits of corn in the history of Western Canada was on display. The show was held in preparation for the World's Grain Exhibition and Conference to be held at Regina, in 1932, and many entries in the corn classes of the 1932 world-wide event may be expected from the farmers of Western Canada. A total of $19,000 is being offered in cash prizes in the different classes for corn.

AGRICULTURE INVESTS

The Federal Government and State agricultural experiment stations spend close to $30,000,000 a year to learn how to control production, reduce loss, and increase the profits of the $60,000,000,000 agricultural industry. This is only three-tenths of 1 per cent of the annual turnover of $10,000,000,000, a somewhat smaller proportion than the $200,000,000 which other industries invest in research.

This investment in research, according to Dr. A. F. Woods, director of scientific work of the United States Department of Agriculture, has made American agriculture, with all its shortcomings, the best in the world. Not only has it placed the business of agriculture on a sounder basis than it otherwise would be, but it has also brought about a conservation of the Nation's wealth of forest and animal life. Other industries have found their research expenditures a good investment in progress, Doctor Woods says.

POTATOES ARE GROWN IN EVERY PROVINCE

The total yield of potatoes in Canada in 1930 totalled 81,933,333 bushels, from 574,500 acres, an average yield of about 142 bushels per acre. In 1929 the yield was 66,550,000 bushels from 543,727 acres, an average yield of about 122 bushels per acre. Potatoes are grown successfully in commercial quantities in every province of the Dominion.

The Inquiring Mind

(*From page* 24)

to get them interested. One can, therefore, imagine the joy he felt when on returning 10 years later, he found a flourishing orchard at the home of nearly every one of his former pupils. They had not forgotten the instructions and demonstrations given by their teacher, but had waited until they had homes of their own and a free hand to put them into effect. In the agricultural school of El Vergel there are, today, many Indian boys who are sons, brothers, cousins, and nephews of Mr. Bullock's former students. They remember and appreciate the work done in the past, and now send relatives to the school.

The church at El Vergel, Angol, Chile, as seen from the park and flower gardens.

El Vergel, formerly called Bunster Farm School, has two farms. The part west of the Malleco River comprises 917 acres of river bottom land, the greater part of which is irrigated and used for nursery, orchard, flower garden, vegetable garden, dairy, and school purposes. The other part of the farm, lying east of the river, consists of 2,890 acres of very hilly and, in some places, rocky land, not suitable for irrigation. The soil, however, is excellent for wheat and oat growing and, during most of the year, for grazing purposes. The Institution is not only a Missionary School, but is a successful commercial enterprise; not for money making, but to support and maintain both teachers and pupils. The valley in which Angol is situated is singularly suitable for school and farm purposes.

The climate is extremely mild, so that apples, peaches, plums, quinces, and cherries abound. Apricots, persimmons, and English walnuts also flourish. Surprising as it may seem, such semi-tropical fruits as oranges, figs, lemons, grapefruit, olives, and even alligator pears also thrive in the valley, where snow rarely falls. The principal farm crops are, wheat, oats, barley, corn, beans, lentils, and potatoes. The mild winter makes it possible to have several kinds of fresh vegetables at all times during the year.

El Vergel has the largest nursery south of Santiago and the second largest in Chile. In it are some 2,600 bearing trees, mostly apples, besides a large number of young trees which will soon come into bearing. In all,

the nursery has over 650 varieties of fruits on trial, and contains nearly 900,000 plants of all kinds. Elbert E. Reed, a graduate of Iowa, has been in charge of the orchards and nursery since 1920, that work being his specialty, and wonderfully well executed. He is also responsible for the office, as well as the business relations of the Institution.

Dairying with finely bred cows is fast becoming an important department of the farm. From 40 to 60 cows are milked. Horses now number 71 head; cattle, 272 (including 119 work oxen); sheep, 673; and pigs, about 150. The sheep are grade Hampshires and the pigs grade Duroc-Jerseys. The sires are purebred.

The farm harvest for 1929 gave a total of 4,658 bushels of wheat, 1,626 of barley, 3,115 of oats, 1,532 of potatoes, 888 of lentils, and 331 bushels of beans. Wheat, barley, and lentils are principally cash crops. Some of the wheat is used to feed the workmen, and the oats, corn, potatoes, and beans, not used for local consumption, go to market.

El Vergel Rates High

The school has been in operation for eight years and four classes have been graduated. The course of study consists of three years of school work, together with actual practice in the field, and one year of practice in the particular section elected by the student. The signal success of some of the graduates has given the school standing and position among the educational institutions. The total average attendance of the school and its primary school is 65 daily. Both schools are under the direction of Mr. Bullock and receive a government grant sufficient to cover about half of the annual cost, the remainder being borne by the farm.

The strictly church work, with Mr. Bullock as pastor, is intended primarily to minister to the spiritual needs of the workmen and their families. Religious instruction is also a regular part of the school curriculum. By the different means employed, it is hoped the students will be so grounded in the principles of Christian living that they will lead useful Christian lives. The beneficient influence of the spiritual and moral ministration of Mr. Bullock is well evidenced by the fact that, in one day, he married some 22 native couples who previously had been living under common law conditions.

Another highly important feature of the work at El Vergel is the summer conferences and encampment for Christian workers of all denominations who speak English and for young people of all the Protestant churches of Chile. There are also two or more annual encampments of the Y. M. C. A. and Y. W. C. A. of Santiago and Valparaiso.

A Life of Service

These varied activities comprise a unique and wonderful undertaking for friend Bullock and his associates. In a way, the work means isolation and martyrdom. To the writer, it appears a fine expression of self-sacrifice, unselfishness, fortitude, and Christian purpose in this modest, unassuming, enterprising scientist. Although eminently qualified to head some great agricultural institution of research and education in his native land, he has elected, with his wife, to devote his life to the intellectual, practical, and spiritual training of the uncultured natives of a far country. Probably there will be meager financial gain and applause in his chosen work; but at least he will have the satisfaction of knowing that he is obeying the dictates of his conscience and usefully serving The Master. He hopes that the small corner of the world in which he and Mrs. Bullock are working will be a bit better for their influence and that the people there in consequence will have higher ideals.

We who remain at home can but extend them Godspeed and wish them success in their "Great Adventure."

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

The annual "Report of The Chief of The Bureau of Chemistry and Soils" of the United States Department of Agriculture, by H. G. Knight is an interesting and illuminating digest of the work accomplished and in progress in 1930.

"The Bureau of Chemistry and Soils is primarily a research and fact-finding organization whose activities cover a wide range of subject matter pertaining to land utilization, soil fertility, fertilizer resource development, and the utilization of agricultural products of various kinds. The bureau has for its objective the gathering of information and the determination of scientific facts and principles through experimentation and research to the end that these may be applied to the conservation and utilization of American soils and to crop-production and crop-utilization problems of regional and national importance."

The report gives a brief account of the progress of the work to date, together with a few statements as to information that has so far been obtained. It is the latter which makes the report especially interesting.

The fertilizer requirements of the cranberry are naturally somewhat peculiar, owing to the unusual conditions under which it grows, and data on the use of fertilizers for this crop are rather limited. Thus, the work of C. S. Beckwith of the "Effect of Fertilizers on Cranberry Land" (New Jersey Agricultural Experiment Station, Bulletin 501, June, 1930), should be of great interest to cranberry growers. The data over a period of years indicate that a complete fertilizer with an approximate ratio of 1-4-2 at 500 to 750 pounds per acre a year should be used. The nitrogen should be partly of inorganic and partly of organic origin, a readily available phosphorus carrier should be used and sulphate of potash is recommended as a source of potash. The fertilizer is shown not only to have increased the yield, but also the quality of the berries. The fertilized cranberries were larger and had less rot than the unfertilized.

"Commercial Fertilizers, Report for 1930," Agr. Exp. Sta., New Haven, Conn., Bul. 321, Oct., 1930, E. M. Bailey.

"Report of Analyses of Commercial Fertilizers," La. Dept. of Agr. & Immigration, Baton Rouge, La., Fert. Rept., 1929-1930, Harry D. Wilson.

"Sources of Nitrogen for Potato Fertilizers in Aroostook County," Agr. Exp. Sta., Orono, Me., Bul. 354, Apr., 1930, B. E. Brown, F. V. Owen, and E. R. Tobey.

"Fertilizer Recommendations for 1931," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 53 (Rev.), Nov., 1930, C. E. Millar, G. M. Grantham, and P. M. Harmer.

"Tabulated Analyses of Commercial Fertilizers," Dept. of Agr., Nashville, Tenn., Oct. 1, 1930, W. J. Fitts and H. P. Strack.

"Fertilizers for Pecan Soils," U. S. D. A., Wash., D. C., Leaflet No. 71, Nov., 1930, J. J. Skinner.

Soils

An excellent guide to the various soils of Connecticut and their fertilizer needs has been prepared by M. F. Morgan in "The Soils of Connecticut,"

(Connecticut Agricultural Experiment Station, New Haven, Bulletin 320, September, 1930).

The first part of the bulletin describes the various soil types, and gives a key to their identification. In this connection a well-prepared map showing the location of the soils is appended. The second part of the bulletin briefly considers the uses to which the different soils have been put; while the third part deals with their chemical composition. Under this latter subject, it is pointed out that the total phosphorus in the soils of this state is moderate, but the availability is low. The potash content is also moderately high, especially in the heavier soils. However, the author points out that "in spite of the high amounts of total potassium, the soils of this state that have not been liberally fertilized or manured are commonly so deficient in available potassium that most crops grown upon them are apt to suffer from a deficiency in this element." Most of the soils of this state naturally tend to be acid, but the actual acidity in any particular location will be largely dependent upon the treatment the soil has had. The fourth and last part of the bulletin treats in some detail the fertilizer needs of the various groups of Connecticut soils. The crops naturally have different requirements, but it is shown that in general most of them studied need phosphorus and potassium fertilizers on most soils.

Bulletins of this type are of great aid and value to County Agents within the state and in surrounding states with similar soils, and Connecticut is fortunate in having such a well-prepared publication.

"Soil Survey of The Bear Lake Valley Area, Idaho," U. S. D. A., Wash., D. C., No. 15, Series 1926, E. N. Poulson and N. C. Derrick.

"Soil Survey of Jackson County, Michigan," U. S. D. A., Wash., D. C., No. 17, Series 1926, J. O. Veatch, F. W. Trull, and J. A. Porter.

"Soil Survey of Menominee County, Michigan," U. S. D. A., Wash., D. C., No. 31, Series 1925, J. W. Moon, M. W. Beck, L. R. Schoenmann, and J. O. Veatch.

"Soil Survey of Polk County, Missouri," U. S. D. A., Wash., D. C., No. 18, Series 1926, H. H. Kruseckopf, Howard V. Jordan, and M. W. Beck.

"Soil Survey of Lenoir County, N. C.," U. S. D. A., Wash., D. C., No. 2, Series 1927, R. C. Jurney and W. A. Davis.

"Soil Survey of The Grande Ronde Valley Area, Oregon," U. S. D. A., Wash., D. C., No. 16, Series 1926, A. E. Kocher and W. L. Powers.

"The Physical and Chemical Characteristics of Certain American Peat Profiles," U. S. D. A., Wash., D. C., Tech. Bul. 214, Nov., 1930, Irvin C. Feustel and Horace G. Byers.

Crops

"Monthly Bulletin of the Department of Agriculture, State of California," Dept. of Agr., Sacramento, Calif., Vol. XIX, No. 11, Nov., 1930.

"St. Johnswort on Range Lands of California," Agr. Exp. Sta., Berkeley, Calif., Bul. 503, Dec., 1930, Arthur W. Sampson and Kenneth W. Parker.

"Annual Report of the Maine Extension Service for the Year Ending June 30, 1929," Univ. of Me., Orono, Me., Bul. 191, Apr., 1930.

"A Chemical Study of Cranberries," Agr. Exp. Sta., Amherst, Mass., Bul. 265, Oct., 1930, F. W. Morse.

"Hardy Woody Plants," Agr. Exp. Sta., Amherst, Mass., Bul. 267, Oct., 1930, Frank A. Waugh and Charles H. Thompson.

"Alfalfa Trials at the North Central Experiment Station," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 267, June, 1930, Otto I. Bergh.

"Identification of Cultivated Raspberries," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Tech. Bul. 66, Apr., 1930, J. D. Winter.

"Annual Report of Extension Work for 1929 in Agriculture and Home Economics in Mississippi," Miss. A. & M. College, A. & M. College, Miss., Ext. Bul. 54, July, 1930, R. S. Wilson.

"The Production and Storage of Sweet Potatoes," Agr. Exp. Sta., A. & M. College, Miss., Bul. 279, Aug., 1930, J. C. C. Price.

"Cotton Inheritance Studies, Lint Percentage," Agr. Exp. Sta., A. & M. College, Miss., Tech Bul. 18, Sept., 1930, J. Fred O'Kelly and W. W. Hull.

"Production and Feeding of Silage," Agr. Exp. Sta., Columbia, Mo., Bul. 287, July, 1930, L. J. Stadler, M. M. Jones, C. W. Turner, and P. M. Bernard.

"Dry-Land Shelter-belt Tests at the Judith Basin Branch Station," Agr. Exp. Sta., Bozeman, Mont., Bul. 233, Oct., 1930, I. J. Jensen and F. M. Harrington.

"Wheat Varieties Under Irrigation," Agr. Exp. Sta., Bozeman, Mont., Bul. 234, Oct., 1930, LeRoy Powers.

"Dry-land Shelter-belt Tests at the Northern Montana Branch Station," Agr. Exp. Sta., Bozeman, Mont., Bul. 235, Oct., 1930, F. M. Harrington and Geo. W. Morgan.

"Growing Potatoes in the Home Garden," Univ. of N. H., Durham, N. H., Ext. Cir. 110, July, 1930, O. Butler.

"Development and Ripening of Peaches as Correlated with Physical Characteristics, Chemical Composition, and Histological Structure of the Fruit Flesh: II. Histology and Microchemistry," Agr. Exp. Sta., New Brunswick, N. J., Bul. 507, Sept., 1930, R. M. Addoms, C. T. Nightingale, and M. A. Blake.

"Climate as It Affects Crops and Ranges in New Mexico," Agr. Exp. Sta., State Col., N. M., Bul. 182, Mar., 1930, Charles E. Linney, Fabian Garcia, and E. C. Hollinger.

"Film Strips of the U. S. Department of Agriculture," U. S. D. A., Washington, D. C., Misc. Pub. 91, Oct., 1930.

"Everbearing Strawberries," U. S. D. A., Washington, D. C., Farmers' Bul. 901, Oct., 1930, George M. Darrow.

"Supervised or Directed Practice in Evening Agricultural Schools," Federal Board for Voc. Education, Washington, D. C., Monograph No. 9, Oct., 1930.

"List of Technical Workers in the Department of Agriculture and Outline of Department Functions, 1930," U. S. D. A., Washington, D. C., Misc. Pub. 93, July 1, 1930.

"Second-growth White Pine in Wisconsin, Its Growth, Yield, and Commercial Possibilities," Agr. Exp. Sta., Madison, Wis., Res. Bul. 98, June, 1930, S. R. Gevorkiantz and Raphael Zon.

Economics

The prices received by farmers for their products appear to be the most reliable guides to probable future changes in farm production. In view of this fact, such studies as that presented by Roger F. Hale in Bulletin 321 of the University of Maryland, Agricultural Experiment Station are highly valuable. Entitled "Prices Paid for Maryland Farm Products, 1851-1927," this bulletin contains monthly prices received by Maryland farmers for 34 different products and annual prices for several additional products. An index number of the composite series is also presented.

Such data are not only of value from a historical viewpoint, but they are of especial value to agricultural statisticians and economists who are interested in studying the inter-relationships between supply, demand, and price.

"Wheat," Agr. Exp. Sta., Berkeley, Calif. Bul. 502, Nov., 1930, E. W. Braun.

"Buying Tomatoes on Grade 1929," Agr Exp. Sta., Lafayette, Ind., Bul. 336, Feb. 1930, Fay C. Gaylord and John H. MacGillivray.

"Principles of Farm Management," Univ. of Me., Orono, Me., Bul. 192, May, 1930, Donald W. Reed.

"Part-time Farming in Massachusetts," Agr. Exp. Sta., Amherst, Mass., Bul. 266, Oct., 1930, David Rozman.

"A Bibliography of the History of Agriculture in the United States," U. S. D. A., Washington, D. C., Misc. Pub. 84, Nov., 1930, Everett E. Edwards.

Diseases

One of the most important publications on the diseases of a major crop appearing recently is the new Bulletin 354, "Corn Diseases in Illinois, Their Extent, Nature, and Control." The authors, Benjamin Koehler and James R. Holbert, have compiled their data with graphs, illustrations, and colored plates into about as complete a volume on the diseases of corn as is to be found anywhere. The bulletin should find its way into a great many reference libraries, as well as into the hand of corn growers. There are several instances cited where fertilizers play an important part in disease control.

"Virus Diseases of Tobacco in Kentucky," Agr. Exp. Sta., Lexington, Ky., Res. Bul. 306, June, 1930, E. M. Johnson.

"Control of Common Diseases of Stone Fruits in New Hampshire," Univ. of N. H., Durham, N. H., Ext. Cir. 111, May, 1930, Stuart Dunn.

"Control of Cane-fruit Diseases in New Hampshire," Univ. of N. H., Durham, N. H., Ext. Cir. 114, Oct., 1930, L. P. Latimer and Stuart Dunn.

"Combatting Stamping-off of Tomatoes by Seed Treatment," Agr. Exp. Sta., Geneva, N. Y., Bul. 586, Oct., 1930, James G. Horsfall.

"Seed Treatment Reduces Loss from Plant Diseases," U. S. D. A., Washington, D. C., Misc. Pub. 94, Nov., 1930, F. C. Meier.

Roosevelt's Life Policy

Do what you can, with what you have, where you are.

IDAHO POTATOES BEING WASHED BEFORE MARKETING

The practice of washing potatoes before marketing is reported to be increasing in the West. Seymour Jones, Oregon State Market Agent, says that "in some parts of Idaho the potatoes are washed and dried before shipment, and it is claimed that 400 carloads have been thus treated so far this season. Potatoes undergoing this process are beautifully bright and clean, but they must be disposed of quickly in order to avoid deterioration, as they are subject to many unfavorable possibilities after washing."—*M. A.*

TENNESSEE SEES PROFIT FOR LOW-PRICED PRODUCERS

"Cotton growers must get high yields at low cost in order to profit," the University of Tennessee is telling producers in that state. "Cotton growers," according to the announcement, "who produce above average yields of quality cotton at low cost may expect fair returns for their labor and land this year but those who produce below average yields of low grades will receive low returns for their labor.—*Marketing Activities, January* 21 *and* 28, 1931.

The Rots of Corn

(*From page* 22)

crosses of inbred strains.

Even though resistance to these diseases is not dominant it would be possible to obtain strains which are pure for resistance and hybrids between unrelated inbreds would give hybrid vigor and also show this resistance. Where these root rots are important diseases the inbred strains that are being used for developing new varieties should be subjected to these diseases and their resistance determined.

The first important step in control is better field management, crop rotation, fertilization, and sanitation. For example, wheat should neither precede nor follow corn in the corn-wheat sections, because of scab fungus. The cleaning up of old corn-stalks will get rid of a large source of infection. Good seedbed preparation with sufficient plant food material in a balanced condition and correct time of planting will help greatly in reducing the amount of disease. Under optimum corn production conditions, root rot does not affect the yield if the seed is viable.

Of next importance is seed selection. Growers should not select ears for seed from infected stock. Only ears that ripen naturally on stalks that do not die prematurely and stalks that do not fall over should be used for seed. The selection of plants with erect ripened ears and green tops has been an effective means of getting rid of the different rots. Internal cob-discoloration is associated with the corn rots and reduced yield. This kind of seed should not be used.

Artificial curing of seeds has helped greatly in reducing the amount of disease. Seed should be selected as early as possible in the fall and the moisture gotten out of it as quickly as possible. Drying the kernel helps to protect against the fungus invading the scutellum.

The next step in combating these diseases is to conduct a germination test. It has been shown that early vigor and yield are closely associated. The use of the modified rag-doll or sawdust-box tester by which ears can be individually tested for not only ability to grow, but freedom from disease, is recommended. Many diseased

ears can be weeded out from the seed supply.

The treatment of seed with organic mercury dusts has helped in mild cases of infection and in springs of cold, wet weather. Wherever these diseases are suspected the dusts are worthy of trial.

The addition of plant food in the form of commercial fertilizer has consistently been of great value and, applications of potash have given excellent results with diseased corn. Plenty of potash in the fertilizer for corn will help materially in reducing damage due to the corn rot troubles.

Weedless Pastures

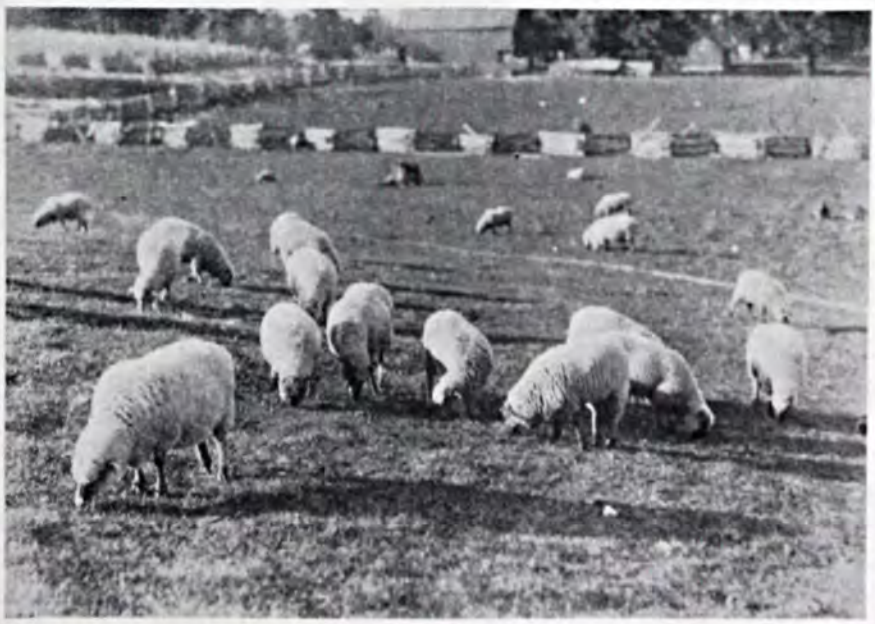
(*From page* 28)

applied. The expense should not be very great, and if this simple treatment doubles the carrying capacity of the land, it will prove a mighty good business proposition, for at small cost the pasture acreage has been doubled, and without the expenditure of a single nickel for taxes.

But lime and fertilizers do not tell the whole story, since pasture management plays an important part in coping with the weed problem. The most serious mistake in handling pastures is not over-grazing, as many farmers contend. The experiments of Carrier and Oakley of the Virginia Station indicate that over-grazing is almost impossible because animals will starve before grass is seriously hurt. Turning the livestock into the pasture too early in the spring before the grass has obtained a good start is the common error that results in much killing of the tender succulent grass, the place of which is soon taken by hardy weeds.

There is also a logical theory that close pasturing in early fall is detrimental. Let us keep in mind that plants manufacture plant food elements in the leafy parts of the plant. Perennials send a portion of the plant food back to the roots to strengthen them so that they may endure the winter or dormant period. Removing the livestock in early fall in order that fall growth of the leaves may be sufficient to store an adequate quantity of plant food in the roots is desirable. If this grass is bluegrass, it will make excellent pasture for late fall and early winter at which time the grazing can be continued.

In addition to lime and fertilizer as weapons that the farmers should use in driving out the weeds, clipping



Pasturing too close in early spring and early fall may prove detrimental to the grass.

should be practiced. Clipping will not only prevent obnoxious plants from forming seed but will also keep them in check by reducing their leaf surface. Mowing should be done twice a year. The first cutting should be made in June at which time the plants should be cut high, some six inches from the ground. A single mowing, however, is of little avail against such weeds as chicory and wild carrot, because these species have a habit of maturing a second crop of flowers and seed so close to the ground as to be out of reach of the sickle. This can frequently be corrected by cutting about six inches of stubble the first time, leaving a tall stubble on which the second crop of blossoms will form. As soon as the second crop is in blossom, mow close to the ground and the chances are that a third crop cannot set seed before frost.

Where pastures are infested with scattered specimens of heavy-rooted plants as ironweed, dock, and mullen, digging with a spade to cut the fleshy root is a practical means of control. The spud, a chisel-shaped implement, is probably the most satisfactory for the eradication of burdock and plants of that type. A farmer in Clallam county, Washington, devised an implement to be used in eradicating sedges that was very satisfactory. The implement was made much like a dirt scraper only it consisted of a blade or cutting edge that cut under and uprooted the plant. Two horses were used to supply power.

When it comes to eradicating perennial weeds with creeping rootstalks, more drastic means must be applied. It is true, however, that a good stand of grass will hold even Canada thistle and field bindweed in check. In most cases they are not killed but are kept dormant and do not spread. Where these weeds are confined to patches, they should be sprayed with chlorates. One or two applications of the spray should be sufficient to kill the roots and do away with the source of infestation. As the chemical kills all types of vegetation, it will be necessary to reseed the treated areas to grass after the chemical has completed its action. The soil should be back in a fertile state some six months after spraying.

Another method that has been very successful is to salt the livestock on the weed patches. The combined effects of the salt and tramping will cause the hardiest of weeds to "give up the ghost."

Under present conditions the pasture crop is the most neglected of all crops. There are altogether too many so-called pastures that furnish little aside from exercise for the livestock. If in too bad shape to warrant reclaiming, allowing the land to go back to forest trees may furnish a solution to the problem. A farmer can ill afford to pay taxes on land that does not bring returns, and only by making every acre pay can he hope to make the most of his farm.

Clover Needs Potash

(*From page* 26)

very small amount of clover. The ground not growing clover did not lie bare by any matter of means; the weeds came right in and claimed it. The yields given, however, are for the clover actually produced, the estimated yield of weeds having been deducted.

For 1930, the story is quite different. The young clover died on all plots except those where the treatments included either potash or manure. It will be seen that neither lime nor inoculation separately, nor a combination of the two of them insured

the stand of clover unless to this combination, potash or manure was added.

Manure is comparatively high in potash, and using the common analysis given for manure, about 80 pounds of actual potash were applied to the manure plots every two years or considerably more than was applied in the commercial muriate of potash.

It is also evident that no combination of inoculation, lime, nitrogen, and phosphorus was able to carry the young clover through the drought of July and August of 1929. On the other hand, lime, inoculation, and potash or some potash carrier were able to turn the trick.

Nothing so disrupts the sandy soil farmer's livestock and crop program as a failure of his clover to catch. The fact that potash pushes the clover "over the hump" on soils of this character is a distinct contribution to our knowledge of how to insure success. The residual effect of the clover produced as a result of the potash treatment is very marked, but that is another story which will follow at a later date.

A First-Prize Show

(*From page 29*)

Geo.—Well that certainly was too bad.

Sam.—Are you still raising potatoes?

Geo.—Yes.

Sam.—Well, how did they turn out for you.

Geo.—I got very good results this year.

Sam.—How is that?

Geo.—I am a member of the Riverside Potato club in Pierce county. Our club decided to have a fertilizer demonstration in order to see the value of certain kinds of fertilizers for potatoes. I had an acre of land that I was going to plant in potatoes so I measured off four-tenths of an acre for the fertilizer plots. (Indicates with hand.) Then I divided it into four

one-tenth acre plots. The first plot, I called "the check plot." The second plot, I called "the 3-10-0 plot." The third plot, I named "the 3-10-10 plot." And the last or fourth plot, I called "the 3-10-15 plot." (Divides plots with strings).

Sam.—Well, why do you call the first plot "the check plot"?

Geo.—Because it is the plot I check the value of the other plots by.

Sam.—Well, what is this 3-10-0, what does it mean?

Geo.—The "3" represents 3% nitrogen, the "10" represents 10% phosphoric acid, and the "0" represents 0% potash. Do you see that?

Sam.—Yes, but what's this 3-10-10?

Geo.—The 3-10-10 has one more element than the 3-10-0. This element is the potash of which there is 10% as shown in the formula. Do you see that?

Sam.—Yes.

Geo.—The 3-10-15 in this fourth plot has 5% more potash than the third plot. Now in the first plot or check plot I didn't use any fertilizer at all, but on the second plots I used 100 pounds of 3-10-0 making 1,000 pounds per acre. This application would cost $21 per acre. In applying it I watched to see that I got it on evenly over the plot. The third plot I fertilized with 100 pounds of 3-10-10, making 1,000 pounds per acre. On this plot I also watched to see that I got it on evenly over the plot. This application would cost $25 per acre. Then the last plot I fertilized with 100 pounds of 3-10-15, making 1,000 pounds per acre. This application would cost $28 per acre. (Applies fertilizer from small sacks.)

Sam.—What results did you get?

Geo.—In the check plot the yield of large potatoes per acre was 6,240 pounds. This represents the yield of large potatoes. The yield of small potatoes was 3,180 pounds. This pile represents the yield of small potatoes in the check plot. The total yield was 9,420 pounds. The yield of large potatoes in the 3-10-0 plot was 8,910 pounds and the yield of small potatoes was 2,520 pounds. The total yield was 11,430 pounds. These represent the yields in the 3-10-0 plot. (Points to piles of potatoes.) Now you can see the difference in the yields. You see the yield of large potatoes is increased by the use of 3-10-0 and the yield of small potatoes is decreased.

Sam.—Yes, I see that.

Geo.—In the 3-10-10 plot the yield of large potatoes was 9,000 pounds and the yield of small potatoes was 1,920 pounds. The total yield in this plot was 10,920 pounds. These two piles of potatoes represent the yield of large and small potatoes. Now, by the use of stronger fertilizer you can see that the yield of large potatoes is increased and the yield of small potatoes is decreasing.

Sam.—Yes, I see that.

Geo.—In the last plot or the 3-10-15 plot the yield of large potatoes was 9,828 pounds. This represents the yield of large potatoes in this plot. The yield of small potatoes was 2,064 pounds. The total yield was 11,892 pounds. So there you see the 3-10-15 is the best.

Sam.—How would this fertilizer be for cabbages or lettuce?

Geo.—This fertilizer does not apply to leafy plants because it has too much potash and not enough nitrogen. Leafy plants need plenty of nitrogen. I would recommend a 6-8-6 for your cabbages or lettuce.

Sam.—Did the fertilizer pay for itself?

Geo.—Yes, it did. Figuring at $40 per ton for large potatoes and $10 a ton for small potatoes, the market value in the check plot was $140.70. In the 3-10-0 plot the market value was $190.80. After subtracting the cost of the fertilizer which was $21.00, the net profit from the fertilizer was $29.10. In the third plot or the 3-10-10 plot the market value was $189.60; after deducting the cost

of the fertilizer which was $25, the net profit was $24.90. The fourth plot had a market value of $206.88. After deducting $28.00 for fertilizer, the net profit was $38.18. So there you see the 3-10-15 is the best kind of fertilizer for potatoes.

Sam.—Yes, I see that. I guess I will have to try it next year. Well, I have to be going.

Geo.—If you need any help or information on it, just come around. So long.

Sam.—So long. (Shake hands.)

Another exceptionally convincing fertilizer demonstration on potatoes was completed by Karl Baur of the Kelly Lake community, but the yield figures were not available for use at the Fairs, since the harvest was later in the season. The crop was planted on a soil containing a large proportion of muck. The complete results are given here.

Fertilizer Treatment	Yield per acre Market Size	Culls	Profit per Acre from Fertilizer
200 lbs. Sulfate Potash	6,920	1,180	$27.85
1,000 lbs. Complete 5-10-10 fertilizer	11,560	1,660	97.55
1,000 lbs. Complete 5-10-10 fertilizer with 200 lbs. sulfate of potash	15,090	1,820	156.05
No fertilizer	5,180	870	.....

These young farmers have carried their work through to a worth while finish, and there is no doubt they have proven to their satisfaction and the satisfaction of many other growers, that fertilizers high in potash bring potato profits.

Little Aroostook

(*From page* 30)

the material is wasted and to have it in proper balance for growing the plants in the best manner.

We are using a 5-8-7 fertilizer at the rate of one ton per acre as a standard application on the check plots in this experiment. In varying the elements for the other treatments, when one is varied the other two remain constant. For example, there are two variations for phosphorus, 5-0-7 and 5-16-7. These can be compared directly with the 5-8-7 check plots. Potash is varied with a 5-8-0, a 5-8-3, and a 5-8-10, and in the nitrogen plots we have an 0-8-7 and an 8-8-7. These variations in time should throw some light on the proper formula for potatoes, at least on that type of soil, with its particular historical background.

There must be, in the very nature of things, good reasons why a crop responds in one way to a deficiency or excess of a certain element on a given soil type and in another way on another soil type. The plant food already in the soil inherited from nature and the treatment it has had for decades or in some cases even centuries must have their bearing in the matter. This field has been included in the dairy rotation practiced on the Jackson farm for many years. Even though the land has not been plowed often, it is customary for the dairymen in the Colebrook area to top-dress their hay land annually, if possible, with barnyard manure. This practice must have considerable influence on the work that we are now doing, and may partially explain the effects which we are now getting from our fertilizers in this experiment. It may also serve to indicate why our responses differ in many respects from the results obtained by the Maine Experiment Station in the Aroostook area.

Fertilizers are applied only to the potatoes in this rotation experiment. One ton of fertilizer is the application used on all treatments, except on one series which gets 3,000 pounds of a 5-8-7 and another on which 1,000 pounds of the same material is applied.

Two years' results have been obtained from the plots. Check plot yields have been maintained at a fairly high level, averaging almost 400 bushels per acre for the two seasons.

Omitting the potash from the potatoes in the 5-8-0 formula has depressed yields more than leaving out phosphorus in the 5-0-7 or nitrogen in the 0-8-7 series.

The results for nitrogen might be forecast, as the soil is undoubtedly high in organic matter. But as manure is relatively high in potash also we might expect the plots where that element is omitted to respond somewhat more favorably than they do.

Expressing the yield of the check plots as 100, we get a relative yield of 69 for no potash, 80 for no phosphorus, and 92 for no nitrogen. With the exception of the element omitted, the amounts of the other two elements are held constant with those of the check plots.

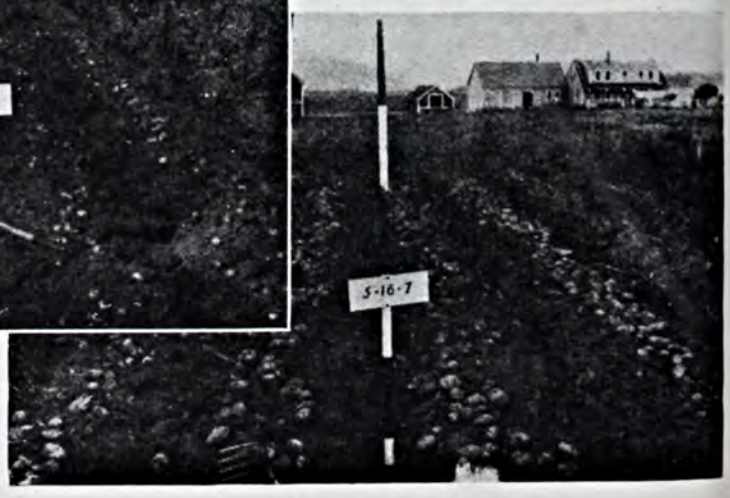
Reducing the potash to three per cent, as we have in the 5-8-3 plots, reduces the yield to 91 as compared with the check plots. By increasing the potash to 10 per cent, which has been done in the 5-8-10, we have secured a comparative yield of 107.

Increasing the phosphorus in the 5-16-7 has given these plots a rating of 115.

A fertilizer of this formula merely means adding one-half ton of 16 per cent superphosphate per acre to one ton of 5-8-7. It is rather interesting that in these studies, to date, making such an application has given us more potatoes than putting on an extra half ton of 5-8-7 as has been done in the 3,000-pound plots. The 3,000-pound plots have a rating of 112, while the plots receiving 1,000 pounds of a 5-8-7 have so far yielded 82 on a comparative basis.

Increasing the nitrogen to an 8-8-7 has had no significant effect on yields up to the present. It should be remembered that in this work the phosphorus in our 5-16-7 has been doubled over the 5-8-7 whereas the potash and nitrogen have been increased only about 50 per cent in the 5-8-10 and the 8-8-7. What the rating of potash plots on a 5-8-14 level would be, we can only guess. But it is doubtful if nitrogen, increased to a 10-8-7 would show any appreciable gain over the check plots in the light of present results and taking the past history of

Left: One ton per acre of 5-8-0 yielded 196 bushels. Below: One ton per acre of 5-16-7 yielded 488 bushels per acre.



("We do not have a picture of the 5-8-7 plots. However, it would not differ materially from that of the 5-16-7."—*Ford S. Prince.*)

the soil into consideration.

In comparison with the series of plots getting no potash, there is a corresponding series with a two-ton application of lime. Last year is the first year that potatoes have been grown on the limed plots, consequently there is but one yield to report from them. The yields from these two series compared with the check plot yields for 1930 are as follows:

Treatment	*Rating*
Check plots	100
5-8-0	71
Lime and 5-8-0	55

Yields for one year in work like this probably mean nothing, yet we are inclined to place some confidence in these figures particularly because the two series of 5-8-0 plots, with and without lime, were contiguous in the field. This would tend, at least, to eliminate soil variations.

We have noted in another article on alfalfa fertilization how an excess of lime apparently reduced alfalfa yields where chemicals were not used in top-dressing. Here is another crop, as sensitive to lack of potash as alfalfa, responding adversely to liming. This is not necessarily an indictment against lime, but merely an indication that introducing lime into the soil causes chemical reactions there that throw available potash out of solution and render it unavailable for plant growth. The use of lime may indeed tend to increase the necessity for potash applications upon those crops that depend particularly upon that element.

The use of lime in any form upon land that will be planted to potatoes in the near future should be attended with great caution on account of danger from potato scab. On this soil which is well buffered two tons of ground limestone has brought the Ph up from about 5.0 to 5.5 and even at this point potato scab appeared in abundance on the limed plots in 1930.

From the practical viewpoint, lime should be used in a potato rotation only when clovers fail. When this does occur, it is probably better to keep lime applications small enough to encourage clover growth, but not large enough to make a great change in the Ph value. Alsike clover is being used in this rotation because it will make a somewhat better growth on acid land than red clover.

Lime has had a beneficial effect on both oats and clover in this experiment. Clover has responded with larger increases than oats but both appear to be significant.

No fertilizers are applied directly for either oats or hay. The residual effects of the fertilizers applied for potatoes are small when checked up on the forage crops in the rotation. The no-phosphorus plots appear to be depressed in yield but aside from this observation little of significance has developed thus far.

Controlled Weeds

As a demonstration in controlling quack or witch grass this experiment has been well worth while. The soil for potatoes is plowed immediately after haying, when the food reserves in the quack grass roots are at a low ebb. Following this, the land is harrowed every 10 days or so with a quack grass harrow through the fall and continued once or twice in the spring if necessary. Although there are but a half dozen of these harrows in New Hampshire at present, they appear to be very effective in tearing out and combating quack grass, and leave the soil in a nice, mellow condition for the potato crop.

The results for this test so far have been published in the New Hampshire Station reports for 1929 and 1930. Future work will also be listed there.

Whether the results of other years will be like those here reported is anybody's guess. If they are, it is quite possible that new potato fertilizer formulae will be developed, particularly in this important producing area.

Invest in Pastures

(*From page* 15)

That with the aid of commercial fertilizers such lands can be quickly made to yield luxuriantly is demonstrated by what farmers of Marinette county, Wisconsin, for example, have accomplished. Ten years ago dairying was fading as an important industry of that county. At that time almost as much feed was shipped into this locality as was grown. Then a few progressive farmers began to use fertilizers to dress their meadows. They saw immediately that it not only improved their meadows but likewise made other crops of the rotation yield better. Today the use of fertilizers has become a standard practice on nearly every farm and the county has become as prosperous as any in the state. Today this county is an export rather than an importing feed section.

If a cow could tell what she knows about the benefits to be derived from fertilized pasture, she undoubtedly would say, "It is ready to graze earlier in the spring by a week or two. This gives me more pasture days. Fertilized pasture withstands summer dry weather better. I, therefore, have better grazing in seasons of drought. But, best of all, well-nourished pasture tastes better and satisfies." She will prove her point too, if with her calf she is put on the scale or her milk is weighed and tested.

The use of fertilizer is not an expense. What is spent for plant food to increase yields is paid back with dividends. Such an investment offers no parallel in the way of both immediate and permanent creation of wealth. At present the need of pasture improvement is of paramount importance, for the United States Department of Agriculture reports the conditions of meadows at present as 59 per cent of normal.

The Time to Fertilize

Late fall or early spring is the time to treat pastures. If the soil is sour it should be limed. Then a good high grade fertilizer should be broadcast. All meadows respond to nitrogen, 90 out of 100 are hungry for available phosphoric acid, and potash is especially beneficial where clover makes up a part of the herbage. Hence, a generous application of a complete formula containing all of these essential plant-food elements will be no gamble.

Paul Strickler, Centerville, Iowa, dairy farmer, points out you can even employ fertilizer to kill sprouts in your meadow. He says:

"Last fall I had a pasture near the woods on which there was considerable hazel brush. We cut the brush in the fall and then early this spring broadcast some complete fertilizer over a portion of the meadow. Soon after applying the plant food, we noticed that the grass responded, but so did the brush sprouts. Of course, there

Both cattle and hogs make most economical gains on well-fertilized pasture.

were brush sprouts where no fertilizer was applied as well as where we applied the plant food. However, the sprouts on the treated part of the meadow were of a much darker color. When we turned our cows into the meadow they sought the fertilized area and grazed both grass and brush sprouts down to the roots. Meantime, the sprouts on the unfertilized part of the pasture remained untouched and grew woody. The result is that we now have an improved, clean pasture where we applied fertilizer, whereas the hazel brush still decorates the rest of the meadow."

The Farm and Home Garden

(*From page* 12)

portant a factor to the home gardener as to the commercial grower, however.

Experimental results seem to indicate that mulch paper is of greatest value when used in growing of early, quick maturing crops, warm-season crops, and in conserving moisture in periods of drought.

The most suitable way to use the paper in the home garden is to place it between the rows of vegetables covering the entire area. The paper must be anchored. Covering the entire edge of the paper with a couple inches of soil will prove a satisfactory method of holding it in place. The edges should come close to the planted row, thus almost entirely eliminating the growth of weeds.

Seedlings Need Care

Seedling plants started in boxes, hotbeds, or coldframes should be transplanted when they are one to two inches high. Plants of this size transplant more readily, make stockier plants, and develop better root systems, all resulting in earlier maturity and higher quality vegetables. Spindling plants are usually the result of crowding, too much water, or lack of light.

In setting plants in the garden, water plants 12 hours ahead of transplanting. Use care in keeping as much dirt on roots as possible and set plants in freshly made holes.

Most home gardeners plant seed too thick. Thinning to proper distances will hasten maturity, increase yields, and insure higher quality. The best time to thin seedlings is shortly after they are up. Onions, beets, carrots, and parsnips should be thinned when plants are small to prevent disturbance of root systems.

An abundance of humus or decaying organic material, plant food, and water are prime requisites for a real home garden. When watering either with hose or other means of irrigation, soak the soil thoroughly. During periods of extreme drought, watering in evening is most beneficial. Light sprinkling in dry, hot weather usually does more harm than good.

In order to care for fall and winter needs, it is best to make special July plantings of root crops rather than depend upon those started earlier which have passed maturity and consequently are of poor quality.

Late potatoes in the Midwest may be planted from July 1 to July 15 with a fair degree of success. In the region as far south as southern Indiana, they may be planted as late as July 15. Only certified Rurals, Ohios, or Cobblers should be planted, and on most farms certified Rurals will do best as sources for the winter's supply.

Late celery plants of the varieties Easy Bleaching, Golden Self Blanching, or Giant Pascal should be planted not later than July 10. Plants may be placed four inches apart in the row and rows three feet apart for horse cultivation. In growing late celery it is of greatest importance that the plants be placed on soil of the highest fertility. Where possible black

loam soil is best. After the celery plants are five to eight inches tall, they may be side-dressed with an application of barnyard manure or another application of high-grade, complete fertilizer.

Detroit Dark Red beets, Danvers Half Long carrots, Danish Ball Head cabbage or Wisconsin Yellows Resistant Hollander, where yellows is troublesome, should be planted in midsummer to give excellent quality for winter. During the last half of July, Purple Top Globe turnip seed should be sown in abundance.

A July planting of stringless green pod beans, leaf lettuce, and parsley may be planted to give fall crops and the last tempting reminder of the joys of summer before winter sets in.

For city people the garden will help reduce food costs and act as an excellent immunizer against any form of "golfitis." The farm garden will help to keep the labor on the farm and the cash in the bank. Nothing can take the place of the country, summertime, big dinners, and how can you have 'em without fresh green peas, sweet, juicy corn on the cob, piles of red-ripe tomatoes, not to mention the hosts of other vegetables that make the memory of country dinners linger on.

If you want definite information—your County Agricultural Agent or Agricultural College will be glad to send you complete plans and helps for the home and farm garden. They will give in detail, cultural directions, best varieties, and other information which will help you in making your garden a real one. Why not plan so you can brag later about that wonderful garden, even though your wife does the work?

Potash Insures Tomato Quality

(*From page* 8)

equivalent of a minimum carload. They have never had any trouble with their tomatoes or other truck crops "going bad" in transit for they are properly grown, graded, wrapped, and packed, and arrive at destination in prime condition. Their fleet of trucks operates between the South Georgia points mentioned above and New York City. However, they have built up such a great demand for their high quality tomatoes that their trucks seldom get north of Washington, D. C., before they are sold out.

A careful study of vegetable markets in past years clearly reveals that prices are higher in the smaller towns where solid carloads of tomatoes or other perishables are not shipped directly. This condition exists for the reason that the small markets must pay the cost of redistribution that the terminal centers are not called upon to bear. For instance, the retail price of lettuce in Griffin, Georgia, (40 miles from Atlanta) is usually higher than the Atlanta market because the Imperial Valley Growers of California know that Griffin cannot consume lettuce in carlot quantities and therefore they ship through Atlanta wholesalers who must, rightfully, have their redistribution cost.

This condition makes the trucks very valuable as a means of transportation for vegetables, for they can unload from 10 to 50 crates in a town where prices are higher than in terminal centers. Trucks carry mixed cars at a flat rate while railroads require a mixed car of vegetables to carry the highest rate called for by any one vegetable that the cars contain.

Mr. Royal reports that they can deliver tomatoes in New York City in 45 hours and that all their shipments have arrived in excellent condition. However, they are going to specialize

in towns of less than carlot consumption where prices are better.

The experience of the Seaboard Farms and the Georgia Vegetable Growers Association is typical of what is going on down in Dixie. During this reconstruction and readjustment, many farmers will sustain heavy losses and perhaps a few will pass out of the picture entirely, particularly those who cling tenaciously to old systems, methods, and practices and refuse to adopt new standards or employ modern equipment. Out of this upheaval will come a self-sustaining agriculture that will make country life in the South as much to be desired, as comfortable, and as independent as was the plantation life in colonial days.

Knowledge Is Power

(*From page* 19)

Chemistry through its extension service is likewise taking its work to the farmers of the province by its system of field demonstrations.

As already mentioned the Department of Chemistry in its extension work has held meetings in several centers where interesting demonstrations have been maintained. In addition to this the facts concerning various field demonstrations are supplied to the local and provincial press. By these means results reach the farmer many times during the period while the demonstrations are still standing. This leads to more visits to the demonstrations and closer examinations of the tests. During the growing season the Department has made a feature of keeping its demonstrations advertised by placing suitable signs where these demonstrations are being carried out. Through this means farmers have been enabled to watch the results of soil treatments throughout the summer and have taken a special interest in locations where field meetings have been held.

Following the growing season the results are compiled in pamphlet form. Other avenues of dissemination of this information include exhibits at the world-famed C.N.E. where last year the Department of Chemistry featured its soil studies. At several county fairs, local exhibit-demonstrations brought facts of value to the attention of the attendants at the fairs. On such occasions many questions of local inter-

This exhibit at the Bowmanville, Ontario, 1930, fair is typical of the extension exhibits presented at fall fairs.

est were discussed. The object of the field-demonstration work is to take to farmers in all parts of the country, valuable information which has been gathered by the Department of Chemistry.

Veritas

(*From page* 4)

embalmed bit of imagination that hurts any nation's integrity. We would rather swallow a few fables in history than listen to so much cant and hypocrisy in the public forum.

We probably know what truth is in the abstract, if not in specific doses. Truth is either a fact or a condition that exists, or it is a principle. Facts and conditions move and change, but we like to regard principles as fixed or established by the *mores* of the common thought.

As we can't be everywhere when facts happen or conditions arise, somebody else has to pass them on to us, if they choose, by written or spoken words. Yet as we know from court testimony, as well as newspaper garbling, two or more persons on the scene of action may not agree in detail as to what occurred.

So truth, if come by either in person or through proxy, stands a mighty big, human chance of distortion or misunderstanding. I often think that animals and birds, within the limits of their meager intelligence, arrive at truth in their own world and ours a trifle better than we do. Perhaps it's the human ego that interferes, or is it that we have imagination and lower forms of life lack it?

I am no different than the average. I am often nonplussed and distraught by the multitude of alleged truths, facts and near-facts, conditions and theories, that enter into every hour of my consciousness. We get them in great gobs of domestic and foreign news, by radio, by conversation, and by telephone. Even on the "Day of Rest" our doors are assailed by carriers with weighty budgets of assorted entertainment, information, conjecture; and thorns of unrest prickle our Sabbath hours of ease. We are not allowed to forget Monday, or tax time, or the threat of Communism during the supposed hours of domestic bliss. Any modern man who can find a quiet retreat where he can think of nothing is a fortunate citizen indeed, if he is still at liberty. They seek you out in summer resorts and install radios in your hotel chambers.

Verily, the "isolated farmer" is as scarce as red flannels and chin whiskers in the silo sections. The "forlorn apprentice" of Hogarth's day now owns his tuning-in apparatus and takes his daily paper. Imbibing what we call truth is a mania, although I do not call it a menace.

When our forebears forded streams and hewed logs in the game afterwards called "empire building" at Kiwanis luncheons, there were different conditions. A relatively narrow environment and slow modes of communication resulted in fewer facts and less complex conditions touching the minds of the men. They had to do with handling the rough and heavy stones of the foundation, not being agitated or perplexed with choosing fine points of trimming in the superstructure. The creators of a thing often are less finicky than those who undertake reforming or repairing.

Turning now to the greatest outcome of truth, we acknowledge that it must be *opinions*. This is true, because unless we first make up our minds, we can't very well act on anything. Opinions are determined by what brand of truth we absorb, if any. Nowadays there may be a *few* folks who won't absorb any facts or

see any conditions, and of course, they have no opinions.

As I am an unlicensed sort of philosopher and a crude one at that, what I opine herein may jar the theories of some who have sat at the feet of the Masters. It's only another opinion anyhow, and subject to all the bias of anybody's convictions.

The pioneers above mentioned were adamant in many of their opinions because they were not overwhelmed or confused by any such mass of events and cross-currents as we face today. Therefore, they were usually willing to fight for them, take punishment for them, and possibly die for them. They are a legion in our history, those Mormons and moonshiners, those Free Soilers and Abolitionists, those Pro-Slavery men and those Nullificationists, as well as the "cults" and clans of free lovers and free thinkers.

RIGHT here I will tell you why I like to read John Brown's Body, by Stephen Vincent Benet. This poet laid broad hands on the lives of the great and the humble in a period of national turmoil when there were mighty clashes between men of opposite opinions. He did not traffic with any group or clique, nor did he rail at any of their weaknesses as some of our smart modern writers prefer to do. He took us into the lovely old Southern plantation houses and marched us along with the farmer boys from the North, showing us that the power of this country was welded in the heat of men's convictions, and remains a lasting tablet over some of their buried hopes. Lately he did something for Griffith's Lincoln movie, but I'd much rather see him embroider the histories we give to the children.

So as we scan their turbid lives, often bitter and poor, we sense the fact that they were above all else true to themselves and their beliefs. How many of us are able to say the same today?

We are not prone to cling with much fervor to our opinions and go tumbling into the ditch of battle for them. This is because changes are so rapid, conditions are so fluid, news and views are so varied as to crush any attempts to gain an even keel in the sea of our sentiment.

With more facts and more conditions and with more ways of reaching more people more quickly and simultaneously with the tidings, we are feeble in our reaction to them.

This is possibly why we find that the spectre of Intolerance wears so shabby a coat in this century of enlightenment. We forgave the intolerance of the Puritans or the Free-Soilers because they were of the pioneers and building the foundation. Possibly they were companions on the Cross with the thief of Calvary, and the worst of their shortcomings deserve an equally tolerant forgiveness.

BUT, let me ask you, in this day of swift change and lightning-like marvels, who is there willing to assume that the grain of truth seen through his microscope is the only atom on which conduct or conditions may be safely based? I am afraid that there are too many in high places who do this very thing.

When a bunch of us get organized in a society or a department or something equally satisfying and chummy, we get together and make rules of conduct that square with our sanctum ideals; and then we begin certain campaigns and movements to shake down the apples. Usually we don't stop long enough to study psychology or the general effect of our doctrine on the hinterland. What's ours must be right, so we go on with an eight-cylinder juggernaut driven by an unlicensed chauffeur who is color-blind.

In the meantime somebody on the sidewalk disagrees, which is human and according to the constitution. At once the fuse is set afire to blow that non-conformist higher than the latest altitude record. All the outlying

clansmen are given the burning brands to carry from peak to peak, issuing grave warnings against the bumptious individual who dared to put a questionmark in parenthesis into our sacred Magna Carta. And mayhap while we are thus nobly engaged, some worthy brother in the inner circle steals the altar and all the trimmings.

And unfortunately, friends, the worst offenders in the game of putting the non-conformist on the spot are our institutions of learning and our Departments of Official Interference. Although they have access to all the legion of philosophers and the index to all the screed of science, these chaps from whom we expect better guidance are the first to cast the rocks or braid the crown of thorns. When will higher education begin to make leaders instead of lashers?

AS long as education was content to sit on a log and be a humble tutor, his function was only limited by what truth he possessed to impart. But now, when education seeks to rule and order the universe, and requires seventy-five per cent of the public's budget to maintain its inquisition, we face a starvation of individual thought in the midst of a packing-town of provisions! We educate men to think for themselves and then penalize them if they sit up and take notice of anything that rattles in the world's omnibus. It's probably better to sleep along, and we'll get there just the same—with lilies and a good sermon at the end.

As a journalist, I was taught that accuracy first is the abiding principle of getting out a public chronicle. As a journalist I hope I escaped the blasé effect of finding out how much truth is only varnished opinion. We are all more or less open to the mistakes of the tyro journalist, which lie in getting the "copy" in the news page which really belongs in the editorial column. We want to be editors and molders of thought, which is part of the urge for expression born in us with the first squawk. Merely to relate is not so entrancing as to debate. Yet from experience I know that those who sell narratives get longer pedigrees in Who's Which than those content to argue.

DR. GLENN FRANK, into whose office I was once admitted after six weeks' appointment, pictures the fervid cub reporter as sorting carefully the sheep of truth from the goats of propaganda. It isn't quite logical, for most of our slickest headlines depend on an ounce of fact in a ton of tommy-rot, and if there were no propaganda used in newspapers the universities would be as empty as a football stadium in February.

Now propaganda is not pure quill imagination put to its choicest use. Propaganda is not always untruth either. It is the clever repetition of some truth with a sauce of fancy, a setting-up of idols that may breed intolerance or bring reforms. There is truth that hurts just as much as there is propaganda that harms.

We have somehow come to dislike the term "propaganda" while we have put a halo on truth, but the one may be as desirable to fit a condition or fill a need as the other. We can fool ourselves into happiness just as we can bewail ourselves into a sink of depression by telling too much of the truth. If some of the actual facts that get into print were left out and their places filled with a little harmless bunco I should not buy any horsewhip for the editor.

BUT despite all the vagaries that we have to contend with in order to be practical and "live with folks," there is in most of us an earnest desire to follow truth as a principle, even if facts *do* embarrass us sometimes. Only a misanthrope believes that the world

is all wrong and deliberately devilish.

I reckon we can sort of live the truth in a humble way if we don't let our ambitions outdistance our abilities. Just as soon as any of us with mediocre talent and bird-seed courage try to straddle too many giant jobs at one time, or imitate the culture of somebody who acquired it honestly, there is apt to be a sudden parting with truth as a living principle.

The man who tries to mix around and be ingratiating when he would rather sit in the attic and dream; the country-minded man who moves to town and tries to boss the ward; the preacher who ought to be a pee-wee golf expert; the woman social worker with a hen-pecked husband; and the essay writer who studied to be a chiropractor—these are all living examples of ones who misunderstood truth. They are not evil-doers.

And finally, there's where the shoe grinds the bunion for most of us. We are all more or less distant from the truth and probably will be as long as America is dedicated to individual initiative. But if we were all serfs there would be just one truth, and that would be dished out to us with a cat-o-nine-tails. When we die and go to glory, the curtain will part and we shall behold the original instead of the reflected imitation. Our part down here, I guess, is to shave as close as possible to the image we see in our own mirror of veracity and trust to luck to arrive at the pearly gates with a smooth chin.

New truths constantly appear and old texts are soon obsolete. What is taboo in this generation will be the mode of the next one. Hence I for one shall "wait with patience the race that is set before us," glad that each morning I will have the sense to open the shutters of my mind and put up my periscope, ready to let the spectrum of that day's new thought put a little vitamin into my scant stock of veritas.

HOW'S YOUR BRAIN?

This is a trick—so don't say we didn't warn you. Read this sentence:

FEDERAL FUSES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

Now, count the F's in that sentence. Only once—don't go back and count them again.

Elsewhere on this page you'll find the answer, and it will tell you something about how good your brain is.

A minister, learning to play golf, suddenly remarked "I must give it up! I must give it up!"

"Give up what?" he was asked. "Golfing?"

"No, the ministry."

If a couple of men get along well, it's a sure thing their wives will dislike each other on sight.

A DIFFERENCE—YES

The gum-chewing girl
And the cud-chewing cow
Are somewhat alike,
But different somehow.
What difference?
Oh yes, I see it now;
It's the thoughtful
Look on the face of the cow.

Boss: "A man is never older than he feels. Now this morning I feel as fresh as a two-year-old!"

Steno (sweetly): "Horse or egg?"

REAL DIPLOMACY

A good customer was getting lax about the payment of invoices, and Abe suggested that Mawruss write him a strong but diplomatic letter calling his attention to this laxity.

Mawruss worked for several hours over the letter, then showed it to Abe for his approval. After reading it over carefully, Abe said: "By golly, dot's a wonderful letter. Strong and to der point and not personal or insulting. But you got a couple mistakes in it, Mawruss. 'Dirty' you should spell mit only one 'r' and 'cockroach' begins mit a 'c.' "—*The Clutch.*

Two little boys came into the dentist's office. One said to the dentist, "I want a tooth took out and I don't want no gas because I am in a hurry."

Dentist: "That's a brave boy. Which tooth is it?"

Little boy: "Show him your tooth, Albert."

The open cookie jar has built a halo big and lasting about the head of many a boy's mother.

There are six F's in the sentence you read in the paragraph in the first column. An average intelligence recollects three of them. If you spotted four, you're above average. If you got five, you can turn up your nose at most anybody. If you caught all six you're a genius, and a lot too good to be wasting your time on foolishness like this.

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Every progressive farmer in your county is vitally interested in securing the greatest acre profits from each crop. Greater acre profits mean greater financial success for your farmers, greater prosperity in your county, and greater accomplishment for you in your field of endeavor.

In seeking the way to greater acre profits your farmers are constantly turning to you for advice on their problem. In your recommendations of best cultural practices for each crop, seed treatment for the control of seed-borne diseases has earned a definite place.

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As a further means of interesting the farmers in your county, our motion picture films on cereals, corn, potatoes, cotton, and vegetables, which show the common seed-borne diseases, the damage they do, and how easily they may be prevented by seed treatment, are available to you.

For samples of seed treatment—and for further information on our motion picture films—just fill in the coupon and send it to us.

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Also send me information on motion picture films.

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Address .....

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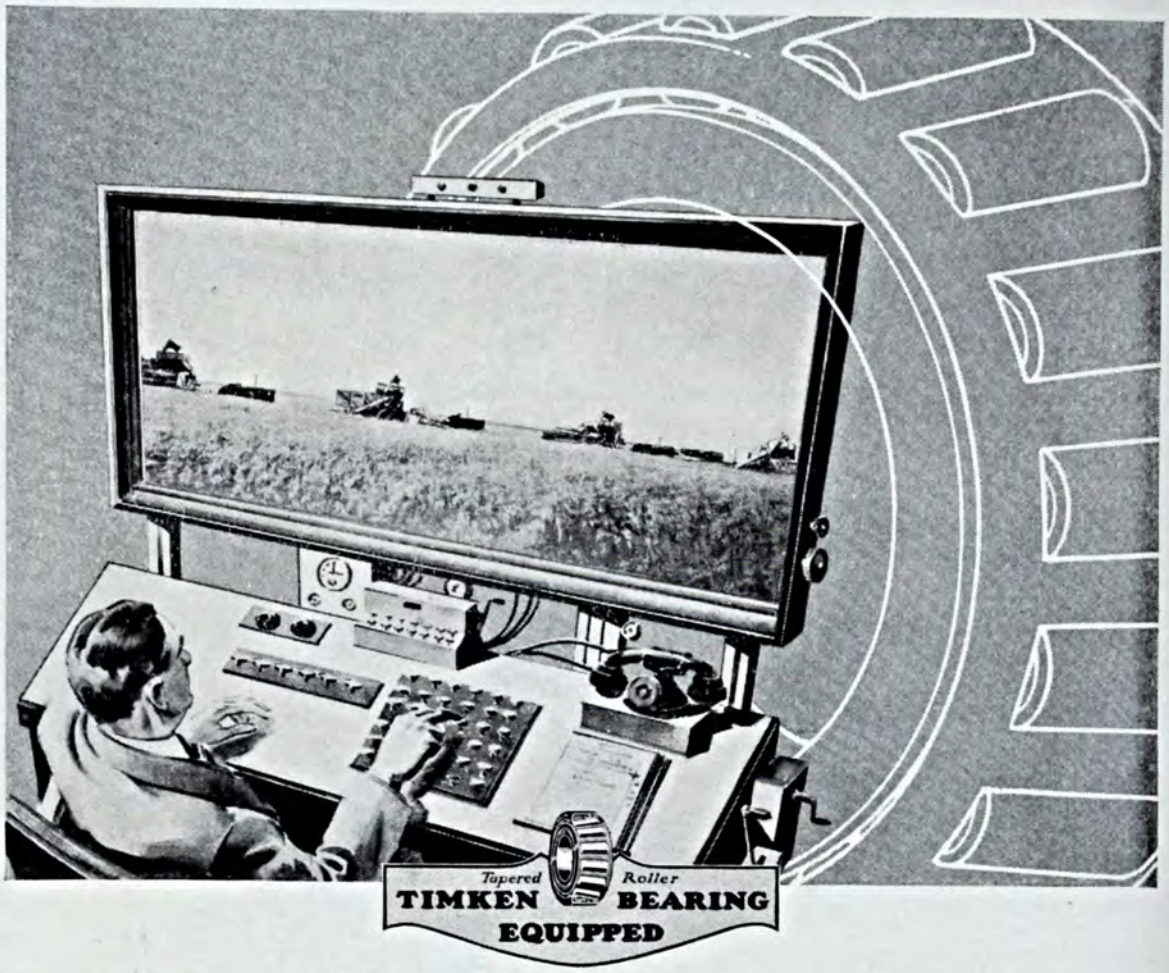

100 YEARS AHEAD

Will farming operations be conducted by remote control radio and television a century hence?

When you consider the astonishing progress that is being made in all branches of science, the above pictorial prediction may not be so wide of the mark.

But even today, measured in terms of human progress, American farming is fully 100 years ahead of the rest of the world, with over $2,500,000,000 already invested in modern farm machinery and large additions continually being made.

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County agents and other farming authorities advise farmers to buy Timken-equipped machinery because their experienced judgment tells them that there is no firmer foundation for farming prosperity. The Timken Roller Bearing Company, Canton, Ohio.

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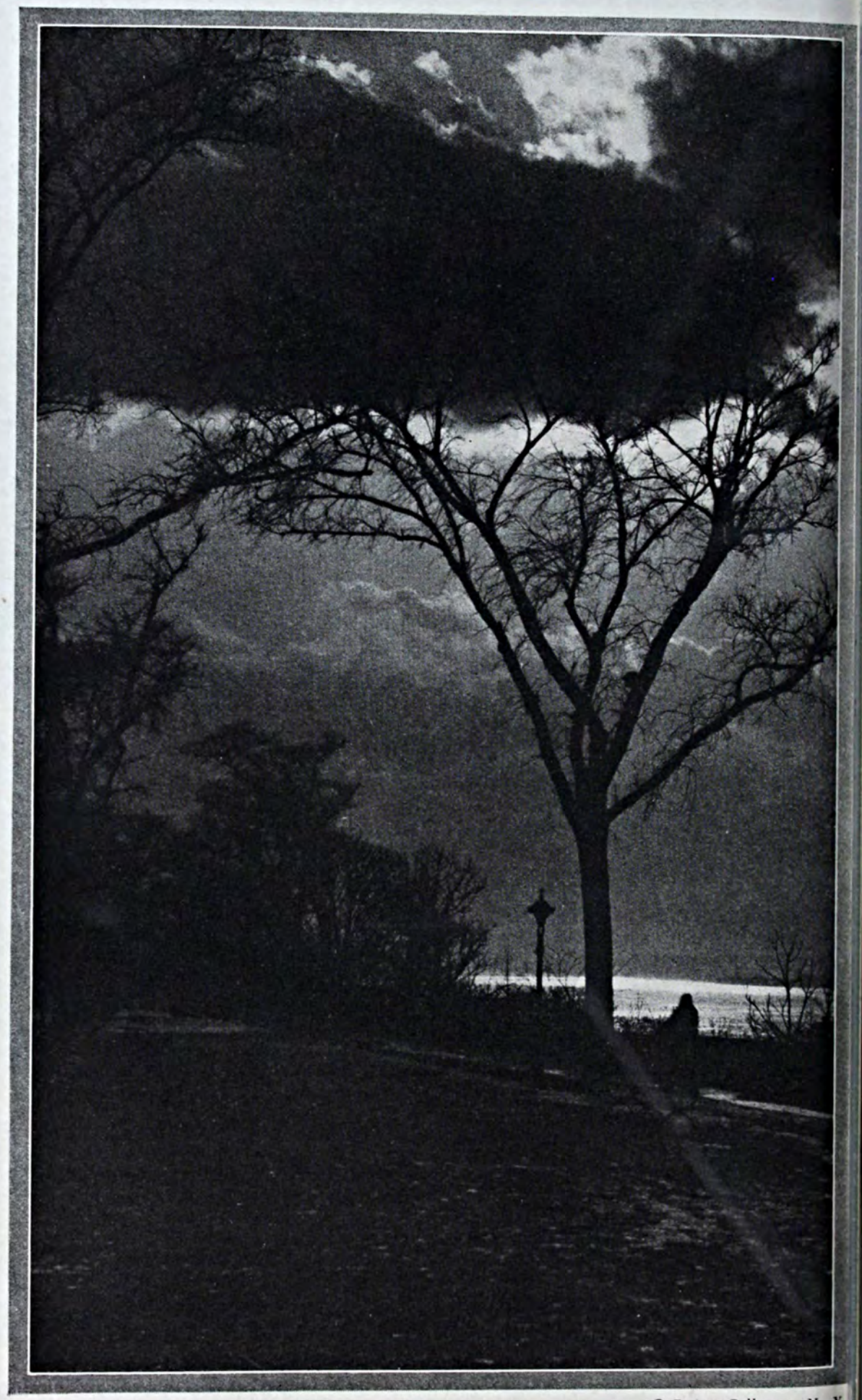
N. V. POTASH EXPORT MY., INC.
of Amsterdam, Holland

Directors: J. N. HARPER G. J. CALLISTER



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A MARCH DAY ON RIVERSIDE DRIVE, NEW YORK CITY.

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VOL. XVI NEW YORK, MARCH, 1931 No. 3

Jeff Gets Serious in Considering—

A. E. *and* U. S.

By Jeff McDermid

WHEN A. E. (George Russell) blinked through double lenses at me in the corridor of a hotel during the American Country Life Conference, I should have requested an interview. His sturdy bulk and ruddy British appearance behind that tawny beard gave me little cue to his poetic nature or his Utopian idealism. He looked so much like a banker or a successful statesman that I missed the great chance to accomplish a tete-a-tete between the two great, free-lance philosophers of the age—ergo, his favorite author and mine!

Luckily, I chanced to receive from his American sponsors a copy of his treatise on The National Being, a booklet that I have gone into quite carefully during the spare hours between jitney jaunts to work and sundry domestic duties. It must be sufficient for me to have clasped hands with him and murmured a trite tribute to him on his luncheon address. It

is too late to mend my broken opportunity; but I shall weave some of my commentary into the thread of his discussion, begging your pardon for this cotton warp in the woof of his silken sentiments.

Although A. E. frankly states that his thought is mainly for the aid of newly emerging zones of self-determination, I find it strangely fertile ground in which to look for the tares sown by the cultivators of far older democratic fields. If A. E. considers he is confining himself modestly within the social laboratory of Ireland, he has at least held up the mental mirror at a certain Anglo-American angle which gives one reflections of conditions over here.

PERHAPS it is not easy to teach older dogs the newer tricks, but perhaps A. E. has shown our own mastiffs where their bones of puppyhood lie buried. Is it worth while to dig them up? Yet no moral teacher can put danger signals on the course of a newly born democracy without reference to the blunders of an older order. This, and his zest for the old rural questions ever new, form the excuse for my intrusion.

After stating his theme, which is that any aspiring nation must realize and define its national character and inward spirit and be concerned with the soul as well as the substance, he writes as follows:

"When we begin to build up a lofty world within the national soul, soon the country becomes beautiful and worthy of respect in its externals. That building up of the inner world we have neglected. Our excited political controversies, our playing at militarism, have tended to bring men's thoughts from central depths to surfaces. Life is drawn from its frontiers away from its spiritual base, and behind the surfaces we have little to fall back upon. Few of our notorieties could be trusted to think out any economic scheme or social problem thoroughly and efficiently. They have been engaged in passionate attempts at the readjustment of the superficies of things. What we require more than men of action at present are scholars, economists, scientists, thinkers, educationalists, and litterateurs, who will populate the desert depths of national consciousness with real thought and turn the void into a fullness. We have few reserves of intellectual life to draw upon when we come to the mighty labor of nation building. It will be indignantly denied, but I think it is true to say that the vast majority of people in Ireland do not know the difference between good and bad thinking, between the essential depths and the shallows in humanity."

PONDERING what he has said, we find that America has indeed gone through its early period of empire expansion and almost reached the boundaries of its physical growth. The descendants of the frontiersmen must be content to join hands with the newer immigrants in whatever we shall make out of it hereafter. There is no longer any chance for our idealists to elope with their visions into some fresh countryside to dream and build anew. There is no new country here any longer or any relief from the inroads of standardization and corporate dominance. Only the burning desert or the lofty mountain peak afford such hermitage in America, and few there are who listen to voices that have no broadcasting license or assigned wave length. It is quite plausible to believe that whatever new springs of energy and hope we have in reserve must come from mental and spiritual forces within us rather than, as before, from unconquered material resources.

A. E. says that Ireland needs scholars and thinkers and poets more than men of materialistic action. To me it seems that we of America require

(*Turn to page* 60)

Feed Tobacco Well

Pennsylvania Farmers Find It Pays

By D. E Haley

Professor of Soil and Phytochemistry, Pennsylvania State College

THE system of agriculture followed by the farmers of Lancaster county, Pennsylvania, may well serve as an example of efficiency for many other farming communities in the United States, in that it involves *addition* rather than *subtraction.* In other words, Lancaster county farmers pride themselves in doing all that is humanly possible to keep their soils in a high state of fertility through the liberal use of lime, stable manure, commercial fertilizers, and carefully planned crop rotations which always include legumes.

The original soils were quite fertile and they were selected by the early German settlers for this reason. These settlers, we are told, were representatives of the twenty-fifth successive generation of farmers in their mother country, and thus were well qualified to recognize the crop-producing powers of a soil from a study of the native vegetation. After a farm had been chosen, it was handed down from father to son through successive generations. It has been our privilege, on several occasions, to visit some of these farms which have been operated by the same family for more than 200 years, and which still are in a high state of fertility. The Ephrata Station is located on one of these farms.

Field work on Pennsylvania tobacco is being conducted at Ephrata, Lancaster county, and Lock Haven, Clinton county. The greater part of this work, however, is conducted at the Ephrata Station under the direction of the Office of Tobacco Investigations, U. S. Bureau of Plant Industry, in cooperation with The Pennsylvania State College. This work is supervised by Otto Olson, who has been interested in investigations dealing with cigar-

This tobacco received 165 pounds of urea, 195 pounds of precipitated bone, and 600 pounds of sulphate of potash per acre, and was grown in a four-year rotation. It yielded 2,080 pounds per acre. (Ephrata Station)

leaf tobacco for a long period, and is thoroughly familiar with the agricultural conditions prevailing in that locality.

We believe that field experiments relating to the tobacco crop of this locality should conform, as closely as possible, to the general agricultural system now in operation and which, no doubt, was in vogue long before any tobacco investigations were conducted. This policy has been rigidly followed at the Ephrata Station, but the results of the investigations lead us to believe that some modifications could be made in the prevailing methods of growing tobacco for both yield and quality, without seriously interfering with the present general program.

The Lancaster county system of soil treatment is highly satisfactory as regards crop yields and the preservation of fertility, but the soil today is not necessarily as capable of producing as good a quality of tobacco as it was when first placed under cultivation. While we have no experimental data to show whether this is true or not, experience with virgin soils leads us to raise the question. While it is entirely possible for the farm soils of today to have as great a quantity of organic matter and the necessary mineral nutrients as virgin soils, attention must be given to differences which may exist between the character of the organic matter and the form of inorganic materials in virgin soils, as compared with the cultivated soils of today. In other words, it is imperative to consider the quantity and kind of organic matter, and the quantity and kind of commercial fertilizers added to the soil, as well as the time and method of application.

The Use of Stable Manure

One of the best forms of organic matter to add to soils is stable manure. The beneficial effects of a single application of manure have been known to persist for more than 50 years. Manure contains many beneficial micro-organisms which multiply in the soil. In addition, it stimulates the growth and reproduction of those micro-organisms pre-existing in the soil, since it serves as a food material for these lower forms of plant life as well as those of a higher order. It must be remembered, however, that stable manue is, at best, an unbalanced fertilizer, with nitrogen the predominating element. Moreover, it stimulates those soil organisms which have to do with the fixation of atmospheric nitrogen, so that an application of manure may serve both as a direct and as an indirect source of soil nitrogen. This is a point that should be given consideration when questions pertaining to tobacco fertilizers are raised.

Nitrogen favors the vegetative phase of plant growth, hence excessive quantities delay the proper ripening of tobacco. Unripe tobacco cannot be utilized to advantage in the manufacture of high quality cigars. Moreover, if there is a considerable delay in ripening, there is likewise a danger from frost; frosted plants do not cure nor ferment properly.

The addition of stable manure immediately before the young plants are transplanted, invariably leads to a deficiency of nitrogen, since the available supply is appropriated for a time by soil micro-organisms. This condition may be largely controlled by the addition of a nitrate fertilizer to the manure before it is applied to the field, or shortly after. The use of stable manure, therefore, may lead to a lack of nitrogen during the early stages of plant growth, and to an excess during the latter stages.

Our experience leads us to believe that there is no valid reason for the use of stable manure alone as a fertilizer for tobacco. The yield is consistently less, the quality inferior, and the plants are less resistant to the invasion of disease, as compared with plants which draw their sustenance from a soil receiving applications of properly reinforced manure or other desirable soil treatments. Good quali-

Havana Seedleaf tobacco is carefully harvested at the Pennsylvania Lock Haven Station.

y tobacco has been obtained through he use of commercial fertilizers alone. Hence we recommend that manure be pplied to the soil elsewhere in the rotation rather than directly to the tobacco crop, so that its maximum beneficial effects may be obtained and its injurious effects may be reduced to a minimum.

Plowing under legumes is another method practiced by Lancaster county tobacco growers, in order to supply organic matter and nitrogen to the soil. This practice has a place under any progressive system of agriculture. A measurable quantity of soil constituents are absorbed and utilized during the growth of the legumes; these become available to succeeding crops, after decomposition has taken place. The practice of plowing under stable manure and legumes, which is so prevalent among tobacco growers, and the high nitrogen content of the tobacco crop, lead us to believe that the Lancaster county soils are relatively high in nitrogen.

What has been said does not necessarily minimize the importance of nitrogen in the growth of the tobacco plant. No plant food can compare with nitrogen in its desirable effects on growth and quality; this is known to all who are concerned with this particular crop. No one would recommend nitrogen alone as a tobacco fertilizer; and no one would recommend a fertilizer lacking in nitrogen. A proper balancing of all nutrients is necessary.

The Use of Lime

A soil deficient in lime is not usually a very fertile soil. The general tendency is for a soil to lose considerable quantities of this material after being placed under cultivation. If the lime content is not maintained within certain limits, maximum crop production cannot be obtained. The rational use of lime, therefore, is to be recommended.

Lancaster soils are of limestone origin and the lime content appears to be retained to a considerable degree against the forces of leaching. Some of these soils can be cropped for a long period without a lime application being necessary. If a soil is able to produce a good crop of legumes, lime is not a limiting factor. A soil, however, can have too much lime, so far as the tobacco crop is concerned. We believe that this is a factor that is

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Some Deficiencies of Complete Fertilizers

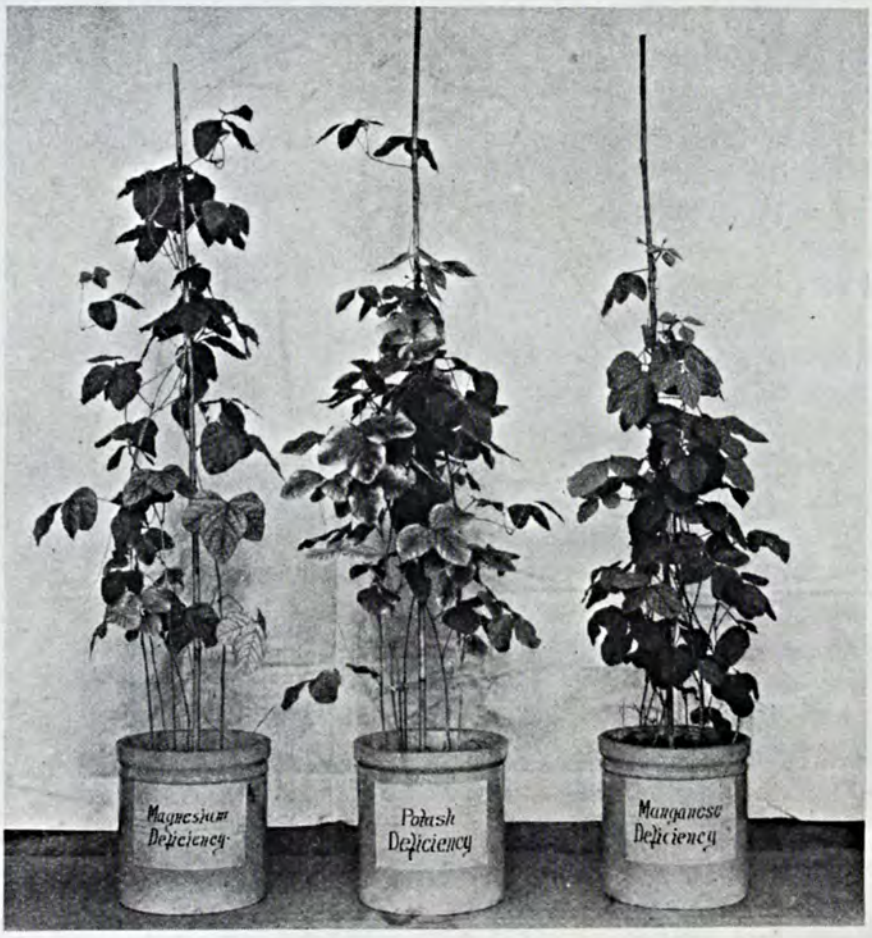
By L. G. Willis

Soil Chemist, North Carolina State College of Agriculture

A COMPLETE fertilizer as defined by law is one which contains available nitrogen, phosphoric acid, and potash. No other component is given legal recognition, but the law is notoriously empirical in its definitions, and this one is no exception. Everyone conversant with the results of fertilizer investigations recognizes its inadequacy.

There is abundant evidence from various localities in the country to justify the conclusion that not only the three named ingredients but also sulphur, magnesium, calcium, and perhaps chlorine are valuable components of fertilizers. In the face of this evidence the only justification for the current interpretation of the term complete fertilizer is one of expediency to facilitate the analysis of the fertilizers in control laboratories.

The time is overdue when research agencies should scrutinize their data to see what has really been proved as to the use of fertilizers. Perhaps the greatest chance for fallacious conclusions lies in the assumption that superphosphate is valuable in fertilizers as a source of phosphoric



THREE TYPES OF PLANT-FOOD DEFICIENCY IN SOYBEANS

Magnesium deficiency appears at the base of the plant, the leaves becoming chlorotic between the veins.

Potash deficiency produces a marginal chlorosis of the leaves.

Manganese deficiency is very similar to magnesium deficiency except that it appears at the top of the plant and the leaves do not shed.

acid only. Probably everyone will agree that the contents of sulphur and calcium have values as plant foods, and yet when the results of experiments are assembled for interpretation, the conclusions are almost invariably drawn as though the phosphoric acid were the only valuable ingredient. This attitude is taken in spite of the well-known fact that for many crop plants sulphur is as important a plant food as is phosphorus and that sulphates are readily lost from soils by leaching, whereas the phosphates are not.

COTTON PLANTS FROM FIELD FERTILIZER EXPERIMENT

1, Concentrated fertilizer alone; 2, Concentrated fertilizer with 20 pounds of gypsum per acre; 3, Concentrated fertilizer with 40 pounds of gypsum per acre.

Many observant investigators of fertilizer problems have learned to distinguish between the brassy appearance of plants grown with an insufficient supply of sulphur and the deep, blue-green color that develops in plants fertilized with compounds containing sulphur. No one can question the value of sulphur, especially for the legumes and cruciferous crops, and the response of these on many soils to fertilization with superphosphate may be in part due to the sulphur content of the fertilizer.

The Role of Calcium

The calcium content of fertilizers in general and of superphosphate in particular is of less certain value. Only a few instances have been noted in which the calcium supply in the soil has not been adequate for normal plant growth. There is, however, some evidence that the calcium content of fertilizers is important aside from its value as a plant food. When, for example, the fertilizer contains organic nitrogen, this is promptly converted into free ammonia in the soil unless the fertilizer also contains a calcium salt which will neutralize the ammonia. Free ammonia is very injurious to many plants.

On the other hand there is a possibility that the present high concentration of calcium salts in fertilizers is not always desirable. The use of superphosphate on the muck soils of eastern North Carolina has resulted in decreased yields of corn, and experiments during the summer of 1930 indicate that at least a part of this unfavorable effect can be attributed to the calcium content of the fertilizer.

These two properties of calcium salts would seem to enhance or detract from the efficiency of superphosphate quite independently of the value of the actual content of phosphoric acid itself.

The Need for Magnesium

The need of many soils for magnesium has been widely observed and there can be no doubt that this element is a valuable component of fertilizers. Magnesium deficiency ex-

hibits distinct symptoms in tobacco, cotton, soybeans, and corn which can generally be recognized by persons familiar with the condition.

The fact that magnesium deficiency has not become one of the major soil deficiencies on some of the lighter soil types may easily be due to the unintentional inclusion of this important plant food element through the use of crude potash salts.

Magnesium deficiency for tobacco is commonly observed in the southeastern States and dolomitic limestone is extensively used as a source of magnesium for its correction. This is in reality a method of fertilization, and it must always be differentiated from the ordinary practice of liming. On the other hand the response to liming when dolomitic limestone is used cannot be attributed entirely to the neutralization of soil acidity unless it is certain that no benefit has been derived from the added magnesium serving as a plant food.

Insufficient Data

The southeastern States use more fertilizers than the rest of the country combined. This is not a boast nor a criticism, only a statement of fact, and the underlying reason is the extreme deficiency in the natural supplies of plant-food elements of the soils on which the fertilizer is used.

Under such conditions it would be a matter for surprise if only three of the seven or more essential mineral elements were naturally lacking, and the surprises of nature are directly related to a lack of human knowledge.

An immense amount of effort has gone into the study of soil fertility problems in this area. Most of it has been expended in the study of problems of current practical importance, and the methods have been largely empirical. There can be no doubt of the value of the results as they concern their immediate objectives. It is in their application to changed fertilizer practices that erroneous conclusions may be drawn.

A few examples of the inadequacy of the data we have might be given:

If 600 pounds per acre of a 4-8-4 fertilizer composed of superphosphate, nitrate of soda, and muriate of potash are found to give the most satisfactory returns with cotton on Norfolk sandy loam, what returns could be expected from equal amounts of plant food from ammonium phosphate, ammonium nitrate, and muriate of potash?

There is no correct answer because we do not know to what extent the calcium and sulphur content of the

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SAND DROWN OR MAGNESIUM DEFICIENCY OF TOBACCO

The leaves are arranged from left to right from the top to the bottom of the plant. Sulphate of potash-magnesia is an effective remedy for this condition.

This is the way potatoes turn out on the farm of Ray C. Prescott, Island Falls, Aroostook county, Maine—a yield of 464 bushels per acre. Note the even size and excellent type. Liberal uses of certified seed, clover plowed under, 2,200 pounds of 5-7-10 fertilizer per acre, and dusting and good care did this.

Intelligence and Potatoes

By R. F. Thomas

Houlton, Maine

A SIX-YEAR average per-acre yield of 420 bushels of potatoes does not "just happen." It is the result of a combination of approved practices.

The plowing under of big crops of clover, the planting of liberal amounts of high-grade certified seed, heavy application of high-analysis fertilizer, and thorough dusting are some of the practices that have made it possible for Ray C. Prescott, prominent potato producer of Island Falls, Aroostock county, Maine, to attain a six-year average per-acre total yield of 420 bushels of potatoes. In 1930 from 47 acres, including 5 acres of tuber-unit seed plots, he harvested 23,001 bushels, which is an average per-acre yield of 489.3 bushels. On one 12-acre field, he dug 7,203 bushels, an average of 600 bushels per acre.

It is the unanimous opinion of agricultural workers that Mr. Prescott is the most outstanding, all-around potato producer in this section of the country. He and his brother John, who farms on an adjoining farm, have been practicing these approved methods for several years and are now reaping their rewards.

Ray specializes in the growing of high-grade Spaulding Rose and Irish Cobbler seed potatoes for Florida and local trade and plants about 50 acres a year. John, although a smaller grower, produces excellent seed of the same varieties for the same trade.

Mr. Prescott, for a long time, has

During the latter part of the growing season, the field is a solid mass of tops.

recognized that soil filled with humus is very essential in producing big yields of well-shaped tubers and has relied upon peavine or mammoth red clover to furnish this. In 1930 a clover crop that would go better than three tons of cured hay to the acre was mowed the last of June and left on the ground until the aftermath grew up through, when both were plowed under the first of August, for next year's potato crop.

This land was immediately disced and again plowed around the middle of October. It is planned to plow once more before planting. The reason for so many plowings is to promote decay of the heavy crop of clover turned under and distribute it thoroughly throughout the soil so as to reduce to a minimum the danger in interfering with the capillary rise of moisture to the plants. When seedbeds are prepared, they are deep and mellow and remain that way throughout the season. The soil doesn't bake. Tubers have a real chance to develop normally. The soil looks as if it had "life," due to the abundance of decaying organic matter.

Mr. Prescott tests his soil for acidity and applies lime when and where needed. He applies about 400 pounds per acre of ordinary potato fertilizer to the acre when seeding down so as to insure a good crop of clover.

His rotation has been potatoes, potatoes, barley, and clover. From now on it will be potatoes, barley, clover, potatoes, and he is going to try seeding clover alone on some fields because he has no use or market for the grain. He also wishes to minimize the danger of intensifying diseases by avoiding following potatoes with potatoes two years in succession on the same piece of ground.

Is Sure of Good Seed

Belief that the foundation for high, per-acre yields of quality potatoes lies in the development of a high-yielding strain of as disease-free stock as is possible to grow, has led him to plant five acres of tuber-unit seed plots each year. These are isolated from the other fields and planted on clover sod and are constantly under his supervision throughout the season. On most farms the seed plot usually is planted after the general crop is put in, but this is not so on the Prescott farm. The seed plots are the first planted, and in 1930 were in by May 6.

Mr. Prescott's object in planting these plots early and first is to get the plants grown to the stage where diseased plants can be distinguished and pulled up and the remainder inspected again several times before plant lice, which transmit virus diseases, appear. Everything that looks abnormal comes out. The plots are inspected for diseases 20 times during the growing season, and the majority of the inspections are made before lice appear. It is not uncommon for eight different men, capable of identifying potato diseases, to inspect all of the plants in the plots. When dug, a man capable of telling spindle tuber, or anything else, follows the digger and picks them out. The three-year average yield of the tuber-unit plots is 360 bushels, a high yield when the small number of hills grown per acre is considered.

Only tubers having good size and excellent type are used in the foundation fields, and only those meeting his requirements as to measurements, type, and weight are used in the tuber-unit plots. He estimates that his yield has increased an average of about 27 bushels a year due to tuber-unit seed plot work.

Small quantities of manure have been applied, but Mr. Prescott relies almost wholly on commercial fertilizer to grow the crop. Up to last year a ton of 5-8-7 to the acre, was applied. Due to a demonstration on his brother John's farm in 1929, with 7 and 10 per cent potash in the fertilizer, in which more stocky plants and 108 bushels more potatoes per acre in favor of the 10 per cent were produced, he used all 5-7-10 in 1930 at the rate of 2,200 pounds per acre. He was so well satisfied that he will apply all 7-10-14 in 1931.

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Left: Ray C. Prescott examines the soil to see that it is light and fluffy and contains plenty of humus.

Right: A close-up picture, with the soil scraped away, shows a mat of decaying clover.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

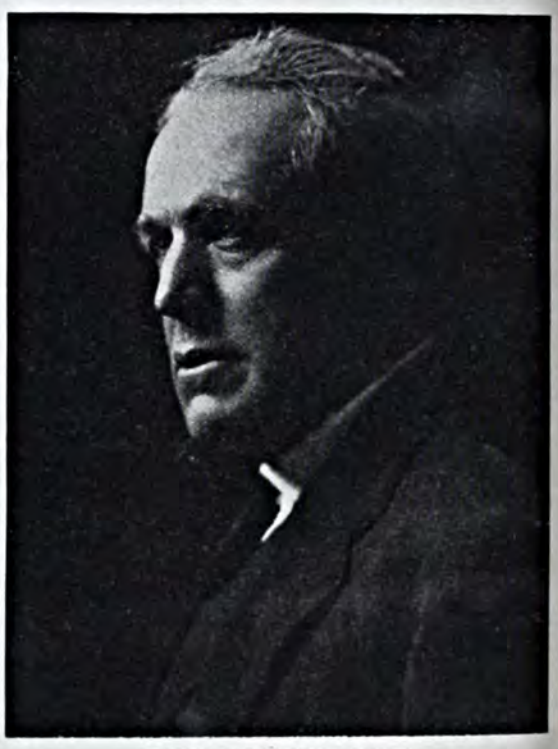
"THE thing can't be did!" said the neighbors to J. H. Hale, when he proposed a great new undertaking in fruit-farming; but there was no such word as "can't" in his vocabulary. He *did* what he set out to do!

The indomitable will to do things characterized the life-work of this man, who as a small boy in 1866, began growing small fruits on one-eighth of an acre and peddled the product from a rickety, little push-cart. By 1895 he had acquired 1,000 acres of orchard land, had come to be called the "Peach King," and marketed his fruit with a line of trolley cars of his own.

A Humble Beginning

John Howard Hale was born in South Glastonbury, Connecticut, November 25, 1853, and was destined to become the leading orchardist of his day. He never knew the love and guidance of a father, for the head of the house died when John was but two years old. His early life was spent on a mortgaged farm with his mother, two sisters, and a younger brother. Their's was a stern, uphill pull in those early years. There was much work to do, and little time for schooling. John left the district school when but 11 years old and, tall, slender, wiry lad that he was, became the mainstay of his mother. Intensely, he loved the land, nature, farming and gardening, but fruit trees were his chief delight.

One day, when husking corn on a neighbor's Connecticut hill farm, he spied a seedling peach tree growing in



JOHN HOWARD HALE

the fence-row and forthwith sampled its rosy-cheeked fruit. As the sweet juice ran down his chin, inspiring thoughts came to him and he speculated thus: "Seeing this seedling has done so well, maybe I could make a success of peach-growing in these rocky hills of old Connecticut? Anyhow, I'm going to try," and thereupon began saving his hard-earned pennies to buy foundation trees for a trial orchard.

The "do or die" spirit carried the far-seeing, shrewd, thrifty Yankee boy through his adventure, and, in

1869 he proudly and lovingly set out his first 200 trees. Three years later, according to a record quoted by *The Field, Illustrated,* he had increased his orchard to 3,000 trees and kept on expanding his operations, as means allowed, until in 1890 he owned 10,000 peach trees. By this time he had also put New England on the map as a peach-producing country, and had gained a reputation for honesty in marketing. That principle became a dominating attribute and purpose with him, and accounted, in large measure, for his success in life.

U. C. Top; U. C. All

Splendid traits of character had been inculcated in John, his brother, and sisters, by their devoted, widowed mother, and of these, strict integrity was paramount. Early, he determined that no buyer ever should be able truthfully to say that a package of fruit purchased from him was short in measure or poor in quality. When harvesting apples, for example, only mature specimens were taken from the tree at each picking, and it was a month or more before all were gathered from any one tree. The prevailing plan in his day was to pluck all at one time, and ship ripe, half-ripe, and green all together.

The Hales decided that honesty in marketing would insure success, therefore, they adopted the slogan "U. C. Top; U. C. All"—meaning that the fine fruits were not all on top, for show in basket or box, but that the entire contents were of equal quality.

That admirable idea, rigorously adhered to, quickly brought reputation, fame and fortune. Later the famous "RED LABEL" on the cars of the nightly express train that carried his peaches from Atlanta, Georgia, to Boston and other New England centers became recognized as a trademark guaranteeing supreme quality of product. What an advance was that speeding, refrigerator-car train to the humble little pushcart of Hale's boyhood days!

At the beginning of his career the widow's son, on the hilly, rocky, mortgaged farm at Glastonbury had, in addition to his historic pushcart, a shovel, hoe, and spade, no cash, no horses, no modern implements, but an inherent love and talent for fruit culture. He was a boy of farseeing vision who early chose his course and never swerved from it in later life. He had the *will,* and made the *way.* Nothing deterred him from his purpose, and in all that he did his brother was his able partner from boyhood until 1896.

Developed a Nursery

Their first strawberry patch of mixed varieties came from the old fruiting bed of a neighbor. At the age of 14 John hired out as a farm laborer to earn money to buy more improved varieties of fruit plants and, incidentally, to learn the art of marketing. Neighbors, it is said, warned their mother against letting the boys "take the best part of the farm for a brier patch." Fighting quack grass in a season of drought taught the boys that thorough cultivation was the next best

The Connecticut home of J. H. Hale.

thing to irrigation for fruit. Marketing experience taught them that neat packages and honest presentation of products insured profits. Then the importance of fertilization appealed, and led to study of the subject. Chemicals soon proved the "salvation of horticulture." Testing new varieties of fruit also occupied their attention and brought profits. A great nursery business eventually developed from the demand for plants and trees of some of the fine fruits the Hales offered on the market.

Purchased More Land

In the spring of 1896, a farm adjoining the original Hale homestead was acquired. The house on it had been built by Grandfather Hale 100 years before and was ample for the family. The additional acres furnished a broader field of labor. On it and the old farm, the nursery business was continued. A larger area was planted to small fruits, and these, stimulated by an abundant flow of water from a new irrigating plant, made splendid progress. Enlarged experimental grounds were established, and included test plots for 60 varieties of strawberries which attracted many visitors in the fruiting season of 1897. An extensive orchard of Japan plums was next formed, and the six approved varieties planted included the Hale Plum, which became famous for its prolificacy, beauty, and quality. Over 3,000 peach trees, added to the already large orchards, completed the onward march of horticultural progress on the home farm.

But the Hales were not yet satisfied. In another Connecticut county two adjoining farms were purchased, fences and walls removed, and 100 acres in a solid block plowed and planted to thousands of additional trees, plants, and vines, as a further proof of their faith in fruit-growing as a most enjoyable and profitable branch of soil culture. Three hundred acres in all around Glastonbury and Seymour were planted to orchard trees.

Most men would have thought these investments a sufficient venture; but not the enterprising Hales. In 1890, 1,800 acres of fruit land had been bought near Fort Valley, Georgia, from the profits earned on the northern home acres. About 100,000 peach trees were set out on the new plantation, which in time grew to an orchard of 200,000 trees, of which 90,000 were in full-bearing at one time. Fifteen hundred acres were devoted to orchard and 300 acres prepared for planting, six varieties of peaches were grown, there being 20,000 bearing Elberta trees, 10,000 bearing trees each of Greensboro, Waddell, Highly, and Bell of Georgia varieties, and 5,000 bearing Carman trees.

In 1912, 151 carloads of peaches were marketed in New York, Philadelphia, Boston, Baltimore, and other leading Eastern cities. The total shipment of fruit aggregated 76,104 crates, containing 456,624 four-quart baskets of the finest quality peaches. "That year the Georgia peach crop returned a net profit of 85 cents per basket to the grower. The Hale crop netted more than $1 clear, per basket." (*The Field, Illustrated.*) Some of the best trees yielded as high as 10 crates in a single year. A mature tree should produce at least one crate per season.

Fertilized His Soil

To obtain his fine results, Mr. Hale always fertilized the soil each year. He got good results from a mixture of 600 pounds of muriate of potash and 1,400 pounds of a phosphate fertilizer. Ground bone and Thomas slag entered into the home-made combination. Barnyard manure was used to fertilize young trees, but was not found satisfactory for mature fruit trees.

The enterprising orchardist was ever experimenting and devising new short cuts and better methods. Usually, he had to solve his own problems, for in his day the experiment stations had

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The corn went down badly on the plots which were not fertilized.

Proving an Idea

By L. C. Brown

Farmer, Genoa, Illinois

I HAVE found the advantages in fertilizing corn to be fourfold:

1. Rapid early growth enabling earlier cultivation with power cultivators and greater control of weeds.
2. Higher yield.
3. Improved quality, feeding and market value.
4. More strength to the stalks, which means that the fertilized corn stands up better and more corn is saved when using a corn picker.

A few years ago I began the use of limestone. On some fields two tons of limestone per acre failed to grow clover, and on these fields I increased the application to six tons per acre. I then secured good stands of clover, but the growth was short and stunted. This led me to believe that I had a shortage of plant foods in addition to a need for lime. The soil type is brown silt loam.

In 1929 I began fertilizing corn using 125 pounds of 4-16-4 per acre, hill-dropped. This treatment increased my yields an average of 9 bushels per acre. I tried four different fertilizers on small plots to determine the best one under my conditions, using 0-12-12, 4-16-4, 0-14-6, and 0-20-0. The 0-12-12 and the 4-16-4 gave the best increases, each giving an increase of 14 bushels per acre over the check.

In 1930 I fertilized 200 acres of corn using 0-16-6 following clover and 4-16-4 on other corn land. These fertilizers were hill-dropped at the rate of 125 pounds per acre. My average yield this year was 50 bushels per acre. Before I began liming and

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Proper Fertilization *Makes Minnesota Peats* Produce

By E. C. Torrey

Former Publicity Specialist, Minnesota Extension Service

APPLICATIONS of commercial fertilizers to peat land plots in Wadena county, western Minnesota, in 1930, increased the yield of clover-timothy hay at the rate of about 1½ tons to the acre.

Flax sown on a plot treated with 250 pounds of potash responded with a yield at the rate of 23.76 bushels to the acre, while the unfertilized plot yielded at the rate of only 17.29 bushels. A variety of barley known as Peatland averaged about 33 bushels to the acre on the fertilized tracts. Where no fertilizer was used, the yield was at the rate of 18.90 bushels to the acre.

All the root crops responded better to heavy applications of fertilizer than did hay or grain. Carrots on fertilized peat yielded at the rate of 15.7 tons to the acre. Without fertilizer the yield was at the rate of only 4.22 tons per acre. Many potato growers reported outstanding yields on fertilized peat. Cabbage was a good crop when properly fertilized, but yield tests were not taken.

Reed canary grass, spurred by commercial fertilization, yielded two tons to the acre the same season it was sown. Give this perennial forage another season's growth under normal conditions and it will yield three to four tons to the acre. Oats were seeded too late and were badly damaged by rust.

Wadena county has a large acreage of peat land, and two seasons of drought in succession have aroused increased interest in its development, says Carroll Blakeslee, county agent. Late in the season of 1929 it was decided to make this development a major extension project for the year 1930. Accordingly, several acres of peat were plowed and a seedbed prepared in the fall of 1929. The plan called for the growing of clover-

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These samples of clover-timothy hay grown on peat show that even a light application of fertilizer will give greatly increased yields the first year. Left: No fertilizer, yield 0.84 ton per acre. Right: Fertilized with 100 pounds of potash and 50 pounds of superphosphate, yield 2.12 tons per acre.

The fertilizer was applied to the gardens with an ordinary wheat drill.

Potash *in the* Garden

By E. C. Stair

Assistant Professor of Horticulture, Purdue University

EARLY in the spring of 1930 we decided to apply some potash to part of our student garden at Purdue University to determine the value of this plant food on vegetable crops in general. On the basis of 15 acres of the crops grown, and including all of those acres which showed a loss, there was still a profit of $7.73 for each $1 invested in potash.

The soil on which these fertilizer demonstrations were conducted as class exercises, is a sandy loam underlaid with gravel. The tract has been used for gardening purposes for the past eight years. At the beginning, the land was a rather thin piece of ordinary farm land. Since starting to develop the garden, the land has received a number of good coats of manure and some commercial fertilizer each year.

The garden had all been plowed in the fall of 1929. On March 13, 1930, twenty per cent superphosphate was added to the garden at the rate of 1,000 pounds per acre, which is accepted as a good commercial practice for market gardens. On the same day the east one-half of the garden received an application of muriate of potash at the rate of 500 pounds per acre. This was applied with an ordinary wheat drill as shown in the accompanying picture. The following day this fertilizer was thoroughly worked into the soil with a double disk and tractor. This was done about two weeks before any seeds were planted in the soil.

THESE CROPS RETURNED AN AVERAGE PROFIT OF $7.73 FOR EACH $1 INVESTED IN POTASH

CROP	Yield Per Acre $K_2O+P_2O_5$	Yield Per Acre P_2O_5 alone	Increase due to use of Potash	Selling Price	Increased Value due to use of Potash	Net Gain or loss due to use of Potash	Gain per dollar spent for Potash
Early Scarlet Globe Radish	1,586 doz. bunches	1,092 doz. bunches	494 doz. bunches	40c per dozen	$197.60	$182.60	$13.17
Earliest Scarlet Globe Radish	3,150 doz. bunches	1,946 doz. bunches	1,204 doz. bunches	"	481.60	466.60	32.10
Earliest Scarlet Globe Radish	1,605 doz. bunches	1,316 doz. bunches	289 doz. bunches	"	115.60	100.60	7.71
Rapid Red Radish	1,778 doz. bunches	1,624 doz. bunches	154 doz. bunches	"	61.60	49.60	4.11
Giant Butter Radish	434 doz. bunches	308 doz. bunches	26 doz. bunches	"	10.40	4.60*	.30*
Alaska Peas	1,560 lbs.	1,496 lbs.	64 lbs.	.07½ lb.	4.80	10.20*	.68*
Notts Excelsior Peas	1,968 lbs.	1,984 lbs.	−16 lbs.	.07½ lb.	15.00*	15.00*	1.08*
King of Denmark Spinach	2,480 lbs.	1,924 lbs.	556 lbs.	.03½ lb.	19.46	4.46	1.30
Head Lettuce	847 heads	559 heads	298 heads	1.00 doz.	25.00	10.00	1.67
Tomatoes	9,907 lbs.	7,593 lbs.	2,314 lbs.	.04 lb.	92.56	77.56	17.14
Stringless Greenpod Beans	3,923 lbs.	3,151 lbs.	772 lbs.	.02½ lb.	19.30	4.30	1.29
Beets	900 doz. bunches	636 doz. bunches	264 doz. bunches	.25 doz.	66.00	51.00	4.40
Eggplant	25,643	15,600	10,043	.75 doz.	627.75	612.75	41.85
Early Cabbage	12,659 lbs.	12,218 lbs.	440 lbs.	.02 lb.	8.80	−6.20*	.41*
Leaf Lettuce	3,300 lbs.	2,875 lbs.	425 lbs.	.05½ lb.	233.75	218.75	15.58

*Loss

All rows in the garden ran east and west. This gave equal lengths of all rows that were supplied with muriate of potash and phosphoric acid to compare with the other end of the garden to which only phosphoric acid had been added in addition to the manure which had been applied fairly uniformly over all parts of the garden. In addition, spinach, cabbage, head lettuce, and leaf lettuce were given from one to three side-dressings of nitrate of soda at about 10-day intervals, or when they began to show need for nitrogen. When nitrogen was applied it was applied to both ends of the row alike.

The figures in the table opposite show only the results obtained from the use of potash. The value of the potash used was $15.00 per acre. All figures given are arranged on the acre basis for each crop.

A Profitable Investment

In studying the results of this table it may be seen that some crops responded much more favorably to the use of potash than others, and as is shown in the case of radishes some varieties gave much better returns than others. One variety showed a loss. The radishes were all planted on one piece of ground which made the conditions very similar from the standpoint of soil. The radishes also seemed to be at about the same stage of maturity and were all harvested on the same day.

An interesting thing noted with regard to the head lettuce was the quality produced and the rate at which it matured. The harvest extended over a period of 10 days. On the plot which received the potash, 72 per cent of the heads were harvested during the first four days of the harvest period. These heads grew and matured quickly; they were tender, sweet, and of very good quality. On the plot receiving phosphoric acid alone 65 per cent of the heads harvested were cut during the last four days of the 10-day period. These heads matured slowly and were tough, bitter, and of poor quality.

This entire garden raised two crops this year with the exception of the strip planted to eggplant. Part of the crops listed in the table are from the first planting and the remainder were from the second planting. The tomatoes were the second crop raised on the same plot where the radishes were grown as the first crop. The tomatoes were pruned to one stalk and trained to stakes.

The stringless greenpod beans were from the early planting. Potash evidently produced a fairly large increase in the yield of this crop without any additional nitrogen other than that from manure. While the beans were growing and before the crop was completely harvested, a very decided difference was noted in the color of the foliage. The foliage on the plot receiving no potash was dark green while that on the plot receiving potash had a decided yellowish color quite similar to that produced by nitrogen deficiency. This would seem to indicate that more nitrogen might have increased the benefit from the potash on the crop.

According to results secured from this first year's work, it seems that potash is especially important on root crops and on some other crops such as eggplant, lettuce, and tomatoes.

On the basis of 15 acres of crops as listed in the table, and including all of those acres which showed a loss, there was still a profit of $7.73 for each dollar invested in potash. This was based on the prices listed in the table in the column marked "selling price." These were all wholesale prices and were low.

Many crops were benefited by liberal applications of potash, but the maximum increase apparently was not obtained without the proper amounts of nitrogen and phosphorous to balance the ratio.

Lespedeza seed is harvested in Stanly county, North Carolina, with a seed pan arrangement such as this.

A County Rebuilt

By F. H. Jeter

Editor, North Carolina State College of Agriculture

SINCE the time a very plausible gentleman sold me for $50 a history of North Carolina entitled, "Rebuilding an Ancient Commonwealth," in which he intimated that my share in rebuilding the State would be commented upon at length, I have been somewhat shy of anything having to do with rebuilding. The history in question contained two volumes of very mediocre history and two volumes of scintillating autobiography. I say "autobiography" because the material was very largely furnished by the subjects themselves and anyone having $50 could have his unusual accomplishments commented upon. If he had $85 he could have a picture included. I suspect he could have been nominated for Governor for the other $15.

The history was designed to give posterity an account of the work done by men of mark in North Carolina during this past few years of progress. The only trouble was, the promoters left out the word "easy."

But there is a historical accomplishment in this ancient commonwealth about which posterity should be informed. Among the 200 or more newspapers coming to this office in the course of a week, there is the *Stanly News and Press.* A modest newspaper telling about the doings of good people in a good county. It records their goings and comings and dwells more than do most papers on the affairs of rural people. Appearing in bold relief on one of the pages of this paper recently was a full-page advertisement prepared for the busi-

ness men of the county endorsing the work of county agent O. H. Phillips.

The advertisement declared that this extension worker was responsible for the great progress made in the county during that 10-year period in which he had served it. It was also said that the county had made more agricultural progress than any other North Carolina county during this period. Thirty-five business firms contributed to the advertisement.

This is something unique in extension work. Of course, when fights are made on county agent work, it is common for groups of farmers to appear before the county boards to seek a continuance; but, there was no fight on Mr. Phillips. These firms had seen the good things accomplished and wished to add a word of appreciation.

What Was Accomplished?

Perhaps, therefore, it would be interesting to go back a few years and study Stanly county agriculture. The soil was poor and the people were poor. Probably here as nowhere else in North Carolina could one find accurate expression of the old adage that a fertile soil makes a prosperous people and an infertile soil produces a hopeless, disillusioned people. The soil was poor, nor is it yet naturally fertile. It is of the characteristic slaty composition found in two or three counties of that section and is hard to work, hard to improve, and hard on the souls of its owners.

Therefore, Mr. Phillips saw this condition and adopted soil improvement as his principal project. That was 10 years ago. Last fall the people of Stanly held a great banquet attended by some 400 farmers and farm women and a few invited guests. These folks were conscious of new power. They had the light of achievement on their faces. They had crossed the Alps, the Rubicon, and several other significant barriers, and no one could talk with them without feeling the radiant exultance of accomplishment.

And why? Because they have builded a new agriculture. Starting with lespedeza, that lowly legume said to have been left in the South by the scattered feed bags of a conquering host, the farmers are graduating into alfalfa, sweet clover, pastures, dairy cattle and a happy, prosperous farm life. Not graduating entirely, because lespedeza remains as the principal crop. On it, the other things have been built.

Perhaps there are 45 square miles of lespedeza being grown in Stanly county each year now. At least there were between 25,000 and 30,000 acres

Harvesting a two-ton crop of lespedeza hay. Farmers claim that it is an easy matter to cure lespedeza hay in a way that retains almost all of the leaves.

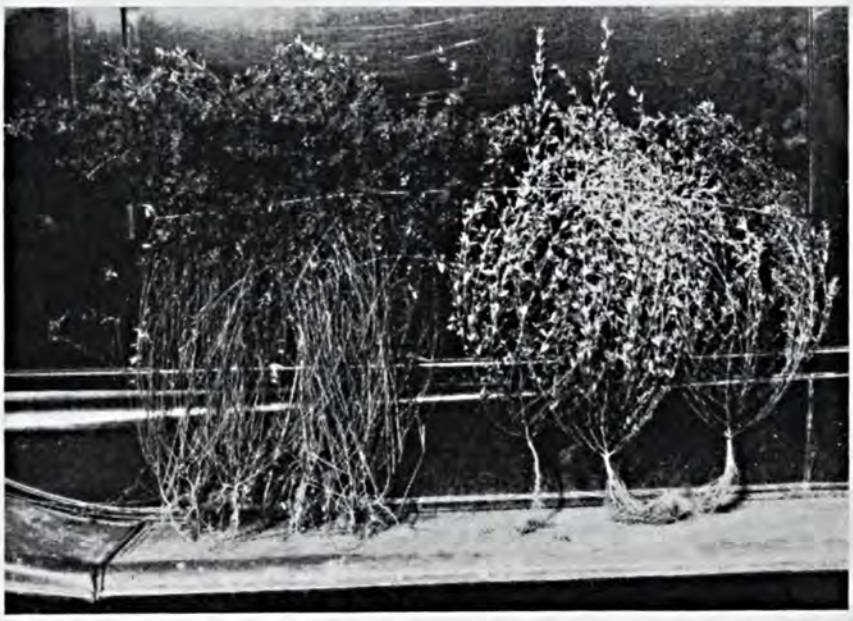
grown by some 1,200 farmers in 1930. The crop is being grown on over 95 per cent of the farms and it is planted for hay, pasture, and soil improvement. It is a million-dollar crop to Stanly county, says Mr. Phillips, and will increase the farming value of the soil from $20 to $30 an acre the first season.

Farmers Vouch for Lespedeza

Some of the claims appear to be extravagant, but the farmers themselves vouch for the fact that lespedeza has increased the average yield of corn from 20 bushels an acre in 1926 to 30 bushels in 1930. The increase with cotton, hay, and small grain has been in proportion, they say. Getting down to concrete figures, the men of this county say actual demonstrations have proven that a crop of lespedeza will increase the yield of corn 20 to 25 bushels an acre; wheat, 10 to 18 bushels; oats and barley, 10 to 30 bushels; and cotton 500 to 1,200 pounds of seed cotton an acre. It is an easy matter to produce 500 pounds of lint cotton an acre with a 300-pound application of a 12-4-4 fertilizer after a crop of lespedeza if the boll-weevil is not permitted to become too active.

Travel over the county and interview the farmers. The testimonials in favor of lespedeza will read like a patent medicine advertisement. The farmers have formed the Stanly County Mutual Exchange which is a co-operative, non-profit, seed-growers' and soil-improvement association. This association is banded together to improve the soils of the farmer members and to sell the surplus lespedeza seed that may not be needed for the next season. Each season the Exchange issues a small booklet telling about the virtues of the crop and some of the results secured from it and giving specific facts about how to plant, cultivate, and harvest.

An extract from the current publication says, "Lespedeza will make profitable growth without lime or fertilizer, but will respond to an application of 1,000 pounds of ground limestone an acre applied each two or three years. It will also respond to an application of 200 or 300 pounds per acre of a fertilizer analyzing 2 to 3 per cent nitrogen, 12 to 16 per cent phosphoric acid, and 4 to 8 per cent potash. This should be applied when the small grain is seeded or when lespedeza is seeded in January or February."



The lespedeza on the right illustrates its habit of growth when sown very thickly. That on the left shows its general habit of growth. Note the fine stems and the immense branching.

It must be kept in mind that lespedeza is generally planted on the small grain in late winter but will do almost as well when sown alone. There are four popular varieties, including the Common, Tennessee 76, Kobe, and Korean. Stanly farmers use the Common almost exclusively. Its fine stems are heavily loaded with leaves and its dense

(*Turn to page* 53)

These Wealthy apple trees, shown here in full bloom on May 18, 1930, were fertilized with 6 pounds of nitrate of soda, 5 pounds of superphosphate, and 1 pound of muriate of potash per tree. (Fertilizer experiment, Abbotsford, Quebec.

Complete Fertilizers *for* Apple Trees

By F. S. Browne

Assistant to Superintendent, Dominion Experimental Station, Lennoxville, Quebec

DURING the past 10 or 12 years, the practice of using a nitrogenous fertilizer only, in apple orchards, has become quite general in Eastern Canada and the New England States. In many instances the response to this treatment has been remarkable, the value of the increase in crop being many times that of the fertilizer used.

Investigators have become converted to the idea, as a result of field experiments during the period. Following their recommendations, the practice, as would be expected, has spread with even greater rapidity.

The general realization of the value of nitrogen, in fruit bud formation, has also played an important part in popularizing the nitrogen-alone program. By many it is believed that a liberal supply of nitrogen in the soil during the early part of the season will be drawn upon by apple trees, and when assimilated, will induce the formation of fruit buds. These under favorable conditions will blossom and probably set fruit the following year. Accordingly, if more fruit is wanted, apply more nitrogen, and so on "ad infinitum."

While the fact that apple trees require phosphorus and potassium as well as nitrogen is admitted, it is assumed by the nitrogen-only expon-

ents that a sufficient quantity of these minerals will be rendered available, as required, from the large stores known to exist in our northern orchard soils. There is now, however, considerable evidence available to show that this assumption is lacking in accuracy and that the nitrogen-alone program has been carried far enough.

Matter of Balance

In this connection it should be recalled that previous to 1914 fertility was maintained in orchard soils in much the same way as in soils used for field crops. The most commonly used fertilizer was barnyard manure, and where commercial fertilizers were used, the old 4-8-4 was the favorite. The chief variation was in the use of basic slag or a combination of potassic and phosphatic fertilizers as a supplement to manure. Now, as apple trees require less phosphoric acid and potash and relatively larger amounts of nitrogen than farm crops, the limiting factor in this system of fertilizing was nitrogen. Also, since phosphoric acid and potash are practically non-leaching, and about the only way they can be removed from the soil is by means of plant roots, a large reserve of these essential minerals must have been built up in many orchard soils. Accordingly, when nitrogen was applied, a correct balance was obtained and greater production resulted.

The trees, however, were still using phosphoric acid and potash in even larger quantities than formerly, as nitrogen had ceased to be the limiting factor. This condition has prevailed for some time, and additions have not been made to the reserve of phosphoric acid and potash. It is, therefore, probable that reserve of these essentials is becoming depleted and that the amounts rendered available, from the natural store in the soil, are too small to balance the large quantities of nitrogen usually applied. It is, accordingly, possible that minerals may, or shortly will, become the limiting factor. From the evidence available, it would seem that such is the case in many places.

Respond to Complete Fertilizers

During the past three or four years, individual growers here and there over Eastern Canada and the New England States have found that their trees were not making a satisfactory response to nitrogen only, and a few have begun using complete fertilizers with good results.

In a cooperative experiment conducted by the Dominion Experimental Farms in the orchard of Mr. A. W. Buzzell at Abbotsford, Quebec, under the supervision of the writer, complete fertilizers have proven superior to nitrogen only, with the varieties Wealthy and Fameuse. The soil on the area chosen was very (*Turn to p.* 58)

This picture was taken on August 20, 1930, and looks down the center of the block of Fameuse apple trees used in the fertilizer experiment at Abbotsford, Quebec.

The Rainbow's End

By Charles Kilpatrick

Fort Smith, Arkansas

NOT only is Oklahoma young as a State, but the use of commercial fertilizers is still more or less new to her farmers. The fertilizer manufacturers in the past have termed it "border territory." Now the judicial use of commercial fertilizer is listed as one of the major items in Oklahoma's soil reclamation program.

Pioneers and homesteaders who made the race to stake "free claims" given by the government, routing the prairie dog, clearing the land, and breaking the sod, were impressed with the rich virgin soils. Land agents advertised Oklahoma as the "Land of Plenty," as the "Field at the End of the Rainbow." Agricultural workers talked of the bounteous fertility of the soil. Crop yields were high. But there came a day of disappointment to the farmers. Crop yields grew smaller and smaller. Old fields were abandoned. New land was cleared. The soil's power to produce failed because of the continuous leaching and washing away of the organic matter and available plant food. Terracing, legumes, and pure seed were introduced by agricultural leaders, and marked strides have been made along this line.

Leading farmers, particularly the potato growers, have taken hold of the fertilizer problem with a great deal of interest. They are anxious to spend their money to get the most out of it, but as in all new fertilizer sections, the farmers bought on ton prices rather than on plant food requirements. However, during the past two or three years numerous tests have been made by leading growers to improve the grade of the fertilizer and find the most economical rate of application.

Mr. John Brown of Muskogee, Oklahoma, who last year averaged 300 bushels of No. 1 potatoes per acre on 88 acres, fertilized with 450 pounds of the 4-8-10 mixture per acre, gives his experience as follows:

"For several years I have grown potatoes very extensixely, experimenting with various fertilizers, and my experience has been that a high content of potash is very essential and decidedly improves quality.

"I used one car 4-8-10 this year and my results were phenomenal, both as to yield and quality. My brokers in Chicago, Cincinnati, and Denver wired me, 'Your potatoes positively best arriving our markets.' My experience has taught me that a high content of potash produces better and smoother potatoes, better shippers, and more No. 1's, and returns several times the investment."

Over 200 tons of this 4-8-10 mixture was used in the State last year, mostly in an experimental way. So well pleased were the potato growers with this analysis that Mr. R. T. Payne, Vice-President and General Manager of the Oklahoma Potato Growers Exchange, mailed out the following letter to members, fertilizer dealers, and others interested in improving both yield and quality of potatoes:

"You will soon be buying your potato and truck fertilizer. Many growers have used fertilizer with decided success, both as to increased yields and a superior quality product. Others have been disappointed. In many of these cases, it has been because of buying low grade fertilizer.

"For your information we are giving you results of demonstrations made by leading potato growers in this section last year as to the proper analysis to use.

"The increase from the extra potash, at a nominal cost per acre, more than paid the whole fertilizer bill. Our observation has convinced us that a fertilizer with high potash content adds to the yield as well as the carrying quality of potatoes. It produces a healthy, vigorous plant that enables it to resist disease.

"Many of our leading growers in the State used the 4-8-10 mixture last year on their entire acreage with decided success. It costs about 20c per hundred more than the 4-8-6 mixture that has commonly been used in eastern Oklahoma, but these growers claim the 4-8-10 mixture was far superior to the 4-8-6 in increasing the yield and particularly the quality of the potato. Mr. C. Gamble, Garvin, Oklahoma, states, '$128.00 invested in extra potash returned me $1,750.00 gross income. My potatoes sold for 25c per hundred more than anybody else's in the county. I attribute this to the 10 per cent potash that I used. Out of 28 cars shipped I only had one complaint on one car because of potatoes going down in transit. In previous years while using lower potash, it was common to have 25 per cent damage in transit.'

"Our recommendation is that you use only certified seed or potatoes from fields on which you can obtain the field readings and a 4-8-10 fertilizer."

Mr. Gamble averaged 233.3 bushels No. 1's per acre on 50 acres fertilized with 800 pounds of a 4-8-10 mixture per acre. The unfertilized only averaged 77 bushels per acre.

Grower	1000 lbs. per A. 4-8-4 (N-P-K)	1000 lbs. per A. 4-8-8 (N-P-K)	1000 lbs. per A. 4-8-12 (N-P-K)
F. M. McRoberts	306 bu.	301 bu.	323 bu.
John Brown	311	350	354
Brooks Stephens	243	269	283
C. Gamble	256	274	290
Average Yields	279 bu. No. 1's	298.5 bu. No. 1's	312.5 bu. No. 1's

8% potash content gained over 4% 19.5 bu. No. 1's at cost of $2.00

12% potash content gained over 4% 33.5 bu. No. 1's at cost of $4.00

Years *of* Good Pasture

Top-dressing with Fertilizers Kept It Good.

By Ford S. Prince

Specialist in Soils and Crops, University of New Hampshire

A NEW ENGLAND pasture that will produce two tons of dry grass per acre, analyzing 18 per cent protein, is undoubtedly a good pasture.

According to figures secured by the New Hampshire Station in 1930, the pasture of Charles S. Phelps of Jaffrey made this record. It was not due to the weather, for this element was surely adverse; nor to accident; but to the fact that since 1910 Mr. Phelps has been using a top-dressing of fertilizer on his pasture annually.

To those of us who during the past two or three years have started experimenting with old pastures, it seemed rather odd that anyone should have considered this same matter 20 years ago. To have kept it up for two full decades seems rather more remarkable, for Mr. Phelps never has let a spring go by without returning some plant food to his pasture.

As soon as Mr. Phelps came to our attention, we lost no time in getting in touch with him, believing that through his experience and in his pasture we might learn much as to what continued pasture fertilization will do for the vegetation and for the cows.

Mr. Phelps we found to be a man well along in years, living in Jaffrey on the farm which his father had owned before him. Prior to 1910 for 25 years he had been working in Connecticut. While there, reports came to him about wonderful crops of grass hay being grown by George M. Clark at Higginham, Connecticut.

Feeling that the time was near when on account of failing eyesight he would be forced to return to the home farm, Mr. Phelps visited Mr. Clark to learn what he could about

(*Turn to page* 51)

The pasture on the left received 600 pounds of an 8-16-16 fertilizer per acre; that on the right was unfertilized. The picture was taken three weeks after the complete fertilizer was applied.

Sweet Potatoes

And a Boy Who Knows How to Grow Them

By Amos Kirby

Mullica Hill, New Jersey

BYRON SHAW

BYRON SHAW of Swedesboro, New Jersey, is a successful 4-H club member. Last year he led his county on yield in the sweet potato club and established a new high State record with a production of 346 bushels per acre. His record attracted so much attention that he was invited down to Atlantic City in December to address the State Horticultural Society on his system of growing sweets.

This was Byron's first year in club work. He was only 11 years old, and the story of his success as a sweet potato grower is quite remarkable, when we consider that he followed the same general method of fertilization and cultivation that is followed in this famous area.

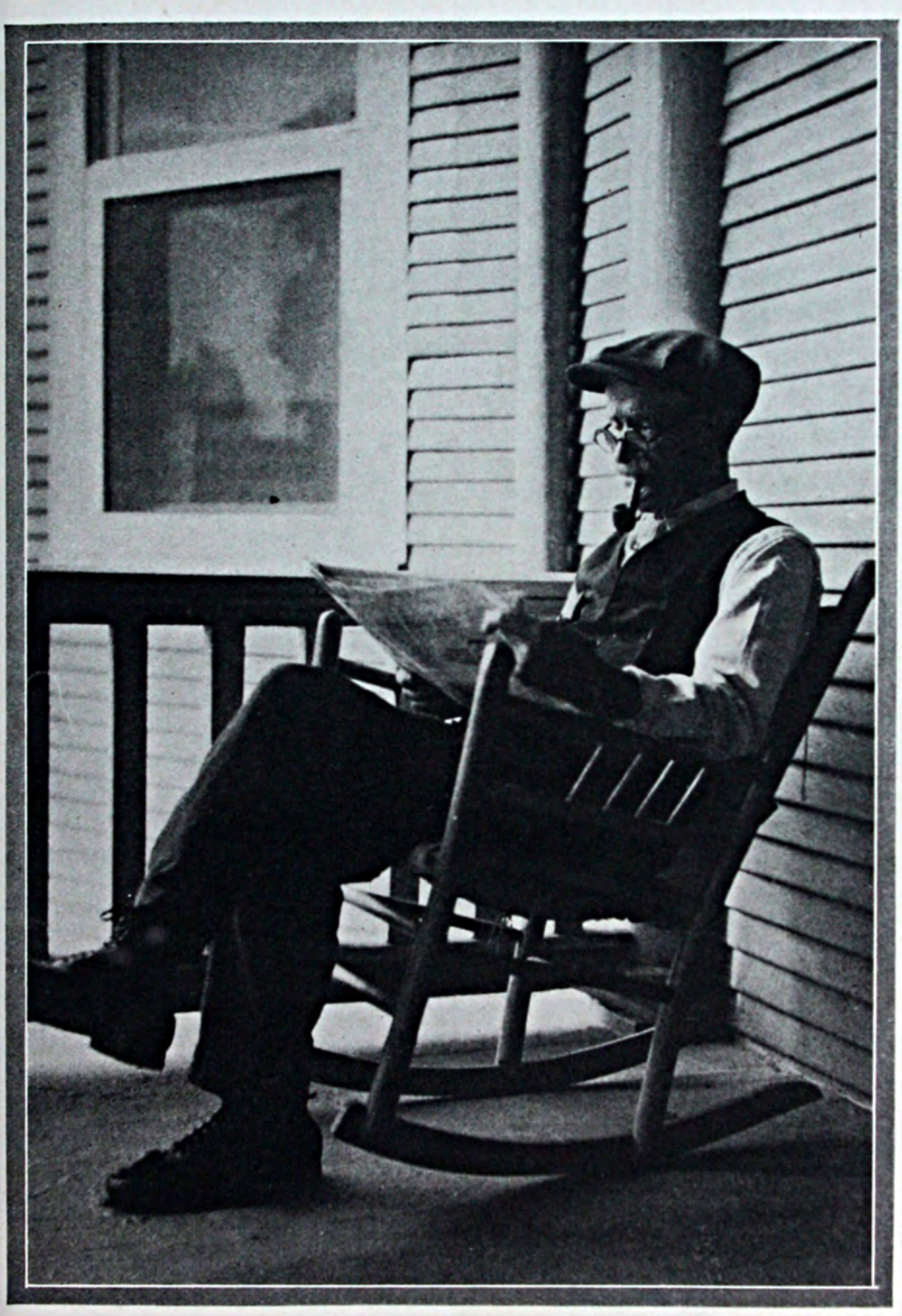
Byron is too small to do all of the work in connection with growing a crop of sweet potatoes, but he did help to grow his own plants, assist in preparing and cultivating the soil, digging the crop, and he attended to many of the detail operations that are necessary in the production of good sweet potatoes.

He Paid for His Help

Last spring when his father, Frank Shaw, was putting out his sweet potato beds, Byron took an active part in his club project by helping to get the soil ready for the plant beds. Later on when they were bedding the potatoes, he helped all day to place the seed. The plowing of the ground and the preparation of the soil for the sweet potatoes was done by a hired man, but his father charged him at regular rates for the time required to do these various tasks.

Byron's first big job came when it was time to put the plants in the field.

(*Turn to page* 42)

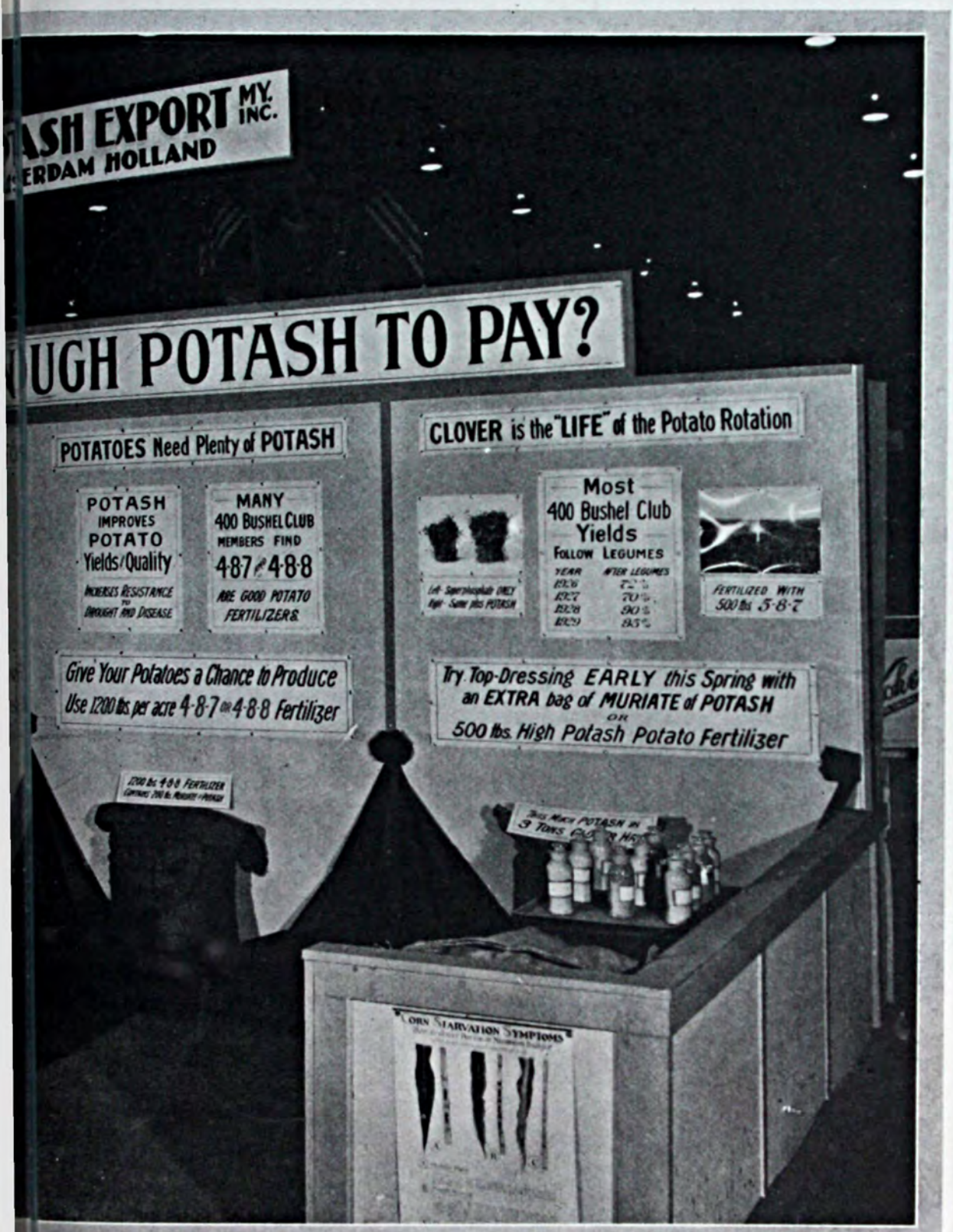


By Ewing Galloway, N. Y.

PICTORIAL

A FERTILIZER EXHIBIT AT THE RECEN

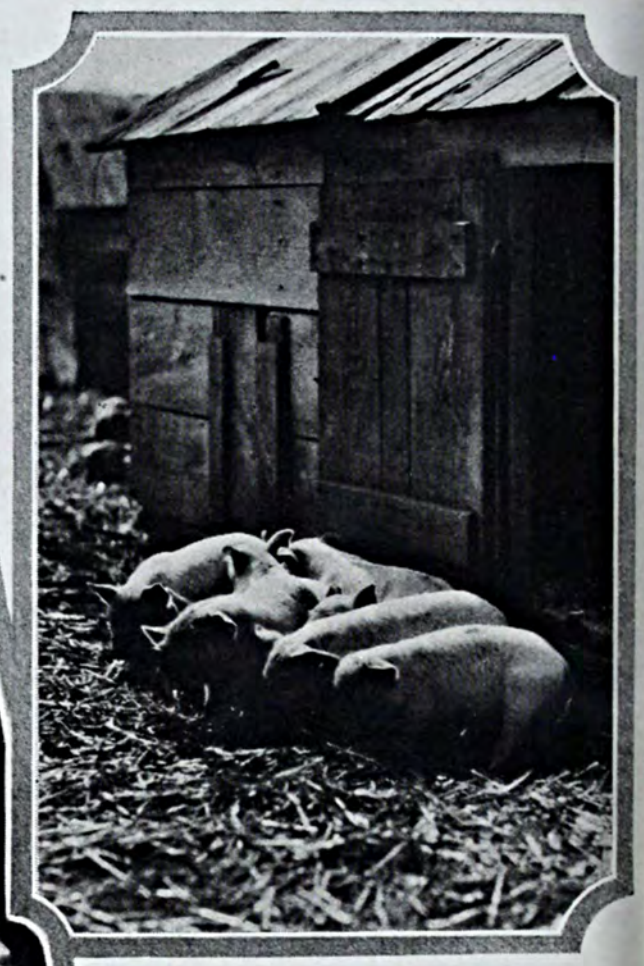
The potash exhibit at the Pennsylvania Farm Products S
able use of this plant food on pastures, potatoes, clover, and ci
It is estimated that more than 300,000 farmers attended the s
was given to farmers visiting this booth.



NYLVANIA FARM PRODUCTS SHOW

Harrisburg, Pennsylvania, Jan. 19-24, featured the profit-
co, four crops of special interest to Pennsylvania farmers.
he week. Information based on sound experimental data

Right: Early spring pigs enjoy and profit by getting out into the sunshine.



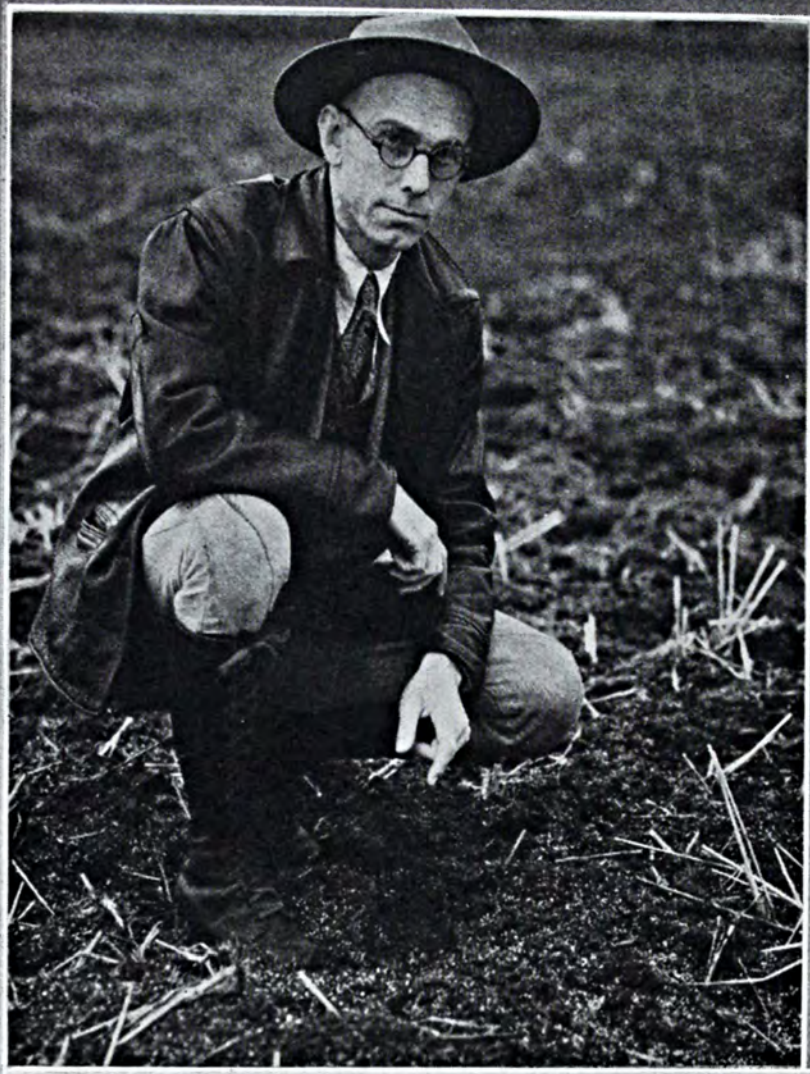
Left: The Barnyard Philosopher—there is one in every farm community.

Right: Celery cutting in Sanford county, Florida, where one-third of the nation's supply of celery is produced.

Left: This foursome are stepping out as though glad to get back into the harness.

Right: Two pretty farm girls inspect the fine lespedeza grown in Stanly county, North Carolina.

Left: With the rare instinct of a great artist, the photographer has caught this March plowman and his team in a minute's rest.



Probably the first fertilization of rice ever made by airplane was made on February 11 at Oroville, California. The plane, equipped with special machinery, demonstrated to local growers and agricultural experts the feasibility not only of sowing rice by airplane, but also of spreading the fertilizer. The method is as cheap or cheaper and quicker than any other. It gives even distribution of fertilizer while the rice land is under water; allows the material to go into solution quickly; saves time by not having to wait until the farmer could get onto the land; and aids the farmer in obtaining an earlier market. Left: County Agent Henry P. Everett of Oroville supervised the tests and inspected the distribution of material on the ground.

The Editors Talk

Another Frontier Vanishes

Among the frontiers that are fast vanishing is the fertilizer frontier. It was not so many years ago that a fertilizer salesman west of the Mississippi was out of his element, at least so far as profitable fertilizer sales were concerned. Now it is quite different. Not only is there an increasing interest in the profitable use of fertilizers in certain sections of nearly every State, but actual fertilizer tonnage is increasing rapidly in many States west of the Mississippi.

For instance in a group of some 15 States—from Minnesota to Idaho and south to Texas and New Mexico—total fertilizer sales since 1920 have increased from approximately 69,000 tons in 1920, to 311,000 tons in 1929, or an increase of 351 per cent.

In this group New Mexico, where the control of fertilizers was authorized in 1929, has just put out a fertilizer report. In 1930 there were 30 fertilizer registrations. The law requires that reports of all fertilizer shipments into New Mexico be made to the Feed and Fertilizer Control Office within 24 hours after the shipment is made. Based on such reports, a total of 1,787 tons of fertilizer were shipped into New Mexico in 1930. Up to February 11, 1931, 16 registrations had been made for the current year. While a noticeable percentage of the tonnage was superphosphate, it is also very interesting to note that the mixed fertilizers registered for sale are all high analyses, such as the 6-10-7, 4-8-4, 4-12-4, 5-8-6, 6-12-6, 0-15-6, and 5-15-5. It is evident that New Mexico is not only increasing fertilizer usage, but is also avoiding the mistake common in a great many older fertilizer territories of going through the unprofitable very low fertilizer analysis cycle. Doubtless in the next decade a great many interesting developments will take place in fertilizer usage in this territory.

"Hope Springs Eternal..."

The American Tobacco Company's Board of Directors' answer to the depression was a vastly increased budget for advertising Lucky Strikes. Captains of industry and general managers of large financial institutions realize (and employees and workers in the ranks should realize) that it requires more energy, effort, ingenuity, and originality to run a business successfully when times are bad than when times are good. It does not require courageous leadership or marked ability to swim or float along with the current. It is when we strike the whirlpool of an economic depression that we need strong leadership of courage and vision.

The action of this board of directors was wise, and benefits from it will be twofold. First, advertising is a tremendous motive power in not only maintaining present business but in building up new business as well. Second, this greatly increased fund calls for the expenditure of millions of dollars that will be distributed among such industries as newspapers, magazines, paper manufacturers, etc., who employ vast numbers of workers who must be gainfully

employed in order to purchase their full requirement of "Luckies."

There is a great lesson to be learned by the farmer from this master-stroke of good business approved by these wise men. Spring and planting time is just around the corner, and although times are admittedly bad, and farm prices extremely low, yet the farmer must do something with his land, livestock, labor, machinery, and opportunity, and the only way out is forward. Urged on by that enterprise that has lifted American agriculture from a crude beginning to its present leadership, we are sure to see with the coming of the spring season, with its attendant sunshine and showers, a breaking away of the clouds of depression and there will emerge a new agriculture that will be far better and more self-sustaining than we have ever known.

However, we must not become disillusioned or overcome with optimism even though in the springtime "Hope springs eternal in the human breast." Rather we must keep a cool head and both feet on the ground. In such a condition we can meet our perennial problem of how best to conduct our farm in order first to make a good living and second to make as much money as possible.

What is good business in selling cigarettes is good business in farming. The American Tobacco Company directors not only spent their usual amount for advertising but greatly increased it. They have found that advertising is the best way to expand business and insure profits. In farming one of the best assurances of bigger yields of better quality is through the liberal use of carefully selected high-grade fertilizers.

The U. S. Department of Agriculture in cooperation with the various State Experiment Stations has conducted carefully planned tests that show that yields of cotton, corn, potatoes, wheat, and other crops are greatly increased by the use of fertilizers. These stations' results further point out that as yields are increased by the judicious use of fertilizers, cost per unit is correspondingly lowered. Fertilizer should not be looked upon as an expense of farming but as an investment that on the average will pay a handsome profit. A farmer cutting his fertilizer bill in the spring will ultimately cut his profits at harvest time. He should grow more cotton, corn, hay, tobacco and other feed and food crops on fewer acres. To do this he must plant only his best acres and intelligently fertilize them.

Balanced Agriculture

The better balance between production and market demand in agriculture has occurred coincidently with the more extensive use of the facts and services provided by the expanding organization of the Bureau of Agricultural Economics, says Nils A. Olsen, chief of the Bureau, in his report to Secretary Hyde of the Department of Agriculture upon the work of the bureau in the fiscal year 1929, recently made public.

A staff of more than 2,000 workers scattered throughout the United States and in several foreign countries form the largest economic fact-gathering agency in the world working for the agricultural industry of any country.

Through the use of economic information, the business of farm production and distribution is gradually being reorganized and redirected.

The bureau's Outlook reports now cover 38 of the most important crops and livestock, giving world-wide and domestic conditions of production and demand and probable trends of production and prices to aid producers in planning for profitable farming. Through extensive agencies—radio, the press, etc.—this information is being carried into every farm community in increasing degree.

Among the bureau's research projects, the mere mention of which indicated the complexity of modern commercial agriculture, are studies of types of farming, large-scale versus small scale farming, power farming, the outlook for farm commodities in the markets of the world, statistical methods of crop estimating and forecasting, cotton grade and staple estimating, cooperative marketing, direct buying, foreign competition and demand, price analysis, transportation, credit and finance, shifts in farm population, land utilization, land settlement, and land values.

"Studies of types of agriculture in specific regions and localities are being continued," Mr. Olsen says, "as well as of the broader aspects of agricultural development. Such research points the way for more efficient and profitable farming in the future. Price analysis and its application in outlook and price-situation reports is being further developed. Intensive studies regarding the most effective use of land in areas of low agricultural productivity are being made. Investigations in farm management are enabling farmers to make adjustments to the economic outlook and to low production cost.

In addition to the above, Mr. Olsen says, "Increasing attention is being given to the marketing of agricultural commodities; progress is being made in developing a crop-reporting service for foreign countries; and improved methods are being devised for estimating acreage changes, and in forecasting crop yields. Also much educational work has been done by the Bureau in reducing waste and losses in the marketing of perishable farm products."

Altogether, this report of Nils A. Olsen of the Bureau of Agricultural Economics is an illuminating discussion on how the facts and service provided by this Bureau can help the farmer.

A Cotton Utopia

In years of over-production and low prices we always have acreage reduction campaigns. Economists tell the farmers that they must keep their production in line with consumption and generally blame them for all that has happened. Are the farmers to blame? Let's consider the cotton situation, for example.

In the spring of 1930 the farmers of the South planted 46,187,000 acres of cotton and with an average abandonment of 2.1 per cent harvested 45,218,000 acres. The general feeling at this time was that business conditions would gradually grow better, but the reverse has been true. Home consumption and foreign exports of cotton have shown a steady decline ever since the 1930 cotton crop was planted.

The December 1 estimate showed that the farmers of the South had produced 14,243,000 bales of cotton, a normal crop for the last seven years. But due to small home consumption and a reduction in foreign exports, a large carry-over has been created, and an otherwise normal crop of cotton has become an exceptionally large crop because the total supply of American cotton for the time is in excess of world demand. The price has declined far below any reasonable cost of production.

The average yield of cotton per acre in 1930 was 150.8 pounds. Had the average yield been 130.6 pounds as in 1923, the total crop would have been 11,811,000 bales rather than 14,243,000 bales. On the other hand, had the yield been 182.6 pounds as in 1926 the total crop would have amounted to 16,514,000 bales. What would the price of cotton be had the latter crop been produced?

From the figures just given we see that with a crop of 45,000,000 acres of cotton, weather and insect damage can make a difference in the total yield of 5,000,000 bales, but what can we do about it? A manufacturing plant can revise its production schedule at any time, but once a crop is planted its yield lies in the lap of the gods.

We understand that in Utopia the supply of cotton and the demand for it are always equal. We will possibly have a like situation in this country, 1. When there is an accurate forecast of consumption and exports of cotton; 2. When the acreage planted to cotton and the fertilizers used are controlled; 3. When weather and insect damage are controlled; 4. When there is a complete removal of any surplus from all sources of supply.

Government and Soil Improvement

It would appear that more than usual interest on the part of Canadian Government officials is being taken in furthering the intelligent use of fertilizers. At a recent conference arranged by Professor L. C. Harlow of the Soil and Fertilizer Division of the Department of Agriculture and held in Halifax, Government officials and representatives of the colleges met representatives of fertilizer companies to cooperate in a more systematic and united plan of fertilizer usage. The problems discussed included not only the use of fertilizers but the education of fertilizer salesmen, toward the end that larger yields per acre may be produced in the cheapest possible way by adapting fertilizers to the soil and crop.

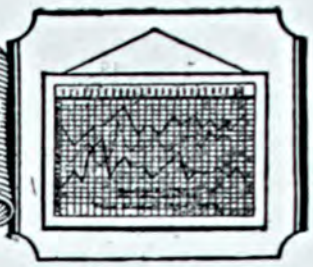
At the annual conference of the staff of the New Brunswick Department of Agriculture with officials of the Dominion Department of Agriculture at Fredericton, N. B., January 15, the pasture improvement demonstrations organized by the Provincial Department in 1930 were favorably commented upon and their continuation recommended during the following year. A possible influence of the system of pasture improvement with commercial fertilizers upon the livestock industry in the province was indicated from one of the demonstrations conducted during the past year, where 7,624 pounds of milk were taken off an acre of fertilized pasture during a period extending from May 14 to August 10.

In connection with the interest in pasture improvement it is to be noted that the Department of Agriculture in Quebec is offering a grant of $4.00 an acre to help county agents induce farmers to fertilize their pastures. Between five and fifteen farmers must be found who fertilize three to eight acres of pasture, leaving an equal area unfertilized, to get the benefit of this grant. Records will be kept of the number of grazing days, number of cows, and surplus milk produced on the fertilized area.

In Ontario the Agricultural College is cooperating with the fertilizer industry in an extensive fertilizer and soil improvement program. An article by Henry G. Bell, Associate Professor of Chemistry in Charge of Fertility Extension, of the Ontario Agricultural College, appearing in the February issue of BETTER CROPS WITH PLANT FOOD, describes some of this work.

Millions of dollars are spent in North America annually on fertilizers. If agriculture is to prosper, both the farmer and the industry must make a profit on this large investment. It is, therefore, encouraging to see the cooperation between government officials, the fertilizer industry, and the farmers in solving the intricate problems involved.

AGRICULTURAL DEVELOPMENTS



At Pendergrass School

By H. T. Maddux

Atlanta, Georgia

ON Friday night, February 13, 1931, in a heavy rain which had lasted all day, 25 farmers gathered at Pendergrass schoolhouse in Jackson county, Georgia. This was the tenth night they had met to discuss farm problems and make plans for 1931 as to crops to be grown, seed to be used, methods of cultivation, and fertilizer practices on their red and gray clay soils. On this particular night they discussed cotton.

In an effort to reduce the amount of short staple cotton and better compete with cotton farmers in the western section of the cotton belt, they selected four varieties of seed which would give them desired staple length. These varieties were: D. & P. L. 4-8, Coker's Cleveland No. 5, Piedmont Cleveland, and College No. 1.

As to methods of planting they decided upon 3½ foot rows, with 2 plants every 12 inches apart. Where only one plant per hill was used, they decided upon a spacing of 8 inches for best results.

In the face of a large world carry-over of cotton, they considered a reduction of acreage imperative. The fact that Southeastern States are unsuccessfully competing with the West in cotton production was brought out. The farmers expressed themselves as follows: "There is but one successful way to compete with the West in cotton production—by growing more cotton per acre, as facts have shown that as production per acre increases, the cost per pound to produce decreases."

As to fertilizers they decided upon 60 pounds of phosphoric acid, 56 pounds of ammonia, and 58 pounds of potash per acre for cotton on their red clay soils and the same phosphoric acid and ammonia but 68 pounds of potash for their gray soils. A portion of the ammonia and potash was to be used as a top-dresser. The plan specified 75 pounds of muriate of potash per acre in the top-dresser.

Considering the total plant food per acre this gave them the equivalent of 600 pounds of a 10-9-9½ on the red clay soils and 600 pounds of a 10-9-11 on gray soils.

Up to 1927 the farmers of this section thought that because their red and gray soils contained relatively large amounts of native potash that 3 to 4 per cent potash in the planting mixtures was sufficient. However, Jackson county fertilizer men at Braselton, Talmo, Jefferson, and Commerce recommended more potash for cotton and the farmers of this section have found that they can use at a profit three times as much potash for cotton as in the past. Some farmers also have found that extra potash pays good returns on small grains and on corn.

IOWA SEEKING SUBSTITUTE CROP FOR OATS

More Iowa farmers are considering a substitute crop for oats this year than ever before because of continued low oat prices, according to H. D. Hughes of the farm crops department at Iowa State College.

Mr. Hughes suggests four crops, barley, flax, soybeans, and winter wheat, which may be used to replace part of the oat acreage to give a larger net return. Barley is probably the best substitute on Iowa farms, he says, because it fits perfectly into the rotation, is seeded at the same time as oats, it is an excellent nurse crop for clover, and it gives about the same distribution of labor.

Experiments by the College show that barley will produce about 25 per cent more pounds of grain per acre than oats, on the average. Thirty per cent of the oat kernel is hull, while only 15 per cent of the barley kernel is hull, thus giving a net gain of about 50 per cent of actual feed from barley as compared with oats.—*Marketing Activities*, Feb. 18, 1931.

CANADIAN CO-OPS GROW IN NUMBER

Cooperative associations in Canada numbered 1,095 in 1930, with a total membership of 690,685. In 1929, there were 936 of these organizations, which reported 512,835 members. This type of organization includes the grain growers of the prairies, the largest cooperative organization in Canada, the dairy farmers, and the fruit and vegetable growers in the eastern provinces. In addition, there are some 325 cooperative distribution societies affiliated with a central cooperative union. There are also a number of consumers' cooperative societies outside the union, the majority being in the western provinces.

Sweet Potatoes

(*From page* 30)

Every plant in the one-half acre plot was set out by this 11-year-old boy. Using a trowel, it required the best part of two days before the task was completed. Of course he had some help; his sister Evelyn, aged eight, dropped the plants for him.

Most of the cultivating was handled by his father, as Byron was too small to handle the heavy cultivators. Although he was relieved of this part of the work, he did not escape putting in the time necessary to complete his own project. His father gave him a horse and a lighter cultivator and had him put in the same number of hours in the asparagus fields.

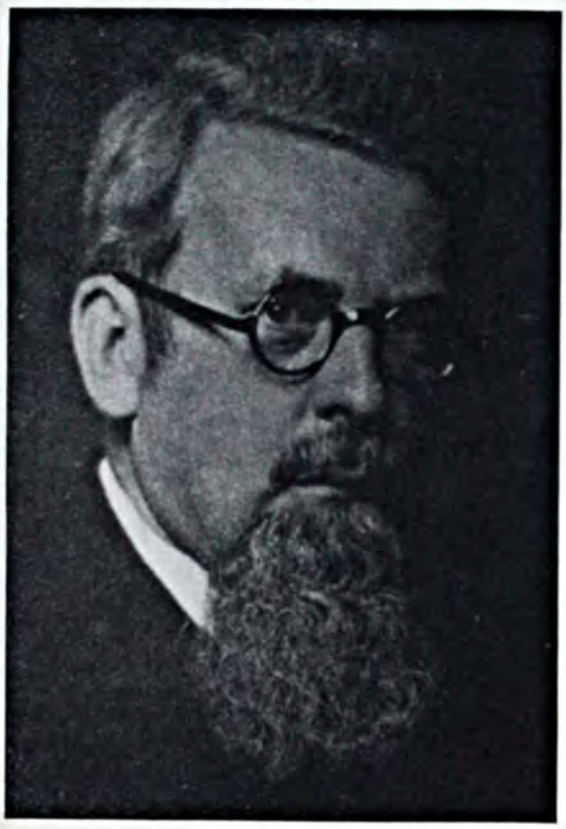
Outside of the horse cultivation, all of the hand work was performed by Byron, himself. All of the hoeing and "browsing," was done by this youthful club member, and later on he kept the field clean of weeds and grass.

At digging time, the farm crew who were harvesting his father's crop turned in and dug his plot. Byron helped to pick off the potatoes and pack them in bushel hampers. When the crop was dug and the baskets counted, Byron found that he had 123 bushels of prime potatoes and 50 bushels of seconds from his half-acre plot, all of which were marketable. On the basis of the prevailing prices, the crop from the 3,600 hills was valued at $215.70. But this was not all clear money. Byron had a labor bill to pay. His father had charged him for the fertilizer and the hampers, which totalled $60.70, leaving him a

(*Turn to page* 51)

Twenty-five Years of Service

DR. PAUL KRISCHE celebrated on March 6, 1931, the 25th anniversary of his services as Director of the Literary Bureau of the German Potash Syndicate and Editor of the illustrated agricultural bimonthly magazine "Die Ernaehrung der Pflanze" (Plant Nutrition).



DR. PAUL KRISCHE

Born in Goettingen, January 5, 1878, Paul Krische studied Natural Science at the University there. After extended foreign travel, he was assistant from 1904-1906 at the agricultural experiment station at Koeslin, and since has been librarian of the German Potash Syndicate. In addition to his contributions to German and foreign technical publications, Paul Krische has published material in the fields of chemistry, agricultural chemistry, the potash industry and soil science:

1904: How to Study Chemistry? 2nd Ed. 1919,
1905: Methods of Agricultural Chemical Research. Russ. 1911, 2nd Ed. 1928,
1906: Agricultural Chemical Control Methods,
1908: Value of Potash in Industry and Agriculture,
1910: Extracts from the Potash Year Book,
1911: Agricultural Chemistry (Teubner) 2nd Ed. 1921,
1916: Potash Fertilization,
1921: Principal Agricultural Soil Types of Germany,
1923: Potash,
1929: Soil Maps.

"Die Ernaehrung der Pflanze" is one of the broadest technical publications for agricultural chemistry and scientific soil investigation. In addition to evolving a clear, easily understandable, narrative style, especially provided with pictures and charts, on agricultural, market gardening, and forestry fertilizer experiments and plant physiological investigations, Paul Krische has fostered various special fields in this magazine. Among these are experiments on improvement of quality through fertilization, the con-

trol of plant disease and pests by fertilization, portrayal of domestic and foreign agriculture, and agricultural statistics and history. Enjoying constant entrance to the agricultural research and teaching institutions of the world, "Die Ernaehrung der Pflanze," under the 25 years of Paul Krische's editorship, has contributed materially to the advancement and spreading of new practices and research in the field of plant production, especially since the magazine receives the contributions of distinguished technical specialists of various lands.

Controlling Tobacco Wildfire

THE most important factors in the outbreak, spread, and control of wildfire disease are: 1. the weather conditions; 2. the methods of cultivation; and 3. the fertilization of the tobacco plant.

As American workers stated in 1922, there must be 4 or 5 days of stormy, rainy weather before wildfire becomes noticeable. The experiments of the author checked the conception of American workers assuming an incubation period of 5 to 8 days. Sunny, dry weather with cold nights seems to prevent the spread of the disease, while hail favors it very much.

Certain methods of cultivation spread and encouraged the disease. Early and low topping of the plant increased its susceptibility, while late and high topping produced more resistant plants. No topping prevented the appearance and spread of wildfire almost entirely. No topping of tobacco plants, however, is not to be recommended, for economical reasons, as a poor quality of leaf develops, and also as a botrytis fungus living in the petals of the tobacco flower would cause leaf rot of the tobacco leaves. The reason why early and low topping encourages the development of the fungus is to be seen in the retarded ripening of the leaves, which retain a high protein content over a longer period. The plant tries to restore the disturbed morphological and physiological equilibrium by compensation sprouts.

Fertilization influenced the disease considerably as was made clear by pot and field experiments of the author in 1928 and 1929. Plants receiving a deficiency of potash or nitrogen or no fertilizer are the most susceptible. A surplus of potash prevents outbreak and spread of the disease entirely, while a surplus of phosphoric acid is of little use. The addition of magnesium salts did not give beneficial results. The lime content and the soil reaction seemed to be minor factors with the disease. Older leaves are generally not so much affected with wildfire as younger ones, high in protein. With the addition of much nitrogenous material this is reversed. Then the older leaves retaining the protein over a longer period are the more susceptible, while the younger leaves are more or less resistant. With potash-fertilized plants, after artificial infection with wildfire, the disease was overcome without any delay in growth and with little or no loss in leaf surface; while plants receiving an excess of nitrogen could finally outgrow the disease too, but with much retardation in growth and loss of leaf surface.

The yellow flowering tobacco was resistant to infection with wildfire.

Spraying with 1-2 per cent bordeaux mixture checked the spread of wildfire, but only in the case of well-fertilized and well-treated plants. Spraying may be resorted to with younger plants, but it is not economical with older plants.—*Karl Böning, Zeitschrift für Parasitenkunde, II. Bd., Heft* 5, 1930, S. 645.

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

Additional information on factors important in the production of sugar beets is presented by Dr. J. Tyson in Technical Bulletin 108 of the Michigan Agricultural Experiment Station, entitled "Influence of Soil Conditions, Fertilizer Treatments, and Light Intensity on Growth, Chemical Composition, and Enzymic Activities of Sugar Beets." It was found that the mineral content of the beets followed a definite ratio when the largest roots were produced. When this ratio was disturbed, smaller beets resulted. The order in which the nutrients were found on the leaves, from highest to lowest, was potassium, phosphorus, nitrogen, calcium, and magnesium. The same order prevailed in the roots except that calcium and magnesium were reversed. It was brought out that the life processes and chemical transformations which take place within a plant are influenced more by the ratio and concentration of all the nutrients, excluding nitrogen, than by the supply of any one nutrient. The sugar content of the beets was usually highest on the plots producing the best yields of roots. When large quantities of nitrate of soda were applied or when it was applied late, the sugar content was lowered, although the growth of the beet may be increased. However, a definite minimum quantity of nitrogen is essential for growth. On soils low in potash, the potash fertilizer increased the sugar content of the beet. On other soils it had little influence on the sugar content. The intensity of the light did not influence the sugar content, but affected the weight of the beet. Poor light thus reduces the total sugar produced. This research bulletin will be of interest to those interested in the why and wherefore of fertilization, primarily of beets, but also other crops.

Those interested in the broad question of fertilizers, their use and production in the world as a whole and by countries will find valuable information in Circular 129 of the U. S. D. A., "Survey of the Fertilizer Industry" by P. E. Howard. In addition to data by countries, the production and consumption of fertilizers in this country by States is given special attention.

The old question as to whether chemical analysis of the soil would tell what fertilizer to use, is indirectly answered again in the negative by Dr. J. A. Bizzell in Bulletin 513 of the Cornell University Agricultural Experiment Station, entitled "Chemical Composition of New York Soils." In this he reports the amounts of total nitrogen, phosphorus, sulphur, potassium, calcium, and magnesium in a large number of soils in this State. Large variations naturally were found, although relationship to several factors could be noted. The heavier soils such as clay loams and clays tended to be noticeably higher in nitrogen and potassium and to a lesser extent in magnesium, sulphur, and phosphorus. Calcium did not bear a consistent

relation to soil texture. Nitrogen and sulphur are higher in the surface soil, while potassium and magnesium and sometimes calcium are higher in the sub-soil. Phosphorus is variable. The author considers this data with respect to the potential fertility of New York soils. With a few exceptions, the soils are well supplied with total nitrogen, sulphur, magnesium, and potassium and tend to be low in phosphorus and calcium. However, many soils producing poor crops are shown by the chemical analysis to be relatively rich in total plant nutrients, and in some cases the converse is true. We thus can arrive at the conclusion that total nutrient content is not a guide to the fertilizers needed. A good example of this is potassium which was found in large quantities in some soils which responded to potash fertilization. The author concludes that it appears as if only a very small part of the soil potassium was immediately available for use by the plants.

Nitrogen and potash were found to be the most important fertilizers in the production of potatoes according to L. W. Ware in Circular 92 of the Mississippi Agricultural Experiment Station, "Fertilizer Work with Irish Potatoes." This is in the nature of a progress report, but gives interesting results and guides in the fertilization of this important crop.

"Quarterly Bulletin," State Board of Agr., Dover, Del., Vol. 20, No. 4, Dec., 1930.

"Testing Corn Stalks Chemically to Aid in Determining their Plant Food Needs," Agr. Exp. Sta., Lafayette, Ind., Bul. 298 (Rev.), Jan., 1930, G. N. Hoffer.

"Official Inspections," Agr. Exp. Sta., Orono, Me., Bul. 137, Oct., 1930, James M. Bartlett.

"Commercial Fertilizers," State Fertilizer Inspection Service, College Park, Md., Control Series, No. 138, Jan., 1931.

"Fertilizers, What They Are and How to Use Them," Agr. Exp. Sta., New Brunswick, N. J., Ext. Bul. 79, Oct., 1930, H. R. Cox.

"Lysimeter Investigations: 1. Nitrogen and Water Relations of crops in Legume and Non-Legume Rotations," Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 166, July, 1930, R. C. Collison and J. E. Mensching.

"Fertilizer Bulletin, 1929," Pennsylvania Dept. of Agr., Harrisburg, Pa., Bul. 495, Vol. 13, No. 10, Aug., 1930, James W. Kellogg.

Soils

A very interesting bulletin showing the changes in needs of soils over a number of years has been prepared by Dr. F. C. Bauer and entitled "Response of Illinois Soils to Systems of Soil Treatment" (Illinois Agricultural Experiment Station, Bulletin 362). The yields obtained on experimental fields located on a number of the most important soils of the State for a period of 15 to 25 years with various systems of management are analyzed. When this work was started the treatments in grain farming that gave the most profitable results were usually the crop residue plowed down plus lime. Later rock phosphate began to give returns and now potash is necessary on nearly all of the light colored soils and also on some of the dark colored soils. The results from rock phosphate have been variable, giving rise to a number of questions as to the relative value of this material. The author analyzes the various factors carefully and among other things concludes it is a satisfactory carrier especially when crop residues are plowed down in the rotation and the soil is not too sweet. The author finds an increasing need for potash, especially on the light colored soils, alkali soils, and peat soils. The author concludes that "potassium has a more important place in the soil treatment systems on some types of soil than was anticipated when these experiments were established." Based on this work Dr. Bauer makes recommendations for management practices on these various soils and also gives a few basic principles of sound soil management. The bulletin is a distinct contribution to our soil fertility literature.

"Soil Survey of The Buckeye-Beardsley Area, Arizona," U. S. D. A., Wash., D. C., No. 3, Series 1927, W. G. Harper and F. O. Youngs.

"Microbiological Studies of Some Typical Iowa Soil Profiles," Agr. Exp. Sta., Ames,

Iowa, Res. Bul. 132, June, 1930, P. E. Brown and T. H. Benton.

"Soil Survey of Washington County, Ohio," U. S. D. A., Wash., D. C., No. 19, Series 1926, S. W. Phillips, H. M. Smith, A. H. Paschall, Ralph Blaney, and George Drewes, Jr.

"Progress Report of the Irrigated Eighty-Acre Demonstration Farm Unit of the Harney Branch Experiment Station, 1927-1930," Agr. Exp. Sta., Corvallis, Wash., Bul. 270, Oct., 1930, Obil Shattuck and Roy E. Hutchison.

"A Chemical and Microbiological Study of Lufkin Fine Sandy Loam in Relation to Productiveness," Agr. Exp. Sta., College Station, Tex., Bul. 421, Jan., 1931, E. B. Reynolds.

"Character of the Colloidal Materials in the Profiles of Certain Major Soil Groups," U. S. D. A., Wash., D. C., Tech. Bul. 228, Jan., 1931, M. S. Anderson and Horace G. Byers.

"Variations of the Colloidal Material Extracted from the Soils of the Miami, Chester, and Cecil Series," U. S. D. A., Wash., D. C., Tech. Bul. 229, Dec., 1930, R. S. Holmes and Glen Edgington.

Crops

With considerably less fall of rain and snow this winter in many sections of the country, there is much speculation as to whether the serious drought of 1930 will carry over into this spring's growing season. Without doubt, this condition is becoming a matter of concern to some farmers planning their spring planting and fertilizing programs. An interesting discussion of the beneficial effects of fertilizers in a dry year is to be found in bulletin 470, "Forty-Ninth Annual Report 1929-1930," of the Ohio Agricultural Experiment Station, just released. Results in the fertility test at Ohio's Madison County Experiment Farm show that, while the total yield of all crops was reduced by the extreme drought of 1930, the increase of the fertilized over unfertilized plots was nearly as large as is secured as an average over a period of years.

"Kudzu in Alabama," Agr. Exp. Sta., Auburn, Ala., Cir. 57, Jan., 1931, R. Y. Bailey and E. L. Mayton.

"The Date to Plant Corn in Colorado," Agr. Exp. Sta., Ft. Collins, Colo., Bul. 369, Dec., 1930, D. W. Robertson, Alvin Kezer, and G. W. Deming.

"Oat Varieties in Colorado," Agr. Exp. Sta., Ft. Collins, Colo., Bul. 370, Dec., 1930, D. W. Robertson, Alvin Kezer, F. A. Coffman, J. F. Brandon, Dwight Koonce, and G. W. Deming.

"A Progress Report on Onion Investigations in the Arkansas Valley," Agr. Exp. Sta., Ft. Collins, Colo., Press Bul. 75, Jan., 1931, E. J. Allen.

"Dedication of Atwater Laboratory," Agr. Exp. Sta., Storrs, Conn., Bul. 168, Nov., 1930.

"Rose Growing," Agr. Ext. Ser., Gainesville, Fla., Bul. 59, Oct., 1930, W. L. Floyd and John V. Watkins.

"The Tung-Oil Tree," Agr. Exp. Sta., Gainesville, Fla., Bul. 221, Oct., 1930, Wilmon Newell, Harold Mowry, and R. M. Barnette.

"Inheritance in Lettuce," Agr. Exp. Sta., Urbana, Ill., Bul. 356, Oct., 1930, Charles E. Durst.

"Peach Pointers," Dept. of Agr. Ext., Purdue Univ., Lafayette, Ind., Ext. Bul. 171, Dec., 1930. Monroe McCown.

"Annual Report for Fiscal Year Ending June 30, 1930," Agr. Exp. Sta., Ames, Iowa, Oct., 1930.

"The Production of White Burley Tobacco," Univ. of Kentucky, Lexington, Ky., Cir. 230 (Rev.) Sept., 1930, E. J. Kinney.

"Raspberry Culture in Kentucky," Univ. of Kentucky, Lexington, Ky., Cir. 23 , July, 1930, W. W. Magill.

"Annual Report for the Year Ended December 31, 1929," Univ. of Kentucky, Lexington, Ky., Cir. 236, Jan., 1930.

"Strawberries For The Garden," Univ. of Kentucky, Lexington, Ky., Cir. 238, July, 1930, A. J. Olney.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., Vol. VIII, No. 1 and 2, Jan. and Feb., 1931.

"Forty-Second Annual Report for the Fiscal Year Ending June 30, 1929," Agr. Exp. Sta., A. & M. College, Miss.

"Pasture Crops For Spring Pigs, Their Value and Use," Agr. Exp. Sta., Bozeman, Mont., Bul. 236, Dec., 1930, W. E. Joseph.

"Experiments with Alfalfa, Clover, and Timothy for Hay in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Bul. 512, Nov., 1930, H. B. Sprague, E. E. Evaul, H. W. Reuszer, and N. F. Farris.

"Forty-Ninth Annual Report for the Fiscal Year Ended June 30, 1930," Agr. Exp. Sta., Geneva, N. Y., Jan. 1931, U. P. Hedrick.

"The Effect of Spiral Ringing on Solute Translocation and the Structure of the Regenerated Tissues of the Apple," Agr. Exp. Sta., Ithaca, N. Y., Memoir 133, Oct., 1930, L. H. MacDaniels and Otis F. Curtis.

"Growing Onions on the Muck Soils of New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 510, Sept., 1930, J. E. Knott.

"Filberts," Agr. Exp. Sta., Geneva, N. Y., Bul. 588, Dec., 1930, G. L. Slate.

"Identification of Mazzard and Mahaleb Cherry Rootstocks," Agr. Exp. Sta., Geneva,

N. Y., Cir. 117, *Dec.*, 1930, *H. B. Tukey.*

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, No. 148, *Jan.-Feb.*, 1931.

"Methods of Ginning in Relation to the Grade and Staple of Cotton," Agr. Exp. Sta., College Station, Tex., Bul. 416, *Nov.*, 1930, *D. T. Killough and G. T. McNess.*

"Varieties of Cotton for North Texas," Agr. Exp. Sta., College Station, Tex., Bul. 417, *Nov.*, 1930, *P. B. Dunkle.*

"Citrus Production in the Lower Rio Grande Valley of Texas," Agr. Exp. Sta., College Station, Tex., Bul. 419, *Dec.*, 1930, *Hamilton P. Traub and W. H. Friend.*

"Virginia Department of Agriculture and Immigration," Richmond, Va., Bul. 277 *and* 278, *Jan. and Feb.*, 1931.

"Feeding Value of Alfalfa Hay Treated With Calcium Arsenate," Agr. Exp. Sta., Logan, Utah, Bul. 223, *Dec.* 1930, *H. J. Frederick.*

"Fortieth Annual Report for the Fiscal Year Ended June 30, 1930," *Agr. Exp. Sta., Pullman, Wash., Bul.* 245, *Dec.*, 1930.

"Annual Report of the Western Washington Experiment Station For the Fiscal Year Ending March 31, 1930," *Agr. Exp. Sta., Puyallup, Wash., Bul. No.* 18-*W* (*New Series*), *Oct.*, 1930.

"Cut The Cost of Feeding Cows," Agr. Exp. Sta., Madison, Wis., Bul. 417, *Sept.*, 1930, *E. B. Hart and G. C. Humphrey.*

"Origin and Nature of Rogues in Canning Peas," Agr. Exp. Sta., Madison, Wis., Res. Bul. 101, *Nov.*, 1930, *E. J. Renard.*

"Proximate Composition of Fresh Vegetables," U. S. D. A., Washington, D. C., Cir. 146, *Jan.*, 1931, *Charlotte Chatfield and Georgian Adams.*

"Tobacco Culture," U. S. D. A., Washington, D. C., Farmers' Bul. 571, (*Rev.*) *Nov.*, 1930, *W. W. Garner.*

"The Making and Feeding of Silage," U. S. D. A., Washington, D. C., Farmers' Bul. 578 (*Rev.*) *Oct.*, 1930, *T. E. Woodward, J. B. McNulty, George M. Rommel, E. W. Sheets, and F. R. Marshall.*

"Watermelons," U. S. D. A., Washington, D. C., Farmers Bul. 1394, (*Rev.*) *Oct.*, 1930, *W. R. Beattie.*

"Currants and Gooseberries, Their Culture and Relation to White-pine Blister Rust," U. S. D. A., Washington, D. C., Farmers' Bul. 1398 (*Rev.*) *Oct.*, 1930, *George M. Darrow and S. B. Detwiler.*

"The Common Barberry and Black Stem Rust," U. S .D. A., Washington, D. C., Farmers' Bul. 1544 (*Rev.*) *Nov.*, 1930, *E. C. Stakman and Donald G. Fletcher.*

"Sugar-Beet Culture in the Humid Area of the United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1637, *Nov.*, 1930, *J. G. Lill.*

"Potato Production in the Far Western States," U. S. D. A., Washington, D. C., Farmers' Bul. 1639, *Nov.*, 1930, *William Stuart.*

"Asparagus Culture," U. S. D. A., Washington, D. C., Farmers' Bul. 1646, *Nov.*, 1930, *Ross C. Thompson.*

Economics

With cotton prices the lowest in 15 years, the recent bulletin of the United States Department of Agriculture, entitled "The World Cotton Situation, With Outlook for 1931-32, and the Long-time Outlook for Southern Agriculture," should be of interest to those concerned with agriculture in the Southern States. Changes in supply and demand conditions, in both the United States and abroad, are analyzed in this bulletin. The material presented should be helpful in formulating a long-time program for Southern Agriculture.

"Marketing California Apples," Agr. Exp. Sta., Berkeley, Calif., Bul. 501, *Nov.*, 1930, *E. A. Stokdyk, H. E. Erdman, Charles H. West, and F. W. Allen.*

"Taxation in Connecticut," Agr. Exp. Sta., Storrs, Conn., Bul. 166, *Sept.*, 1930, *M. Slade Kendrick.*

"Prices of Illinois Farm Products From 1921 *to* 1929," *Agr. Exp. Sta., Urbana, Ill., Bul.* 363, *Dec.*, 1930, *L. J. Norton.*

"Economic History of the Newlands Irrigation Project," Agr. Exp. Sta., Reno, Nev., Bul. 120, *Oct.*, 1930, *F. B. Headley and Cruz Venstrom.*

"Newer Truck Crop Area Studies—A Preliminary Economic Report," Agr. Exp. Sta., Clemson College, S. C., Cir. 45, *Jan.*, 1931, *W. C. Jensen and C. Gunnells.*

"Milling and Baking Qualities of World Wheats," U. S. D. A., Washington, D. C., Tech. Bul. 197, *Oct.*, 1930, *D. A. Coleman, Owen L. Dawson, Alfred Christie, H. B. Dixon, H. C. Fellows, J. F. Hayes, Elwood Hoffecker, J. H. Shollenberger, and W. K. Marshall.*

"The Farm Real Estate Situation, 1929-30," *U. S. D. A., Washington, D. C., Cir.* 150, *Nov.*, 1930, *E. H. Wiecking and B. R. Stauber.*

"Land Utilization and the Farm Problem," U. S. D. A., Washington, D. C., Misc. Pub. 97, *Nov.*, 1930, *L. C. Gray and O. E. Baker.*

Diseases and Insects

"Diseases of Apples in Storage," U. S. D. A., Washington, D. C., Farmers' Bul. 1160 (*Rev.*) *Oct.*, 1930, *Charles Brooks, J. S. Cooley, and D. F. Fisher.*

"Effect of Seed-Potato Treatment on Yield and Rhizoctonosis in Florida from 1924 *to*

1929," *Agr. Exp. Sta., Gainesville, Fla., Bul.* 220, *Sept.*, 1930, *L. O. Gratz.*

"*The Control of Corn Diseases in Illinois,*" *Agr. Exp. Sta., Urbana, Ill., Cir.* 364, *Jan.*, 1931, *Benjamin Koehler and James R. Holbert.*

"*Protecting South Carolina from Crop Pests and Plant Diseases,*" *Agr. Exp. Sta., Clemson College, S. C., Cir.* 43, *Oct.*, 1930, *J. A. Berly.*

"*Blemishes and Discolorations of Market Onions,*" *U. S. D. A., Washington, D. C., Cir.* 135, *Nov.*, 1930, *G. B. Ramsey.*

Deficiencies of Complete Fertilizers

(*From page* 10)

superphosphate contributed to the result.

The insufficiency of data in this respect is obvious, but it is possible to go even deeper into the analysis of experimental results. If the calcium and sulphur contained in superphosphate augment the yield, is it not possible that after years of experimentation on the same land the phosphate content of the superphosphate would so saturate the soil with that ingredient as to make the replenishment of the moderately soluble gypsum the most important real objective of the continued use of the superphosphate? Or, conversely, if the high concentration of calcium in superphosphate is responsible for the inefficiency of that material as appears to be true in the peat soils of North Carolina, is it not possible that even greater amounts of phosphoric acid could be used to advantage if the calcium content could be reduced to the minimum requirements of the crop?

The facts are that with all our data on fertilizer experiments we do not know how many of the properties commonly attributed to phosphoric acid in fertilizers are really a response to the other components of acid phosphate. If it should happen that the answers to these questions when found indicate that the results obtained with the crude fertilizing materials are applicable to the use of new ones, then luck has served us well.

There is an acute need for a more comprehensive study of the plant-food deficiencies of soils, especially of those showing the greatest degree of depletion of the nitrogen, phosphorus, and potassium, and for recognition of the physiological and nutrient effects of the other components of ordinary and

CORN ON NORFOLK FINE SANDY LOAM, SHOWING SULPHUR DEFICENCY

1, No sulphur; 2, Calcium sulphate; 3, Sodium sulphate; 4, Potassium sulphate.

concentrated fertilizers. Until information on these points is available, the plans of fertilizer experiments must be laid in their present empirical basis.

From the standpoint of strict accuracy a complete fertilizer is one that will supply all the plant food deficiencies of normally depleted soils, and there is considerable evidence to support the belief that extensive areas now fertilized on the basis of the three component complete fertilizers really require five or six of the essential elements. Only the heterogeneous nature of the materials used in fertilizers has delayed recognition of this fact. This interpretation is not altered by the fact that many other soils do not require that such a number of elements be supplied.

It is obviously impracticable to devise experiments for the intensive study of the optimum rates of application of any but the most costly of these ingredients of fertilizers, but this should not lead to the fallacious assumptions as to the value of all of them for influencing crop growth.

Probably it will be advisable to avoid the use of the term complete fertilizer in technical terminology rather than let expediency compromise exactness.

Feed Tobacco Well

(*From page 7*)

not generally recognized by the tobacco growers.

The effect of a high concentration of lime in the soil is to render soil potash and potash applied in fertilizers more insoluble. Care should be taken, therefore, to avoid using lime where it is not necessary; and to avoid, as far as possible, those treatments, such as applying excess quantities of nitrogen-containing materials, which increase the availability of the lime in the soil.

In addition to rendering soil potash insoluble, our results show that a high concentration of lime tends to interfere with the direct absorption of this material by the plant, especially in a dry season. Under these conditions we find that the dry matter of the cured plants contains about 8 per cent of lime and about 2 per cent of potash. This is not desirable; the large amount of calcium is not helpful to the "burn," while the low content of potash is even more undesirable from the standpoint of burning quality. The plants also contain excessive quantities of nitrogen, which is harmful to the burning quality.

Rain appears to remove some of the excess calcium and nitrogen from the soil without necessarily affecting the potash content. At the same time, there is a response in root development which aids in the increased absorption of potash. Our results show that under conditions of optimum rainfall, the plant contains less nitrogen and calcium, and more potash.

There is no doubt that some of the soils in Lancaster county need lime. On the other hand, we know of good tobacco soils that have received no lime for a period of 50 years and yet produce crops of good quality tobacco. Likewise, possibly there are some soils that are quite deficient in available nitrogen. In choosing a tobacco fertilizer formula, therefore, it is necessary to approximate the average soil conditions of the county. The recommendation of 1,000 to 1,200 pounds per acre of a 3-5-12 or a 5-5-12 fertilizer, depending upon the preceding crop and whether manure is used, is, we believe, fundamentally sound. This will increase the potash content of the tobacco, lack of which appears to be of first importance at this time.

Sweet Potatoes

(*From page* 42)

net profit of $155 for the half acre—a rate of $310 per acre.

The Swedesboro System

No story of the success of this 4-H boy is complete without a description of the system for the production of sweet potatoes that is followed in the Swedesboro area.

It is the practice on the Shaw farm to apply about 500 pounds of muriate of potash to the acre every time the crop rotation comes around to sweet potatoes. The potash is usually applied in the fall and left on the ground to be washed into the soil by the winter rains, although some growers prefer to apply the potash in the spring after the ground has been plowed.

In the spring of 1930, Mr. Shaw applied 500 pounds of muriate of potash to the soil after the ground had been plowed. This was disced into the soil about the first of April. Two weeks later, 500 pounds of a 2-8-10 fertilizer was broadcast and disced into the ground. The usual practice on the Shaw farm is to apply about 1,000 pounds of the 2-8-10 mixture, but due to a previous treatment on this particular field the amount of the complete fertilizer was cut in half.

Early in May, the ridges were made up, and the plants were set out as soon as the weather became favorable. Cultivation started immediately and was continued until the vines covered the ground. During the latter part of the season, the weeds were removed by hand. Digging in the Swedesboro section starts early in September and is usually completed by the middle of October.

Extra Potash Pays

Mr. Shaw, like most growers in Gloucester county, places much faith in this extra application of potash. He says it has become the accepted practice on about 80 per cent of the farms in the Swedesboro area and about 5,000 acres were so treated in the fall of 1930 for the coming season's sweet potato crop.

Sweet potatoes treated with the extra application of potash grow better and develop a potato that is short and chunky. Dealers will pay a premium for the potatoes from fields which have been so treated as they know that the potatoes are marketable and worth more money.

Years of Good Pasture

(*From page* 29)

his methods. He went to see the wonderful grass lands that Mr. Clark was fertilizing with nitrate of soda, bone, and potash, and was truly impressed with the tremendous yields of five and six tons of hay per acre that Mr. Clark was securing.

"Why," reasoned Mr. Phelps, "if Mr. Clark can get these results on hay, can't I do it on the pasture lands of the old home farm? The pasture is the weakest link in the farming scheme, necessitating high costs for feeding in summer. If I can build up the old pasture at small cost, it will mean more profits for me in dairying."

Even before Mr. Phelps resigned his

position to come back to the farm, he bought one bag of this wonderful fertilizer with which Mr. Clark had been so successful, sent it to Jaffrey, and had part of it spread on the pasture and the remainder about the fruit trees on the place.

"Even in that year, which was 1910," stated Mr. Phelps, "I noticed that the cows grazed off more closely the spots where fertilizer had been spread. The next year I used four bags of fertilizer in the pasture and have gradually increased the amount until for the last six years I have used 200 pounds of fertilizer per acre each season."

With the exception of one year during the war, when potash was scarce and expensive, Mr. Phelps has always used the same bone base fertilizer, analyzing 10-3-8 available and 10-8-8 total plant food.

No lime has been applied to the pasture areas during this period. A few wood ashes have been applied on some of the weak spots. Gray birch was cut at the outset on sections of the pasture, and any grass that appeared afterward would be "coaxed," as Mr. Phelps puts it, with a little fertilizer each spring until the sod was well established. No portion of the area has ever been seeded.

A Cow Per Acre

For many years Mr. Phelps has been carrying a cow for each acre of grass land. Little or no supplementary forage is given the cows except occasionally during the hot dry weather in August. The pasture season for Mr. Phelps means from May first to October first, which is several weeks or even months longer than most New England farmers feed their pastures.

These were the things we learned from Mr. Phelps at our first visit. With his permission, we decided to erect cages in his pasture to check up on his yield and study the vegetation he is producing.

Late in April we erected three square-yard cages in which to conduct our study. These cages were harvested June 5, July 12, and September 10; the material was taken to the Experiment Station at Durham, dried out and analyzed for protein.

In the following table is presented the total yields per acre, with the protein per acre, based on the results of the harvest from the cages.

	Dry matter per acre	*Protein per acre*
Cage 1	4,815 lbs.	856 lbs.
Cage 2	2,851 "	447 "
Cage 3	4,194 "	827 "
Average ..	3,953 "	710 "

Proteins on these samples varied from 14.45 per cent to 28.76 per cent and averaged 18 per cent for all cuttings. Surely this has been a good way for Mr. Phelps to produce his protein in the summer!

During the fall of 1930, R. F. Copple, assigned to pasture investigation work in New England by the Bureau of Plant Industry analyzed the vegetation in the Phelps pasture. White Dutch clover, bent grasses, and Kentucky blue grass he found to compose practically all of the stand. Contrast with this certain untreated pastures in New Hampshire where Mr. Copple found poverty grass as the major vegetation component, and we begin to realize why yields in Mr. Phelps pasture are high and why the cows find almost their entire sustenance from the pasture.

We found in our yield study that the September harvest was in every case the heaviest of all. Although more time elapsed between the last two harvests it is indicative that the yield from these areas is high all through the season. In pastures where White Dutch clover abounds, this may be expected.

In contrast to this study which was conducted on the Phelps' farm, we have been working in 14 other pastures in southern New Hampshire. None of these pastures had been treat-

ed prior to 1929, and some of them were not topdressed until 1930. Although some of these pastures were excellent, while some of them were only fair, none of them yielded as well as the areas on the Phelps' farm, in spite of the fact that we used an initial application of 1,000 pounds of a 5-10-10 fertilizer on the complete fertilizer plots, following this in 1930 with 330 pounds of nitrate of soda on those plots that had a complete fertilizer in 1929.

Fertilizers Pay

This does not mean that our treatments have not been profitable, for they have resulted in growing protein in the pasture for a little less than half its cost in a 16 per cent dairy ration. What it does mean is that we cannot expect the highest returns from fertilizer until the type of vegetation in many of our pastures has been changed to include more of those species that make better use of fertilizer and that have a higher yield.

Even after but two years of work in these 14 pastures, we note an increase in Kentucky blue grass, bent grasses, and White Dutch Clover with a correspondingly lesser amount of poverty grass. As this change progresses, we can expect even greater response from fertilizers and a much cheaper cost of protein produced by this method.

Note in this table the response from three pastures harvested in 1929 and again in 1930.

DRY MATTER PER ACRE
AVERAGE OF THREE PASTURES

	Yield-Untreated Plots	Yield from Complete Fertilizer and lime Plots
1930	583 lbs.	2,343 lbs.
1929	550 lbs.	1,404 lbs.
Gain in 1930	33 lbs.	939 lbs.

There could not have been much difference in the season else the untreated plots would have shown a wider variation than 33 pounds of dry matter per acre. Yet the completely fertilized plots yielded on an average almost half a ton of dry matter more in 1930 than they did in 1929. This is due no doubt to the cumulative effect of the fertlizers applied, indicating that pasture fertilization, if continued, will become more profitable as time goes on.

Mr. Phelps is, of course, cashing in on past applications of fertilizer from this point of view. And this, no doubt, is what leads him to say, "I consider top-dressing my pasture the most important and paying enterprise on my farm."

A County Rebuilt

(*From page* 24)

habit of growth causes it to yield from one to four tons of hay an acre. Four to twelve bushels of seed an acre are harvested by those who gather these in the seedpan.

But it is not with lespedeza primarily that Stanly farmers are interested. It is the results following lespedeza. Man after man will say that it is the best crop he has ever grown. He will show his barn filled with hay from the crop itself; then, he will exhibit his crib filled with corn grown on lespedeza sod, or he will point out a pasture on which browse fat dairy cattle, hogs, or work stock. If time permits he will tell a story about how poor his land was before he started to grow the crop and what a transformation it has caused. Nor will it be an exaggeration.

Numerous are the old, gullied, washed, and sterile red fields made fertile again by one good crop of lespedeza turned under. As the land has improved in fertility, it is possible to use fertilizers more intelligently and profitably. Along with the fertile soils has come a paying dairy and poultry industry. Milk though cheap in price now is being made to pay a profit because of the good pastures. Stanly county wheat weighs heavy because it is produced on a strong soil. The acreage to sweet clover and alfalfa is increasing and Stanly county has rebuilt an old ramshackle, improvident sort of agriculture into one of the most alert and progressive to be found in North Carolina.

The county is not yet the leading agricultural county, because it had a long way to come. However, it has made the most substantial agricultural progress of any county in North Carolina in the 10-year period between 1920 and 1930. This cannot be successfully refuted by the most rabid and partisan Kiwanian of other counties. And better than all else, the will to win has been imparted to its inhabitants.

Club members from Stanly county take prizes; homes are being improved with lawns, lights, and flowers; communities are interested in their public welfare; and there is the glorious feeling of accomplishment pervading the county. Despite the present depression, Stanly farmers have well-filled pantries, smoke-houses, cribs, and haylofts. They may not have much cash, because no one else has; but, some of them are still making money.

Feeling of Prosperity

Here is what R. A. Lipe, president of the Stanly County Board of Agriculture, says in a letter received as this article was being prepared: "While our farmers are short in money, they are fortunate in having an abundance of things to eat and feed. I believe that Stanly county farmers as a whole are in a better position to live at home and live good at home, than they have ever been. I know my soil is more fertile now, and this is true on practically every farm in the county, and it is much easier for us to live at home when we have fertile soils. I was asked a few days ago, what was re-

A group of Stanly county farmers inspected, cut, and weighed square-rod plots of lespedeza. This particular cutting is Korean. The average height was 14 inches, and the green weight was 9,280 pounds per acre. The total dry weight after being cured for three weeks was 4,480 pounds.

sponsible for these changes, and I remarked that it was through our soil improvement and balanced farm program."

Ten years ago when Oscar H. Phillips began his county agent work, he laid down this principle, "Soil study and management is unquestionably the most important problem facing Stanly county farmers. The soil is the bank account of the county and unless this bank account is kept growing, agricultural disaster or agricultural bankruptcy is certain to follow." Through the years, he has followed this principle and as a result the fertility of the farms and contentment of the farmers have been rebuilt.

A lespedeza and orchard grass pasture actually saved one farmer financially this summer.

Minnesota Peats

(*From page* 18)

timothy hay, reed canary grass, flax, barley, oats, and 10 to 12 garden crops. A variety of fertilizers, used in different proportions and rates, were applied in strips the long way of the land, and the various crops ran across the different applications.

Six plots were treated, and a seventh, left without fertilization, was used for purposes of comparison. The results apparently indicated that the most dependable crop for the peat of that locality is clover-timothy hay. The average yield of this hay on the fertilized plots was 2.09 tons to the acre, harvested the same season as seeded. The crop on the check or unfertilized plot was scanty and light, and the yield was at the rate of less than a ton of hay to the acre.

One clover-timothy combination plot fertilized with potash at the rate of 100 pounds to the acre and phosphate at the rate of 50 pounds to the acre, the whole at a cost of $3.94, yielded at the rate of 2.12 tons to the acre, or a crop worth $24 an acre when it was cut early in September.

One plot, receiving 125 pounds of phosphate only, returned a hay yield of about three-quarters of a ton to the acre as compared with 2.10 tons of hay to the acre taken from a plot that had been given potash only at the rate of 250 pounds to the acre. This big difference indicated that on this particular piece of peat potash was most needed. This is not the case with all peats, as most of them are also deficient in phosphate.

Further trials are planned in the full expectation that the peat lands of the county can with proper treatment be made fruitful, an asset to owners rather than a liability. Goodly increases in the acreages of alfalfa and sweet clover are forecast by the county agent, who says that sweet clover pastures were the only ones to produce any amount of feed during the dry season.

The Inquiring Mind

(*From page* 16)

not gained much experience in many phases of orcharding. It is said that the U. S. Department of Agriculture often appealed to Mr. Hale to help settle difficult questions, and he always proved a wise counsellor. On one occasion he sprayed too heavily with Bordeaux mixture to control brown rot, and the trees promptly shed their leaves. What to do was the question. A new crop of leaves must be coaxed out, or there would be no fruit. The Government experts could not offer a remedy, so the New England genius devised a unique and practical cure of his own. He bought a boatload of muriate of potash and nitrate of soda in New York and applied these fertilizers lavishly in the orchard; then a warm rain fell, and presto—the trees put on a fresh garb of green and eventually produced a bumper crop of peaches.

Further to insure fertility in the great Georgia orchards, cowpeas were sown annually in the rows between the trees on 1,500 acres. Some of the forage was made into hay for the mules of the plantation, and in late summer, all of the sod was plowed under to furnish green manure.

Dynamiting was done with wonderful success in preparing new land for planting. Spraying prevented serious losses from insect pests and diseases, two tons or more of insecticides being used yearly.

About 500 white and colored laborers were employed on the plantation. Fruit grading and packing work was done by skilled white labor. The workers were housed and fed in a hotel on the premises.

The peach crop was marketed through the Georgia Fruit Exchange, city commission men who were members of the Exchange market. The cars were re-iced three times between Fort Valley and New York. Everything possible was done to insure quick delivery and to preserve the quality of fruit. Efforts in these directions have been eminently successful.

It was a specially improvised plan of combating the curculio pest that caused the neighbors to say, "The thing can't be did." But Mr. Hale successfully put into effect his scheme of jarring the trees, catching the insects on frames covered with cotton sheeting, and then dumping them into kerosene. No one else fought the "critter" and no one else in all that region had a quarter of a crop of sound fruit. That season Mr. Hale marketed one-fifth of the entire peach output of the State of Georgia, and for every dollar invested in the fight against the curculio the markets returned him $8.00.

Sought No Honor

Mr. Hale was too busy most of his life to seek public office. He did not court recognition for his notable achievements. But honors came to him nevertheless, for during the last six years of his life he was a useful member of the Public Utilities Commission of Connecticut, and in 1914 the University of Wisconsin conferred upon him its certificate for distinguished service in agriculture. At the presentation Dean H. L. Russell of the College of Agriculture, said:

"John Howard Hale is one of the foremost orchardists of America. He has reached this position of prominence through sheer ability. Denied the benefits of even a high school education, he secured his training in the school of practical experience, and with no start in life except his native ability, he has won distinction not only by the magnitude of his operations, but by the introduction of

business methods in the marketing of his product. The University of Wisconsin recognizes in him an example of what American Agriculture can produce, and I take pleasure in presenting him as one to receive the testimonial accorded those on whom this honor is conferred."

That honor, bestowed just three years before his demise, October 12, 1917, surely was richly deserved and proved that what J. H. Hale had undertaken to do, he had done with all his might. This record of his achievements should be an inspiration to every struggling worker who is endowed with a clear vision and a high purpose in life.

Proving an Idea

(*From page* 17)

fertilizing, my corn averaged 35 bushels per acre. The effect of the fertilizers on the quality of the corn was as marked as the improvement in yield.

Last year I ran out of the 0-16-6 fertilizer I was using on one of my poorest fields, when it was three-fourths planted. The unfertilized corn went down badly. A check of the yields here showed a 40 per cent increase in yield from the 0-16-6 fertilizer, the fertilized part of the field yielding 45 bushels per acre of good quality corn.

Some fertilizer plots on limed land in 1930 gave yields as follows, based on corn containing 15.5 per cent moisture.

Fertilizer	Method of Application	Yield Per Acre Bu.
0-0-0		61.7
122 lbs. 0-20-20	Hill-dropped	66.5
122 lbs. 0-20-10	Hill-dropped	68.3
202 lbs. 0-0-50 & 239 lbs. 0-20-0	Broadcast	69.0
0-0-0		60.1
239 lbs. 0-20-0	Broadcast	60.4
122 lbs. 0-20-0	Hill-dropped	64.2

The corn went down badly on the straight phosphate and on the check

This photograph was taken July 9, 1930. Left, Luther Fuller, General Agricultural Agent, C. and E. I. Railway, standing on the 0-20-20 plot. Right, L. C. Brown, standing on the check plot.

plots, indicating a need for potash. Since I use a mechanical corn picker it means quite a saving of corn to have erect stalks at harvest time.

This year I expect to plant and fertilize 700 acres of corn. I shall use two four-row planters and two four-row cultivator outfits. I intend to use a 2-16-8 or 2-12-6 fertilizer on corn.

I will have 200 acres of barley, 125 of spring wheat, 100 of oats, and 50 acres of alfalfa. I intend to apply fertilizers to these crops by means of a fertilizer grain drill, using an 0-16-6 fertilizer on the small grain and an 0-12-12 or 0-14-14 fertilizer on the alfalfa. The alfalfa will be seeded on limed land.

Complete Fertilizers for Apple Trees

(*From page* 26)

typical of much of the orchard soil in Quebec, having been formed from the breaking-down of syenitic rock. An analysis made by Dr. R. McKibben of MacDonald College, Quebec, showed that it contained 0.32 per cent phosphoric acid, 1.98 per cent potash, and 0.77 per cent total nitrogen. It was, therefore, relatively high in the essential minerals.

The trees of each variety at the beginning of the experiment in 1925 were believed to be 25 years old, and were quite uniform in size and shape. The orchard had been in sod for a number of years, and the fertility maintained by occasional applications of barnyard manure. The fertilizers were applied each spring at the time the leaf buds were bursting, being spread over the ground, under the trees, from about two feet from the trunk to a similar distance beyond the spread of the branches. Throughout the experiment, the entire orchard was kept in sod, the grass being cut once or twice a year, as necessary, and allowed to remain where cut.

The plots of Wealthy were composed of nine trees each, and those of Fameuse, twelve. In the following statements the fertilizer applications and yields of fruit are shown:—

COMPLETE FERTILIZERS INCREASED THE YIELD OF WEALTHY APPLES

Fertilizer Applications per tree	Yield per tree 1926 bush.	1927 bush.	1928 bush.	1929 bush.	1930 bush.	Average bush.
Nitrate of soda, 6 lbs.	8.60	1.54	6.61	4.55	5.75	5.41
Nitrate of soda, 6 lbs. Superphosphate, 5 lbs.	6.23	4.51	6.83	8.28	3.50	5.87
Nitrate of soda, 6 lbs. Superphosphate, 5 lbs. Muriate of potash, 1 lb.	9.67	2.71	10.28	9.28	6.17	7.62

COMPLETE FERTILIZERS INCREASED THE YIELD OF FAMEUSE APPLES

Fertilizer Applications per tree	Yield per tree 1925 bush.	1926 bush.	1927 bush.	1928 bush.	1929 bush.	1930 bush.	Average bush.
Nitrate of soda, 6 lbs.	1.12	13.97	.04	12.04	.37	13.62	6.86
Nitrate of soda, 6 lbs. Superphosphate, 5 lbs.	2.45	12.41	2.10	13.75	3.50	12.50	7.78
Nitrate of soda, 6 lbs. Superphosphate, 5 lbs. Muriate of potash, 1 lb.	.87	16.02	.21	16.46	1.08	16.90	8.59

From the foregoing statements, it may be noted that even on soil relatively high in minerals a favorable response was obtained from the use of phosphoric acid in addition to nitrogen; also that still higher yields followed the use of a fertilizer containing nitrogen, phosphoric acid, and potash.

From these results we may assume that in this soil, high in minerals and organic matter, phosphoric acid and potash are not being rendered available in sufficient quantities to meet apple tree requirements. From the experience of individual growers, it would seem that such is the case in other districts, and that better results would follow the use of a properly balanced fertilizer. From the results of work with apple trees, grown in sand cultures by M. B. Davis at the Central Experimental Farm, Ottawa, Ontario, an apple tree requires nitrogen, phosphoric acid, and potash in the proportion of 9, 5, and 7%.*

* Report of the Dominion Horticulturist, 1928.

Based on these findings, and bearing in mind that some nitrogen may be lost by leaching or denitrification, a good rule to follow would be as follows: apply sufficient nitrogen to promote satisfactory wood growth. To this add one-half as much phosphoric acid as nitrogen and two-thirds as much potash. For a 20-year-old-apple tree, growing in average soil, with an 8-inch trunk and a spread of 20 feet, the usual quantity to apply would be: 8 pounds of nitrate of soda, 4 pounds of superphosphate, and 2 pounds of muriate of potash. Other fertilizers will, of course, prove satisfactory, providing the proper balance of nutrients is maintained.

During the life of the present generation, the program of orchard fertilization has swung from one extreme to the other. It is obvious that a rational middle course of using complete fertilizers would more surely supply apple tree requirements and prove productive of better results.

Intelligence and Potatoes

(*From page* 13)

Mr. Prescott feels that his type was never so good. The extra potash rounded out the tips. Out of 23,001 bushels put in storage as they came out of the field in early October, he sold as certified seed 16,985 bushels or 80 per cent of the total yield when graded and shipped in December. This indicates excellent graded stock.

Ten dustings at the rate of 30 pounds per acre are applied 10 times during the growing season. This liberal application protects the plants from insects and blight.

Much care is exercised in harvesting. The digger is run very slowly and deeply so as to bring up a lot of soil on the bed of the digger, which reduces the distance that the tubers have to fall, minimizing bruising.

In addition to farming, Mr. Prescott finds time for community and county activities. He has served on the County Farm Bureau Executive Committee and is crops project leader of his home town Farm Bureau.

His brother John is also an active worker for the betterment of his community and county. He is serving on the Executive Committee of the County Farm Bureau and is chairman of the local Farm Bureau. He has been Town Treasurer for six years. He has a son in college, and the money to send him there came from potatoes.

Both men have always farmed for a living, and by adopting approved farm practices and through hard work, good management, and honest dealings, have placed themselves among the foremost potato producers in this country.

A. E. and U. S.

(*From page* 4)

both; and probably a new alliance between the doer and the dreamer if we are to get beyond this stone wall on which our vine of destiny is pushing upward for light and air. America cannot well surrender its pushing and daring attributes of national character, which are left over from the times described by A. L. Burt of the University of Minnesota. He testifies to the fact that America has built its national edifice but that the task of designing the dome remains as a challenge to us all. Let's take his statement here:

"This continuous rebirth of society in the west was in origin a revolt against the conservative tendency in the east, a revolt that found ample scope in the open spaces of the west. There they confirmed the impulse that had carried them forth.

"Socially in the west the individual has stood erect on his own feet instead of crouching in the nook of society where he was born—a cramping attitude—or hanging on to the family tree—a monkey attitude—and this has been forever injecting a dynamic force into the life of this continent. The restless energy, the driving power, the buoyancy and exuberance of the westerner have infected the whole. Thus we have had in America a life with little leisure and so-called culture, a life that was intensely practical and concerned with material things, a life in which emphasis was laid on growth and quantity rather than on stability and quality, and on the future instead of the past.

"We are coming to the end of the road. The last frontier in North America is closing with the disappearance of free land up north, with the dying of the pioneer urge in our society, and with our decision to bar the door against peasants from central and southeastern Europe. We may avoid waste by rationalizing the settlement of the relatively limited areas that may still be opened to agriculture, but we cannot escape the fact that we are coming to the end of the road along which our society has travelled for two centuries. What will happen when we reach the end? It would appear that North America in character is ceasing to *grow away* from Europe and is turning back to meet an *Americanized* Europe."

THIS theme of the exhausted frontier has also been taken up by one of the governors of a western State in his message, and he used it to stress the vital need for adjustment of social problems with economic forces. It is not a new idea, for Professor Frederick Jackson Turner advanced it long ago. The world is growing smaller while our problems loom larger. Ireland is not the only land in need of constructive, trained imagination.

A. E. cries for more devoted aid from the thinkers, the scholars, the teachers, and the writers, as well as the scientists. In America we seldom give them the chance to perform such services. They seldom partake in the welter of political campaigns and therefore do not stand in line for the post-election harvest. Furthermore, they tell me on every side that our educational goals are dim and their aims are not definite. They repeat frequently that science labors for materialism rather than for human welfare —for the dollar rather than the heart's desire. We hear that literature has traded its birthright for flashy and fleshy appeals and that good, old, winged Pegasus has died of the glanders.

We set the public service stage of action to cater to mass desires and whims. Perhaps the decision of the

masses is a safe and certain guide, as some insist; and perhaps the dominance of a so-called "aristocracy of culture" would be as bad for us as the rule of the bread-and-butter barons or the adroit politicians. Whoever leads must face the threat of opposition, so I fear that the plan A. E. suggests for the rebirth of an ideal Ireland, if transplanted to America, would require dual control by those who read Shakespeare and those who prefer Will Rogers. Who is there bright enough to invent a harness hitch that will get such a team pulling evenly in the traces of a national movement?

IN my State we have laid down the law that government must be supported largely on the ability to pay, and this tent is favored far and wide. Yet by way of contrast, we have seldom advanced the twin idea that government ought to be furthered and fostered by the ability to *think*. Thus have we discounted mind and leaned heavily upon money. As somebody has to find that money with which to pay, we get all tangled up in our efforts to distribute benefits equally.

When I read the following excerpt from A. E.'s booklet to my friends, the minister and the law student, I got quite contrary and equally vehement opinions. I leave it to you to determine which were yea and nay. On page 8 he says:

"A nation is but a host of men united by some God-begotten mood, some hope of liberty or dream of power or beauty or justice or brotherhood, and until that master idea is manifested to us there is no shining star to guide the ship of our destinies."

We must not be too hard on A. E. nor too skeptical about reaching this ideal, if we have not already done so to some extent. I fully believe that a nation may be much the same as the better typical Americans or the men of any race. That is, within their bodies and souls they may combine all the traits and virtues which he has set down for the make-up of a state. They may have liberty and power, beauty of person, and a sense of justice and comradeship. But along with it, being human, they possess the less desirable traits and tendencies. I do not believe this generation can make the world over anew, but as we become boxed up in tighter environments with the world neighbors at our elbows, we must practice self-control more than we have been accustomed to.

Liberty can become license, power can be arbitrary, beauty can be artificial, and even brotherhood can be drawn out much too fine at times. And sometimes leaders in such positions of control may fancy again, as they have before, that their moods are divine inspiration when they are quite the reverse. A. E. has picked a live coal from the embers in his definition of a nation's principles, but until it cools off I am afraid to touch it again. It seems sure for one thing that we must have fine *followship* as well as leadership to make an ideal state.

And using another old maxim in this connection, it is well to recall that some men live to eat while others eat to live—but in any event, they must all *eat*.

I AM not going into the details of the Irish policy that A. E. develops, bringing the lusterless folks of his land into a fullness of life that they never had before. This is all very ennobling and probably highly successful. It is being applied to the old world type of emerging democracy, born of the industrial revolution. Here in America we face a problem vexing the man owning property and whose fathers before him owned property, men who *believed* they were free at least and who have had the franchise to spend as the mood of the moment struck them.

Ours is a problem of self-control and mutual adjustment, guided no

doubt by as many frescoed ideals as the campaigners can think of. Our western advance and limitless scope, our power and activity have combined in past years to assimulate the immigrant and is almost Americanizing Europe, as Burt says. Regarded in this way, the problem which is put up to us for ultimate solution sounds as important as a decision in a court of last resort. Very likely we should begin to consider something more serious than football stadiums or beauty contests.

WE must share the ideals which A. E. Holds up for a cleaner, brighter, and finer rural environment; for a state dominated by real instincts of service to all. Listen while I give two quotations, one from A. E. and the other from the National Industrial Conference Board in its famous report on agriculture—read by a few and forgotten by many.

Says A. E. in his message: "We have to create national ideals which will dominate the policy of statesmen, the actions of citizens, the universities, the social organizations, the administration of state departments, and unite urban and rural in one spirit."

Respecting that elusive national ideal again, no less a doughty group of American savants than the National Industrial Conference Board said in its bulky report of 1927:

"Finally, it must be recognized that the current problems arising in connection with agriculture are really reflections of the changing position and relationship of agriculture in our national economic development. All these problems converge ultimately toward the question of developing a national economic policy which shall embrace all aspects of our economic life in a unified whole and allot to each its place, in the light of long-time consideration of national security, social unity, and economic justice. Casual adjustment and drifting in matters of such significance lead inevitably to more and more serious difficulty. The choice of this policy, in so far as it can be made deliberately and consciously, is a momentous thing for our future prosperity and growth."

If poor old Ireland is groping for a national policy, led by such men as Plunkett and the Poet, then how about America? How far have we advanced with our agrarian blocs toward getting legislation or social adjustments which fit somewhat into the design drafted so nobly by the National Industrial Board? How have we succeeded in getting this unified policy mapped out and adopted by the universities, the statesmen, and the organizations, desired so much by A. E.? Are we "casually drifting with adjustments" piecemeal in farm boards and marketing agencies, loan funds and pools, or are we really getting hold of an ideal that requires some time for shaping? Have we infected the rank and file of workers and farmers with the zest for a unified national policy, or are we working lopsided from the top down to jam a crown on somebody's head before he is able to wear it?

How far have we gone in getting that cooperation so earnestly requested by the board between industry, commerce, and agriculture? Are we working on platforms or platitudes?

A. E. in another place opens the thought that perhaps the world has lost its heroes and hero-worship, and that singers and poets have quit lauding the leaders and ceased to set up civic shrines. He wonders if perchance that may be the reason for our indifference and contempt, our lassitude and skepticism.

Maybe he forgets that the greatest heroes are deceased. If Lincoln had lived through the reconstruction turmoil, maybe he would have fared about like Wilson at the peace conference and afterward. If Washington advanced the "self sufficing" and "aloof from European entanglement" theory

in these days he might not be so nobly regarded either. Poets and legend writers can do a lot for ordinary folks a generation or two after they are gone. Time mellows all things and reduces some of our worst worries to a joke, while it elevates some of our best leaders to Olympus.

A. E. is trying to reach a state of society wherein people will not forever be in conflict with each other over crumbs of sustenance or a share of luxury, and where their respective efforts will not nullify each other. It is indeed a worthy road to travel in mental leadership, but a tough and devious route for the everyday man.

Some of us may have read and disagreed here and there with the imperfect philosophy of some thinker like A. E. Yet it all serves its purpose, and that is to stimulate us to give heed to some of the things taken for granted or accepted as necessary.

If it were not for just such thinkers and resolvers who pondered and finally led mankind in and out of the mazes of time, we might still be groveling in the morass of such conditions as obtained in the Middle Ages.

Many of the theories of yesterday are the laws and the prophets of today. That is why the world is getting better with each century. And even as each period has its own peculiar and difficult problems to unravel, so it usually produces men and women who finally take us by the hands and lead us slowly forth into a higher level of reason and a nobler conception of life.

So if I have been a little serious in this series for March, I humbly crave your indulgence. I have just paid my taxes and wished to take a little inventory of what the national policy would be in spending it.

NO CHOICE

Kelly and Cohen were having dinner together. Cohen helped himself to the larger fish and Kelly said:

"Fine manners you have, Cohen. If I had reached out first I'd have taken the smaller fish."

"Vell," Cohen replied, "you got it, didn't you?"

A gushing hostess at an evening party rushed up to George Bernard Shaw and asked him what he thought of a new violinist she had discovered and who had played that evening.

"He reminds me of Paderewski," commented G. B. S.

"But Paderewski is not a violinist."

"Just so, just so," came Shaw's reply.

FED UP

Weary Willie, who was out of a job, as usual, rapped timidly at Mrs. Murphy's kitchen door. The lady, angry at being interrupted at her washing, flung open the door, and glowered at him. "Did you wish to see me?" she bellowed.

Weary Willie backed down the steps and said meekly, "Well, if I did, I got my wish, thank you."

A young woman who wished to engage Calvin Coolidge in conversation, when he was President, told Mr. Coolidge that her father had laid a wager that she couldn't get him to utter three words. She expected that this would start him talking. But he said quietly: "Dad wins!"

THE TALE BEARER

He had been to a stag dinner, and his wife wanted to hear all about it when he got home.

"Well," he said, "one rather odd thing occurred. Jim Blankton got up and left the table because some fellow told a story he didn't approve of."

"How noble of Mr. Blankton," exclaimed his wife, "and—what was the story, John?"

"Which would you rather be in, John, an explosion or a collision?"

"A collision."

"But why?"

"Because, in a collision, there ye are—but in an explosion, where are ye?"

"And, there, son, you have the story of your dad and the Great War."

"Yes, Dad, but why did they need all the other soldiers?"

SHE KNEW

The old lady was very ill. She sent for her niece and said: "Sarah, I am going to die, and I don't want anyone to be fooling about it. When you come to lay me out, I want to be laid out in my black silk dress; but take out the back panel and make yourself a dress from it."

Sarah said: "Oh, Aunt Mary, I don't want to do that. When you and Uncle John walk up the golden stairs I don't want people to see you without any back in your dress."

"They won't look at me," the old lady replied. "I buried your Uncle John without his pants!"

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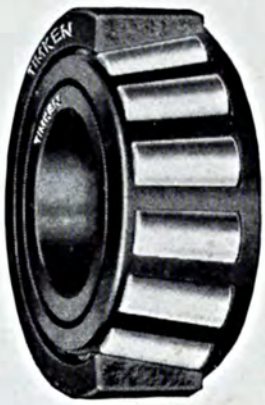

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VOLUME XVI NUMBER FOUR

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Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY., INC.
of Amsterdam, Holland

Directors: J. N. HARPER G. J. CALLISTER

"BEAUTY AND THE BEASTS."

Better Crops with PLANT FOOD

PUBLISHED MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION, INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK, WITH OFFICES AT 19 WEST 44TH STREET, NEW YORK CITY. SUBSCRIPTION, $1.00 PER YEAR; 10c PER COPY. COPYRIGHT, 1931, BY THE BETTER CROPS PUBLISHING CORPORATION, NEW YORK.

VOL. XVI NEW YORK, APRIL, 1931 No. 4

Simplicity Plus Sensible Faith

The Vernal Yearn

By Jeff McDermid

"A" STANDS for April and Ambitions. Those vague stirrings that come to us in the "fussy forties" of life may be different and less apt to bear fruit than the fevers that fired us to action in our expectant youth. Maybe our motives are like plant life. They may not be as powerful as the root germ that pushes aside clods and stones to reach light and air in the outset of our careers. Yet the lateral branch and terminal buds of an older shrub may easily become more useful and ornamental by means of a little stirring and feeding of its roots.

Transplanting some of us old perennials to more favorable ground often causes us to blossom forth and attain new ways of justifying our places in the humble back-yard garden. Not all of us will stand transplanting without withering at the tops or becoming bent before accustomed breezes, like poplars on the seashore.

Then, too, many of us, who were destined by the molecules that made us to be box-elders or lilacs, strive in

vain to change our chromosomes so that we may stand with the blue spruce and the rhododendron on the front drive to salute the dignitaries or to grace the marble marvels of a formal sward.

WE may comfort ourselves by smoking the redolent bark of the family tree in a pipe-dream or two, while the April breezes fan us and the rain patters down alike on the bursting seed of the gnarly thorn-apple and the cone germ of the prospective pine.

But as a rule, a pine remains a pine and a sumac stays a sumac through successive generations without number. To be sure, the wizards in arboretums have hybridized, top-worked, and cross-germinated our plant friends in a way to demolish ancient laws. But I am speaking of the natural species without artificial or mechanical interference.

Though a given plant breeds progeny that may be tall or short, fruitful or barren, in various complex groupings, they are usually the same in most outward forms by which we classify them—if left untouched by science.

But in tracing any human family tree and the trees from which it sprang away back yonder, we find pines in some generations and briar bushes in the next ones. At times a regular sequoia may be the progenitor of something as "small" as Scotch heather. I trust this will not be held against me by such savants as Doctor Pearl, Mr. Wiggam, or Judge Ben Lindsey. I presume to set up no theory in the face of theirs.

The very best and the ultra-meanest traits of plants have to be forced out of them I guess; while the good and the weak spots in mankind sort of crop out naturally—perhaps because we are more prone than plants to get married hastily. I don't know why, neither do you; but it sort of seems to ring true somehow. But is that all there is to it?

I do not believe it is, for if it were infallibly so, we might as well shut up all the schools and churches and run hog-wild without pruning hooks or fertilizer distributors! I am not discouraged with seeing so much quack in the human garden. It proves the soil is fertile anyhow and the life instinct is inherent, though perhaps misguided.

We mustn't give up so easily. We cannot forget this, that the special mystic quality that man has in his sensitive nerve centers (which plants perhaps do not possess) should make us tread lightly in his nursery and act with tolerant wisdom in his neglected orchards.

Man has been a parasite on plant life and an improver of plant life—both of which is primal evidence that man has those aforesaid capacities which the poor plant lacks. He travels, while the plant stays put. He sees, while the plant merely feels. He thinks, while the plant only obeys its impulses.

Yet, with so much more freedom and will power, and with more senses, some of our human herbariums defy the most astute specialists in culture. Yet no case is hopeless, and the good work goes on.

AND this brings me at last to my April fantasy. It takes the form of a confession, as good for the soul as the spring rain is for the cotyledons. It is suggested by April—the time when all men of the soil eagerly turn to plant restoration, plant germination, and plant consummation. If we resume our hopes once more despite depressed prices and other bothers, and sow the accustomed acres to some crop we like best to nurture, is it not a rather blessed sign of recurring hope and optimism—albeit the same may be horrid economics? And furthermore, if we continue to manifest hope toward plant culture, what are we likewise doing for human culture, human hopes, and human harvests? If

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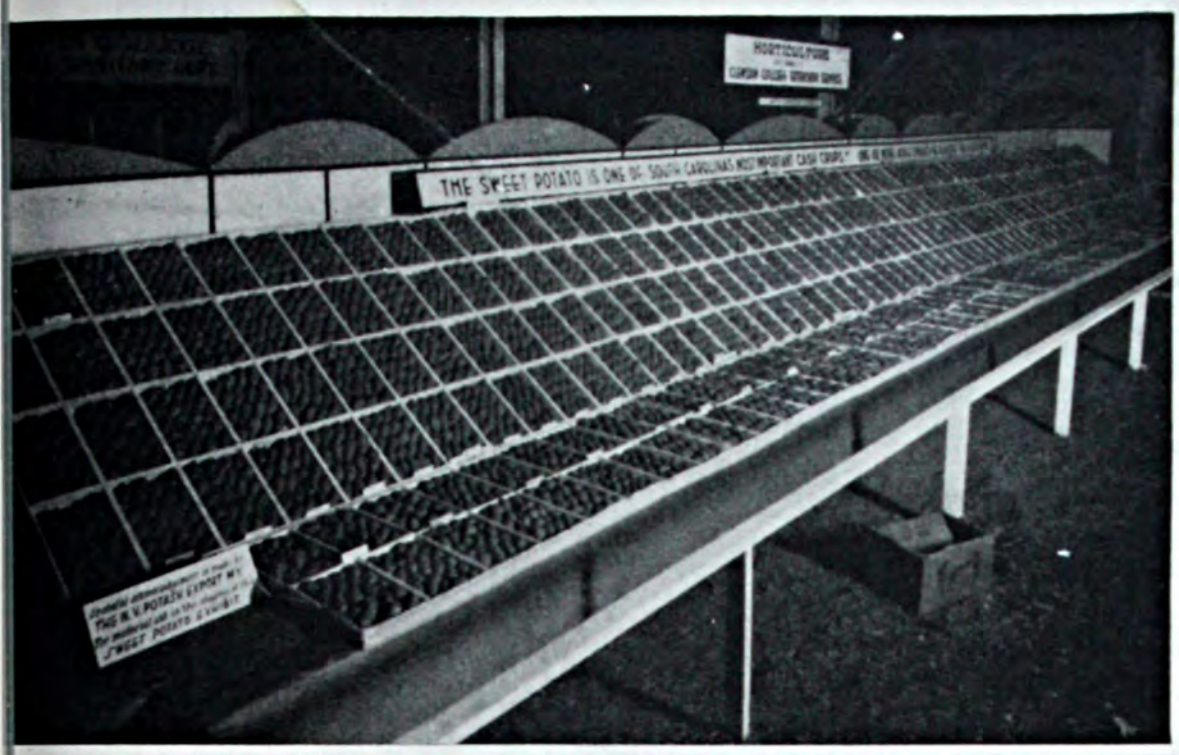

The contestants staged a sweet potato exhibit at the South Carolina State Fair last fall.

More Potash— More "Sweets"

By R. A. McGinty

South Carolina Agricultural Experiment Station, Clemson College, South Carolina

IN South Carolina, the sweet potato is coming back.

Several years ago, through the encouragement of County Agents and Extension Specialists, the acreage devoted to this crop in the State was materially increased. A sweet potato marketing organization was established, numerous storage houses were constructed, and the crop promised to assume much commercial importance. But the promise was not fulfilled for several reasons.

One was the failure of many community curing and storage houses to function satisfactorily. Another was the difficulty in getting growers to properly grade and handle their product so that it would meet the demands of discriminating markets. But one of the most important factors was the low average yield per acre of No. 1 sweet potatoes, the total yield being only about 90 bushels per acre over a 10-year period.

As a result of these difficulties, growers who tried the crop on a commercial scale became discouraged, and turned their attention to other things. Consequently during the last few years although South Carolina has planted some 50,000 acres to sweet potatoes annually, they have, for the most part, been utilized for home consumption, only the relatively small amount of about 200 carloads per year being shipped out of the State.

Believing that South Carolina should

be able to produce sweet potatoes of as good quality and as economically as other parts of the country, the State Extension Service inaugurated a campaign in 1929 to encourage better methods of production for this crop with the aim of establishing it on a satisfactory commercial basis.

In starting this campaign, it was decided to conduct a "Sweet Potato Contest," require contestants to keep accurate records of their operations, and award prizes at the end of the season to those who made the best yields of No. 1 sweet potatoes. The South Carolina Sweet Potato Growers' Association appropriated $600 to be used for this purpose. A state prize of $150 and district first and second prizes of $100 and $50 in each of three districts were awarded to the contestants producing the highest yields. These prizes helped to create a great deal of interest in the contest and made it possible to obtain much information as to the practices and the corresponding yields of a large number of growers.

At the beginning of the contest, growers were urged to follow methods which have been shown by experiments and careful observation in South Carolina and elsewhere to produce the highest yields of marketable sweet potatoes. Especial emphasis was placed on (1) the planting of a good strain of the Porto Rico variety, which is the standard sort in South Carolina; (2) reasonably early planting (before June 15th) to assure sufficient time for the crop to mature properly; (3) close spacing in the row and between rows (10-12 by 36-38 inches) to reduce the number of jumbos and improve the yield per acre; and (4) the use of 800-1,000 pounds per acre of a 3-8-8 or 3-8-10 (NPK) fertilizer mixture.

The last two recommendations were considered somewhat radical by many growers who had been in the habit of using wider spacing and who considered a much smaller amount of lower-grade fertilizer to be sufficient for sweet potatoes. While many of them adopted the recommendations there was a considerable number who followed the old practices. This made it possible to compare results and secure much interesting information. The contest has now been under way for two seasons. The results obtained by growers who have followed the approved practices amply justify the recommendations which were made at the beginning of the contest as the following list of winners for 193[illegible] indicates:

CLOSER SPACING AND MORE POTASH MEANT GREATER PROFITS

Grower	Prize	Date of Planting	Spacing	Fertilizer	Yield No. 1's	Profit per Acre
T. L. Gramling, Orangeburg, S. C.	State Prize	June 10	30"x 7"	1,350 lbs. 3-8-16	449 bus.	$265.0[illegible]
C. McLandon Collins, S. C.	District 1st Prize	May 10	36"x 9"	600 lbs. 4-8-4	219 bus.	$166.0[illegible]
H. Galloway, Hartsville, S. C.	District 1st Prize	May 15	38"x12"	1,300 lbs. 2-11-15	323 bus.	$221.0[illegible]
O. L. Cox, Loris, S. C.	District 1st Prize	May 15	35"x 8"	1,100 lbs. 4-9-9	334 bus.	$234.0[illegible]
C. P. Green, Chesnee, S. C.	District 2nd Prize	May 15	38"x12"	1,600 lbs. 3-8-11	180 bus.	$77.0[illegible]
B. F. Williams, Darlington, S. C.	District 2nd Prize	May 13	48"x10"	700 lbs. 4-8-6	254 bus.	$179.0[illegible]
E. M. Mears, Nichols, S. C.	District 2nd Prize	June 14	41"x10"	1,200 lbs. 3-8-16	279 bus.	$207.0[illegible]

All these winners planted their sweet potatoes before June 15, most of them used close spacing, and they fertilized liberally with fertilizers relatively low in nitrogen and high in potash. Fifty per cent of the contestants in 1930 used 8 per cent or more of potash in their fertilizers, indicating the general tendency to put into practice the results of research which emphasize the importance of potash in improving the yield, shape, and market quality of sweet potatoes.

The State prize-winner, Mr. T. L. Gramling of Orangeburg, made the remarkable yield of 449 bushels of No. 1 sweet potatoes on one acre. This yield was carefully checked at two different times and is authentic. Mr. Gramling described how he made this large yield before a meeting of 300 growers at Orangeburg on February 18. He says that he considers the essentials of success in growing sweet potatoes to be (1) the selection of a good, well-drained, loose sandy loam soil; (2) close spacing whereby 20,000 to 30,000 plants per acre are used; and (3) the use of a liberal amount of a "well-balanced sweet potato fertilizer analyzing about 8 per cent phosphoric acid, 3 or 4 per cent ammonia, and 15 to 20 per cent potash." This mixture, Mr. Gramling thinks, will encourage quick vine growth with subsequent development of chunky sweet potatoes of high quality.

Mr. T. L. Gramling was the State prize-winner with a yield of 449 bus. of No. 1 sweet potatoes per acre.

The records of Mr. Gramling and many other contestants throughout the State have demonstrated conclusively that sweet potatoes may be produced profitably if handled in the right way. In spite of the generally unfavorable season of 1930, the average yield of No. 1's per acre for the 209 growers who finished the contest was 118 bushels per acre with a total yield of 207 bushels. These 209 contestants made an average net profit of $76.12 per acre after deducting the cost of production amounting to $44.95 per acre.

If the records of the contestants who made the 20 highest yields of No. 1's are compared with those who made the 20 lowest yields, we find that the former made not only a larger yield of No. 1's but also that the percentage of this grade was much higher (71 per cent as compared with 41 per cent). The reasons for the differences in yield and percentage of No. 1's seem to lie in the spacing of the plants and the amount of fertilizer and percentage of potash used by the two groups.

The 20 growers making the highest yields spaced their plants considerably closer on the average than the other group and used 958 lbs. of fertilizer

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Making a

Permanent Pasture

By George B. Mortimer

Professor of Agronomy, Wisconsin College of Agriculture

UP to date in the farming practices of the north humid region of this country, permanent pastures built on arable lands have been more accidental than intentional. To those acquainted with agricultural practices, the reasons are clearly evident. It has been and still is a prevalent thought among farmers that only waste land should be used for pasturing, and that all lands capable of being tilled should be used for the so-called more profitable crops. That is a notion supported more by tradition than by the facts involved.

Throughout all pioneer development, as farms were slowly being shaped from virginal lands, it was but the natural tendency to bring all the land capable of tillage under the plow as rapidly as possible, for in the early days the harvested crop was the chief cash product. The process of shaping farms was slow, owing to the necessity of clearing the land of timber, brush, and rocks. Consequently there was always natural grazing lands in abundance for the scattering herds of an unorganized livestock industry of pioneer days. Today, although livestock and their products are the basis for much of the farm income, farms are being operated still too largely on the theory of a direct crop income.

The job of organizing farms has gone steadily forward until now nothing but so-called marginal and waste lands remain as natural grazing grounds for a most intensive livestock industry developed during the past 50 years. This at least is the picture for the humid regions of the United States. Acres that will always be expensively tilled have also fallen under the plow. The agronomist, the soil expert, and the farmer himself have all been devoting their energies to the improvement and production of the harvested crops, to the extent that any consideration given to pastures has been but incidental in cropping systems as practised in this country.

Rotation Pastures Are Inadequate

When natural grazing lands became too limited, no longer supporting the increasing livestock numbers, the so-called rotation pasture came into use. This was and always has been nothing more than an outgrowth of the traditional mixed timothy and clover meadow, and was made possible owing to the perennial habit of timothy. Every farmer experienced with this type of pasture knows too well its shortcomings. Hay for one year; the disappearance of the clovers; then pasture for a year or two when nothing but timothy remains, and frequently not even a full stand of it; a practice which but again emphasizes the relative considerations given to harvested and pasture crops! This pasture program has permeated the agricultural practices of the north humid region of this country since the beginnings of our livestock industry, with the net result that farmers have become reconciled to about eight months of barn feeding and four months of pasturing,

and these not always good enough to satisfy the appetite of a hungry herd.

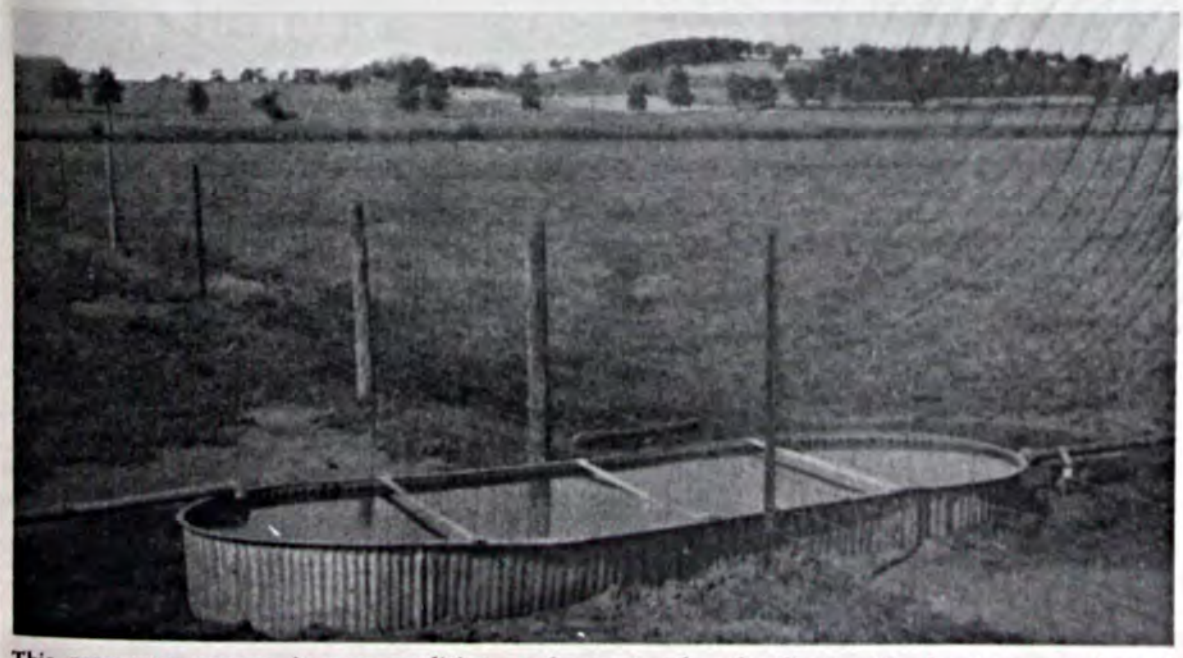
This type of pasture is nothing more than a by-product in the rotation and does not give a mixed seeding of timothy and the common clovers a square deal. Pasturing the year following seeding when the clovers are at their best would place this type of rotation pasture in much greater favor, probably parelleling the much heralded sweet clover in its carrying capacity. But tradition has decreed otherwise, and today such pastures are as always the remnants of once productive meadows.

Sweet Clover Comes to the Rescue

Sweet clover rode into glory among pasture crops largely because of the failure of worn, limited, natural grazing lands and timothy rotation pastures to keep pace in providing the summer's feed supply. It came with a bang into humid and semi-arid regions alike as the savior of the pasture problem. Cheap seed, drought resistance, large carrying capacity, leguminous and deep-rooted habits, lending certain soil improvement properties, were the big arguments for its birth among pasture crops. And rightly so, for is it not in possession of all these virtues?

To those who have attempted it for the first time, its carrying capacity has been its outstanding comparison, both against the natural pasture and the traditional timothy-limited clover-mixed pasture. Owing to its deep-rootedness, its drought resistance has definitely given it a permanent place in semi-arid regions and also on the lighter type of soils in humid regions, both for pasture and soil renovation purposes. But to say that sweet clover in humid regions on the heavier types of soil is always the best pasture crop would indeed in the writer's judgment and experience be stretching the truth. Like every new thing that on the surface appears to be superior, it advanced rapidly from the realm of weeds to a prominent position among pasture crops.

But a saner view seems to be working out of the experiences accumulating from its use. Its evident lack of palatability at first, its failure to carry through the season as has been too many times reported it would do, its temporary nature as a pasture crop, its high lime requirement, coupled with too limited knowledge regarding its effects upon the physical condition of dairy cattle, particularly with reference to loss of body weight, may well become vital problems against an



This permanent pasture, in poor condition at the start, when fertilized with phosphate, potash, and nitrogen and divided into smaller paddocks for rotational grazing, has carried at the rate of one dairy cow per .53 of an acre for a period of 140 full grazing days in 1929 and again in 1930.

extended use of this crop in north humid regions where competition with other good pasture crops is more keenly felt, and where the true worth of these crops when properly handled is bringing to light new evidence in their favor.

There Is No "Best" Pasture Crop

There is no one crop nor any one field on any farm which is the best pasture crop for the entire season. A full five or six months of adequate pasture can only be had on the same principle that operates for the winter's feed supply, and that is by taking advantage of different crops and programs of management. If pastures are expected to bear the same relation to the herd during the summer season that the silo and the mow do during winter months, they will have to be planned for in the same sense that corn and hay are. *No one single crop possesses the miracle of providing a full season of pasture, and when we become so pasture-minded as to recognize that principle, good arable land devoted to a properly built and properly managed permanent pasture may lead to the discovery that it will be counted among the best of pasture crops.*

Sweet clover compared with permanent pastures in their present state on worn, waste lands has every advantage in its favor, but permanent grass on the same kind of good, heavy, crop land as may be growing sweet clover places it in the more favorable light which it deserves in any comparison, since so-called temporary or rotation pastures always have had the advantage of good tillable land. It may be true that sweet clover will carry further into the late summer than either the mixed-rotation pasture of timothy and clovers, or the permanent pasture, but when once it is eaten down by late summer, it is done for the season. It has run its natural cycle and little further vegetative growth is made. In contrast permanent grass and timothy and clover mixtures return considerable fall growth with the advent of cool, moist weather of late summer and early fall so that the total grazing period for the season may equal that of sweet clover.

Permanent Grass Is Efficient

Whether the main pasture be sweet clover, a mixed pasture of timothy and clovers, or permanent grass, there must be supplementary pasture provided for late summer and early fall, if a continuous supply of succulent feed is to be had as far into the fall as may be possible. There are several ways of doing this. Sudan grass, new seedings

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A permanent pasture in the making on the farm of A. J. Glover, Hoard's Dairyman; it was pastured continuously from late June into late October the year following seeding.

Topping the Asparagus Market

By E. R. Lancashire

Vegetable Specialist, Ohio College of Agriculture

AN Eastern asparagus grower has been topping the market for several years with a regularity that should have a couple or more of good reasons behind it. Scientific advisers have for many years doubted the wisdom of one practice of this asparagus grower, namely the annual application of 1,000 pounds of potash in addition to the nitrogen and phosphoric acid used.

In reply to this questioning the grower can only say that he sees no particularily good reason for making a change in his fertilizer program. His statement sounds good since the returns per acre on his very extensive plantings are averaging $500 annually. It would seem that 1,000 pounds of potash at a cost of less than $30 per acre is a reasonable amount of money to invest when the gross returns are so large and when each year the grower succeeds in topping the market of a big eastern city.

Learn by Experience

Then there is the case of a Southern grower who uses an 8-3-15 analysis. The 15 per cent of potash in this fertilizer, coupled with the very low amount of phosphoric acid prevents the asparagus from feathering out during the normal cutting season, according to this particular Southern asparagus grower.

Both of the examples mentioned serve to illustrate that none too much is known about the fertilizing of asparagus. They also lend weight to the oft-repeated statement that every grower might well begin a fertilizer program for such a specialized crop as asparagus with some well-balanced, basic treatment and find out by experience where the upper limit is located with reference to how much fertilizer can be profitably applied and what amounts of nitrogen, phosphoric acid, and potash can be used in such a fertilizer on the particular planting of asparagus in question.

There are many people who very seldom will run the risk of deviating from their time-honored customs. There are others who are attracted by the element of chance.

Two men were riding through the country and they noticed a flock of sheep. The fellow who liked to take a chance said to his less venturesome companion, "Those sheep have been sheared recently."

"Yes," replied the companion, "at least they have been sheared on the side which we can see." He was ultra-conservative.

The Salt Idea

Years ago when asparagus was first introduced to the United States, it was grown near the salty sands of the ocean. As the "grass" migrated westward with the people, it was thought that salt was essential to success until one more or less venturesome grower ran out of salt and being also more or less observing noted that his returns

equaled those of other men who continued to use salt on asparagus plantings.

Salt, as the chemist knows it, is a combination of sodium and chlorine. The presence of excessive amounts of sodium chloride or salt will kill all vegetative growth. The "White Alkali" of the western States is made up in part of sodium chloride.

There is a much more practical combination than sodium chloride which the asparagus grower can use, and that is potassium chloride. To make the departure from the use of salt less abrupt, the potassium chloride could also be called a "salt." This time it would be a "potassium salt" in place of a "sodium salt."

The use of reasonable amounts of sodium chloride is an aid in controlling weeds, but is of little if any value as a fertilizer. Weed control could be more satisfactorily handled by cultivation than with salt applications.

Needs Ample Plant Food

Asparagus is a crop favored by few growers who prefer to ride the market. Since it takes three years to bring a planting of "grass" into bearing, and since the planting may produce profitable crops for 20 years, the business finds more favor with the type of grower who knows that a steady rate of production over a period of years is the safest plan for everyone.

As a long-time proposition it is practical to make sure that the asparagus planting be made on a soil which contains a high percentage of organic matter and is liberally supplied with mineral elements including nitrogen, phosphoric acid, and potash in particular.

Without the mineral salts there can be no plant growth no matter how much water-holding capacity the soil may have. Leafy, vegetative growth such as is especially desirable for the asparagus crop cannot occur without the nitrate forms of nitrogen being available. A plant starving for nitrogen is slow growing, and the leaves take on a yellow, sickly appearance.

Phosphoric acid is essential to root growth. Cell divisions by means of which a root elongates can take place only in the presence of phosphoric acid. This plant food is responsible for the early maturity of vegetation, offering a possible explanation for the observation of the Southern grower who prevents "feathering" of asparagus by holding back on phosphoric acid and increasing the potash supply. Experimental evidence does not bear out this grower's conclusions concerning the effect of phosphoric acid on "feathering."

Potash has been found to be essential to cambium activity. For example the swelling of the beet can be retarded by withholding potash salts. The quality of a vegetable has long been associated with potash, as for example the Irish potato grown on muck land. In the absence of potash the potatoes grown on such soils are inferior to a crop grown with an application of 0-12-12 made in the row at the rate of 1,000 or more pounds per acre.

All three elements—nitrogen, phosphoric acid, and potash — are very necessary to successful asparagus production. A suggested, basic treatment for both a new planting and the older established cutting beds would include many ideas not commonly employed in the fertilizing of asparagus plantings at the present time.

The Need for Organic Matter

First of all it is necessary to assume that the grower understands the value of organic matter to the asparagus planting. Many growers go no further than to supply plenty of organic matter to their plantings, and with apparent success too. These same men could through the additional use of chemical fertilizers make their plantings even more profitable than they now are.

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The practice putting green at the Astoria, Oregon, Golf and Country Club was seeded September 1 and was ready to be played on the following May 1.

The Bent Grasses

By E. N. Bressman

Associate Professor of Farm Crops, Oregon Agricultural College

ALONG with the rapid development of the game of golf and the beautifying of the landscape around homes has come the development of the bent grass industry. There is no doubt that bent grass produces the finest putting green for golf courses and also produces the most beautiful lawns for a fine home. This must not be construed as saying that bent grass should be planted on all putting greens and all lawns, for the grass has its limitations. No one should plant bent grass unless he plans on giving it considerable care in the way of water, fertilizer, and cutting, because this grass demands all of these things if it is to be kept beautiful. Effort spent on bent grass, however, is rewarded with a carpet of green which is not excelled by any other grass.

Along with the development of the bent grass industry has come bootlegging of bent grass seed, chiefly because the seed is so high in price. The price varies from $1 to $2 per pound, depending upon the species and amount purchased. One of the rather inferior bents for lawn or putting green purposes is cheap in price and easily substituted for the desirable seed. I refer to redtop, which is an excellent grass for certain farm conditions and for certain lawns, but is in no way comparable to the creeping bent for real beauty of lawn or putting green.

All of the bent grasses belong to the botanical genus known as *Agrostis*. It is extremely difficult to differentiate between the seed of many of these species. In fact, many analysts have to resort to conducting germination tests to note the rapidity of growth of the various species, and also to identi-

fying the weed seed material to tell from what part of the country the seed originated.

Dr. M. O. Malte, of Canada, a recognized authority on bent grasses, has recently classified the various bent grasses. He places all of the bent grasses into three distinct species.

These are—*Agrostis stolonifera, Agrostis tenuis, Agrostis canina.*

The first of these, *Agrostis stolonifera,* is made up of many types, particularly two of importance. These two types are redtop and creeping bent. He calls redtop *Agrostis stolonifera major* and creeping bent is called *Agrostis stolonifera compacta.* Redtop has its stolons mainly underground, while the creeping bent carries its stolons on the surface of the ground. Another chief distinction between these two varieties is that the latter has rather a compact head, while the redtop has a loose, open panicle.

The second species, *Agrostis tenuis,* is commonly called Rhode Island bent or colonial bent. This species is rather loosely tufted and does not produce many stolons on the surface of the ground. Therefore, it does not spread quickly and does not form the compact sod that is produced by creeping bent. Still it is an excellent grass which is not so exacting on its demands for moisture as creeping bent. Most of the colonial bent comes from New Zealand and it is the same as Rhode Island bent.

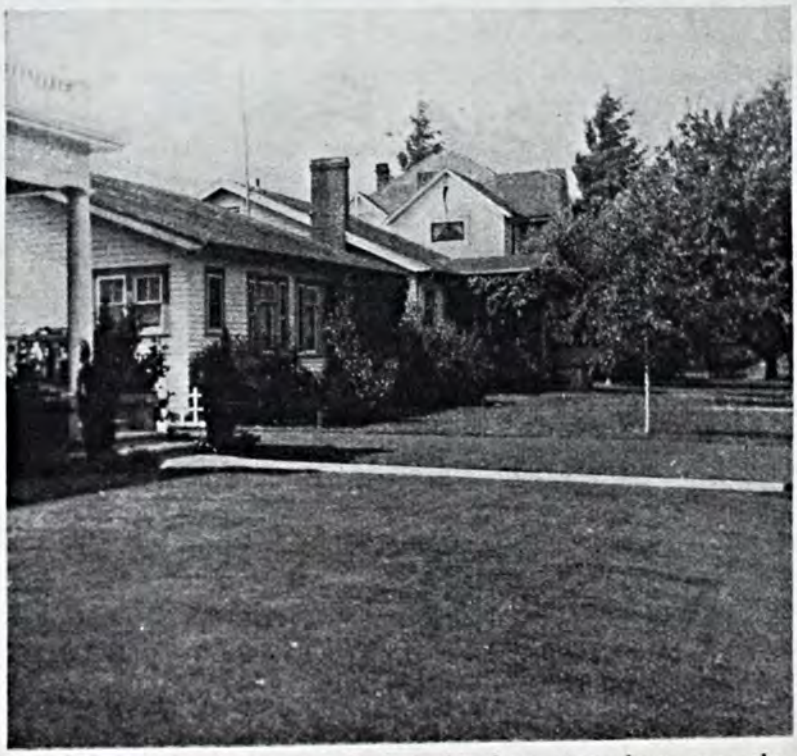
The third species, *Agrostis canina,* is better known as velvet bent. This bent is being produced in Canada on Prince Edward Island and is being sold commercially. Most authorities consider this species as the finest of all bents for both putting green and lawns.

Know What You Buy

Many excellent bent grasses are being sold under various trade names. Most of these belong to the creeping bent species, but some of them are typical Rhode Island bent grasses. The purchaser should know which of these two species he is obtaining, for their adaptation is somewhat different.

M. E. McCollam, formerly agronomist at the Western Washington Experiment Station, says of creeping bent, "The plant is characterized by creeping stems called stolons, which extend over the surface of the ground and send down roots from the joints or nodes. By this means, rapid spreading is possible. These stolons attain a considerable length, three to five feet, or more being quite usual. The color of the leaves could not be called bright green as they have a slight bluish cast. The width of the leaf blades varies according to the situation under which they are growing. If crowded, or in a lawn where they are kept closely clipped, the blades are

(*Turn to page 55*)



An authority on lawns stated that this bent grass lawn was the best lawn he had ever seen.

These farmers are turning in their estimates on a five-acre cotton demonstration on Oscar Moosberg's farm, Henderson county, Texas.

Soil Building in Texas

By Eugene Butler

Editor, The Progressive Farmer and Southern Ruralist

THERE is no more vital problem facing Texas agriculture today than that of putting a stop to the persistent and seemingly relentless decline in the per acre yield of our most important cash crop. Some of us are familiar with the figures showing the average acre yield of Texas cotton by 10-year periods since 1866, but for emphasis they will bear repeating:

Period	*Yield Per Acre*
1866 - 1875	236—pounds lint.
1876 - 1885	185— " "
1886 - 1895	198— " "
1896 - 1905	169— " "
1906 - 1915	135— " "
1916 - 1925	135— " "
1926 - 1930 5 yrs.	128— " "
1921 - 1930	126— " "

During each year of this 65-year period there has been an average decrease in per acre yield of almost two pounds of lint cotton per acre. If this sloughing-off of yield continued at the pace set during the past 65 years, it would be only a matter of another 65 years before our lands would be producing no cotton at all. But, of course, this is not going to happen. The curve is flattening out, and we have about reached the end of the acre yield decline.

When we realize that, according to cost of production studies made by the U. S. Department of Agriculture, other production factors being equal, it now costs six cents a pound more to produce our present yield of 126 pounds per acre than our original yield of 236 pounds, the importance of putting a stop to the decline in per acre yield becomes apparent. On this basis, every 10-year period means that Texas farmers have added one cent a pound to the cost of growing cotton.

No section of Texas has escaped this acre yield decline. The Blackland section has been the hardest hit, with a 40 per cent decrease in the average acre yield during the last 30 years. East Texas is next in line with a 34 per cent decrease, while even West Texas has a decline of 25 per cent. South Texas has come nearest to holding its own, as the decrease amounts to only 12 per cent. For the State as a whole, the decline in acre yield during the 30-year period has been 30 per cent, or in other words, one per cent a year. The following table shows the yields in 1900 and in 1930, and the per cent decrease:—

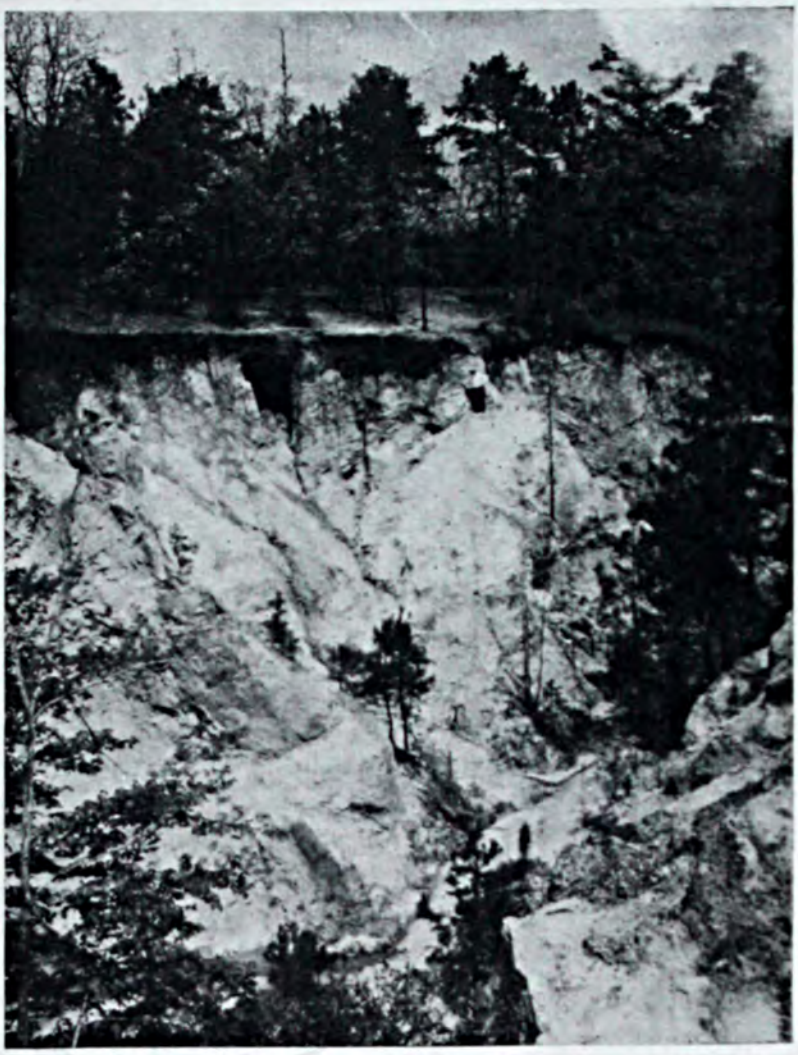
AVERAGE YIELD PER ACRE		*DECREASE*	
	1900—1930	*Pound of Lint*	*Per Cent*
State	180—126	54	30
Blacklands	225—135	90	40
East Texas	175—115	60	34
West Texas	200—150	50	25
South Texas	165—145	20	12

With other crops, the decline has not been so marked. In the 10-year period from 1866 to 1875 the average per acre yield of wheat in Texas was 12.8 bushels. During the past five years, the average has been 12.9 bushels and for the past 10 years 11.0 bushels. Neither has the yield of corn shown a marked decline. In the period 1866-1875 our yield was 23.7 bushels. During the past five years it has been 21.7 bushels and for the past 10 years 19.7 bushels. Weather conditions at tasseling seem to have more marked effect on the yield of corn than the fertility of the soil.

The decline in the acre yield of our most important cash crop may be due to several causes, but it seems safe to conclude that a loss of soil fertility is by far the most important factor. Since poor soils are responsible for our low yields, then "Soil Building" should be the order of the day.

Master Farmers work with their county agents in the production of feed and fertility crops. Here is Henry Jund of Falls county with former county agent E. N. Regenbrecht in a field of corn and peas.

By reason of a marked difference in soil and climatic conditions, no one plan or method of soil building is applicable to every section of Texas. In building up soils, there are three things to be considered: the conservation of soil and water; the addition of organic matter; and the addition of the actual plant-food elements, nitrogen, phosphoric acid, and potash. In one locality only one of these steps may be essential to build soils effectively, in another section, all three may be necessary.



This neglected gully like a cancer is eating into and destroying valuable land.

It so happens that under present conditions, the real problem in West Texas is the conservation of soil and water. The soils still contain fair amounts of organic matter and are pretty well supplied with plant food. The average loss of water at the Spur Experiment Station has been about four inches, which is about 20 per cent of the total annual rainfall. With every inch of water run-off there go three tons of soil, or an average loss of soil amounting to 12 tons per acre a year. At present, West Texas farmers are more i[illegible]ving the [illegible]ng [illegible]ent [illegible]haps some bruises on the journey.

well supplied with plant foods, but the addition of organic matter is required to supply the moisture and bacterial activity needed to make the plant food available to the crops.

In East Texas, all three of the soil-building steps must be taken. There must be conservation of soil and water, organic matter must be added, and inasmuch as East Texas was not blessed with the virgin fertility of Central and w[illegible] or let the actual

(*Turn to pa*[illegible])

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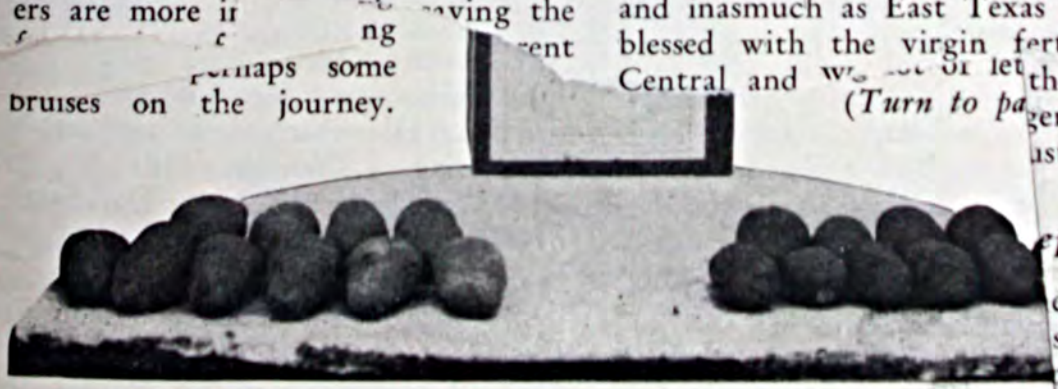

The potatoes on the left were fertilized with 725 pounds of 3-9-18 per acre, and the yiel[illegible] bushels. Those on the right were fertilized with 725 pounds of 3-9-0, and the yield was [illegible] per acre. Note how the potash affected the type of the potato.

taken: (1) growing legumes to turn under; (2) livestock farming which includes legumes, permanent pastures, and the rotation of crops. Where the actual plant food is lacking, it may be supplied by growing legumes and by the use of commercial fertilizer.

Let's see what is being done here in Texas towards the restoration of our soils by these various methods. There has been a tremendous amount of terracing done in 202 out of 254 counties in the State. With a total of 4½ million acres terraced and contoured and the work progressing at the rate of about a million acres a year, Texas is doing an outstanding piece of work, and in this phase of soil building, it is far ahead of all other States. West Texas has been most active in terracing to conserve soil and water, but commendable progress has also been made in both Central and East Texas. A. K. Short of the Federal Land Bank, M. R. Bentley of the Extension Service, county agents, vocational teachers, and others who are having a part in this great terracing campaign are making an outstanding contribution to Texas agriculture. In the next few years even greater progress in terracing the remaining 20 to 30 million acres that need terracing should be possible, as several thousand men and boys have been trained to do this work. In about 75 counties, county road machinery has been used to construct terraces, and it is entirely possible that the Legislature will empower both State and county governments to cooperate with farmers in the conserva- [illegible] of soil and water by terracing.

[illegible] West Texas, [illegible] food elements, nitro[illegible] acid, and potash, m[illegible]

Testing Is First St[illegible]

[illegible]ourse, terracing is th[illegible] soil and water con[illegible] and is the first ste[illegible] in all sections of t[illegible] organic matter to [illegible] two routes which [illegible]

that had its inception in the East Texas Permanent Pasture Contest sponsored by the East Texas Chamber of Commerce, Extension Service, farm papers, railroads, and other agencies. Under the leadership of Roger Davis, agricultural director of the East Texas Chamber of Commerce, this three-year contest which began early in 1930 has attracted 266 farmers in 41 East Texas counties. Many other farmers who have watched the contest from the sidelines have become interested in pasture improvement and are sowing clover and grass seed, keeping down weeds, and in other ways increasing the carrying capacity of their pastures.

When we realize that land in grass loses only one-half as much soil and water as similar land planted to cotton, the value of pastures in the conservation of soil and water can be appreciated. One of the penalties we pay for planting so large a percentage of our land to row crops each year is the loss of organic matter. The clean cultivation demanded by the culture of row crops burns out organic matter rapidly, but with land in pasture, the supply of organic matter is easily maintained. Where crops are harvested and fed to livestock and the manure saved, a considerable part of the plant food is lost before the manure gets back to the land. But in pasturing a crop, there is a materially smaller loss of plant food. It is almost as good for the land as turning the crop under.

There [illegible] ds of acres of Tex[illegible] that [illegible]

Farmers work with their county agents in the production of feed and fertility crops. Here [illegible]y Jund of Falls county with former county agent E. N. Regenbrecht in a field of corn and peas.

According to this farmer

Consumers Appreciate Quality Potatoes

By Fred W. Johnson

Michigan Master Farmer, Edmore, Michigan

MY son, Orion, and I have been trying to grow good potatoes here on our Northern Montcalm Potato Farm for many years. We built a concrete storage in which we could keep 30,000 bushels of potatoes. But despite the fact that we stored our potatoes according to Hoyle and put them on the market graded and in first class shape, I found our potatoes simply would not bring top prices. Here were potatoes from Maine bringing more money. Over there was a lot from somewhere else, also bringing more money. And Idaho growers were really skimming the cream of the market.

When a condition like this arises, there is little use to growl. Consumers weren't paying more money for these "foreign" potatoes merely to get the romance of eating something that had been grown in some far-flung State and had had a long ride with perhaps some bruises on the journey. These potatoes were graded; they were uniform in size; they were put up in attractive, handy packages; and they had QUALITY. Envy does the only good thing it can do when it starts you to thinking and asking yourself questions.

The variety the Idaho grower was topping the Michigan market with was the Russet Burbank. So we got some Russet Burbank seed, and I laid hold on all the Idaho advertising I could rake together.

My first trials growing this variety were under the same conditions that prevail generally in central Michigan. Too many potatoes "set," and with our limited rainfall, too many of them were small. But what we had, we sorted over carefully and put the best into 15-pound cartons with our label on two sides. The first shipment sold for the price of Idaho potatoes, and we received an interesting lot of letters. Ex-

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The potatoes on the left were fertilized with 725 pounds of 3-9-18 per acre, and the yield was 177 bushels. Those on the right were fertilized with 725 pounds of 3-9-0, and the yield was 137 bushels per acre. Note how the potash affected the type of the potato.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

WHEN Lewis Ralph Jones was plodding away at the irksome chores on his father's farm, he little thought that one day he would become world-renowned as a plant pathologist. Yet that was in store.

The boy had no particular love for dairy cows. To him they were merely a useful source of income—great, cud-chewing beasts that demanded constant stoking with feed and had, laboriously, to be milked twice a day. But, as he sat extracting the lacteal fluid, and anon swatted mosquitoes and dodged the cow's swinging stinging tail, his thoughts often were occupied with the beatific beauties of plant life. He was a born botanist. Every green growing thing filled him with delight, and was a mysterious and entrancing subject for study; therefore, he decided to follow his bent, and make botany his vocation.

"Jones-trained" Men

To him, in later days, flocked students from far and near, attracted by his scientific attainments and remarkable abilities as a competent teacher and inspirational leader. Today, forty experiment stations and colleges of agriculture have "Jones trained" men in positions of trust and responsibility. One hundred and ninety-three plant pathologists are practising and extending his methods in the United States and Alaska. Thirty-five represent him in foreign countries and U. S. insular possessions. They may be found at work in Australia, Brazil, Bulgaria, Canada, England, Ireland, Japan, Jugo-Slavia, New South Wales, Norway, the Phillippine Islands, Portugal, Sumatra, and South Africa. His teachings have brought them eminent success in their profession, and have redounded to the benefit of commercial plant growers at home and abroad. All of his ex-students still esteem and keep in touch with their teacher, who inspired them to do things—not dream them all day long.

Honored by Cambridge

In recognition of his eminent achievements and services as a research scientist and instructor in the field of plant pathology, Dr. Jones in 1930 was made chairman of the section of mycology and plant pathology of the International Botanical Congress at Cambridge University, England. There, he was speaker on "The Relationship of Environment to Plant Disease." At the conclusion of the proceedings the faculty of the great institution of learning conferred upon him the honorary degree of Doctor of Science. His other degrees are: Ph. B. University of Michigan, 1889; Ph. D. 1904; and honorary Sc. D. University of Michigan, 1910.

Dr. L. R. Jones was born at Brandon, Fond du Lac county, Wisconsin, December 5, 1864, and received his primary education in the schools of his native county. Then followed his college training at the University

of Michigan, where he majored in botany. From 1890 to 1910 he was professor of botany in the University of Vermont and botanist of the Experiment Station. His work there was notable and useful. From 1910 to 1930 he has been head of the department of plant pathology of the University of Wisconsin, and he is still active in research work in that institution.

Dr. Lewis Ralph Jones

Dr. Jones edited "Phytopathology" for some years, and was author of bacteriological terms for Webster's New International Dictionary. He has written many important bulletins and instructional and informative papers on the subjects in which he has specialized. Everywhere he is recognized as a modest, unassuming man of exactitude and accuracy, who never gets rattled and who has wonderful executive and organization abilities. On many occasions he has shown himself a wise judge and counsellor. At meetings where all around him men have been heatedly arguing a question *pro* and *con*, he has sat silently weighing the evidence; then he has quietly risen, thrown the oil of common sense on the troubled waters, and steered the tempest-tossed ship into the desired haven of peace and quietude.

Dr. Jones is, perhaps, best known for his enlightening work relative to the resistance of plants against disease. He is still occupied with that problem, and will, no doubt, add more facts of great scientific interest and practical importance to those which have already brought him international recognition and fame.

The Case of Sick Cabbage

As the chief originator of a successful method of combating "yellows"—caused by the soil parasite *Fusarium conglutinans*—he has earned the gratitude and applause of all who grow cabbage on a large scale for the great markets of the Central States. He has also made it possible

for growers to raise sound heads of cabbage for sauerkraut production. Were it not for Dr. Jones and his eminent professional associates and practical assistants, there would be today no great fields of cabbage in the famed growing areas of Racine county, Wisconsin. There, the dreaded scourge of "yellows" had laid waste hundreds of acres of promising cabbage. Spraying failed. Fertilization and perfect cultivation did not stay the ravages. The business was doomed. Income ceased. Producers were at their wit's end. Then the plant doctor was called to investigate and proved to be the great physician, for he prescribed a remedy for the dire destroyer and soon had the patient convalescing. Ever since, it has been possible to grow sound cabbage, even on yellows-contaminated land. The historic victory came about in this wise:

Discovers Resistant Strains

Dr. Jones and a number of sorry and chagrinned practical growers were inspecting a twenty-acre Racine county field of cabbage, owned by W. J. Hansche. Scarcely a sound "head" could be seen. The plague had run riot through the crop, ruining the plants and blasting the hopes of the grower. Every phase of the subject was discussed; but no cure could be suggested. Then suddenly, the keen-eyed professor of plant pathology spied a lone, solitary plant that had survived the fell *fusarium* malady. It had developed a splendid head, possessed of every desirable character and quality of its species. The astonished investigating committee examined the plant with puzzled speculation. To Dr. Jones it seemed the counterpart of a pig that had survived a devastating outbreak of hog cholera. Then the happy thought struck him that, as some hogs are born immune to cholera and a recovered hog remains immune, so might this astonishingly robust and vigorous cabbage have possessed inherent resistance of kindred type which enabled it to escape the disease.

The resistant cabbage, roots and all, was removed, carefully stored, and the next spring planted, and allowed to "run to seed." After a time it threw up a healthy stalk, branched out, flowered, and ripened seeds which were destined to prove the salvation of the cabbage industry.

Those seeds were stored and in due course sown. The resultant plants were transplanted and zealously cared for until mature. The records showed that most of them possessed marked resistance against the yellows disease. Then followed several years of selection and testing resistant cabbage, grown on yellows-infected soil, until several resistant strains were established. The original strain, from the head discovered by Dr. Jones in the Hansche field, was christened "Hollander No. 8" and proved superior to all others; therefore, it was officially made the "parent stock" of a new, yellows-resistant variety.

A tremendous demand for this new seed forthwith sprang up, as its reputation spread. At first, the precious seed was distributed in tiny packets; but in 1917 over 300 pounds of it became available and instantly was bought by the grateful cabbage growers of southern Wisconsin. The seed produced resistant cabbage wherever sown.

Continues Disease-Resistant Work

In order to meet the needs of the kraut industry, resistant strains also were selected by Dr. Jones from two of the leading commercial kraut varieties. These were named and distributed as "Wisconsin Brunswick" and "Wisconsin All Seasons" and they have given perfect satisfaction in the field. Work on the disease-resistant strains of cabbage has, since then, been continued at the Wisconsin Agricultural Station in cooperation with the U. S. Department of Agri-

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Before seeding, 1,000 lbs. of superphosphate and 400 lbs. of muriate of potash per acre were applied.

Fertilizing Alfalfa

By G. R. Cobb

Salisbury, Maryland

CONVINCED that "milk flows where alfalfa grows," R. S. Brown, County Agent of Talbot county, Maryland, decided to incorporate alfalfa growing in his program for more and better livestock as well as in his program for soil improvement. He believed that farmers would improve their own financial conditions as well as provide rich food for their cows by growing more alfalfa.

Although alfalfa had been and was at that time being grown in the county, except in a very few cases, the fact remained that it was not a success. The purchase of good seed,

This alfalfa received no fertilizer. Note difference in yield from that pictured above.

inoculation of seed, liming the land, etc., did not solve the problem, as the alfalfa stands still deteriorated rapidly and much too soon.

Before stating the type and results of the demonstration conducted by Mr. Brown, it might be well just to sketch the method of starting alfalfa in Talbot county. The majority of farmers in this county grew at least a few acres of wheat and as a rule they seeded alfalfa in or on the wheat early in the spring, several months before the wheat was harvested. After the removal of the wheat the alfalfa began to turn yellow, wilt rather badly, and sooner or later the plants died. Just why this should happen could not be readily determined, although it was felt that removing the shade cast by the wheat might be the primary cause.

Decides to Fertilize

In view of the fact that other sections of the country were in the same boat, so to speak, and that several experiment stations had ascertained the fact that alfalfa needed comparatively large amounts of mineral fertilizers, Mr. Brown decided to try out the fertilizer analyses that had proven successful in New England and elsewhere.

Accordingly he secured the cooperation of Clayton Legates, a farmer residing near Easton, Maryland. Mr. Legates is an up-to-date, intelligent farmer, and as he has a herd of dairy cattle, he was very much interested in the demonstration. He offered Mr. Brown the use of a five-acre field bordering on the main stone road, which had been seeded in wheat the previous October. One acre of this field was treated with fertilizer just before the alfalfa was sown, while the other four acres received no extra fertilizer.

The fertilizer applied consisted of superphosphate and muriate of potash in the proportion of 1,000 pounds of superphosphate and 400 pounds of muriate of potash. This is in line with recommendations of some experiment stations which advise these amounts before seeding to be followed by an application of 300 pounds of superphosphate and 100 pounds of muriate of potash after each cutting.

This fertilizer was applied broadcast on the wheat after the alfalfa was seeded; that is the fertilizer was applied March 26, while the alfalfa was seeded on March 12 and the wheat was harvested in July. Without doubt just as good results would have been secured had the fertilizer been applied before seeding the alfalfa, but weather and soil conditions, in this instance, made it practical to seed the alfalfa first and then apply the fertilizer.

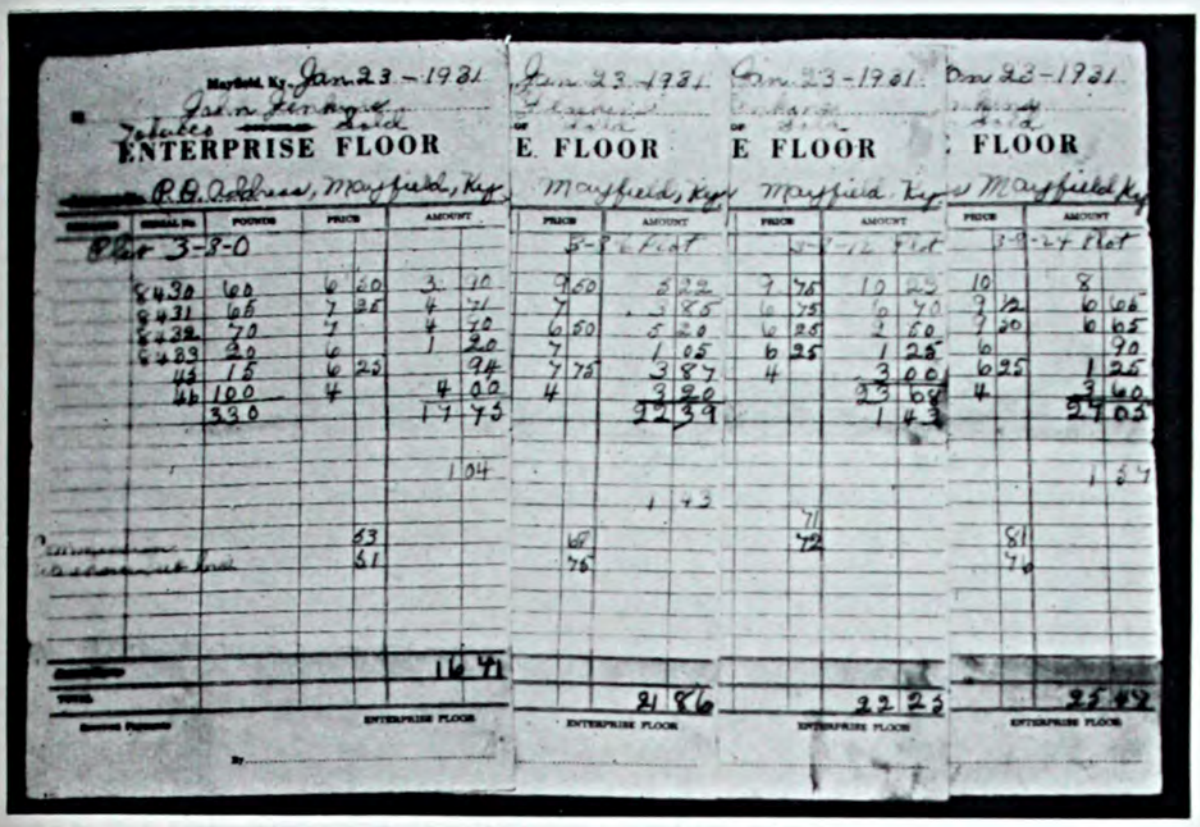
One of the striking effects of the extra fertilizer was the weed situation. On the untreated acres the weeds were from 18 inches to 24 inches high, well-developed and vigorous, whereas on the treated acre they were hardly 4 to 6 inches high and much fewer in number.

The first cutting was made on May 28, and the following figures on the yields of the two plots will describe the difference in weight due to the fertilizer. It should be stated that the winter had been very dry and that very little rain had fallen up to the time the alfalfa was cut, thus the effect of the extra fertilizer is more striking.

Field	Treatment	Yield Per Acre
No. 1	P-K	4,380.2 lbs.
No. 2	Nothing	1,790.8 lbs.

Assuming that good alfalfa hay is worth $25 per ton, and even discarding the fact that the hay on the treated acre was much superior to the other, it can be readily seen that the first cutting more than paid for the extra fertilizer. Added to this difference is the fact that the plants on the treated acre are much more vigorous, larger, with better root systems, and with chances of out-yielding the others for the next cuttings and outlasting those untreated.

In order to ascertain the most practical amounts of these plant foods to use, further tests are being conducted where several varying amounts of this 0-12-15 are being applied.



These Kentucky tobacco warehouse receipts tell the story that —

Extra Potash *Pays* Extra Cash

By E. E. Pittman

Elizabethtown, Kentucky

DURING 1930 the average rainfall in Kentucky was 27.86 inches, and through the growing season temperatures reached 100 degrees and above accompanied by hot winds that withered and burned crops, dried up water supplies, and caused great losses to farmers. Despite the moisture shortage which amounted to 17.98 inches during the year, Kentucky tobacco did respond to fertilizers.

The location of several tobacco fertilizer demonstrations on Kentucky farms naturally involved a variety of soil types and fields, previous managements of which were typical of those prevailing on many Kentucky farms. The grower's farm is his laboratory and in this laboratory which is under his daily and hourly observation, the response of plants to different fertilizers can best be studied.

The first effort was to locate a sufficient area of soil in a field where the soil was uniform and the management of the entire field had been the same for at least three years previous

to planting.

In all cases, four fertilizer analyses were compared with a plot which got no fertilizer treatment: The four combinations used were a 3-8-0, 3-8-6, 3-8-12, and 3-8-24. All these have the same nitrogen and phosphoric acid content; only the potash is varied. Hence, the differences in quality that the leaves showed on the different plots were due to the content of potash in the fertilizer used on the plots.

Before these fertilizer analyses were sent to the farms, they had been carefully tested, to make sure that they would all drill at the same rate. In all cases, the fertilizers were applied in the row before the plants were set.

The plants grown on each plot were kept separate at harvesting time. When the tobacco was stripped, the leaves were graded and these grades were sold separately on the auction floors. Buyers who owe their jobs to the fact that in a moment's time they can appraise the quality of tobacco were the ones who determined, by competitive bids, the quality and price paid for the leaf from the different plots.

$43.68 Net Profit Due to Potash

In Washington county, Donovan Rogers transplanted his Burley tobacco on May 17. The field was a piece of sloping clay soil that had been growing blue grass and clover for the last three years. Three hundred and fifty pounds of each analysis per acre were used. The tobacco was harvested on August 18.

To be sure, the yields were small, but they showed that fertilizers were effective even in this dry year. Where the 3-8-0 had been used, the yield was 380 pounds of cured leaf per acre; the plot that received the 3-8-6 produced 400 pounds of cured leaf per acre; the yield was shoved up to 480 pounds by the 3-8-12; while the 3-8-24 boosted it to 540 pounds per acre.

Though these were nice increases, the improvements in quality brought about by the extra potash were even more striking.

The net value per acre of the Burley produced by the 3-8-0 plot was $72.60. The tobacco on the 3-8-6 plot showed a net acre value of $85.55; the net acre value for the 3-8-12 plot was $93.88; while the net value per acre on the 3-8-24 plot was $116.28.

Other Similar Experiences

Another demonstration on Burley tobacco was on the Ogden College Farm at Western Teachers' College at Bowling Green, Kentucky. Charles Taylor kept these plots under his close observation. The soil here is a level red clay. This particular field grew alfalfa in 1927, produced potatoes in 1928, and in 1929 it was put into potatoes again, using 500 pounds of a 6-8-6 fertilizer. On the 1930 tobacco crop, 400 pounds of each of the analyses mentioned were used.

During harvesting, the tobacco from the 3-8-0 and the 3-8-6 plot were so badly mixed that it was impossible to separate them, and so the yields were added and the average credited to a 3-8-3.

The unfertilized area produced 1,095 pounds of leaf tobacco per acre. A yield of 1,277 pounds per acre was credited to the 3-8-3 analysis, while the yield on the 3-8-12 plot shot up to 1,392 pounds or 115 pounds for the extra nine units of potash contained in the 3-8-12.

The net gain for fertilizer is what remains after the cost of the fertilizer has been subtracted from the value of the extra crop produced by it. The 3-8-3 combination produced a net gain for fertilizer of $13.56 per acre, but on the 3-8-12 plot there was a net gain for fertilizer of $37.87 per acre of which $24.31 was directly due to the potash it contained.

Both the demonstrations reported above are on Burley tobacco. Will dark tobacco with its longer growing season, thicker leaf, and different

(*Turn to page* 41)

On the Road to

Tomato Profits

By F. C. Gaylord

Purdue Agricultural Experiment Station

THE Ten Ton Plus Tomato Club was formed in Indiana to demonstrate that well-grown plants set on thoroughly prepared fertile soil, liberally fertilized, and carefully cultured, would eliminate much of the guesswork and uncertainty of profitably growing tomatoes for the canning factory. More than 3,000 members have joined the Club by following the 10 essentials for successful crops, have doubled the yields of non-club members in the same factory district, and demonstrated that it pays to use both head and hand when more profits are to be pocketed.

In 1930 the Hoosier State, according to the Bureau of Agricultural Economics, produced 390,000 tons of red, ripe tomatoes, which were used in Indiana's 203 canning factories. This tonnage was by far the largest produced in any State.

Not only did Indiana lead in the production, but with 40 factories buying 85,000 tons of tomatoes on the basis of U. S. grades for canning tomatoes, Indiana led in the movement to raise the standards of quality of tomatoes received as well as the products manufactured from them. With 60 factories contracting on a graded basis in 1931, tomato growers are assured a price for their tomatoes in line with the quality of the product delivered. Canners are assured redder,

This 10-acre field averaged $15 per ton and returned a gross income of $150 per acre.

riper tomatoes, and consumers are guaranteed a product free from green or rotten tomatoes; one that will have a zest and flavor that will make repeat orders a certainty.

Under the grading system farmers are being paid from $10 to $14 for No. 2's and from $16 to $20 for No. 1's, on the basis of licensed Federal-State inspector's grade. Under this grading system an extra effort is being made by farmers to increase both yields and quality so that they may secure the greatest returns from their crop.

In the 1930 season in Indiana a little over 16 per cent of Ten Ton Club members reached the coveted goal of 10 tons plus per acre. H. G. Koors of Tipton county, Indiana, led the procession of 1,200 club members with a yield of 23.78 tons of red ripe tomatoes an acre, based on 5.06 measured acres. Charles Lehman of Kosciusko county on 3.1 acres delivered 21.26 tons per acre, while Gus Tebbe of Tipton county and Fred Roudebush of Hamilton county beat the 20-ton mark. These four growers for the first time in Hoosier tomato history secured the coveted gold medals. Almost 200 farmers, with an average acreage of 5.65 per member, grew an average yield of 12.36 tons per acre in 1930.

The Rules for Success

All of the winners followed in general the same formula of success: (1) Selection of fertile, well-drained soil, ranging from sandy loams, clays, clay loams, to black loams. (2) Fall plowing or very early spring plowing followed by thorough preparation of the soil. (3) Liberal fertilization, winners using from 500 pounds up of complete fertilizers analyzing from 2 to 4 per cent of nitrogen, 10 to 18 per cent of phosphoric acid, and from 6 to 15 per cent of potash, depending upon type of soil and previous treatment. (4) Setting of well-grown plants just as soon as soil warmed and danger of frost was past. (5) Frequent shallow, level cultivation with complete destruction of all weeds. (6) And finally careful attention to picking only sound, red, ripe tomatoes that sold for the highest price per ton.

A few concrete examples of canners and farmers who caught up with "Old Man Profit" will illustrate the advantages that come to those who, through educational effort, lead on the trail of increased yields and higher quality. Take for example a factory at Matthews, Indiana. In 1930 on their contract acreage of 946.9 acres their growers delivered 7,906.9 tons or an average of 8.36 tons an acre. These were bought on the basis of U. S. grades at an average price of $15.07 a ton as against a flat price previously paid of $14 per ton. Here the canner paid over $8,000 more to growers for extra quality.

Find the Rules Essential

At Whiteland all the contractors joined the Ten Ton Plus Club and secured an average of 11.82 tons per acre. At Tipton one of the factory reports shows yields of 11.82 tons for club members with an average of 9.4 tons for non-club members. The Middletown factory club members averaged an even 10 tons as compared with 5.5 tons per acre for those who did not join the club. All of these factories and many others found that the rules for the Ten Ton Club were all essentials for high yields and increased profits.

A few typical examples will illustrate how farmers everywhere are securing these higher yields. Take Mark Reuch, with a 19.3-acre field of black soil that had been pasture but was fall plowed and thoroughly prepared, he fertilized with 235 pounds per acre of 0-12-12 broadcast and 100 pounds of 3-15-12 in the row. The plants were set May 19 level shallow cultivated three times, and all weeds were kept out. Picking began on August 22, and the crop was finished on September 26. The yield on the

This basket of tomatoes, just as they were received at the factory, averaged 90 per cent U. S. No. 1's.

almost 20-acre field averaged 11.76 tons per acre, with an average price of $15.18 a ton on graded basis.

Oz. Relfe had 23 acres, all black soil. This field was half clover sod and half corn stubble. The clover was turned under in September and the corn stubble in March. Three-hundred pounds of 2-12-6 were applied broadcast and 130 pounds of 3-15-12 in the row. At the end of the season Relfe had delivered 10 tons an acre, or 230 tons from the field at an average price of $15 per ton.

E. J. Butterfield of Delaware county had fertile clay loam soil which the previous year had timothy and clover on it. Early plowing, thorough preparation of soil, and fertilizing in the row with 125 pounds per acre of 2-10-8 gave Butterfield an average of 11.8 tons per acre on his 12.8-acre field which sold at an average price of $16.03 a ton on the basis of U. S. grades.

Payne and Gosset plowed in March a black loam soil, 40-year-old blue grass pasture of 3.6 acres. The soil was thoroughly prepared, then fertilized with 420 pounds per acre of an 0-12-12 analysis. The yield was 15.7 tons per acre which sold for $15.10 per ton. Conrad Holtzleiter from his 4.5-acre field, half black loam and half clay where clover had frozen out, by early April plowing, thorough preparation of soil, and fertilizing with 500 pounds of 3-15-12, delivered 11 tons an acre which sold at an average price of $16 per ton.

A few glaring examples of failure to meet the requirements of all the essentials show where profits go. One farmer in this same section had an 8.5 acres of good black soil, but he waited until May to plow. He fertilized with a half shot of 265 pounds of 2-12-6, and he planted on June 12, in soil that was dry and cloddy. He secured 2.3 tons an acre with a price of $14.80 a ton, or little more than one-fourth of the average yield of his neighboring growers. Then there was another so-called tomato grower in this territory. His soil was clay that had been used for a truck patch the previous year. He, too, plowed in May, fertilized with 300 pounds of 2-12-6, and set in poorly prepared soil on June 1. These are just two examples of many where records show that liberal fertilization cannot overcome the barrier to high yields and profits laid down by late plowing, poor soil preparation and late planting.

Potash, Potatoes, *and* Profit

By R. J. Friant

Extension Agronomist, West Virginia University

POTASH for potatoes and profits has been the objective of some potato fertilizer demonstrations that have been conducted in 10 widely separated counties in West Virginia the past two years. A little study of the yields obtained from the different treatments, to say nothing about the increased cooking quality, soon convinces one that the job has been well done.

Twelve tenth-acre plots were laid out in each test. An equivalent of 1,800 pounds of fertilizer per acre was applied broadcast on each plot. Plots 1 and 12 received an application of 4-10-0; plots 2 and 11 received 4-10-12; plots 3 and 8 received 4-10-6; plots 4 and 7 received 0-10-6; plots 5 and 9 received no treatment; and plots 6 and 10 received 0-10-0.

The accompanying table gives the average results of these demonstrations. By comparing any two treatments we see paying increases for the potash used. If we compare the average production of No. 1 potatoes from the plots receiving 0-10-6 and 0-10-0 fertilizer, we see an increase of 16½ bushels in favor of the potash contained in the 0-10-6 fertilizer.

By comparing the 4-10-6 treatment with the 4-10-0 treatment, we see an average gain of 20.7 bushels per acre of U. S. No. 1 potatoes for the 6 per cent of potash. We find that 4-10-12 gave an additional 6.7 bushels increase over the 4-10-6.

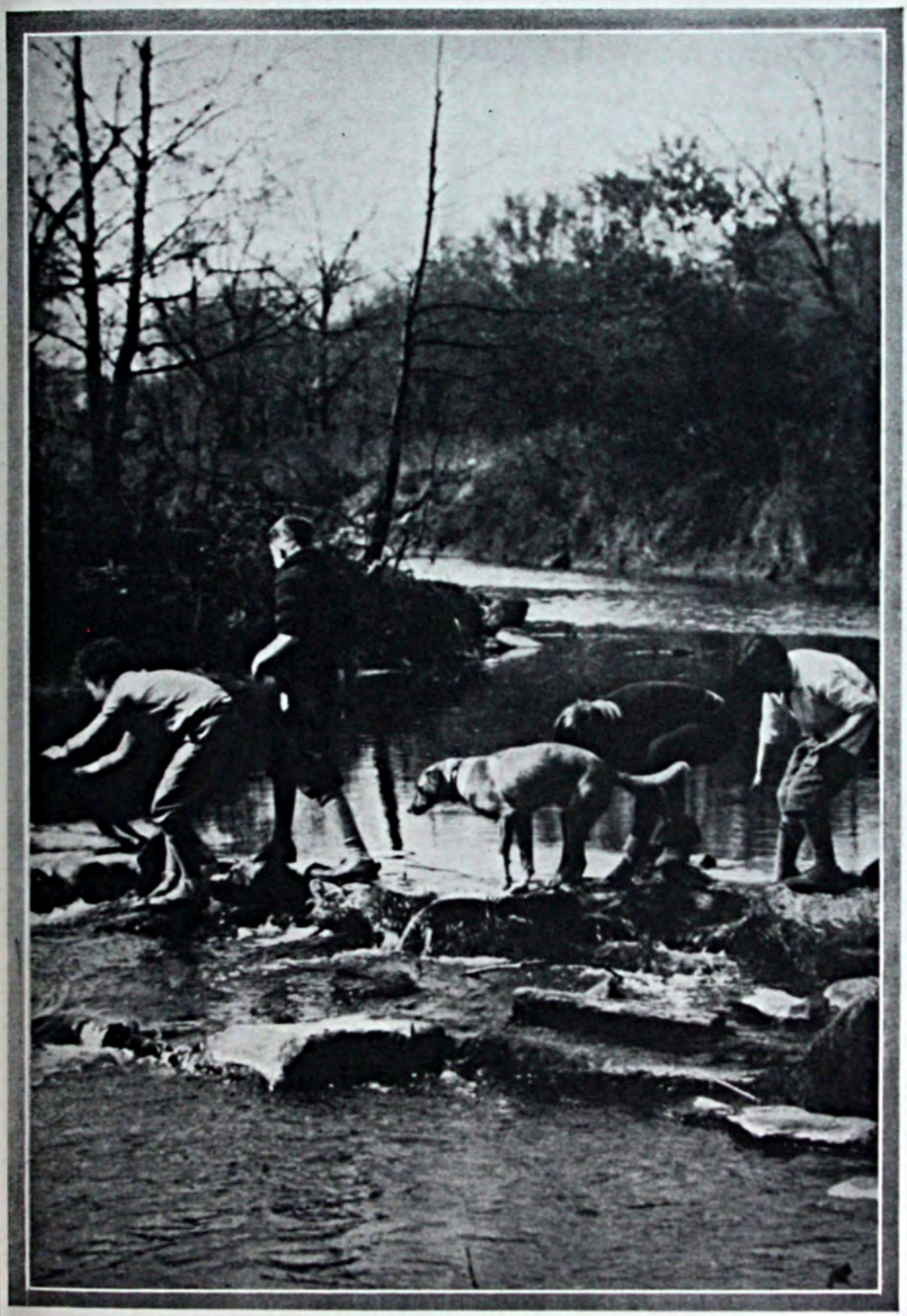
In the light of the results of these demonstrations, I believe we are safe in concluding that for West Virginia at least a complete fertilizer of a 1-2-2 ratio is the most profitable potato fertilizer.

One of the interesting things about the demonstrations is the results of the 1930 tests. According to the United States Weather Bureau, the rainfall for West Virginia was 17.5

(*Turn to page* 41)

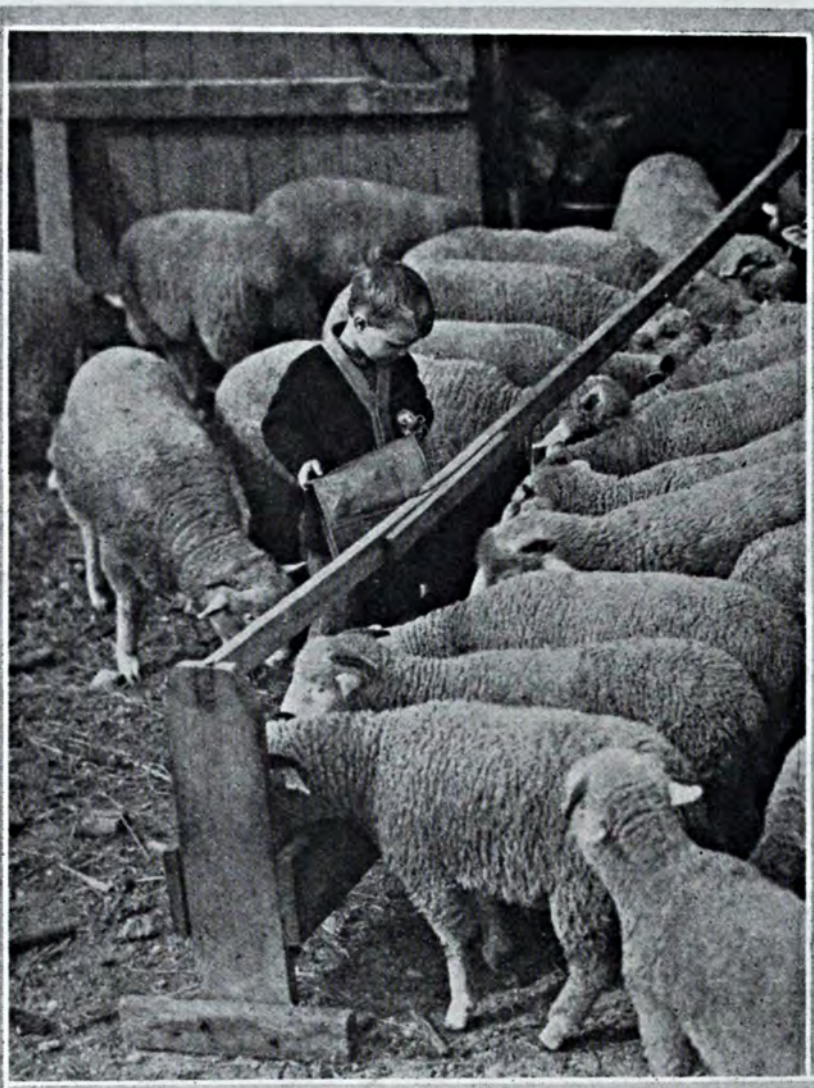
RESULTS OF 1929-30 POTATO FERTILIZER DEMONSTRATIONS IN TEN WEST VIRGINIA COUNTIES

	Ave. 10 Tests 1929		Av. 10 Tests 1930		Av. Tests 1929-1930	
	Yield	Total Yield	Yield	Total Yield	Yield	Total Yield
Treatment	Bu. per A. U. S. No. 1	Bu. per A.	Bu. per A. U. S. No. 1	Bu. per A.	Bu. per A. U. S. No. 1	Bu. per A.
4-10-0	172.5	229.9	118.2	152.0	145.3	190.9
4-10-12	202.1	260.6	143.4	176.5	172.7	218.5
4-10-6	192.0	251.0	140.1	169.7	166.0	210.3
0-10-6	175.8	233.0	135.2	162.3	155.5	197.6
Check			98.2	129.4	98.2	129.4
0-10-0	160.1	222.5	117.8	146.6	139.0	184.5



FOLLOW THE LEADER

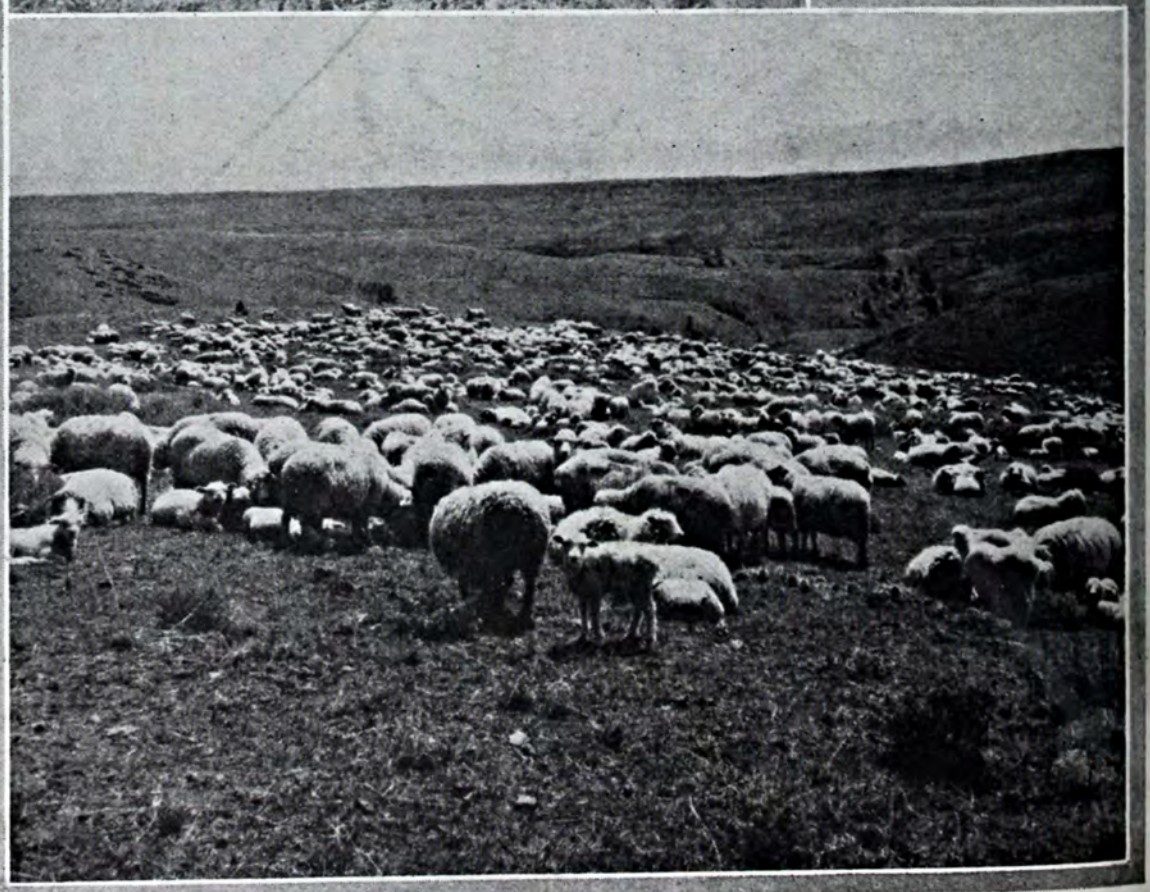
PICTORIAL



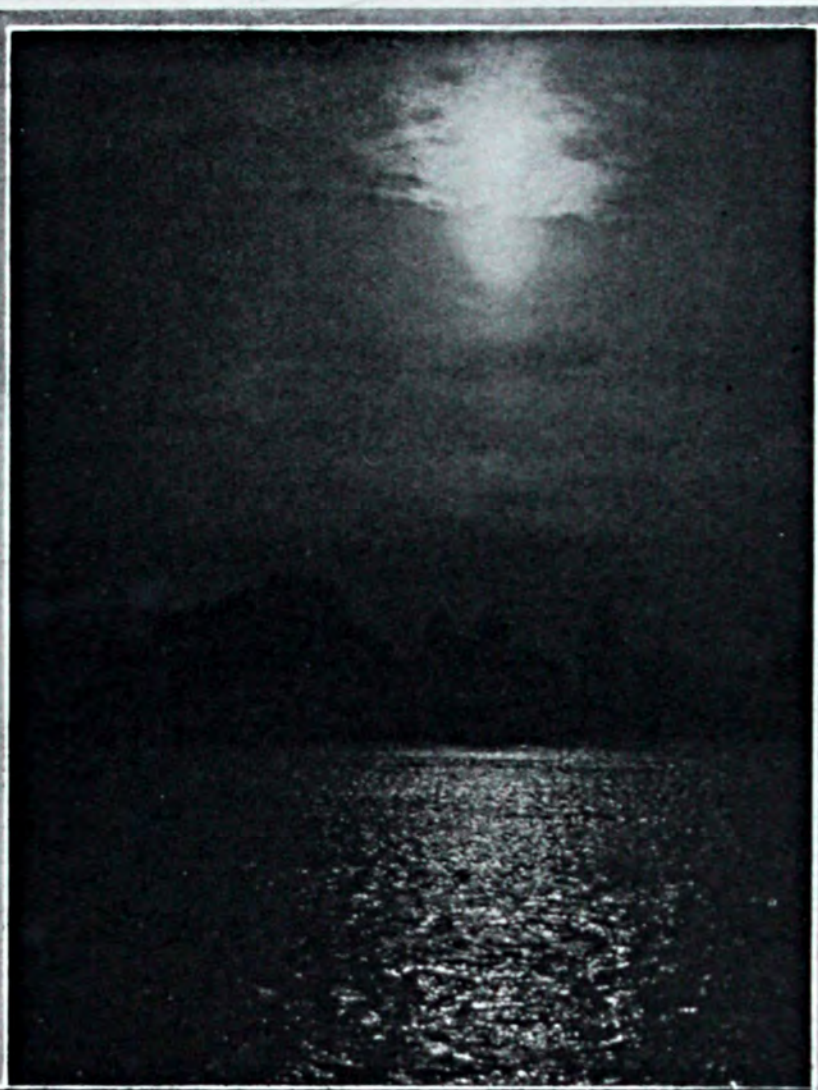
Left: Denoir Baker likes to feed spring lambs soybeans and corn on the farm of his father, Lindley Baker, at Cambridge City, Indiana.

Below: These lambs on the range in Montana know nothing about soybeans and corn, but seem to be thriving, nevertheless.

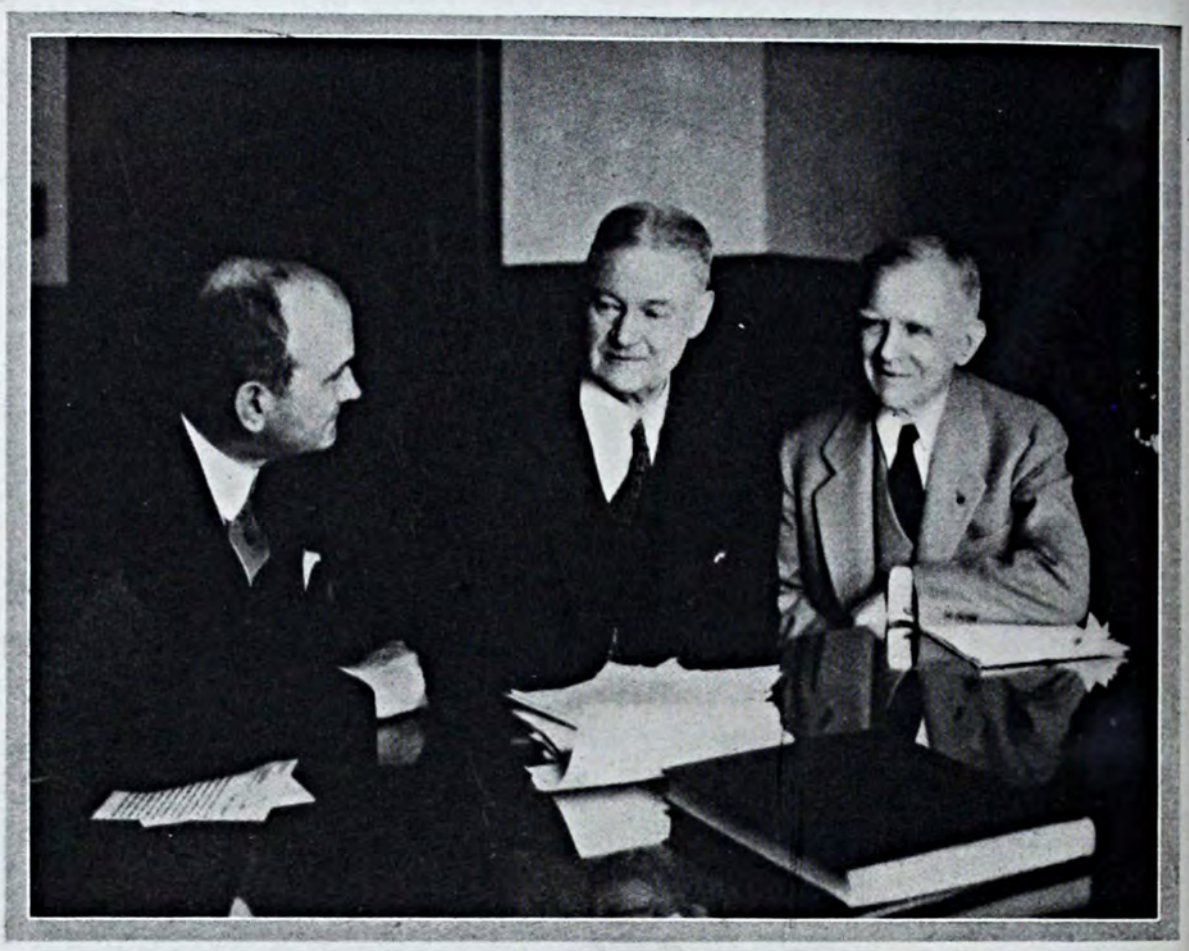
By Ewing Galloway, New York



Right: An April moon has its difficulties, for April showers have no respect for the clock.



Below: When all the ice leaves the streams and the dogwood blossoms appear, we may know that spring is here in earnest.

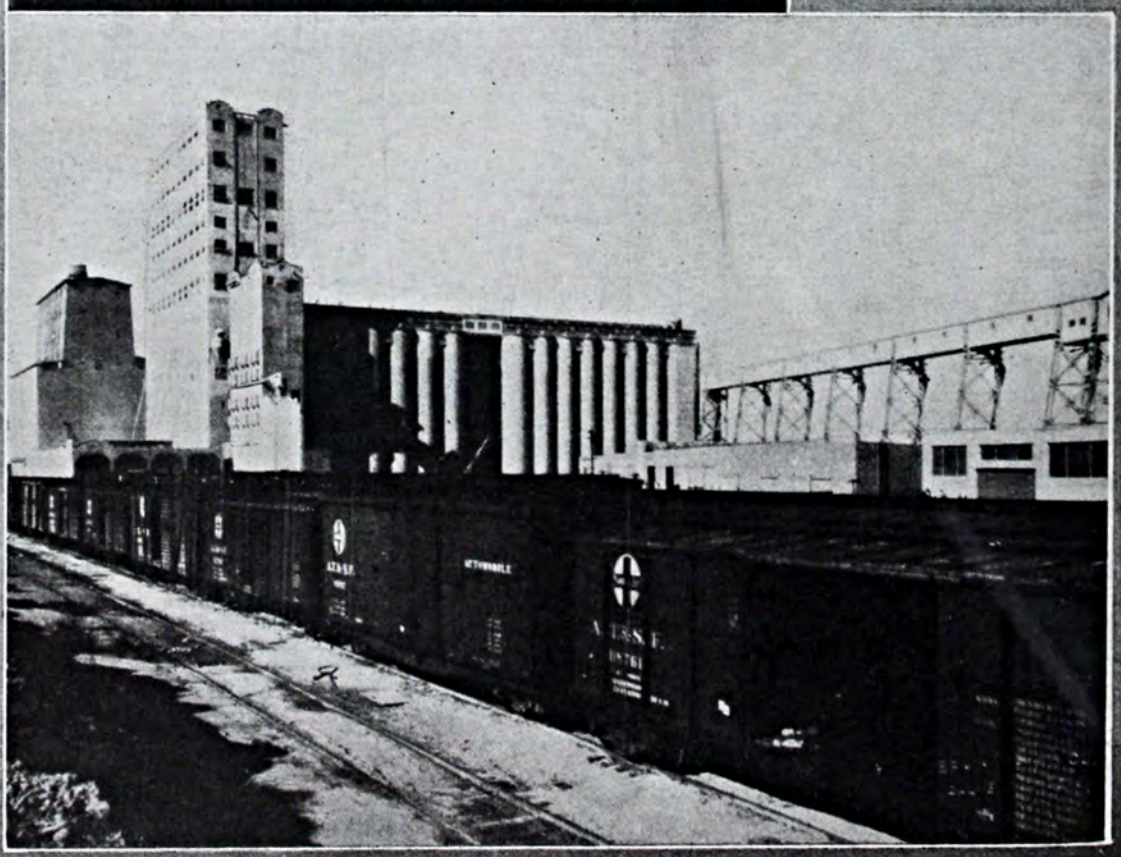


Above: (Left to right) B. C. Powell, Little Rock, Ark., Lewis T. Tune of St. Louis, and Major General B. Frank Cheatham, Washington, D. C., hold the pursestrings of Uncle Sam's Farm Relief Fund. Below: A convenient method of inoculating soybeans.

Above: Albert Faker, 14-year-old, 4-H club boy of Chalmers, Indiana, is the State's Junior Corn King. His acre, fertilized with 130 lbs. of 0-14-6, yielded 100.46 bushels. Below: Food and protection, the essentials of a happy babyhood.

Left: In Holland, this device simplifies flower auctions. The numbers flash on the dial, the highest prices appearing first, and continue to range downward until a bid is made. The system lends speed to the sale, which is quite necessary in the case of these flowers cut in the morning to be taken by plane over Europe in the afternoon.

Below: One of the greatest wheat storehouses in the world is this giant elevator recently erected by the Galveston Wharf Company in Galveston, Texas, at an approximate cost of $3,000,000. The supports of the colossal structure will support 600,000,000 pounds when the elevator is filled to capacity, 350,000,000 pounds of this weight being grain.



The Editors Talk

Uniform Fertilizer Reports

More uniform reporting by the different States of fertilizer tonnage is badly needed. At present such records are far from uniform. The result is that in spite of all the figures available, no one can today say exactly how much nitrogen, phosphoric acid, and potash is used in American agriculture. There are various guesses—more or less accurate—but no figures that could not be challenged by someone.

In some States such records are excellent and show trends and changes in the consumption of actual plant food that can be accurately observed, which is important. The farmers spend several millions annually for fertilizers. They are changing their fertilizer practices in some crop areas faster than in others. To enable the best service to be rendered by the fertilizer industry to the farmer, not only should the results of fertilizer experiments be known, but also to what extent the farmers in different crop sections are changing their fertilizer practices. Are they conforming to the advice on fertilizers being poured out or are they following another course that has been found to be best from their own experience? It is probable that the farmers as a whole are responding to both impulses.

If someone wants to do a useful piece of work it is to set up a model of the best system of reporting the total fertilizer tonnage in terms of plant food, then gradually persuade States to conform to it as much as is practical and to the extent that their individual conditions will permit; the important requirement being that the actual tonnage of plant food used in each State can be accurately determined.

Why Less Cotton?

Who would think offhand that revolutions in China and the fall in value of silver in that country would adversely affect the humble one-mule cotton planter in the South? Yet this is the case, for the business and industry of the world is fast becoming an economic unit. This is vividly brought out in the chairman's speech at the general meeting of the Westminster Bank, Ltd., London, on January 28.

He pointed out that the cotton industry in England, an important customer of the South, is in very bad shape, to which various causes are contributing, among them China. This country is an important outlet for English cotton goods. "The recurrence of civil wars and the falls in value of silver have reduced trade with that country to a state of stagnation."

The cotton industry in England was also "seriously and adversely affected by the increase in Indian import duties followed by the boycott of foreign cotton goods, which immediately brought about a great curtailment of Lancashire trade in its most important market."

As a result of these and other causes, the year 1930 in the English cotton trade must be described "as the worst experience by this industry during the long depression which has persisted since 1920. Business generally was at very unsatisfactory prices and the year witnessed the closing down of numerous spinning mills and weaving sheds."

And so because there is civil war in China and because the import duties in India have increased, the cotton industry in England buys less cotton from the South; the price of cotton goes down from 14.8 cents a pound in February, 1930, to 9.1 cents a pound in February, 1931. The cotton planter has less money. He buys less fertilizer and as a result of it all the fertilizer trade is not doing so well.

But in spite of all this interdependence of world-wide conditions which no single government, much less a single company or individual, can alter, we too often think we can beat the situation and so go on producing and importing and hoping, and finally in despair we take a loss.

Some day we shall learn that a very large part of success in any industry is adjustment to external and internal conditions; that it pays to adjust our business in relation to external conditions over which we have no control; it pays to face the facts as far in advance as possible, even though they are hard, and make adjustments accordingly. The other internal class of adjustments over which we have complete control, chiefly in the field of production, keeping down expenses, and making every dollar pay, are equally important.

When we learn to critically and honestly face facts, we shall have set the foundation for individual and industrial prosperity, but there's no government in the world that can make us do it. It it up to ourselves.

The Economic Annalist

The Department of Agriculture, Ottawa, Canada, through its Agricultural Economics Branch, has recently commenced publication in both English and French of "The Economic Annalist." This is a monthly publication which started in January, 1931, as A Review of Agricultural Business.

As pointed out in the message in the first issue written by the Honorable Robert Weir, the purpose of "The Economic Annalist" will be to "summarize the research work of the Agricultural Economics Branch and other institutions, federal and provincial, working in this particular field. Notes and information of a timely nature concerning the activities of farmers' organizations will be brought together and summarized."

Another note on the purpose, written in the second issue by J. H. Grisdale, Deputy Minister of Agriculture, points out that "the men in the Branch are expected to do the work of investigation, analysis, and elucidation." The paper is intended to serve as one of the mediums through which facts and recommendations may reach the public.

It is very encouraging that the essential economic character of agriculture is being recognized. A basis of fact is badly needed if a sound and true solution to the many problems confronting agriculture is to be determined. But economic facts in themselves are apt to be dry and uninteresting. Also, they do not always contribute to that steady flow of manufactured optimism that so many people like to hear. Elucidation in the economics field is, therefore,

at times doubly difficult, but it is encouraging that another government department has started out hopefully on this thorny path.

The first two issues of the "Annalist" are very bright and readable. They contain research articles as well as current information. We wish the publication every success.

Fertilizer Experiments

The value of field experiments with fertilizer is a subject of current discussion. Some workers believe in such forms of experiments and some do not. At least one important value of such experimental work under practical conditions is to determine the changing fertilizer requirements of soils under constant usage. This point is illustrated by F. C. Bauer in material on the response of Illinois soils to systems of soil treatment recently published in a bulletin of the Agricultural Experiment Station of Illinois.

This comprehensive and detailed report of different systems of maintaining soil fertility on the major soil types of the State clearly shows the changing fertility needs of successive rotations on the same soil. As the author points out, "The continued cropping of soil, by reducing its productiveness, evidently increases its need for more comprehensive systems of soil treatment; not only do more plant-food elements need to be supplied, but they need to be supplied in different quantities. These are facts that every farmer who desires to make the best use of his lands should recognize.

"A study by rotation periods of the systems of soil treatment that have given the highest net returns reveals the fact that the most effective system for any particular field may change from time to time. A system of soil treatment that produces the best results during one rotation period may not be the best system during a succeeding period."

An interesting table in the bulletin for a number of rotation periods illustrates in detail the basis of these remarks which emphasize the necessity for constant experimental work over long periods if the soil fertility is to be maintained at its highest level and crops produced at the lowest cost per unit.

Land Classification

Among the measures advocated to help the farmer out of the present depression is the policy of an intelligent and comprehensive system of land classification. This policy was discussed by Dr. Henry G. Knight, Chief of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture, at the meeting of the Association of Southern Agricultural Workers held in Atlanta on February 5.

As Dr. Knight pointed out, "It is the hazard of uncertain production on the marginal and submarginal lands that make farming quite generally a gamble today." Of the 500,000,000 acres listed as agricultural land in the United States, he said approximately 100,000,000 acres are marginal and submarginal lands which damage the entire agricultural structure of the Nation by creating crop surpluses in good seasons and cause such hardships and distress in times of drought as at present require widespread meaures of relief.

Dr. Knight indicated that sufficient information is now at hand in the published reports of the Soil Surveys to make land classification of this kind possible for most of the Southern states.

"There is," he said, "Good reason to believe that with the practical application of the scientific knowledge we now possess we can make the other 400,000,000 acres produce almost at will to meet the needs of our expanding population for some time to come."

However the speaker emphasized the necessity for conserving soil fertility needed for our future food supply. "The time will eventually come when we shall need every available acre and we must not allow present economic considerations, private interests, or political differences to cloud the issue."

Regarding methods of utilizing areas of unproductive land which should be removed from cultivation, Dr. Knight said: "There are certain lands best adapted to pasture crops, and certain lands best suited to timber, while turpentine farming wherever practical in the Southern States may be advocated as part of the general agricultural program which would take the poorer and rougher lands out of cultivation."

Comparing our wastefulness in land to our ruthless destruction of timber and mineral resources, Dr. Knight said it would be an easy course to continue our present negligence and allow erosion and other destroying agencies to reduce our arable acreage until a balance is reached between production and consumption.

To accept such a policy, aimed directly at soil destruction of a State or Nation in order to meet any present emergency, he said, would cause future generations to rightly condemn us as freebooters and robbers, destroyers of that which we could not use, spreading desolation which would make the savage destruction wrought by Genghis Khan and his hordes pale into insignificance, for new and virile nations rose on the ashes of their destruction, whereas we would be destroying the substance itself upon which nations are builded.

Quality Cotton

From all accounts, markets are beginning to recognize quality of cotton and pay for it.

A most striking statement has appeared in a Berlin newspaper recently to the effect: "Is America losing her supremacy as the World's premier cotton market?" This question is propounded by the *Deutsche Allgemeine Zeitung* which alleges that there is a tendency among cotton-consuming countries, including Germany, and even some American manufacturers, to prefer non-American cotton. This dispatch to the *New York Times* points out that four-fifths of German cotton imports came from America two years ago. Last year it was less than two-thirds. This year the amount is still further declining, whereas imports for Egypt had increased to 74,012 bales against 42,114. This means an increase of 76 per cent in Egypt's favor. Imports of cotton from India increased 4 per cent. Imports from other countries increased by 25 per cent in the same period.

The reason for this is attributed to the need for a finer quality cotton for finer and softer fabrics. This has been accomplished at the cost of coarser American cotton.

It would appear that the quality of cotton is becoming an increasingly practical matter. Therefore, any work in breeding and fertilizing cotton that tends to improve quality will be of primary importance during the coming decade, especially if cotton prices continue low and the World's cotton production continues at a fairly high level, in comparison to the needs of the World's market for cotton goods.

A group of West Virginia farmers looking over one of the 1930 potato fertilizer demonstrations.

Potash, Potatoes, and Profit

(*From page* 30)

inches less than normal during 1930. This amounts to approximately 1,900 tons of water per acre less than ordinarily falls. Yet in spite of this tremendous shortage of water, the average of the 10 tests shows that 1,800 pounds of 4-10-12 fertilizer per acre produced a yield of 45.2 bushels more of U. S. No. 1 potatoes than the average of the plots receiving no fertilizer.

This is quite contrary to the common notion that heavy applications of fertilizer will burn crops especially in dry weather. It should prove conclusively to these "doubting Thomases" that heavy applications of well-balanced fertilizers, when properly applied and thoroughly worked into the soil, do not burn crops even in dry weather.

Extra Potash Pays Extra Cash

(*From page* 26)

demands, show the same increase for additional potash?

In Graves county, John Jenkins planted his dark tobacco on a clay soil which had grown tobacco the year before. But before replowing, Jenkins had spread six tons of manure on each acre. He used 250 pounds of the several tobacco analyses per acre.

Where the 3-8-0 was used, 1,320 pounds of dark tobacco were harvested; the 3-8-6 put the yield up to 1,340 pounds; while the 3-8-24

boosted it to 1,380 pounds per acre. These increases were fairly outstanding.

However, the most significant differences were in the average net prices which the leaf from the various plots brought. Quite true, all prices were low, but they were net after all selling costs had been subtracted and were in line with the selling prices of tobacco in this community this year.

The average net price paid for the tobacco from the 3-8-0 plot per hundred pounds was $5.06; an average of $5.62 was secured for all the leaf grown on the 3-8-6 plot; while $6.74 was the average paid for each hundred pounds of tobacco produced on the 3-8-12 plot. The high average of $7.38 was secured from the plot which had the 3-8-24 applied to it.

Kentucky farmers have asked: "Would it pay to use additional potash in the form of sulphate of potash sowed broadcast before plowing, or just before putting out the plants?"

G. T. Underwood in Christian county used 150 pounds of 12-24-12 in the row on all his tobacco. On one plot, in addition, he sowed 300 pounds per acre of sulphate of potash broadcast before breaking the ground and on another equal area, 300 pounds per acre broadcast while the plowed soil was being fitted.

There was no appreciable increase in the yield, but from the auction floor sale bills, we saw a remarkable increase in quality due to the potash broadcast. The average price paid for all leaf produced on the plot to which the 300 pounds of sulphate of potash were applied before breaking was $18.75. Where the same amount was applied and worked into the plowed ground, all the leaf produced brought an average of $19.25. Compare this with $15.98, the average price received for the plot which got only the 12-24-12.

John Walters, one of the very extensive and very scientific growers of Hardin county, had the same kind of demonstration except that he used 300 pounds of 6-8-6 on all rows with the 300 pounds of sulphate of potash broadcast on one plot before breaking and on the other after breaking.

Five representative sticks of tobacco were taken from each plot. These were stripped separately and carefully graded. From each of the two lots from plots which received additional potash, 11 hands of high quality tobacco were secured with 4 hands of "tips." From the plot which received only the 6-8-6, Walters got 7 hands of high quality and eight of inferior grade. This is a big difference because this man has a stripping table so arranged that every sign of either good or poor quality can be detected and thus the leaves are placed unerringly in their proper grade.

These demonstrations seem to indicate that it would pay Kentucky tobacco growers to use more potash in their tobacco fertilizers because of its capacity to increase the yield and improve the quality of the leaf. Contrary to a current notion, extra potash did not burn the crop, even in this dry year.

IOWA FARM INCOME RANKS SECOND AMONG STATES

The cash income from farm products in Iowa averaged $639,828,000 for the five years, 1924 to 1928, a cash income that gives Iowa second highest rank among the 48 States, being exceeded only by Texas, according to the Iowa Industrial Survey report, authorized by the forty-third general assembly of the State.

The 1,700 page report presents statistics obtained after a lengthy survey of agricultural and manufactured products, raw materials, transportation and banking facilities and other subjects relative to Iowa, her people and her industries. It was learned that "Iowa ranks first in production of more different types of agricultural products than any other State in the Union." — *Marketing Activities, March* 4, 1931.

Foreign and International Agriculture

Farming in Labrador

By F. C. Sears

Head, Department of Pomology, Massachusetts Agricultural College

WHILE the United States and some other countries are struggling with the problem of various agricultural surpluses, up in Labrador the problem is an agricultural *deficit*, in fact agriculturally there isn't much *but* deficit. And this scarcity of fruits and vegetables led Sir Wilfred Grenfell who has been working among the people of that coast for the past 40 years to ask the writer to make a survey of the coast and see what the possibilities were for increasing the output of these crops.

The writer showing Sir Wilfred Grenfell the cabbage crop at St. Anthony.

Accordingly in 1928 I made my first trip North and have been there each summer since then for about two months. And while things move slowly in that country, owing to the short summer season and the conservatism of the people, yet we already have some right interesting results from our work.

Our chief problem is to secure sufficient areas on which to grow crops. One who has never visited that coast can have little idea of the absolute lack of anything but rocks in most places. A few sections, such as Northwest River, have fairly good stretches of light sandy soil which when cleared make good gardens; but for the most part clearing the land of rocks is a real problem.

Next to this is the problem of drainage, for most of their soils are rather heavy, and the rains are frequently torrential, so that getting rid of surplus water is a serious matter. The usual method of dealing with this problem has been to make the gardens up into rather narrow beds with fairly deep ditches between, and the results have been reasonably satisfactory.

Then we were at first wholly in the dark as to the fertilizer needs of Labrador soils and have just barely begun to

throw some light on this question. We early discovered that nearly all soils are sour and most of them very sour, so that lime must be used if satisfactory crops of certain vegetables are to be secured. And so far as our experiments have gone (which it must be admitted is not very far as yet) we have not secured much response from nitrogen. I am expecting, however, when we get this phase of the work started at Northwest River where the soils are light and sandy, that we will find a nitrogen shortage. In contrast to this there is a very distinct shortage of phosphorus at St. Anthony, where most of our fertilizer experiments to date have been carried on. In all cases there has been a marked response here to applications of superphosphate. As to potash requirements we have no evidence as yet, for up to date we have not been able to get any potash experiments started, but we are expecting to do so this coming season at least in one or two localities.

Our major problem this past season, which bids fair to stay with us for some time, was the question of pests. This is a trouble which I had not expected to encounter up there, at least not in so serious a form, but it was a real trouble in 1930. The cabbage root maggot was rampant and appeared all along the coast in every little isolated village where cabbages were grown. One can hardly imagine how it could possibly have become disseminated so widely, but it certainly was there, in many cases absolutely wiping out the cabbage crop. And since this is one of their major crops the loss was felt keenly. Club root of cabbages and turnips is also very general and destructive. And in some sections, notably at St. Anthony in northern Newfoundland and at Northwest River, Labrador, which is 200 miles inland up Hamilton Inlet and Lake Melville, the greasy cut-worm was very destructive.

On the other hand there are some distinctly hopeful factors in the situation, the most important being the speed with which vegetables grow. In fact it is difficult for one to realize just how rapidly plants do grow and mature up there unless one has seen it

(*Turn to page* 47)

A view of one of the gardens at Northwest River, Labrador.

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

"Inspection of Agricultural Lime Products," Agr. Exp. Sta., Amherst, Mass., Bul. 57, Dec., 1930, H. D. Haskins and H. R. DeRose.

"Report of Analyses, Commercial Fertilizers and Fertilizer Materials," State Dept. of Agr., Jackson, Miss.

"Analyses of Commercial Fertilizers, Fertilizer Supplies, and Home Mixtures for 1930," Agr. Exp. Sta., New Brunswick, N. J., Bul. 514, Nov., 1930, Charles S. Cathcart.

"The Amount of Manure Necessary for Vegetable Growing II," Agr. Exp. Sta., Kingston, R. I., Bul. 225, Nov., 1930, F. K. Crandall and T. E. Odland.

"Results of Fertilizer Experiments on Norfolk Fine Sandy Loam and on Norfolk Sandy Loam," U. S. D. A., Washington, D. C., Tech. Bul. 225, Feb., 1931, J. J. Skinner.

Soils

An effective and practical correlation of experimental data and soil survey work is shown in Cornell Bulletin 514, "Soil and Field-Crop Management for Chenango County, New York," by A. F. Gustafson, H. O. Buckman, and H. P. Cooper. It is frequently somewhat of a problem to make available for use by the farmer, county agent, and extension worker much valuable information gathered by experiments and the soil survey. Too often the older type of soil survey was put out with too limited an interpretation to achieve the greatest good from the work. This bulletin effectively solves a large part of the problem. The individual soils of the county are considered from the viewpoint of their origin, agricultural importance, utilization, adaptation, and management. A discussion of the general principles of soil fertility as related to Chenango county conditions follows, manure, lime, and fertilizers being taken up. Then various crop rotations adapted to the section and their fertilization are given, and finally detailed information on the growing and fertilization of specific crops. Such a comprehensive and practical publication is of inestimable help and value to all interested in the agriculture of the area and vicinity for which written.

"Organic Compounds Associated With Base Exchange Reactions in Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 31, Jan. 15, 1931, W. T. McGeorge.

"A Soil Management Program for Carrington Loam," Agr. Exp. Sta., Ames, Iowa, Bul. 276, Jan., 1931, W. H. Stevenson and P. E. Brown.

"Chemical Composition of the Soils of McHenry County," Agr. Exp. Sta., Fargo, N. D., Bul. 240, Nov., 1930, T. H. Hopper and H. L. Walster.

Crops

A welcome addition to the pasture literature is found in Extension Circular No. 28, "Emergency Pasture," recently issued by the University of Delaware. G. L. Schuster, agronomist and author of the circular, in his introduction not only calls attention to the importance of emergency pasture in drought-stricken areas, but gives information on bringing back permanent pastures. He quotes statistics from the New York College of Agriculture which show that a cow may be fed on pasture for 9.7 cents per day and that when barn fed her

feed costs 38 cents per day. With regard to the use of fertilizer in bringing back permanent pastures, Professor Schuster says that commercial fertilizer will hasten the growth of pasture more in the early spring than will manure and is to be recommended except in cases where the soil is low in organic matter. He recommends taking about 1/3 of an acre per animal and fertilizing it with 50 lbs. of nitrogen, 50 lbs. of phosphoric acid, and 50 lbs. of potash per acre or any mixed fertilizer having about equal parts of nitrogen, phosphoric acid, and potash and applied at the rate of 500 to 600 pounds per acre. This fertilizer should be applied about 6 weeks before the first grazing date.

"Lettuce Irrigation Studies," Agr. Exp. Sta., Tucson, Ariz., Bul. 133, Nov. 15, 1930, H. C. Schwalen and M. F. Wharton.

"Field Experiments with Cotton," Agr. Exp. Sta., Tucson, Ariz., Bul. 135, Dec. 15, 1930, R. S. Hawkins.

"Fifteen Years Field Crop Work Prescott Dry-Farm 1912-1927," Agr. Exp. Sta., Tucson, Ariz., Bul. 136, Jan. 1, 1931, S. P. Clark.

"Essentials of Irrigation and Cultivation of Orchards," Agr. Exp. Sta., Berkeley, Cal., Cir. 50, Dec., 1930, F. J. Veihmeyer and A. H. Hendrickson.

"Apricot Growing in California," Agr. Exp. Sta., Berkeley, Calif., Cir. 51, Dec., 1930, A. H. Hendrickson.

"American Potato Journal." The Potato Association of America, East Lansing, Mich., Vol. VIII, No. 3, March, 1931.

"An Agricultural Policy and Program for New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 225, Nov., 1930, Herbert J. Baker.

"Fifty-Third Annual Report for the Fiscal Year Ending June 30, 1930," Agr. Exp. Sta., Raleigh, N. C.

"Best Methods of Growing Early Vegetable Plants," Ext. Ser., Raleigh, N. C., Ext. Cir. 182, Jan., 1931, E. B. Morrow and Glenn O. Randall.

"Research Leads to Farm Progress," Report of Oklahoma A. & M. College 1926-1930, Agr. Exp. Sta., Stillwater, Okla., C. P. Blackwell.

"Biometrical Analysis of Upland Cotton Grown at Stillwater, Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Bul. 187, June, 1929, Fred Griffee, L. L. Ligon, and L. H. Brannon.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, No. 149, Mar.-Apr., 1931.

"Department of Agriculture and Immigration," Richmond, Va., Bul. 279, Mar., 1931.

"Potato Growing in the Irrigated Districts of Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 246, Jan., 1931, Harry J. Jensen and O. M. Morris.

"Sixteenth Annual Report," Ext. Ser., Pullman, Wash., Bul. 154, Dec., 1930.

"Growing Greenhouse Tomatoes," Agr. Exp. Sta., Madison, Wis., Bul. 418, Jan., 1931, E. F. Burk and R. H. Roberts.

"Forces Building Farm Life," Wis. Col. of Agr., Madison, Wis., Cir. 242, Feb., 1931, K. L. Hatch.

"The Germination of Tobacco Seed," Agr. Exp. Sta., Madison, Wis., Res. Bul. 104, Dec., 1930, James Johnson, H. F. Murwin, and W. B. Ogden.

Economics

The problem of providing credit for financing the 1931 farm crop is of greater importance than usual because of the sharp decline in farm prices during the past year. Especially timely, therefore, is the discussion of agricultural credit corporations which is presented in Bulletin No. 259 of the University of Arkansas Agricultural Experiment Station. This bulletin, entitled "Organization and Management of Agricultural Credit Corporations in Arkansas," covers the development, problems, and success of these credit institutions in the State. Mr. B. M. Gile, the author, points out possible methods of providing for more extensive use of these credit facilities.

"The 1931 Agricultural Outlook for California," Agr. Ext. Ser., Berkeley, Calif., Cir. 52, Feb., 1931, H. R. Wellman, E. W. Braun, S. W. Shear, and E. C. Voorhies.

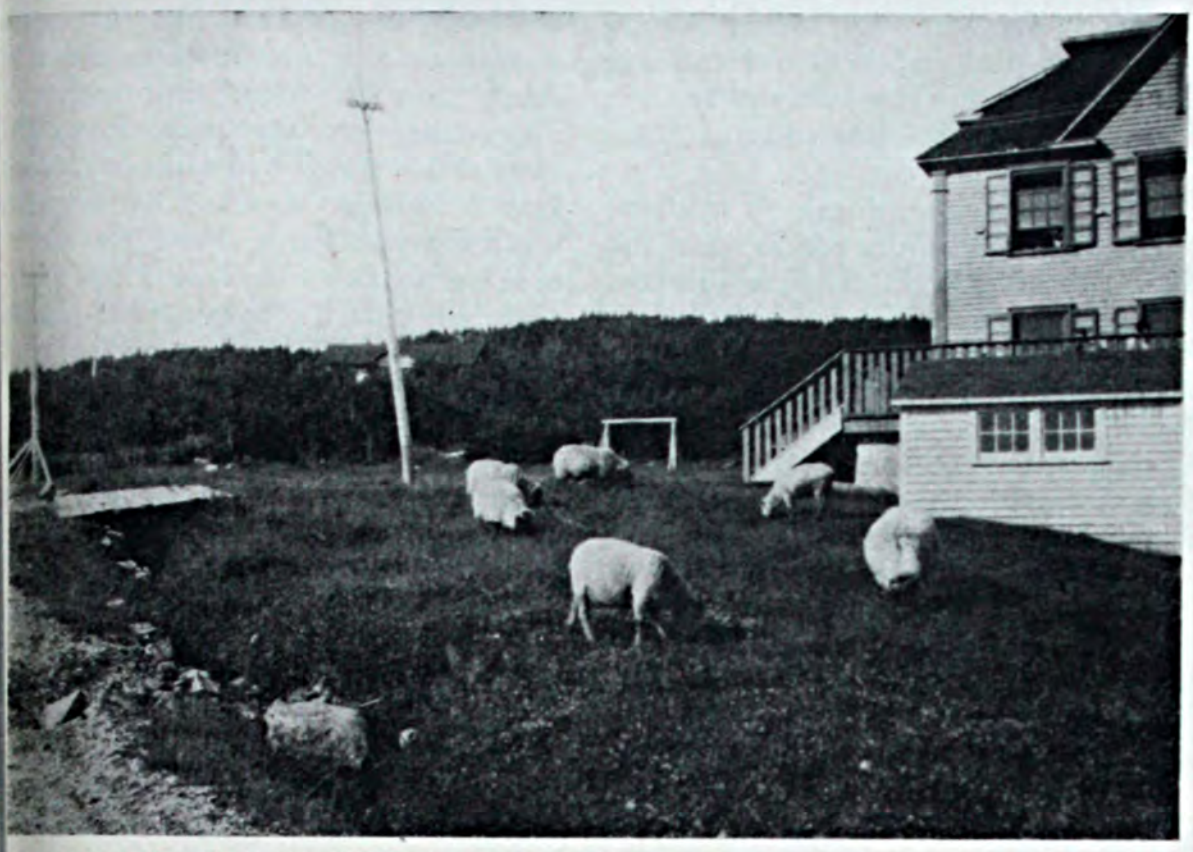
"An Economic Analysis of Production Problems on the Flathead Irrigation Project," Agr. Exp. Sta., Bozeman, Mont., Bul. 237, Dec., 1930, Sherman E. Johnson.

"Current Farm Economics-Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Series 49, Vol. 4, No. 1, Feb., 1931.

"A Cooperative Marketing Manual," Agr. Exp. Sta., Raleigh, N. C., Bul. 276, Dec., 1930, Joseph G. Knapp.

Boy: "Do you know, dad, that in some parts of Africa a man doesn't know his wife until he marries her?"

Dad: "Why single out Africa?"



It is hoped that Black Face Highland sheep will thrive in Labrador. Here are some of the flock at St. Anthony.

Farming in Labrador

(*From page* 44)

happen. Here is an instance which an old trapper at St. Mary's River reported to me. He had planted his potatoes on July 28, which is mighty late even for Labrador, and gone away inland on a hunting trip. One might have expected that his crop would be like the amateur enthusiast's who reported that his potatoes had done wonderfully well that season—he had "some the size of hen's eggs, a lot as big as marbles, and of course quite a lot of little ones." But the old trapper came back from his [illegible] has been [illegible] tons. Comparing the last five years with the immediately preceding five years, fertilizer consumption has almost doubled. When it is considered that the fertilizers now used are of a considerably higher analysis than in former years, it is safe to say that East Texas farmers are using twice as much commercial plant food as was the case five to ten years ago.

[illegible]ing can be made [illegible]. There are certain plant [illegible]s that can only be added in commercial fertilizers, and we have in East Texas large areas of land actually deficient in plant food. Hence, the necessity for commercial plant food in this section.

As ordinarily used, commercial fertilizers add to the soil larger amounts of certain plant foods than are taken out of the soil by crop growth, erosion, etc. As a result, the judicious use of fertilizer over a period of years will build up soils, all the while returning two or three dollars in increased crop

Some may be asking the question: "Why have our cotton yields not shown the effect of this additional plant food?" The answer is that we are just now beginning to use enough commercial fertilizers to have any ma-

week in October, and feeling hungry for some potatoes, went out and dug into the side of a few hills and brought in three potatoes, and *one* of them was *all* he could eat.

Of course the length of summer days is principally responsible for this rapidity of growth. During July and August there is little except day. It is still fairly light at 11:00 p. m. and morning begins to break about 1:30 a. m. And on a good sunny day the temperatures at such inland settlements as Northwest River are fairly high, from 70 deg. to 80 deg. F. in the shade being common.

This past season we tried out northern-grown vegetable seeds from North Dakota, and Maine certified potatoes with good results. And at St. Anthony, with good seed, good fertilizers, and good drainage, we raised a ton and three-quarters of cabbage, where the year previous we had only 1,500 lbs.

Another agricultural venture on which we are working, but have made comparatively little progress as yet, is the livestock question. Of course livestock can never be as generally distributed as gardens, for livestock maintenance requires more capital and much more attention. But with the imperative need for milk, it would seem that we ought to make every effort to locate cows and milk goats wherever possible, and we are planning to do so. Goats seem especially promising since they require little room and feed, and some of the best breeds yield a surprising amount of milk.

In 1930, in response to a request from St. Anthony for a hardier breed of sheep than the Shropshires (the ewes of which breed had often proved barren) we sent up some Black Face Highlands which we hope may meet the requirements.

Three years' work leads me quite definitely to the conclusion that while the outside world is still safe and always will be, so far as any competition from Labrador agriculture is concerned, yet I believe that some day we shall see a reasonable supply of fresh vegetables for those people and a corresponding improvement in their health.

CANADIAN FARMERS EAGER TO LEARN

VIII, No. [illegible] General desire amon[illegible]

"An Agricultural Policy and [illegible] for New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 225, Nov., 1930, Herbert J. Baker.

"Fifty-Third Annual Report for the Fiscal Year Ending June 30, 1930," Agr. Exp. Sta., Raleigh, N. C.

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"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, No. 149, Mar.-Apr., 1931.

Columbia an agricultural demonstra tion train toured the province makin 23 stops with an attendance of 2,10[illegible] In Manitoba, in connection with th[illegible] sheep on farms, was op[illegible] attenc[illegible]

"The 1931 [illegible]ing fornia," Agr. Ext. Ser., [illegible]ain 52, Feb., 1931, H. R. Wellman, [illegible] S. W. Shear, and E. C. Voorhies.

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Boy: "Do you know, dad, that in some parts of Africa a man doesn't know his wife until he marries her?"

Dad: "Why single out Africa?"

More Potash—More Sweets

(*From page* 7)

as compared with 576 lbs. used by the low-yield group. In the case of the 20 highest yields, an average of 8 per cent of potash was used in the fertilizer while 5 per cent was the average used in making the 20 lowest yields.

So many variable factors were involved in the growing of these sweet potatoes, that the reliability of the figures may be questioned; however, they do indicate general trends and are worth consideration from that standpoint.

At the South Carolina State Fair last fall a sweet potato exhibition was staged, the exhibitors being growers who had been in the contest. Ninety-seven growers furnished a bushel of sweet potatoes each, thus making up probably the largest exhibition of this product ever put on in the Southeastern States.

One of the important features of the sweet potato contest has been the practical demonstration in grading given each grower in his own field at the time his yield was estimated. As a result of such demonstrations, and of meetings and newspaper publicity, as well as the publication of the results of the contest in bulletin form (South Carolina Extension Circular No. 111), the possibilities of the sweet potato are being realized to a degree that should in the not distant future make South Carolina an important factor in the commercial production of this crop.

Soil Building in Texas

(*From page* 18)

ers and a number of agricultural leaders thought that the use of fertilizer was evidence of poor farming. Even today this prejudice is not entirely gone, and I quite often find commercial fertilizers overlooked as one of the important steps in soil building. It should be apparent to any one that where plant food is actually deficient in a soil it must be put there by some means before farming can be made profitable. There are certain plant foods that can only be added in commercial fertilizers, and we have in East Texas large areas of land actually deficient in plant food. Hence, the necessity for commercial plant food in this section.

As ordinarily used, commercial fertilizers add to the soil larger amounts of certain plant foods than are taken out of the soil by crop growth, erosion. etc. As a result, the judicious use of fertilizer over a period of years will build up soils, all the while returning two or three dollars in increased crop yields for every one dollar spent for fertilizer.

During the past 25 years the use of commercial fertilizers in Texas has increased 600 per cent. In the five-year period from 1905 to 1909, the average annual consumption for the State was 23,000 tons; for the past five years the average consumption has been 133,000 tons. Comparing the last five years with the immediately preceding five years, fertilizer consumption has almost doubled. When it is considered that the fertilizers now used are of a considerably higher analysis than in former years, it is safe to say that East Texas farmers are using twice as much commercial plant food as was the case five to ten years ago.

Some may be asking the question: "Why have our cotton yields not shown the effect of this additional plant food?" The answer is that we are just now beginning to use enough commercial fertilizers to have any ma-

terial effect on yields in East Texas or the State as a whole. Certain counties where from 75 to 95 per cent of the cotton is now being fertilized, but in most cases too lightly, are already showing an increased per acre yield.

In increasing the consumption of commercial fertilizers in East Texas, the educational bureaus of the various fertilizer manufacturers have been very helpful. In cooperation with the Extension Service, thousands of demonstrations have been made which have not only sold farmers on the use of fertilizers, but have assisted them in their proper selection and application.

In terracing, in the use of fertilizers, and in livestock farming, Texas has made commendable progress. But there is one step in our soil-building program that we seem reluctant to take. That is the growing of legumes, such as cowpeas, soybeans, sweet clover, alfalfa, hairy vetch, etc. Legumes have had a large part in the restoration of soils in other sections, and should have in Texas. There is one or more legumes that can be grown in every section of Texas. Some progress has been made in growing sweet clover in Central and West Texas, while cowpeas, soybeans, velvet beans, and vetch are grown to some extent in East Texas; but taking the State as a whole, Texas has about as small a per cent of its land in legumes as any State in the Union.

The Inquiring Mind

(*From page* 22)

culture and other experiment stations.

While remarkably rapid progress has been made by the experiment stations in the perfecting of fungicides for controlling plant diseases, the relative emphasis on control methods of plant pathology, under the supervision of Dr. Jones, is being paid more and more to disease resistance. His belief is that the responsibility for the finding or developing of disease-resistant plants lies chiefly with the plant pathologists and then with the geneticists and the plant culturists, whether from the field of horticulture or agronomy. The essential step in such work is the finding of the first plant of outstanding disease resistance, as was the case with Dr. Jones and his historic Racine-county, yellows-resistant cabbage. That scientist has said:

"All about us in fields, in garden, in orchard, are our chief possibilities. It is in the hunt for these rare plants that many keen searchers are needed."

Here is an opportunity for every professional and practical possessor of "the inquiring mind and the seeing eye." Fame and reward await the man who is successful in finding and developing the initial resistant plant, and profit for those who adopt it in their productive work. Dr. Jones is of the opinion that not only should the aid of the amateur be welcomed by professional plant pathologists, but that those scientists should encourage the amateur spirit, not merely as exemplified by enthusiastic devotion of purpose, but as concerns freedom to follow the natural leads of the problem. It is also his sincere belief that "the spirit of research must not be restrained by the artificial bounds of professional or administrative classification. The only criterion should be the genius and ability for sustained progress in a natural course."

The triumph of Dr. Jones in his mastery of the yellows disease is but one of his many successes. Both in Vermont and Wisconsin he has repeatedly come to the assistance of producers in their perplexities and has contributed numerous important facts to the scientific knowledge of his specialties. Today he is studying

diseases of the aster, and other problems. Soon he may announce new things of importance to floriculture.

As when a boy, he is still inquiring into the mysteries of nature, but with deeper insight and more definite purpose. These inquiries have strengthened rather than weakened his belief in the omnipotence of the divine Creator. He is a devout churchman, although a scientist of profound erudition, and he never hesitates to acknowledge that when a research worker in laboratory or field succeeds in lifting the veil of the unknown and obtaining a peep into the inner sanctuary of science, he will find an illimitable field beyond, and that back of everything there is—GOD!

Therein Jones and Einstein agree, in a wise conclusion that all may understand and appreciate.

Making a Permanent Pasture

(*From page* 10)

of sweet clover, and meadow aftermaths may all be used to advantage. *Since this is the case, arable land laid to permanent grass and properly managed may be the best pasture in the long run owing to its permanency and superior palatability.*

There is some experimental evidence to support this view-point. During the years 1926-1929 inclusive, the writer carried on a grazing experiment at the Wisconsin Station farms at Madison in which three-acre pasture paddocks of sweet clover, mixed timothy and clovers, permanent bluegrass-redtop pasture, and timothy, all on good crop land, were compared for carrying capacity and gains made on dairy heifers ranging over one and under two years of age. The data presented is an average of four-year trials for sweet clover alone and mixed pastures respectively, two years for permanent pasture and one year for timothy.

When we recover from the silly notion that only so-called untillable land can be afforded for permanent pasture, *and realize that since such lands are unfit to grow grass for the mow they are just as unfit to grow large yields of grass for grazing,* some of the tillable lands on our farms will be laid to pasture for indefinite periods with the probable discovery that a good permanent grass pasture is unequalled as a steady source of income in livestock production. Good heavy farm lands are capable of developing and maintaining a good grazing sward, when the soil is properly prepared at the beginning and the right cultural treatments are practiced. We do not have to envy the excellent grass pastures of the British Isles and Continental Europe. We can have them right here in this north humid region if we put into practice the principles of pasture development and maintenance operating over there.

Field selection and soil fertility are the basic considerations in laying land to permanent grass. Lands that lie right with respect to moisture retention and are conveniently located near the barns should always make a strong appeal for this purpose. Droughty,

	Sweet clover 4-yr. average 1926-1929	Mixed timothy and clover 4-yr. average 1926-1929	Permanent 2-yr. average 1928-1929	Timothy 1 yr. (1929)
Heifer pasture days	457.25	471.75	529.0	430.0
Average daily gains	.331 lb.	.727 lb.	1.1 lbs.	1.28 lbs.

thin soils should always be avoided; they cannot support good grass. Deep, heavy soils rich in organic matter and mineral nutrients are ideal for heavy grass production and turf development. The "stuff" must be present that will put the punch in the grass from the start and that will keep it going unhampered for a period of years.

Needs Plenty of Plant Food

Heavy applications of stable manure and legumes either pastured or plowed down are a sensible suggestive treatment for enriching the soil with organic matter, so essential for large moisture capacity, quick fertility, and good soil tilth. Since a pasture when once established is to remain unplowed, it is better to make a good application of lime if needed, and phosphate and potash applications during seedbed preparation. The best grass is grown on soils high in mineral fertility and rich in nitrogen. The soil and its preparation are the prime factors in making a permanent pasture. *It is a waste of time, money, and effort to try to make a real pasture on any but fertile soils; all others invite failure.*

The old notion of allowing soils worn by years of previous cropping to run to grass, expecting that good returns will be had from it as pasture, is entirely fallacious. Fertility must first be built up so that it will be capable of supporting a heavy stand of grass. *Phosphorus and potash encourage vigorous clovers from the start, which in turn continue to add to the store of organic matter and nitrogen.* Grass will flourish under such conditions.

In sowing grass seeds, the sort of seedbed prepared may stand between success and failure. Since the success of the seeding from the beginning will depend to quite an extent upon how well the soil is fitted, how the seedbed is prepared, and how the seeding is done, no step in any of these processes essential to the greatest success should be neglected.

The field should be plowed preferably in the fall because by so doing good tilth and compactness of the soil will probably best be accomplished. *Grass seed should never be seeded on loose soil.* If there is any one thing that should be most carefully attended to when sowing grass seed, it is to make a compact seedbed. Fall plowing allows time for the soil to settle back firmly upon the sub-soil. Following the harrowings in early stages of seedbed preparation, which usually work the soil up to depths greater than is necessary for seeding, the compactor or roller should be used to firm the lower layers of the seedbed and to crowd out air-pockets. The surface soil should be well fined so that following seeding the rains will settle the soil completely about the seeds. If the seeding is done in spring, compacting subsequent to seeding is hardly necessary. Sowing grass seed on a well-firmed seedbed is one guarantee for a successful catch.

A Good Seed Mixture

It is best to use a seed mixture that insures the quickest returns. Such long time perennial grasses as Kentucky blue grass and redtop are comparatively slow in "setting" themselves and because of this, such quicker growing crops as timothy and red and alsike clover should be used in the mixture for the greatest returns in the early life of the pasture. When such a mixture is used, pasturing may start in the fall, and always the next season from the time there is a good grazing growth. Although the clovers are short-lived, their use is warranted not only as a means of producing more feed, but also for the organic matter and nitrogen which they leave behind. Timothy should be prized in any permanent pasture, and seeded this way, it will persist for some time.

A suggested mixture might be like this: timothy, 4 lbs.; alsike, 3 lbs.; red clover, 4 lbs.; blue grass 10 to 15 lbs.; redtop, 3 to 5 lbs.; and white

clover, 2 lbs. Redtop grass is included because it lends pasturage further into the season than blue grass will alone, and it continues to maintain itself well for long periods in association with blue grass. If either of the clovers is omitted, it might be suggested that it be red clover, owing to the perennial tendency possessed by alsike.

The seed is best sown in early spring with a reduced seeding of some small grain, preferably either barley or early oats. A bushel to one and one-quarter bushels of grain to an acre is heavy enough. Everything should be done to give the young pasture the best chance. *It, and not the grain nurse crop, is the primary consideration.* A pasture thus established, if kept properly stocked and top-dressed with the right fertilizers from time to time to keep it "pepped up," will surprise even those who are skeptically inclined toward the comparative worth of permanent pastures. Good pasture and plenty of it cheapens the cost of both milk and meat because barn-feeding is usually from three to four times as expensive as pasturing.

Consumers Appreciate Quality Potatoes

(*From page* 19)

cerpts from three are given below.

Herbert C. Powell, Commissioner of Agriculture, says:

"I don't see why anyone would need to buy Idaho potatoes if enough other good farmers like yourself would make a specialty of raising this variety and putting them up the way you do. I believe you are doing a service to the potato-raising industry of Michigan in starting this enterprise."

J. F. Cox, Dean of Agriculture of Michigan State College, wrote:

"I think you have done a fine piece of pioneer work in demonstrating that Michigan-grown baking potatoes of highest quality can be produced and marketed if proper methods are followed.

"Your potatoes equal the best that I have eaten of the Idaho brand."

Burt Wermuth, Editor of the *Michigan Farmer* said:

"These potatoes were superior in baking and eating quality to any we have been able to buy. The flavor was the best I have tasted in any baking potato, not excepting the famous Idaho brand."

This simply flattened two myths, one that Michigan soils would not produce quality potatoes and the other that Wolverine consumers preferred potatoes grown "somewhere away."

The winter of 1929-30, I had some time to make a study of Idaho advertising, and I found that one reason given over and over for the quality these Idaho spuds possessed, was that they were grown in the ashes of extinct volcanoes. Here they could get a feast of potash. I could see no reason why the same variety would not use the same plant food in Michigan as elsewhere, and so last spring I turned an entire five-acre field into a testing station, not only to find out about potash and quality, but to answer some other questions as well.

This field is a uniform sand loam, almost level, with a few small stones. For perhaps 20 years, it has been regularly cropped with the three-year rotation to which we are addicted—potatoes, oats or barley, and red clover. We have always manured the clover sod before plowing in the fall, then manured again before replowing in the spring. We did this to get rid of the quack grass, but we have the quack in subjection now, so we are quitting the replowing.

The potatoes were planted on May 29. We used about 12 bushels of seed to the acre. The standard application of fertilizer was 725 pounds put in with a two-row planter, the fertilizer being placed in two bands on either side of the hill and a little lower than the seed piece.

The growing season of 1930 was the dryest we have ever experienced. Really the drought was not broken until early October. However, as the summer progressed it was apparent that every fertilizer combination we used was developing a better set of tops than the check plots, with one exception. This one exception was the 3-9-0. The phosphorus was ripening the potatoes too fast during the drought.

Profit in Potash

Since we planted with a two-row potato planter, each four rows received a different fertilizer treatment and every fiftieth set of four rows was an unfertilized plot. Many interesting comparisons were possible after the potatoes from each plot were weighed and graded.

On plot 14, 725 pounds of 2-16-8 produced a total yield of 166.2 bushels of potatoes. It so happened that this was the identical yield on plot 11 which received 725 pounds of 4-16-8. It was apparent that more than two per cent of nitrogen did not increase the total yield under conditions prevailing this year.

As to phosphorus, 725 pounds of 4-8-8 on plot 17 produced 165.6 bushels while the same amount of 4-16-8 used on plot 11 produced 166.2 bushels. From this, we figure that around 58 or 60 pounds of phosphoric acid is all we need for a potato crop of this size.

The yield from the potash plots showed that we obtained increases in yield with each increase in potash up to 27 per cent, although the increase was not so marked after reaching 18 per cent potash.

Unfertilized, the rows produced 130.6 bushels per acre, while 3-9-0 produced 137 bushels. The 725 pounds of 3-9-9 made 159.3 bushels. The same dose of 3-9-18 and 3-9-27 yielded 177 and 185.6 bushels respectively. Our net profits were naturally in proportion. The net profit on the 3-9-0 plot was but $2.40 after subtracting from the gross profit the cost of fertilizer, the cost of harvesting the extra bushels at five cents per bushel, interest on the money invested in fertilizer for eight months at six per cent, and $3 per ton for the cost of hauling and distributing the fertilizer.

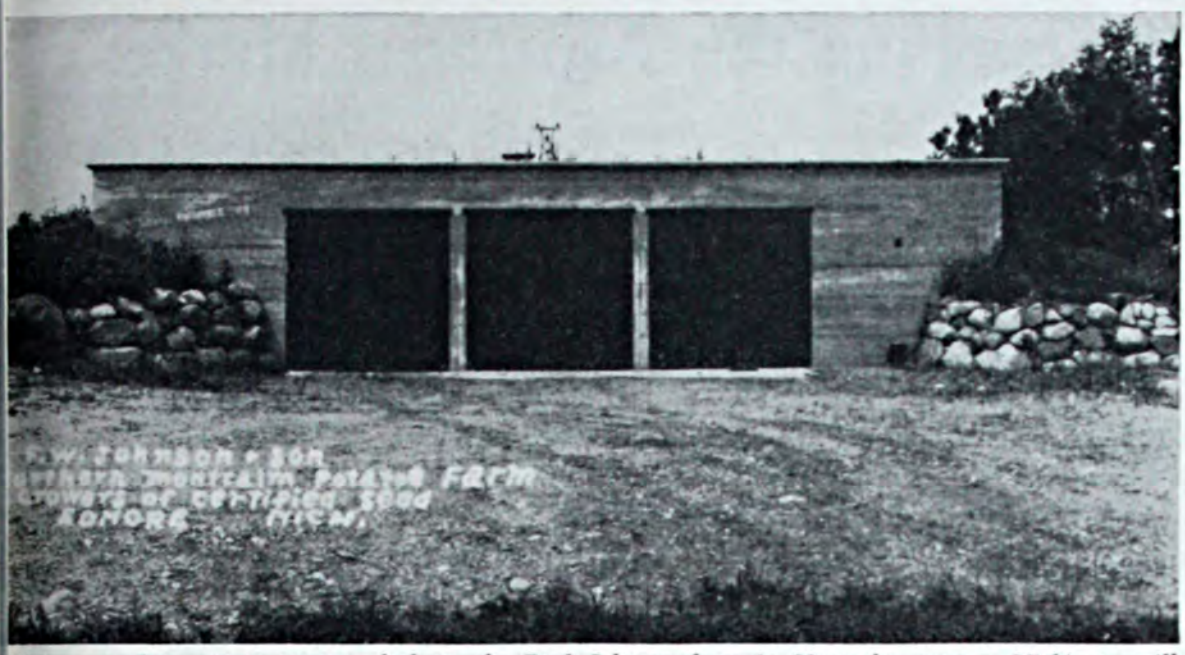
For using a 3-9-9, we got a net profit of $13.25 per acre, while the net profit for 3-9-18 was $32.96 per acre.

On plots two and three, we compared 725 pounds each of 3-18-9 and 3-9-18. The 3-18-9 gave us 160 bushels per acre with a net profit of $13.73 per acre, whereas the 3-9-18 gave us 177 bushels per acre with a net profit of $32.96. On plots 14 and 15, 725 pounds of 2-16-8 gave us 166 bushels with a net profit of $4.35, while the same amount of 2-8-16 gave us a net profit of $18.14 from a total yield of 185 bushels. It might be explained in connection with these last two plots that the nearest check plot yielded somewhat more than the other three check plots, which indicated that the natural fertility of this part of the field was greater than elsewhere.

Greater Amounts Profitable

Our comparisons of increasing amounts of the same analysis show that higher net profits come with higher applications, even though they may cost more. The 725 pounds of 4-8-8 produced 165.6 bushels, while 1,350 pounds of 4-8-8 produced 191.8 bushels.

The 725 pounds of 4-16-8 gave us 168.7 bushels, while 1,450 pounds of the same analysis gave us 205.6 bushels.



This up-to-date potato storage shed on the Fred Johnson farm in Montcalm county, Michigan, will house 30,000 bushels of potatoes. "But good storage did not solve the problem," says Mr. Johnson.

Naturally, what I am most interested in is that fertilizer analysis that will produce the largest yield, because high yields contain the largest number of potatoes of the quality we pack in our "Johnson's Gems." Wherever we used an analysis with an approximate plant food ratio of 1:3:6, we obtained the highest yield and the highest quality.

The Bent Grasses

(*From page* 14)

one millimeter or slightly less in width. If a plant is not crowded, the leaf blades may become as wide as seven millimeters. This variation is well illustrated in a lawn which has been untrimmed around the edges for some time. The stolons will extend into the pathway at the edge of the lawn, and the leaf blades on these stolons will be very wide and coarse, while in the lawn itself, the leaves will be narrow and fine.

"Despite the fact that creeping bent grass spreads rapidly, it is not likely to become a weed pest in cultivated land, because the method of spreading is on the top of the ground, not underground. In other words, it does not spread by underground rootstocks, but has merely a fibrous root system which is confined to a relatively small area. The stolons, which propagate the plant most rapidly, are killed if plowed under."

Most Americans designate redtop as *Agrostis alba.* They also designate the true creeping bent grasses as *Agrostis stolonifera,* while the Rhode Island bent grass usually is designated as *Agrostis vulgaris.* When purchasing bent grass seed, it is well to keep in mind these various species and be sure that not only the right species is obtained but the seed is pure.

A recent classification of bent grass is as follows: redtop, *Agrostis alba;* creeping bent, *Agrostis palustris;* colonial bent, *Agrostis capillaris;* and velvet bent, *Agrostis canina.* This classification is not very different from Dr. Malte's. It places redtop and creeping bent in different groups, which is desirable because of the great difference in their commercial value. The scientific names are somewhat different from Dr. Malte's.

Topping the Asparagus Market

(*From page* 12)

Whether it be for the purpose of supplementing the organic fertilizers used or whether it be to handle the feeding of the crop without organic fertilizers, the use of chemical fertilizers properly applied and in the right amounts and with the correct balance between the elements will always be a profitable business for the asparagus producer.

The chemist can analyze a quantity of asparagus and tell within narrow limits just how much plant food is removed per acre each year by the crop. The removal of spears and tops takes about 160 pounds of nitrogen, 80 pounds of phosphoric acid, and 200 pounds of potash from an acre planting of high yielding asparagus. This does not take into account the amounts removed by weed competitors of the asparagus crop.

Replace Plant Food Removed

To replace the amount of fertilizer removed by the crop each year with manure would require an annual application of 16 tons per acre, since that amount of fresh manure contains about 160 pounds of nitrogen, 80 pounds of phosporic acid, and 192 pounds of potash. A few extra tons of manure could be applied to allow for weed competition and to provide a surplus of plant food. The burning of the tops would return some plant food to the soil. Manure is a well-balanced fertilizer for asparagus.

To apply 160 pounds of nitrogen, 80 pounds of phosphoric acid, and 200 pounds of potash to the acre of asparagus planting with chemical fertilizer would require an application of one ton of an 8-4-10 goods. This analysis is not so very far removed from the 8-3-15 which the southern asparagus producer uses.

A comparative cost of the manure treatement at the rate of 16 tons per acre with the use of 2,000 pounds of chemicals containing the same amounts of nitrogen, phosphoric acid, and potash is interesting. If the manure could be purchased and delivered and applied to the asparagus beds for $4 per ton the total cost per acre would be $64. The value of the ton of 8-4-15 is about $50 plus the cost of application and the hauling from the station to the farm. On this basis it is entirely practical to supplement the use of barnyard manure with chemical fertilizers when the organic fertilizer supply is needed elsewhere or when the amount available is not sufficient.

Build Food Reserves in Roots

Whether manure is used alone or in combination with chemical fertilizers or whether chemical fertilizers are used alone, the object is the same, namely the building up of an abundant supply of reserve food in the roots of the asparagus plants. This building up of an abundant supply of reserve food in the roots goes forward during the growing season. The fertilizer program is built mainly around the idea of securing a maximum top growth during the time between the end of the cutting season, July 1, and the coming of the first killing frost in the fall.

Reserve food is stored in the large, fleshy root system of the asparagus plant during the summer and fall months. The following spring the roots which contain the most reserve food are best able to send up a large crop of spears. Anything which interferes with this storing-up of reserve food is sure to reduce the total tonnage of "Grass" harvested the following spring. Asparagus beetles are harmful, since they destroy the top growth. Cutting the top growth down before the first killing frost oc-

curs brings about the same result.

Not long ago it was thought that all fertilizer applications should be made about one week before the end of the cutting season. The most widely accepted method of fertilizing producing asparagus plantings now begins with the application of about 30 pounds of available nitrogen (100 pounds of nitrate of soda contains 15 pounds of available nitrogen approximately) before the cutting season begins. At the same time 120 pounds of phosphoric acid and 50 pounds of potash is applied. Muriate of potash is 50 per cent potash. The 20 per cent superphosphate contains 20 pounds of phosphorus in each 100 pounds of the superphosphate.

This early spring application is followed by another, one week before the end of the cutting season. At this time 60 pounds of available nitrogen and 150 pounds of potash are applied.

A third application is made 6 or 7 weeks after the end of the cutting season. Forty-five pounds of available nitrogen are put on at this time.

Keep Top Growth Vigorous

It is especially important that the top growth of asparagus be vigorous at all times during the growing season following the cutting season. Any time that the foliage is yellow and lacking in vigor during the growing season a top-dressing of nitrogen is needed.

The above applications of fertilizer call for 135 pounds of nitrogen, 120 pounds of phosphoric acid, and 200 pounds of potash. To translate such an application to analysis and pounds it would be necessary to call for a 6.75-6-10 at the rate of 2,000 pounds per acre.

A better understanding of the methods of fertilizing asparagus plants is possible when it is recalled that both carbohydrates (sugars) and proteins (nitrogen plus sugar) are found by the chemist in asparagus roots. The carbohydrates or sugars are manufactured in the leaves of the plants and are later stored in the roots. Translocation is made possible by the presence of potash. The nitrates are taken in by the roots and are later combined with carbohydrates to form the proteins.

When this storage of sugars goes on in the presence of the necessary amount of nitrates, the ratio of sugar to protein will be correctly balanced. In such a case the early spring application of additional available nitrogen will result in an excess which would disturb this balance. The early application of nitrogen may decrease the yield of spears in such a case.

A practical answer to the question of whether to apply nitrogen before the cutting season begins lies in observing the type of growth made the season before. When a good top growth is made each year, it is best to delay the early spring application of nitrogen until about the end of the cutting season. On old beds where the top growth may not be as vigorous as is desirable, the early spring application will be an advantage.

Fertilize for Maximum Yields

When the basic fertilizer program has been adapted to fit the needs of any particular asparagus planting, the grower will be in a position to obtain maximum returns over a long period of time. The cutting of maximum crops of asparagus year after year without replacing the ton or more of 8-4-10 used annually by the plants is very obviously impossible. The crop would soon eat up all the available soil fertility and a rapid deterioration of the planting would result.

Topping any asparagus market depends upon many factors, but chief among them is the knowledge of how to properly fertilize the crop. The object of fertilizing asparagus is that of securing a fast growing, luxuriant top growth which will in turn store reserve food in the roots. A profitable cutting of "Grass" normally follows the storing up of abundant supplies of reserve food.

The Vernal Yearn

(*From page* 4)

we sink temporarily in the dumps of despair over material achievement, will it not blast our chances of rendering some benefit to the things of the spirit, which are the plant food of men?

Perhaps we may agree to some extent with the statisticians who inform us that men beyond the middle forties seldom attain wealth, if they have failed to roll up the principal prior to that period. Beyond trying occasionally to get first prize in some weird word-juggling contest, I for one have given up any latent hopes of dining with Morgan, Rockefeller, or Insull. They say that accidents only bring fortunes to middle-aged men. Hence we may lay that aside as a sample of attainable desires for any April fantasy.

MORALIZING on the insecurity of such tangible fortunes or the hazard it brings to souls would be like the fox and the grapes, and I shall not inflict such a hypocritical philosophy upon you. We merely accept it as a sad fact of fate and pass it by. Besides, some of us shrubs never had the lucre chromosome in our sap anyhow, even though we originated in Scottish ground.

Beauty also is a thing apart from our yearnings, having been impressed upon us years ago by the simple method of comparison. Health is indeed the foundation of beauty, and if we possess that in some degree beyond our middle years, it should find us content.

Comfort and security no doubt head the list of the middle-aged heart's desires. When he can attain it without leaning upon the trellice-support of the new shoots about his roots, our older human shrub may well feel happy and strong for further service in the garden where he grows.

But all these items have related to self-preservation only, and having passed the "first law of the kingdom," we may switch our attention to another line.

Granting that we can dismiss wealth and beauty as goals for us who stand at the middle mile-post, then there is left one thing to us for consideration, and that is service. Here let us not be misunderstood. I have belonged to "service clubs," the meeting place of back-slappers at high twelve, the ring-around-the-rosy for office misanthropes, the starting point of drives wherein no hammer is tolerated. I give all just due to honest motives, for my best friends belong —yet we cannot call any side-line a hobby. And many of those attempts

at community service cannot well be counted as much more than passing whims to kill a bit of ennui.

What I mean is the fire of the zealot, the cranky notions of a delver after deliverance, the yearn for changes that are broad and deep enough to do some lasting good somewhere. Of course, we bread-winners lack the time to spend in firing mental furnaces, in delving after deliverance, or blasting new ditches for stagnant surface water which drowns a community. We must work for a dole. That is the easiest answer.

Yet two fabled children followed a bluebird and returned home again to happiness, and a man searched the wide world for diamonds and found a tiara in his own premises. If our own happiness is apt to be found near the home roosting place, then why despair of doing good in a similar environment? In facing that question we cannot answer with any answers yet given. We are too busy thinking our own thoughts, planning new essays or working out new problems, to see the chances we have to mix a little with the world and lift one gram of its trouble tonnages. In the main, that's the only answer.

When some slick little invention is patented and makes a fortune for a kid we knew as a dumb-bell, then we exclaim: "Why didn't I think of that?" When we read a grand poem or a thrilling sentiment we are apt to say: "I had just that same idea only last week." When we see a fine painting, perhaps we remember latent talents that time has buried and easel careers that were never realized, and the same thoughts come to us at concerts and dramas. Many a time I have claimed to be able to preach a better sermon than my reverend parson. It is just a human habit to see ourselves in triumph in some other man's boots.

Yet somehow we didn't find it possible to do *all* of those things that make up the total of worthy human achievements. We are lucky indeed if we content ourselves at such times in merely musing, instead of becoming jealous-minded and critical of the other man's success.

But, stop a moment. We picture ourselves quite often in such places of prominence and power, in positions of admiration and veneration — but how often do we yearn to take the place of those few fellows who bury themselves to do a good piece of construction work without salvos or high remuneration?

Just recently there returned for a short time to my city a friend of other years who has "buried" himself in a small Indian mission school in Chile. His life was described for you in the February issue of BETTER CROPS WITH PLANT FOOD. Evidently he did not spend much time yearning to pose aloft with the goodly array of talents he had acquired and inherited. He had many chances to do so, but he rejected them all to penalize himself with the Spanish language and the society of aborigines.

STILL another native of my State, quite capable of living on his well-earned war laurels, has spent his life in earnest devotion to a community of lepers on a lonely island in the South Seas.

Another acquaintance turned down several offers of good positions in a large city to remain as a rather obscure county school superintendent; but somehow merit leaks out, for he has originated some improvements in rural educational methods which have attracted national attention.

"Doc" Cook and Admiral Peary set

their hearts on discovery of the North Pole. They were both disappointed in one way or another, and the former spent some time repenting his folly in the booby-hatch. Yet another doctor went north about the same time to "Greenland's icy mountains," and quietly lent himself with all his surgical and sanitary skill to fostering the physical and social welfare of a frigid corner of the neglected universe. Who doesn't know something about Doc Grenfell of Labrador? I am prouder to have seen him and heard him lecture than my daughter would be to meet all the movie stars of Hollywood. In fact, between you and me and the non-conformist, I choose Grenfell to Byrd or Wilkins any time when it comes to doing something up where underwear is fleece-lined. But let's hasten from heresy.

THEN, of late we are challenged and swept away by the dramatic accomplishments of the great Mahatma Gandhi of Hindustan. Simplicity to the 'nth degree, courage and spiritual fire, and a love of humanity that defies caste or national barriers, have carried his name to the zenith among the world heroes of this century. A big front and avoirdupois did not win for Mohatma Gandhi, because he is a little mouse, weighing under one hundred pounds. This time the British lion met a mouse quite outside of the fable.

Just the other day I heard a Chicago professor who knows Gandhi tell how his creed fits into the proper attitude for agricultural cooperation. He told it to a big group of dirt farmers, too, and they believed it and accepted it—all of which proves to me that this old world is not all wrapped up in dollars and cents.

In more ways than one Gandhi is the "salt" of the earth. I presume we well-fed and fairly prosperous, oversold customers over here will never get into the mental state attained by Gandhi. If he has a bumpy mattress and a crust to match the hard beds and starvation of his own countrymen, it is all he asks. Maybe we can't very well be blamed for being born in the high standard environment in which we live. But I guess Mr. Gandhi doesn't cotton very much to what we call our religious devotion and expression. Sometimes I wonder if the Great Carpenter would either.

Self-denial and self-abnegation is mighty hard to put into practice in a land where the music runs to jazz and the neighbors have to be "kept up with." (I find it easier to "put up with them" than to "keep up with them.") But after all, right now in a period which *we* term a "depression" (which would be a marvel for India) it may be sort of sensible to get used to *not* keeping step with the saxophones, or running races on the concrete.

Then perhaps after we had browbeaten ourselves and intimidated the family into submission to economy and nine-o'clock retiring, we might get a glimmer of the inner light.

MOST of us have lived "fast" but have seldom experimented with a fast to get us into the proper reflective state of mind. I have a friend who thinks all there is to Gandhi's power is his emaciated condition through elimination of the surplus, as it were. I doubt it. I think he might have been equally great were he as big as Paul Whiteman or Chris Christensen.

Another fellow tells me it is the mystic hypnotic trance facilities which the orientals have at their command which enables Gandhi to get there with the mob. That doesn't satisfy me either, for many of us Americans get into the trance habit quite readily in one way or another without much success. He insists that Napoleon had that secret power of the sub-conscious mind, also; but if he did he had a chance to use it on the rock of St. Helena.

You see there are always plenty of chaps ready with some alibi, some excuse to prove that somebody else is

up to a slick racket or has a few extra aces up his sleeve. That usually happens in cases where a man makes a sacrifice or does a noble deed beyond the vision of the average eyesight. We will accept somebody's claim to wealth or mental ability, sight unseen, but when a quiet individual exhibits unusual spiritual qualities, his case is at once suspected by the Hawkshaws.

So the meat of this dish is to get ourselves into a frame of mind nationally where we can *trust* a fellow mortal as far with things of the heart and spirit as we do with some minor elements.

Unless we do get that attitude of open-minded trust in what is apparently good, how in the deuce are we ever going to encourage anybody to lean in that direction? So it's just about as much of a contribution to welfare for us to trust the other fellow's ideals as it is to have a stock of our own handy.

Thus I simmer down the kettle of stew for this month to the dregs—simplicity as an aid to better thinking and easier living, plus enough sensible faith and trust in the best of the rest of us to keep the world on the up-grade.

Reforming a ready-made nation is a bum job for one man. He usually has plenty to do in living a reasonable decent life according to standards he did not himself design. But, as the lawmakers carefully affix to a dubious statute:

"Nothing in this shall be construed" as making a nuisance out of "passive resistance," or failing to flog the tar out of intolerable conditions. Even Mahatma Gandhi would have to adopt that compromise creed if he lived in America.

Potash Pays

$1,500.00

for

The Best Answers to This Question:

"How does a top-dressing of 100 pounds of muriate of potash per acre help cotton to pay extra cash?"

First Prize $500.00

Second Prize $200.00
Third Prize $100.00

10 prizes of $25.00 each
25 prizes of $10.00 each
100 prizes of $2.00 each

RULES

1. This contest is open to any cotton grower and to any cotton grower's ife, son and daughter.

2. It is not necessary for you to have used potash top-dressing for you o compete. Simply write a letter giving our opinions of potash top-dressing or cotton.

3. If you wish you may mention results obtained on your own rm, or on farms or experiment stations ou have visited. You may also mention cts you have noted in potash advertsements, farm papers, fertilizer literare, or agricultural bulletins.

4. Answers are limited to 250 words. Write on one side of the paper nly. Be sure to give your name and ddress.

5. Letter-writing ability, spelling, grammar, etc., are of secondary importance. You must simply show yourself to be a keen observer of the beneficial effects of potash top-dressing in helping cotton to pay extra cash.

6. Your fertilizer man may be able to give you suggestions that will be helpful. Talk it over with him.

7. Address your answers to POTASH, 740 Hurt Building, Atlanta, Georgia. All answers must be received at this address not later than midnight, May 15th, 1931.

8. If you wish you may write this same address now for free literature which may help you to learn more about the advantages of using potash as a top-dressing.

9. Leading agricultural college authorities will select the winning letters in this contest.

you wish additional copies of this announcement to distribute nong friends who are eligible to enter this contest you can tain these by communicating direct with: N. V. Potash port My., Inc., 19 West 44th Street, New York, N. Y.

ALL JOIN IN THE DOXOLOGY

On a moss-grown tombstone was found the following:

"Here lies my wife, Samantha Proctor,
Who ketched a cold and wouldn't doctor.
She couldn't stay, she had to go—
Praise God from whom all blessings flow."

The MacTavish was not a mean man. No; he just knew the value of money.

So, when the MacTavish developed a sore throat he meditated fearfully upon the expenditure of a doctor's fee. As an alternative he hung about for a day and a half outside the local doctor's establishment. Finally he managed to catch the great man.

"Say, doctor, hoo's beez-ness wi' ye the noo?"

"Oh, feyr, feyr."

"Ai s'pose ye've a deal o' prescribing tae dae fer coolds an' sair throats?"

"Ap."

"An' what dae ya gin'rally gie fer a sair throat?"

"Naethin'," replied the canny old doctor. "I dinna want a sair throat."

GOOD SUGGESTION

"Willie," said the Sunday school teacher severely, "you shouldn't talk like that to your playmate. Had you ever thought of heaping coals of fire on his head?"

"No, ma'am, I hadn't, but it's a peach of an idea!"

CAUSED BY PROHIBITION

Soused Voice: "Hello, is this th city morgue? Well, this is the Medi cal School. We want you to com out and pick out the stiffs so the res of us can go home."—*Pitt Panther.*

A cowpuncher ordered a steak at restaurant. The waiter brought it i —rare—very rare. The puncher look ed at it and demanded that it be re turned to the kitchen and cooked.

" 'Tis cooked," snapped the waiter

"Cooked——" said our friend th puncher. "I've seen critters hur worse than that and get well."

Justice: "How did the acciden happen?"

Student: "I was just hugging curve."

Justice: "Yeah! that's the wa most of them happen."

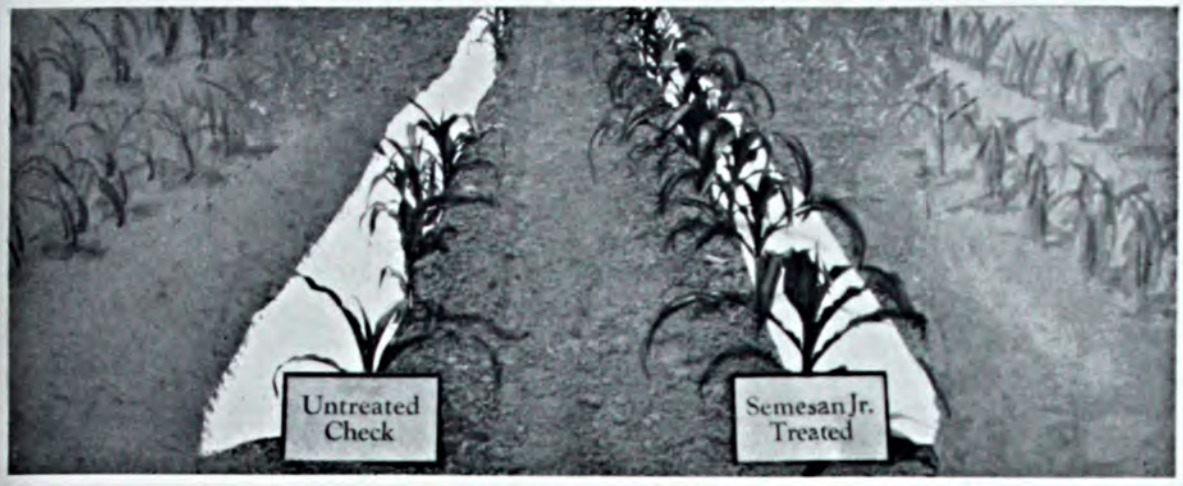
A Negro cook explains her famil affairs to her white mistress as fol lows:

"Yas'm, I got five chillun; I ha two by mah fus husban, an' one b dis Sam husban I got now—an' de I had two by mahself."—*The Visito*

NO MORE THAN FAIR

After terrific struggles, the fresh man finally finished his examinatio paper, and then, at the end, wrote:

"Dear Professor: If you sell any o my answers to the funny papers, I ex pect you to split fifty-fifty with me.



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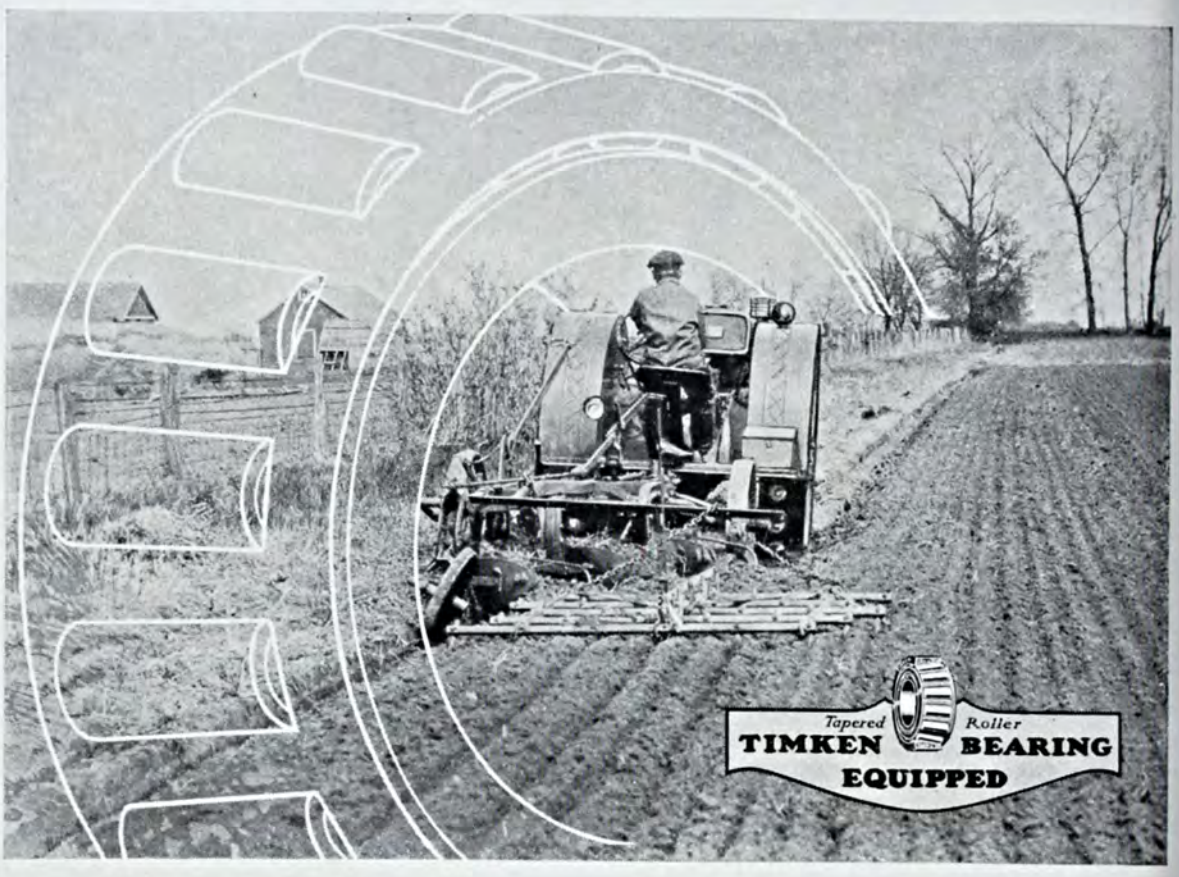

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The Whole Truth—Not Selected Truth

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

Editorial Offices: 19 West 44th Street, New York

VOLUME XVI NUMBER FIVE

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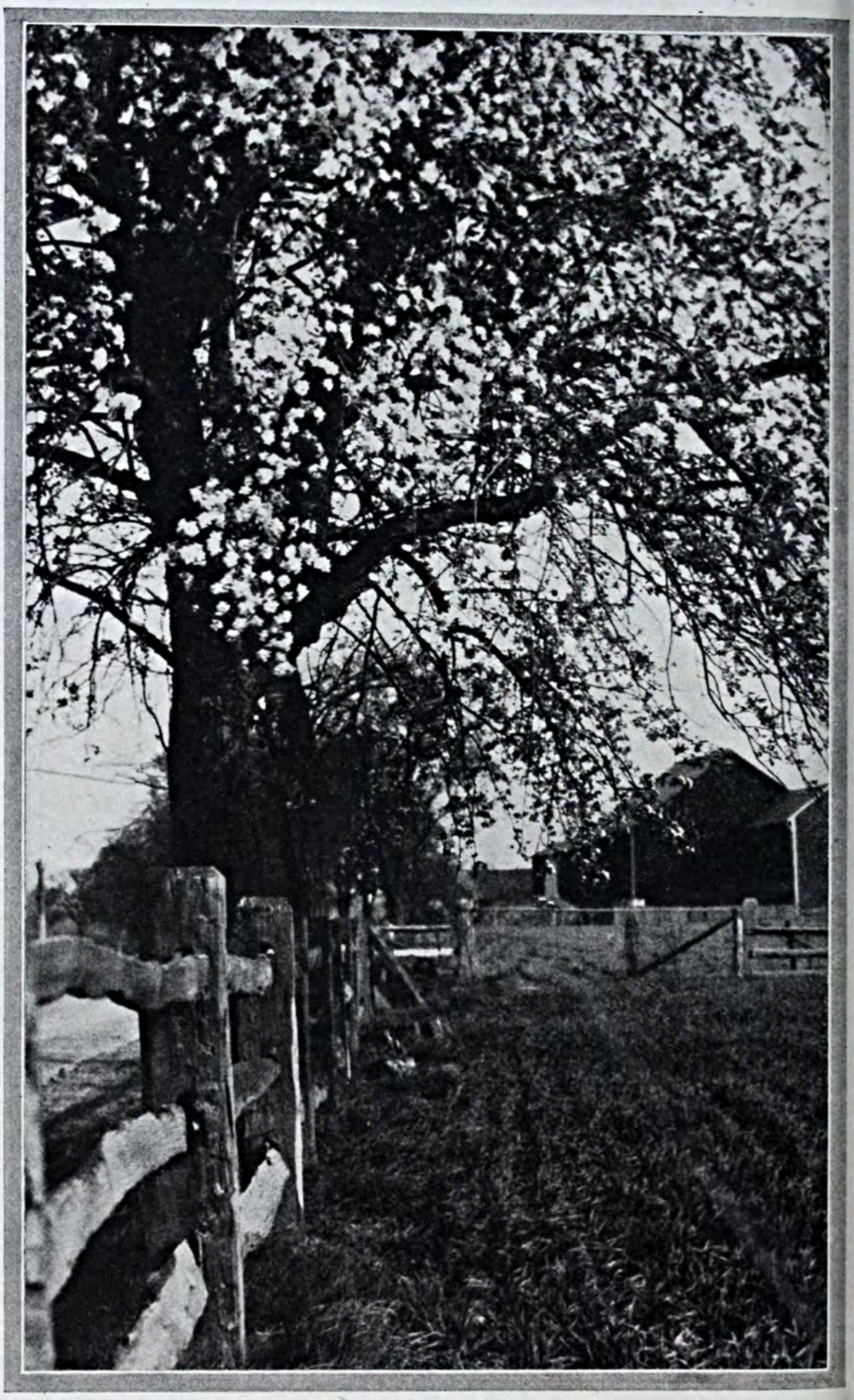

WHEN MAY BRINGS FORTH HER SHADES

Better Crops with PLANT FOOD

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VOL. XVI NEW YORK, MAY, 1931 No. 5

Credit Yourself — With — Piety Plus

By Jeff McDermid

SOMEHOW spring suggests preachers and long sermons, although this orthodoxy of mine may surprise you. It is because as a small boy I used to be forced into a pew on Easter Sunday when the first breath of the awakening woods and marshes wafted through the windows. Chaps about my age can share these memories of droning hours spent in protesting piety.

Father wiggled into his Sabbath regimentals after attending to the barn chores. His struggles with hardpan soil, white grubs, and the Deacon's mortgage on our farm were only matched in awkward intensity by the Boiled Shirt Bother. Fortunately it came but once a week, or when he was chosen to act as a pallbearer.

I can see him yet, through a misty vista, standing with legs encased in wrinkled red flannels, arms upraised in gyrations like a mystic Druid of eld, and his head and shoulders completely hidden in the knobby and scratchy confines of a laundered stiff "buzzum" pleated shirt. When his face emerged, red and wrathy, with a few razor nicks visible from a hasty shave, he shouted for Mother to fasten

his angelic collar and adjust his ready-tied cravat, the kind that fastened on with hooks. (Father preferred buckles and hooks for himself to speed preparations, even as he did for the draft horse harness.)

Whereupon he would glare at me and ask if I had blacked the family foot-gear. We didn't "shine" our brogans in those days. They were "blacked." Stoves were polished, but shoes were not. This smutty task in leather lacquering was mine on Sabbath mornings. Once I spilled part of a bottle of fluid shoe tonic into my Uncle Robert's best ones. That was the day I didn't go to church, and I spent the time pondering how one might induce more accidents to happen.

HOW many bushels of peppermint lozenges Father consumed at church in lieu of burley fine-cut, I dare not estimate. Mother's puffy sleeves, like fat Wiltshire hams at her shoulders, those fingerless mitts as she turned the pages of the hymn-book, the girlish be-ribboned braids in the pew ahead crying aloud for burdock burrs, the collection boxes with long handles like corn-poppers, and my red-haired chum who monkey-shined to give me the giggles—of such I fear were my rituals.

With tender humor I recall that time when Father was weary from a week of threshing and fell into a quiet, nodding slumber during a discourse by Reverend Porter on the text from Ephesians: "Awake, thou that sleepest and arise from the dead!" When he reached the "fourthly" of the sermon his words fell like sinkers on my bent head, and I nudged slyly at my sire. On went the solemn tones from the oaken pulpit:

"By one who sleeps we are to understand a sinner satisfied in his sins, contented to remain in his fallen estate and to live and die in it; one who is ignorant of his disease and the remedy for it; one who never regarded the voice of warning 'to flee from the wrath to come;' one that never saw his danger of hell fire or called out in anguish, 'What must I do to be saved?' "

There were probably many irksome things that my Father stood in need of being saved from; things perhaps more real to him than the visions of vitriol vouchsafed by the well-meaning minister. *Maybe* I was one of them, and I am sure the wrestling with our stony farm *was*. But our dear old Divine, like many others of his day in all creeds and of all cloth, thought chiefly of the world hidden behind the Veil of Mystery and promised in the allegory of the psalms. To be sure their ministry included its full share of sick visiting and family counsel, but the main reason they expected the parish to anticipate major rewards in Heaven was somewhat tied up with their own meager sustenance. Our own preacher never received more than six hundred dollars a year. Luckily, there was no gas tax!

SOME readers into whose hands this book may fall perchance have experienced no similar churchly conditions. Our family comes from no cathedral community and our sky-pilots labored in little meeting houses, white steeples among the hills. I stand on no specific creed, nor do I exclaim as did my zealous aunt of the home mission guild: "Why can't they all join one communion? Why can't they all be Methodists?"

Ecclesiastical tomes are not overwhelmingly preponderant in my library. (Excuse big words.) My library is good enough, what there is of it, and there is enough of it, such as it is. Not caring to be hypocritical, I frankly affirm that I get books for frequent reading purposes, not for historic value or pretty bindings to match the drapes. Hence I need explain little about the lack of sanctity in my sanctum.

Yet somehow I was left a legacy from the family before me which can-

(*Turn to page* 61)

This high-producing orchard has had complete fertilizer for years. A Neubauer test shows that the top 16 inches of soil contain 92 lbs. of available phosphoric acid and 254 lbs. of available potash per acre. The pH is 5.9. The sod is largely clover, alfalfa, and sweet clover.

Profitable Trees

By T. H. Blow

Springfield, Massachusetts

TESTS of 16 southern New England orchards show that the available phosphorus and potash are too low for good growth. The only exceptions are on three soils where complete fertilizer has been used for several years.

Soil samples of the top 16 inches of these soils were secured by making borings with a soil auger. In each orchard many borings were made so as to get representative samples. Neubauer tests were made of these. In this test rye seedlings are grown on sand and duplicated on orchard soil. At the end of 17 days the seedlings are analyzed for available phosphoric acid and potash. The amounts of available phosphoric acid and potash in the soil are determined by subtracting the amounts of the plant foods found in the seedlings grown on the sand from the amounts in those grown on the soil.

This method of determining the needs of the soil is being used extensively in Germany, where it was originated. Soils to be productive should show a reading of at least 2.5 milligrams of phosphoric acid and 10 milligrams of potash per 100 grams of soil. By multiplying the number of milligrams by 20, we get the number of pounds per acre. This means that a productive soil should contain 50 pounds of available phosphoric acid and 200 of available potash per acre.

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An Industry Rebuilt

By L. R. Combs

Extension Editor, Iowa State College

ANOTHER plant disease has met its Waterloo. More than 30 years ago an organism later identified as *Fusarium niveum,* causing watermelon wilt, ambushed itself in the soils of certain truck-growing regions. By 1905 it was becoming a serious enemy and by 1915 it had driven truck farmers from thousands of acres of melon-growing land.

For 10 years the growers fought a futile war against this disease. They tried various methods but to no avail. Then scientists from Iowa State College, plant pathologists trained in the methods of plant disease warfare, moved quietly into the field and arrayed their knowledge of plant breeding, their laboratory and greenhouse equipment, and unmeasured patience against the deadly wilt.

In 1930 fields in southeastern Iowa, one of the important melon-growing centers, which had not produced a crop for 15 or 20 years and which had been infested with the wilt organism all that time, produced crops of marketable melons. Seed produced in those fields will be distributed among commercial growers and used to grow 4,000 or more acres. These 4,000 acres will produce 2,000 to 3,000 cars in a territory where the number of cars of melons shipped out during the past 10 years has been negligible. It is predicted on good authority that within a few years this seed will enable melon growers all over the Midwest to produce melons regardless of whether *Fusarium niveum* lurks in the soil or not.

Acres Abandoned

Muscatine Island, sometimes called the gateway by which sub-tropical crops are brought to the door of Iowa, where once grew field after field of green-backed, red-fruited melons, now lies idle and barren. In no place in America is there soil better suited to the production of melons and other truck crops than in this area, once an island in the Mississippi, now filled in on one side and connected to the mainland. Here and along the Mississippi River Valley in southeastern Iowa lie thousands of acres of soil unsurpassed for melon growing. That is, it was unsurpassed until wilt early in the twentieth century began to infest the soil

The above picture shows just a few of the thousands of acres abandoned in southeastern Iowa because of watermelon wilt. In the background may be seen the abandoned house and buildings of a former farm home.

and take its deadly toll each year. A trip through this territory at any time during the past half dozen years or at the present reveals farm after farm abandoned, overgrown with weeds. In the background may be seen tumble-down barns and unpainted, weather-beaten houses, mute evidence of the disastrous effect of the attack of the *Fusarium niveum* which forced the owners to seek other occupations.

Here are seeds drying in the sun after being taken from the melons. Enough seeds are shown here to plant hundreds of acres.

Some farmers have turned to other crops, but few have been able to make the profit which melons made for them. The abandoned acreage was too large to turn over altogether to production of sweet potatoes and cantaloupes. In other parts of Iowa and in other Midwestern States are many districts where watermelon growing has diminished to one-tenth or less of its former importance and profitableness.

Watermelon Day

At one time the towns in southeastern Iowa, Conesville, Muscatine, and others, were veritable beehives of industry during the melon-shipping season. A visit to one of those towns in late August or early September would have revealed trainloads of melons on the track ready to be shipped out. "Watermelon Day," a festival occasion observed in many of these towns at that time, brought farmers and townspeople by the hundreds to the center of activities. Farmers would drive from miles around bringing with them wagonloads of melons. These melons would be used to feed the crowds in celebration of the completion of another successful season. "Watermelon Day" to these people meant what "Apple Blossom Festivals" mean to northeastern Kansas and what Wheat Festivals mean to the wheat belt.

Although the watermelon industry does not rank in general importance with that of wheat growing and hog or cattle feeding, it is important where truck crops are grown. The loss of this crop in areas suited to melon production is serious when it is realized that much of the land which will return a net profit of more than $100 an acre when in melons will not produce much more than 10 bushels of corn to the acre. The pathetic part of the whole situation in Iowa is that the State once produced enough melons for her own use and shipped out thousands of carloads to other States. For the past few years she has been buying them and paying high interstate freight rates.

Records of the W. H. Hoopes and Sons firm of Muscatine, formerly one of the largest produce houses handling melons in that territory, give evidence of the disaster suffered by the melon-growing industry. In 1906 this one firm alone shipped 139 carloads. In 1912 the shipment had increased to 305 cars. By 1915—the wilt was getting a good hold in the soils by this time—the shipments had drop-

Watermelons from which seeds are to be taken are "threshed" or ground up in a machine such as shown above. The resulting pulp is placed in barrels and allowed to ferment while the seeds go to the bottom after which they are washed and dried.

ped to 40 cars; in 1916, 72 carloads; and in 1917, 48 cars. By 1925, 36 carloads were shipped and in 1926, only 23 carloads. The estimated total for 1928 was 15 cars. Had not wilt virtually destroyed the industry, it is probable that this firm would now be shipping more than 500 cars if the business had continued to grow as expected.

Thus the melon-growing industry has declined to about 10 per cent or less of its former importance. The acreage of melons in Iowa in 1900 was 10,000, while in 1926 it was 1,041 acres. In Lee, Louisa, and Muscatine counties the acreage dropped from 8,000 in 1900 to 641 in 1926, or to eight per cent of the acreage in 1900. Fields which once produced crops of melons have lain idle for 16 years or more.

The Coming of the Scourge

The prevalence of watermelon wilt was first noted in the South in 1894 by E. F. Smith, a plant pathologist of the United States Department of Agriculture. About 1900 it was generally noticed by growers in Iowa, many of whom thought it was the result of activities of a root-boring insect. George Van Horn, Conesville, Iowa, one of the oldest growers in that section, says that he first noticed in 1896 what was later identified as wilt. By 1905 many growers found it unprofitable to grow melons on land which had been in that crop continuously. George Corwin, Fruitland, also noticed that wilt was becoming a serious factor by 1900. By 1919 the acreage had been reduced 65 per cent, and as the soil became more generally infested, melon growing was almost abandoned.

Growers would plant their seed in the spring and hope for a good crop. The plants would come up strong and green. Then one day the farmer would notice the plants wilt in the heat of the day. They might recover at night, but within a few days the leaves would turn a sickly green with yellow edges and in a short time entire fields would be dead, labor and seed wasted and prospects of a crop and any return from the soil ruined for that year. In some cases the plants "damped-off," that is, the tissues at the soil line became weakened, the plants fell over, and soon died. If none of the above symptoms were shown, the plants might appear stunted as if plant food were lacking. Sometimes the seed did not even germinate; the fungus of the wilt strangled the plant before it could break through the surface of the soil.

The Call to Arms

But the melon growers did not sit

calmly by and give up their land without a struggle. In January, 1925, they held truck growers' institutes at Muscatine and at Conesville. J. J. Wilson, county agent in Muscatine at that time, was instrumental in getting the work started. He has "grown up" with the wilt-resistance development and in 1929 took charge of the field work there. These institutes were attended by members of the Iowa State College staff who had been interested in the problems of the truck growers for some time. Among these college men was D. R. Porter who did much of the work in developing the new varieties. The growers asked for help in solving their problem. The next year work was under way. The Conesville Experiment Association was formed. The College agreed to furnish an investigator and to supply seed, labor, materials, and greenhouse facilities while the Association would furnish a field laboratory and sufficient land on which to conduct experiments.

Turn to Wilt Resistance

It was known that the only practical solution of the problem was the development of wilt-resistant strains. No dust or other seed treatment could be found which would control the wilt. Growers and college men had noted that there seemed to be slightly less wilt in plants grown on soil which had been treated with certain fertilizers. However, tests showed that there was no appreciable difference between the amount of wilt in plants grown on soil treated with lime, commercial fertilizers, or barnyard manure and that in plants grown on untreated soil. Crop rotation helped little. A field which produced a poor crop of melons because of wilt in 1910 laid idle for 16 years. Melons were planted in 1926 and wilt killed more than half the vines.

However, it was known that some varieties of melons were more resistant than others and that some of the unedible citrons were almost 100 per cent resistant. Herein, scientists concluded, lay the solution of the problem of rebuilding the melon industry. This work has been done by various members of the Iowa Experiment Station staff under the direction of I. E. Melhus, now head of botany and plant pathology at Iowa State College.

Find the Strain

In 1925, Dr. O. H. Elmer and Dr. S. M. Dietz were inspecting a field of melons on the farm of Frank Everett, near Oskaloosa, Iowa. They noticed

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Everyone likes a nice, juicy slice of watermelon and these truck farmers are sure appreciating their own product. This group is eating "Pride of Muscatine" on the Roy Jean Farm in southeastern Iowa where melons had not been raised for 15 years because of the wilt organism in the soil.

Better Sweet Corn

By R. F. Thomas

Houlton, Maine

FOUR fertilizer demonstrations were carried on in central Maine last year to check up the Hoffer stalk test as a diagnostic agent for the fertilizer needs of sweet corn. Stalk tests made in 1929 on three of these farms indicated that fertilizers higher in potash would increase yields. The 1930 results showed that the extra potash increased the yields of cut corn as much as 1,227 pounds per acre, the average being 855 pounds.

In 1929 the Hoffer stalk test was made on 33 sweet corn fields in central Maine the latter part of August. Representative stalks were selected in each field. Each stalk was split and a chemical used between the nodes to determine whether the plant had received sufficient nitrogen. Abundance of nitrogen was shown by the stalk turning blue. If nitrogen was low, no color developed. Another chemical was applied to the joints or nodes of the split stalks. If a red color developed it denoted the presence of iron. Excessive amounts of iron in the node stops the circulation of the plant and results in decreased yields. Excessive iron in the nodes indicates that the corn is not getting enough potash.

Show Need for Potash

Very few of the corn fields tested in 1929 showed lack of nitrogen. When fertilizers containing 4 per cent of potash had been used, 78 per cent of the fields had more than the normal amount of iron in the nodes of the corn plants. Where fertilizers containing 7 or more per cent of potash had been used, only 14 per cent of the fields had corn with excessive iron in the nodes. Practically all of these were fields where extra nitrogen had been used in addition to the regular fertilizer.

In 1930 fertilizer demonstrations were started on four farms where the Hoffer stalk test had indicated that more potash was needed. Three fertilizer treatments were used: 1, fertilizer with 4 per cent potash; 2, fertilizer with 4 per cent potash and extra muriate of potash applied before corn was planted; 3, fertilizer with 10 per cent potash. The following table gives the results of these tests:

Cooperator	Yields in pounds cut corn per acre with these fertilizer treatments		
	4-8-4	4-8-4 & potash	4-6-10
S. W. Fuller, Albion, Maine	3,333	3,600	4,431
J. Fritz, Hartland, Me.	2,200	3,014	....
L. E. Libby, Hartland, Me.	2,929	4,156	3,480
H. B. Crouse, Dexter, Maine	2,756	3,156	3,068
Average	2,804	3,481	3,659
Value per acre	$84.12	$104.44	$109.78

All of the fields except that of Mr. Libby had had heavy applications of manure which probably explains why the plot which received the highest amount of potash gave the highest yield. The extra potash cost $5 per acre in the muriate of potash and $3.16 in the plot receiving the 4-6-10. After deducting the extra cost of the fertilizer the margin was $15.32 and

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Onions fertilized with 500 lbs. of 4-8-6 per acre yielded a carload per acre on the farm of Millard F. Thomas near Henryetta, Oklahoma. This year Mr. Thomas is using a 4-8-10 fertilizer on 200 acres.

Knowledge Precedes Action

By L. J. McDonald

Agricultural Agent, Chamber of Commerce, Henryetta, Oklahoma

SOME communities get the cart before the horse. Such is not the case with the Henryetta Chamber of Commerce. This group of Oklahoma business men have promulgated the idea that knowledge must precede action.

It was some seven years ago that this industrial city decided that the agriculture of the district must keep pace with industrial growth; therefore, a man trained in scientific agriculture as well as the practical was employed as secretary. Although changes have occurred in the personnel of the office, men of like training have always been at the helm of agricultural development. The field demonstration method has been and now is the basis of all recommendations in furthering the agricultural development. Results chart the course to be followed.

Since the inauguration of this program there has been a marvelous transformation in the agriculture of the district. "King Cotton" has been dethroned, losing his enviable position as the only source of a cash income. Farmers have found that there are many other crops that have a cash value when harvested and supply the table with the necessities of life at the same time. This has been a distinct advantage to the business men, as the cash income of the farmers has been

distributed throughout the year. Strawberries, onions, grapes, Irish potatoes, sweet corn, and soybeans are the leading new cash and food crops being grown.

To grow the new crops is not sufficient. High yield per acre is the advice of the agricultural secretary. Demonstrations in the use of certified seed and commercial fertilizers are the order of the day. These have given uniformly successful and convincing results. These demonstrations have opened new avenues of income that were little dreamed of by farmers a few years ago. The farmers now demand a complete high analysis fertilizer such as 4-8-6 or 4-8-10.

Millard F. Thomas, prominent farmer, relates an interesting story that is typical of the district. "Seven years ago I was growing onions and irish potatoes and was fairly well satisfied with results. My onions produced a bumper crop when they made 150 bushels per acre. One hundred bushels of irish potatoes per acre were considered an excellent yield. I did not pay a great deal of attention to seed and never used any fertilizer.

"In 1930 I harvested more than 450 bushels of No. 1 onions per acre and averaged 250 bushels of U. S. No. 1 potatoes on 40 acres. I attribute this increase in yield to using 500 pounds of 4-8-6 per acre on my onions and 400 pounds on my potatoes. This year I am using mostly 4-8-10 on my 200 acres of onions and will apply 500 pounds per acre. My potatoes will be from good seed and I will apply 500 pounds 4-8-10 on my best land. I expect to have over 100 acres in potatoes. I would not think of trying to grow a crop of onions or potatoes without using commercial fertilizer."

C. F. Young, who has farmed for the past 25 years near Henryetta, conducted an oat demonstration that proved conclusively that pure seed and fertilizer would greatly increase the yield. Certified seed plus 200 pounds of 4-8-6 yielded 55 bushels per acre as compared with a 25-bushel yield where common seed and no fertilizer were used.

Stress Soil Building

Soil building has kept pace with the commercial-fertilizer and pure-seed program. Corn alternated with cowpeas or soybeans has become a fixed practice on many farms. The soybean acreage received a great stimulus last year when an entire car of seed was shipped into the district. Approximately 5,000 acres of soys was the result.

Perhaps the greatest menace to soil fertility in Eastern Oklahoma is soil erosion. Thousands of tons of humus and plant food is washing away every year. In an effort to retard this great loss and to rebuild the soil fertility, a terracing program has been inaugurated.

Terracing demonstrations have been conducted throughout the district where farmers, school teachers, and 4-H club boys have been taught how to terrace the farms. Hundreds of acres have been terraced this year and indications are that the farmers of this

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The Henryetta District Fair had more community exhibits than any fair in Oklahoma in 1930. This shows 9 of the 15 agricultural exhibits.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

AGRICULTURAL educators, research workers, students, farmers, and a host of friends in many different walks of life, were shocked and saddened when a press dispatch brought the news that on March 23, 1931, Dr. L. H. Pammel, professor emeritus of botany at Iowa State College, had passed away. He died on the train, somewhere near Ogden, Utah, while in company with Mrs. Pammel, on the way home from spending the winter in California.

On March 26, he was laid to rest in the College cemetery at Ames, after an impressive service at St. John's Episcopal church where, for twenty years, he had been a senior warden and lay reader. Present at the service were Mrs. Pammel, her six children, and many sorrowing associates, students, and other friends.

The Ideal Scientist

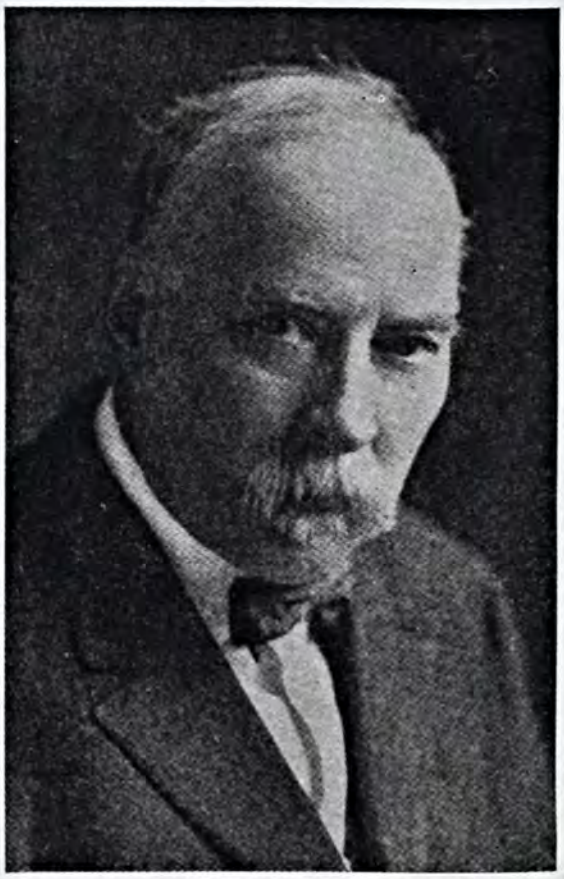
For more than forty years, Dr. Pammel had served in an enthusiastic and masterly way on the faculty of Iowa State College. His work was not only scientific in high degree but of great practical value to all who have to do with the conservation of the beauties and riches of Mother Earth, and the productions of her vegetable and animal kingdom. He had, withal, what Dr. O. H. Cessna, College Chaplain, termed, "A fine spirit of courtesy and an appreciation of things that make life worth while." His students loved him as a sincere sympathetic friend and wise counsellor who, on many occasions, acted kindly as a father *in absentia* when they were discouraged or perplexed.

Of him, President R. M. Hughes of Iowa State College said: "I have never known a man more enthusiastic about his own field or one who drove forward more persistently in the advancement of the causes to which he was devoted. In a very great number of ways he typified the ideal scientist."

Dean Charles F. Curtiss of the Iowa institution esteemed him as "a broad-minded, well-trained scientist, whose influence and service extended beyond the scope of his particular field —a man of far-sighted vision who served the State of Iowa in such an able manner that he leaves behind him an enduring record of deep conviction, worthy purpose, and high ideals in public service."

In his tribute, Dean Anson Marston testified that as an educator Dr. Pammel always emphasized effectively ideal motives, as contrasted with those of self interest, and was responsible, in a large way, for Iowa State College having one of the few strong herbaria in the Midwest. "Probably," he added, "the greatest gift to the State was his effort in the interest of conservation of the beautiful and historic spots in Iowa, as the first chairman of the State Board of Conservation. Dr. Pammel did these things in addition to building up a well-rounded department of botany."

It is interesting to note that Dr. Pammel was not only one of the most eminent botanists of his day, and especially in his intimate knowledge of poisonous plants, their effects upon farm animals, and methods of combating the pests and remedying their ill-effects, but a notable figure in the field of bacteriology. Dr. R. E. Buchanan, Dean of the Bacteriological Department at Ames, relates that in 1889 Dr. Pammel began teaching the subject to students of agriculture, science, veterinary medicine, and home economics, and continued the work during the following fifteen years. "He was one of the first, I believe the first," said Dr. Buchanan, "to teach bacteriology in a land-grant college, and one of the first to demonstrate in his research laboratories the causal relationship of bacteria to plant disease." This eminence in bacteriology, as well as botany, and all kindred subjects, indicates the keen interest Dr. Pammel took in many and diverse fields.



DR. L. H. PAMMEL

Dr. Louis Hermann Pammel was born at La Crosse, Wisconsin, April 19, 1862. His parents moved with him to a farm in State Road Coulee. There he spent his boyhood days, living in a log house, doing chores, and attending the local country schools. Later he studied in a business college and afterward took special instructions in history, languages, algebra, and other subjects, preparatory to entering the University of Wisconsin. There he received his Bachelor degree in agriculture in 1885 and his Master degree in 1889. In 1898, the degree of Doctor of Philosophy was conferred upon him by Washington University, St. Louis, Missouri. In 1925 the University of Wisconsin honored him with the degree of Doctor of Science in recognition of his notable research work relative to the cotton root rot and other important accomplishments.

After graduating, Dr. Pammel acted as private assistant to Dr. W. G. Farlow of Harvard University, from 1885 to 1886. Then he was assistant to Dr. William Trelease of Shaw School of Botany, St. Louis, 1886-1889, and spent the summer of the latter year in studying the root rot of cotton at the Texas Agricultural College Experiment Station. Later that year he became Professor of Botany in Iowa State College, and from 1892 he was botanist of the Iowa Agricultural Experiment Station. During 1900-1901 he studied forage conditions in Iowa, Nebraska, and Colorado for the Division of Agrostology and the Bureau of Forestry of the U. S. Department of Agriculture. Then he studied fungus diseases of Rocky Mountain trees, and the sheep grazing problem. Since 1908 he was collaborator of the U. S. Department of Agriculture, Bureau of Plant Industry, and in 1913 he was field agent for the Bureau of Plant Industry in cereal disease investigations.

Among his official positions of honor may be mentioned the following: President Botanical Society of America, Taxonomic Section, 1920-1929; Vice-president, Section G, American Association for Advancement of Science; President of Iowa Academy of Science, 1893 and 1923; President of Iowa Park and Forestry Association, 1905-1907; President Iowa State Board of Conservation, 1918-1927; Secretary General, Phi Kappa Phi, 1911-1923; President General, Phi Kappa Phi, 1923-1927; Member of Iowa Forestry Commission appointed by Governor Carroll to attend the Forestry Congress in Washington, D. C. He was also a member of the Board of Iowa Geological Survey, 1894 and 1923; American Society of Bacteriologists; Biological Society, Washington; Academy of Science, St. Louis; the British Ecological Society; and Deutsche Botanische Gesellschaft.

A Distinguished Author

Dr. Pammel was also well known as a voluminous and instructive writer. He published some 400 notable papers pertaining to various phases of botany, and delivered many lectures on like subjects. These publications and addresses covered a wide field, including education, morphology, biography, taxonomic botany, weeds, bacteriological subjects, plant pathology, ecology, and conservation. The veterinary profession was indebted to him for hundreds of instructive articles on poisoning of animals by noxious plants, published in various issues of *Veterinary Medicine,* and other journals, and for his *magnum opus*—"A manual of Poisonous Plants"—the standard textbook on the subject. Volume I, was published in 1910 and contained 150 pages, and Volume II, published in 1911, contained 977 pages in small print, and was profusely illustrated. The amount and variety of matter in these books is simply amazing, and the authenticity of their statement appealing. They evidence a prodigious amount of labor. Only a man of untiring energy could have produced them. The author consulted and quoted hundreds of authorities, at home and abroad. His colleague, Dr. R. E. Buchanan, contributed the section on the Schizomycetes, and Professor A. A. Bennett, the chapter on the active principles of plants. Some of the drawings were made by Dr. Pammel's daughter, Miss Lois.

Despite the vast amount of material contained in these books, its author modestly said in the preface to Volume I, "The work does not pretend to be complete. We hope, however, that it may prove useful to veterinarians, physicians, and laymen." That his hope was realized, the writer of this biography can certify, for the text is in use in agricultural institutions, the veterinary colleges, and the libraries of practising veterinarians and physicians throughout the land. Personally, we refer to it year after year, and each time are impressed with its scope, detail, and authoritative matter. If any struggling young producer of "another text-book" becomes discouraged with the writing of one or two-hundred thousand words, let him turn to Dr. Pammel's monumental tome and congratulate himself that his task is infinitesimal in comparison. The Manual is out of print, but its author purposed publishing a revised edition, a fresh demand for it having arisen.

Among other works written by Dr. Pammel were: Weeds of Farms and Gardens: Weed Flora of Iowa; Grasses of Iowa; Honey Plants of Iowa, with Miss C. M. King, and Prominent Men I Have Met.

The biographies written by Dr. Pammel in the last-named publication always will be treasured as of supreme interest. They gave deserved credit to eminent men who might, otherwise, have had little recorded recognition. The men so honored included: Professors J. L. Budd, Alfred R. Wallace, and Seaman Ashel Knapp, and Dr. William Trelease, Dr. William Stalker, Hon. James Wilson, Dr.

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A narcissus field in bloom in the Valley of the Mountain.

Narcissus Production *in the* Pacific Northwest

By H. D. Locklin

Horticulturist, Western Washington Experiment Station

DURING recent years, the production of flowering bulbs has become an important commercial horticultural industry in the United States. Although figures on total values are not available, according to the Bureau of Agricultural Economics of the U. S. Department of Agriculture, bulbs are being grown in practically every State. After six years of commercial growing, the production of the hardy narcissus in the Pacific Northwest is firmly established.

On January 1, 1926, the Federal Government placed an embargo on the importation of all narcissus bulbs to prevent the introduction of serious insects and diseases from foreign countries. Only a limited amount of planting stock was permitted entrance and this was allowed to come in only under special permit and then only when a supply of that variety was not available in the United States. Sixty-five to seventy-five million narcissus bulbs had been coming in annually from other countries. Since these bulbs could not be imported from the usual sources, they had to be grown within the country.

Growers in various parts of the United States started importing planting stock. The Paper White and other tender varieties were planted only in the Southern States. Plantings of the hardy narcissus or daffodils were made in several of the Middle Atlantic Coast States, in a few Northeastern States of the Mississippi Valley, and in the Pacific Northwest. Of all parts of the country, western Washington and western Oregon have been the most successful to date. This has been true because the climate and soil in this section are nearly ideal for the daffodil. The winters are mild, allowing abundant root growth. The springs are cool during the blooming season. Throughout April, May, and June, when the bulbs are sizing up, the weather is warm but not hot. By harvest time the air and soil are dry. The bulbs are partly cured when dug. The cool nights during July, August, and September prevent high temperatures in storage. This largely prevents basal rot. Northwest-grown bulbs ship and store well. The sandy loam, silt loam, and muck soils of this section of the United States have produced large sized bulbs of very good forcing quality.

Replace Importations

Practically all the planting stock in the United States originally came from Holland. For the four-year period preceding the application of the quarantine, the imports on all kinds of narcissus for the entire country increased from 77,193,281 bulbs in 1922 to 142,384,199 bulbs in 1925. Except during the last year of this period most of these bulbs were used in the usual trade channels and were not planted for commercial culture. The next four years (1926 to 1929 inclusive) the country imported a total of 69,531,375 bulbs or an average of over 17,000,000 bulbs per year. During this same four-year period, Washington alone imported 10,152,035 bulbs, or over one-seventh of all imports for that period. Oregon imported 1,949,659 for these four years. It should be remembered that all narcissus brought in after 1925 could be used for planting purposes only and had to be grown two years before being sold for commercial uses.

In the fall of 1930 there were approximately 325,000,000 narcissus bulbs in the United States. Of this number 130,000,000 were of the hardy narcissus or daffodil type. Washington planted 54,471,235* daffodils in 1930, or nearly one-half of this class in the country. Pierce county alone planted 33,640,839* daffodils last season. King, Whatcom, Cowlitz, Thurston, Clark, and Snohomish counties have large plantings. In Oregon most of the daffodils are grown in the Willamette Valley.

Narcissus are grown on various kinds

* Figures furnished by the Washington State Department of Agriculture.

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SPRING GLORY (Narcissus)

Southern Potato Profits

By G. C. McDermid

Charleston, South Carolina

POLITICAL observers always watch elections in Maine, for they say, "As Maine goes, so goes the Nation." But truck farmers are more interested in large yields per acre, than they are in elections. In many instances by careful observation and tests, farmers have shown that "As potash is increased, yields go up." Splendid proof of how potash increases yields is found in results from a test with potatoes carried out by Hal Hetzel, District Manager of the American Fruit Growers, Inc., on their Daniels Island (South Carolina) farm,

The table given below shows just why Mr. Hetzel was so pleased with the results he obtained:

All plots were one-half acre each and were fertilized on February 10 at the rate of 2,000 pounds per acre, the fertilizer being broadcast with a regular broadcast distributor. The soil was about as nearly uniform in all plots as was possible, with the exception of Plot 3, which contained a rather large deposit of oyster shells. The season, as a whole, was not favorable, to the South Carolina "trucking" belt. Very heavy, early rains, just after planting time, gave many farmers grave concern as to whether or not they would get a stand. A long, dry spell, lasting until digging time, followed this wet season. The soil

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	Plot No.	Fertilizer analysis (NPK)	Fertilizer per acre	Yield per acre (bu.)	Grade	Value per acre	Increase due to potash
1st Series	1	5-7-5	2,000 lbs.	93.6	US No. 1	$124.80	check
				45.6	US No. 2	30.40	plot
	2	5-7-7	2,000 lbs.	128.4	US No. 1	171.20	
				46.8	US No. 2	31.20	$47.20
	3	5-7-9	2,000 lbs.	112.8	US No. 1	150.40	
				66.0	US No. 2	44.00	$39.20
	4	5-7-11	2,000 lbs.	134.4	US No. 1	179.20	
				57.6	US No. 2	39.40	$63.40
2d Series	5	7-7-5	2,000 lbs.	97.2	US No. 1	129.60	check
				48.0	US No. 2	32.00	plot
	6	7-7-7	2,000 lbs.	129.6	US No. 1	172.80	
				69.6	US No. 2	46.40	$57.60
	7	7-7-9	2,000 lbs.	133.2	US No. 1	177.60	
				56.4	US No. 2	37.60	$53.60
	8	7-7-11	2,000 lbs.	147.6	US No. 1	196.80	
				54.0	US No. 2	36.00	$71.20

Stepping up the potash in the fertilizer increased the yields: (Left to right) 2-12-18 fertilizer, yield, 16.1 tons; 2-12-12, yield 14.8 tons; 2-12-6, yield 14 tons; 2-12-0, yield 12.2 tons.

Tomatoes *for* Canning

By E. R. Lancashire

Vegetable Specialist, Ohio State College of Agriculture

A TOMATO grower at Oak Harbor, Ohio, thoroughly convinced both himself and his neighbors that applying commercial fertilizers is a decidedly profitable practice. He had 2.88 acres of tomatoes planted and he put on 1,000 pounds of an 0-12-12 fertilizer at the rate of 600 pounds per acre. That part of the field which received the fertilizer produced 20 tons per acre; the part of the field which received no fertilizer produced 10 tons per acre.

The soil in this field was a very black silt loam. The average yield for the whole field was about 16.1 tons per acre. The 600 pounds of 0-12-12 used per acre cost approximately $10 and the increase of 10 tons of red ripe tomatoes produced on each acre which was fertilized sold for $110 leaving a profit of $100 per acre in favor of the fertilizer or about 1,000 per cent on the investment for a 150-day period. Figured as a banker would see it this farmer made 2,000 per cent on his $10 investment in fertilizer.

The use of commercial fertilizer pays maximum dividends only when the supply of organic material in the soil is satisfactory. When such a condition exists, the moisture capacity of the soil is usually sufficient to insure the optimum use of commercial fertilizer by the tomato crop. To obtain the full benefit of commercial fertilizer on the tomato crop, it is important first to build up the organic supply of the soil to a point where it will be able to make maximum use of such applications.

Sandy soils frequently are deficient

in both nitrogen and potash. All the soils in Ohio are deficient in available phosphoric acid except those that have been used for vegetable production for several years. Light colored soils are deficient in nitrogen unless they have had liberal applications of fertilizer and manure. Heavy applications of manure increase the nitrogen and potash content of all soils. Potash is frequently deficient in dark colored loams, silts, and clay loams which are well supplied with organic matter.

A minimum of 500 pounds of a well-balanced commercial fertilizer can profitaby be used on each acre of soil planted with tomatoes. Applications of more than 500 pounds per acre are recommended only when the grower knows through experience that it is practical for his particular field.

Time of Application

Since a complete fertilizer contains available nitrogen which is readily leached from the soil, it is best to apply such a fertilizer just before setting the plants. The most economical and satisfactory way to apply the fertilizer is with a grain drill. If satisfactory tools are available, hill or row applications (200 to 400 pounds per acre) of a complete fertilizer are often a profitable supplement to the broadcast applications. Potato plants with fertilizer attachments could be used to make row applications. Tomato transplanting machines equipped to apply fertilizer in the row are now on the market.

Fertilizers should be drilled in three to four inches deep so that they will be fixed in the soil at a depth where tomato roots are most abundant. Phosphoric acid and potash do not move up or down in the soil as readily as nitrogen does. Phosphoric acid and potash remain very nearly where they are placed and so it is desirable to work the fertilizer well down into the soil where the roots of the plants will be able to reach it.

The recommended fertilizer on light colored silt and clay loams is a 2-14-4 under Ohio conditions. When these soils have not been manured or built up with legume crops, the additional use of 100 to 200 pounds per acre of a nitrogen carrying fertilizer such as nitrate of soda or sulfate of ammonia is practical if the vines are light in color and dwarfed in size. This is applied as a top-dressing when the plants have set their first cluster of fruits. A one-row fertilizer drill can be used to put on this top-dressing, or the nitrogen fertilizer can be spread broadcast by hand on the surface of the soil.

The light colored sandy loams are fertilized with a 4-12-4 when used with manure or legumes. Two hundred pounds of sulfate of ammonia or nitrate of soda should be added as a top-dressing if the vines indicate that it is necessary. Light colored, slow growing foliage indicates a shortage of available nitrogen in the soil.

Dark colored loams, silt, and clay loams respond to an 0-14-6 or 0-12-12 fertilizer. The 0-12-12 gives good results on black soils. If the top growth is not dark enough in color and if the vines are growing slowly, a nitrogen top-dressing should be added.

Such recommendations as are made here are only for the purpose of establishing a working basis. Each grower would do well to test out fertilizers until he has one which suits his soil and crop rotation system best.

A grower can usually tell when a tomato plant needs additional nitrogen. If the plants are small in comparison with other plants of the same age or if the foliage is a yellowish green in color, it is more than likely that the supply of nitrogen is nearly exhausted. The plant which is starving for nitrogen produces very few and very small fruits.

Tomato plants growing on soils which are deficient in phosphoric acid are dwarfed in size. The foliage is a very dark green color. Phosphoric acid

A load of fine quality tomatoes on the way to the canning factory.

starvation symptoms are not as well known as are those for nitrogen.

Potash starvation symptoms have been worked out for several vegetable crops, including tomatoes. Tomato plants which are showing potash deficiency symptoms are of normal size. The most important way of identifying such plants is to examine the lower leaves. If very small spots appear along the veins and these later become so numerous as to cause the leaves to fall off, the grower may be fairly sure that lack of potash was the cause. These spots should not be confused with those of leaf-spot diseases.

The tomato crop will do well on a soil which has a pH value of 5.25 or higher. It is usually unnecessary to add lime for the benefit of the tomato crop except on extremely acid soils where the pH value is less than 5.25. The lime requirement of the legumes in rotation will therefore govern its use. To grow sweet clover or alfalfa requires a minimum pH value of about 6.5, with the optimum near pH 7.5. For red clover the pH should be at least 5.5, with the optimum pH between 6. and 6.5. Soybeans will do well on soil with a pH of 5.25 or higher. If fertilizer and lime are applied at the same time, they are likely to combine chemically, with a loss of availability and efficiency.

At Oak Harbor, Ohio, 66 farmers enrolled in the 1930 Ohio Tomato Club. These 66 men planted 243 acres of tomatoes. Each acre was fertilized with a minimum of 500 pounds of an 0-12-12 goods. The total tonnage produced was 2,224 tons or 9.15 tons per acre.

At Rockford and at Ohio City, Ohio, some 200 men secured an average yield of between 10 and 11 tons per acre. There were about 500 acres at these two places.

Celina and Mendon, Ohio, growers planted approximately 500 acres and averaged nearly 10 tons per acre. The 100 tomato growers at St. Henry, Ohio, produced an average yield of 10 tons per acre.

And so the production of 10 tons per acre in the case of tomatoes for canning is within the reach of any grower who is willing to do a good job of tomato growing. In the 1930 Ohio Tomato Club there were 203 men who produced between 10 and 15 tons per acre and 27 men secured yields between 15 and 20 tons per acre. Only one man was able to show a yield of 20 tons and over; Val Deitsch of Celina, Ohio, produced an average yield of 21.56 tons per acre on a 2.12-acre field.

The dark but not black colored silty loam soil on which the 21.56 tons per acre were produced was fertilized with 500 pounds of a 2-12-6 per acre drilled in broadcast just before the plants were set. In addition to this the plants were watched closely and a side-dressing of available nitrogen was applied at the first appearance of nitrogen starvation symptoms.

Growers Test Fertilizer

Mercer county is one of the most important tomato canning districts in Ohio. In this county, as in many other Ohio tomato districts, are to be found men who each year test out various kinds and amounts of commercial fertilizers in an effort to learn what analysis and what amount of commercial fertilizer should be used on their particular fields.

One of these men at Celina had a

very interesting demonstration of the value of fertilizer in securing an early and profitable first picking. On the 5.11-acre field where this test was made the average yield at the end of the 1930 season was 9.83 tons per acre. Four hundred pounds per acre of a 2-12-6 fertilizer were applied broadcast on all but four rows which were left unfertilized.

The results were convincing proof of the fact that fertilizer pays on tomatoes. The first picking on the four unfertilized rows yielded at the rate of .616 tons per acre, whereas the fertilized rows produced 2.01 tons per acre. The .616 tons of tomatoes sold for $6.77 while the 2.01 tons brought $22.11. The difference was $15.34 in favor of applying 400 pounds of an 0-12-6 per acre at a cost of $7.33. Here again the investment in fertilizer yielded at the rate of 2,000 per cent a year. This was one of those accidental fertilizer demonstrations brought into existence because the farmer ran out of fertilizer and did not get a new supply since the field was so nearly finished.

Another grower at St. Henry set out very definitely to find out just how many pounds of fertilizer he could profitably expect to apply per acre on his particular field for the canning tomato crop. He laid the field out in three plots. To one plot he applied 500 pounds per acre of a 2-12-6; to another 1,000 pounds per acre; and to a third 1,500 pounds per acre. The total numbers of crates produced per acre on each plot were 558 on the 500-pound plot, 566 crates on the 1,000-pound plot, and 532 crates on the 1,500-pound plot. So the profitable rate of application in this case was between 500 and 1,000 pounds per acre. The eight crates gained by using 1,000 pounds per acre in place of 500 pounds were sold for a little more than $2. The usual rate of application for canning tomatoes in Ohio is between 500 and 700 pounds per acre.

Then there were those who were interested in testing the value of potash on the tomato crop. The following table clearly shows that in the case of this particular demonstration the potash was a limiting factor:

Date Planted May 21, 1930
Date Harvested July-September

Plot No.	Fertilizer Treatment	Yields per Acre (tons)	Value per Acre @ $11	Cost of Fertilizer	Net gain for Potash
A.	1,000 lbs. 2-12-0	12.27	134.97	14.18	
B.	1,000 lbs. 2-12-6	14.00	154.00	17.48	15.73
C.	1,000 lbs. 2-12-12	14.90	163.90	20.75	22.36
D.	1,000 lbs. 2-12-18	16.09	176.99	24.05	32.15

Fertilizer Costs:—2-12-0=$28.35; 2-12-6=$34.95; 2-12-12=$41.50; 2-12-18=$48.10.

Crop Prices:—$11 per ton field run.

Remarks:—Irregular size of plots due to shape and location of the field and advantages of location favor the low potash plots.

The next demonstration showing the effect of potash especially on the speeding up of maturity of the tomato crop is worthy of attention:

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Miss Signe Holmer of Manistee was crowned Queen of the Festival by Fred W. Green, Governor of Michigan.

A Cherry Festival

By W. E. Fowle

Instructor of Agriculture, Traverse City, Michigan

IN the northern part of the lower peninsula of Michigan are two small peninsulas: Leelanau and Grand Traverse, protruding out in the blue waters of Lake Michigan. Nature has especially favored this region, making it possible to raise bountiful and superior crops of both the sweet and the sour cherry. The cool lake and bay breezes render the budding of the fruit trees an untold protection from damage of the spring frosts. These same breezes during the fall keep back the severe frosts, that come early to inland regions, and protect the trees until a blanket of snow has covered the roots of the young orchards.

By the middle of May these rolling hills, covered with cherry orchards, present a beautiful picture of trees in full white bloom. Honey-bees are constantly working on these millions of blossoms, lending music to the picture by their busy hum, and incidentally doing untold good by helping pollination for later fruit production. During this time of the season people come from far and near, making tours through the cherry region to observe its splendor. On a given Sunday during this blossoming time, services are held in one of the beautiful orchard

sites. This service, called "The Blessing of The Blossoms," was started six years ago by Mr. J. Smith and Rev. Wm. Chapman, two of Traverse City's citizens.

About six to eight weeks after blossoming time the earliest of the sweet varieties come into ripening, and within two or three weeks the full cherry harvest is on. Last year 30,000,000 pounds of cherries were brought into the six canning plants of the community. These cherries put into pies would represent a line of over 30,000,000 cherry pies, a solid line of pies way across our continent and losing itself through the Golden Gates into the Pacific Ocean.

Hold Festival in July

During the third week of July the celebration of the Cherry Harvest Festival is held. At this time more than a dozen communities join with Traverse City in its festivities. Organized orchard tours take the visitors into the very center of the fruit region, where they are allowed to get out and wander about the rolling orchards.

Later the large canning factories and plants are visited where the fruit is canned in tins by sanitary processes or by the fresh freezing processes by which they are preserved as fresh for consumption in later months. A farmer cooperative "made up of cherry farmers working with cherry farmers, for cherry farmers" is canning about 60 per cent of the cherries of the region. Last season witnessed the inauguration of this cooperative venture.

On the second day of the celebration a young lady is crowned as Cherry Queen. This honor was given last year to Signe Holmer of Manistee; the elaborate coronation, amid beautiful surroundings, being performed by Governor Fred W. Green of Michigan. During the day two elaborate parades with scores of floats moved up and down through the streets of the city and the National High School Band of the Interlocken Bowl supplied music. Among the activities of the day were motor boat races held on the beautiful Grand Traverse Bay.

In order to have such elaborate ceremonies, thorough community cooperative spirit, and yields of cherries, there must be some fine orchard work being carried on by the fruit growers on these two peninsulas. These orchards are producing high yields per tree.

Use Complete Fertilizers

In looking for the success of the cherry enterprise, one must turn his attention to the question of soil fertilization. The amount of experimental data on orchard fertilization is very limited. For a long time the adding of the nitrogen fertilizers was considered sufficient; however, today, many of the better orchards are being fertilized with complete com-

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The Queen was at the throttle of the locomotive taking out the first trainload of cherries of the season.

Fertilizers *and* Disease Control

By A. L. Pierstorff

Plant Pathology Specialist, Ohio State University

PATHOLOGISTS and agronomists are realizing that one of the best ways of eliminating losses from diseases of some crops is by the application of more fertilizers, especially of certain elements like potash.

A striking case in point was demonstrated in Ohio last summer in the drought-stricken tobacco area. Illustration I shows plot A on the right which received no potash, but equal amounts of the other fertilizer elements. Plot B on the left received 128 pounds of potash in addition to the other elements. The yield of the plots and the price received per acre tell an interesting story. (See table.)

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Plot	Fertilizer treatment	Yield per acre pounds	Quality and price received		Value per acre	Fertilizer cost	Net gain
	400 lbs.	100	Yel.-Bright	12c	$12.00		
	0-20-0	392	Red	6c	23.52		
	400 lbs.	0	Lugs	..	....		
A	4-10-0	256	Flying	4c	10.24		
		128	Tips	2c	2.56		
		172	Trash	7c	12.04		
			Total		$60.36	$12.16	
	400 lbs.	564	Yel.-Bright	16c	$90.24		
	0-20-20	344	Red	10c	34.40		
	400 lbs.	40	Lug	10c	4.00		
B	4-10-12	212	Flying	7c	14.84		
		20	Tips	2c	.40		
		168	Trash	10c	16.80		
			Total		$160.68	$20.15	$92.33

For Alfalfa

Apply Limestone Well in Advance of Seeding

By A. F. Gustafson

Extension Professor of Soil Technology, New York State College of Agriculture

SEVERAL years ago the writer visited a field of alfalfa in Tioga county, New York, one part of which was making excellent growth while the rest of the field was doing very poorly. Upon inquiry the owner stated that the entire field received the same treatment except lime. The soil growing the good alfalfa was treated with hydrated lime while that carrying the poor alfalfa was treated with limestone. The limes were used in quantities having approximately the same neutralizing power and both were applied but a few days before the alfalfa was seeded.

It is common knowledge now that hydrated lime acts very quickly in the soil. In fact hydrate, if intimately mixed with the soil, may do its work within a very few days. On this soil the hydrate had made conditions favorable for alfalfa and it grew well. Limestone, on the other hand, is comparatively slow in its action, and in this soil had not had sufficient time to make conditions suitable for alfalfa, with the result that the crop did not thrive. In fact limestone needs several months, after being thoroughly mixed with the soil, to do its work of correcting the unfavorable soil conditions usually referred to as soil acidity.

Recently it has been noted that alfalfa does better following cabbage than it does after some other crop on essentially the same soil, even though lime and phosphorus have been used at practically the same rate of application to the acre over the whole area seeded to alfalfa. On the cabbage land limestone was applied fully 12 or 15 months before seeding the alfalfa. On the area, not growing cabbage, however, the limestone was put on in the spring before alfalfa was seeded. The difference in growth of alfalfa resulted from the fact

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The lime spreader puts the material on more uniformly than is possible by hand or with a manure spreader.

This picture was taken May 21, 1930. Left, 0-0-0 and lime, yield 1,474 lbs. dry matter; right, 1,000 lbs. 5-10-10 and lime, yield 2,578 lbs. dry matter.

Green Pastures *in* Ohio

By Earl Jones

Extension Specialist in Soils and Crops, Ohio State University

TEN permanent pasture improvement demonstrations, outlined according to the four-plot plan of the National Fertilizer Association, were carried on in northeastern Ohio in 1930. Nitrogenous fertilizers alone produced no benefit on three badly run-out pastures. There was a slight change in color, but the growth was only slightly increased and there was no increase in grazing. The complete fertilizer very noticeably brought blue grass back into the old run-out pastures. Timothy came in when the field had been mowed for hay in the last five years.

These demonstrations were placed on the farms of men who had already shown their interest in the proposition by doing some pasture improvement work at their own expense. The pastures selected varied from good to very poor condition. No other method of selection would be satisfactory since the condition of the permanent pastures of this section varies in this way.

The liming materials and mineral fertilizers were, with one exception, applied in the summer and fall of 1929. The nitrogenous fertilizers were spread the first week in April. The first clipping in the fenced area was made May 21 to 26 when the complete-fertilizer plot was in condition to furnish good pasture. The influence of the drought was beginning to be felt at this time, but the reduction in yield is not believed to have been large since the early growth started along well.

A hay harvest was made July 1 to

3. This is not reported since it cannot correctly represent pasture conditions. A second clipping was made at this time on only a few demonstrations, since the drought had noticeably reduced the growth. Later clippings were not attempted.

It was found that the recovery from the first clipping was extremely slow, because the early growth had been clipped too close. An effort will be made to more closely imitate grazing in making future clippings.

These results are not to be considered final. The poor condition of some of the pastures and the drought made the complete utilization of the lime and mineral fertilizers impossible, and it will probably be two or three years before their full effect is noted. The benefits of future applications of nitrogen will doubtless be greater than in 1930.

The uneven condition of some of the fenced plots made it difficult to secure typical samples. The fenced plots will be removed to more uniform areas that were closely grazed in 1930 with the hope that this lack of uniformity will be less serious in 1931.

The table gives a summary of the results as measured by the first clipping. Only eight demonstrations are included in the summary. The nitrogen was spread on the wrong plot in one case and the results of another were discarded because of the uneven growth on the extremely heavy soil. It was necessary for various reasons to discard certain plots on some of the demonstrations. No attempt has been made to figure profits at this time.

SUMMARY OF FIRST CLIPPING, MAY 21-26, 1930

An Average of Eight Pasture Improvement Demonstrations, Northeastern Ohio

	Dry Matter per Acre Pounds	Protein in Dry Matter Per cent	Protein per Acre Pounds
0-0-0	740.4	13.5	98.2
0-0-0 (Lime)	664.0	13.5	92.8
0-10-0	797.7	13.4	111.2
0-10-0 (Lime)	757.4	13.9	117.5
0-10-10 (Lime)	1074.1	13.5	152.5
5-10-10 (Lime)	2089.8	15.9	325.6

* Fertilizer applied at the rate of 1,000 lbs. per acre.

A common scene on pasture lands in northeastern Ohio, where the land is marked with potholes.

The difference in vigor of these plants was not due to fertilizer as no fertilizer was applied to this field. Source of stock was the answer in this case.

Better Peonies

By G. R. Cobb

Salisbury, Maryland

WITH the ever-increasing number of people growing bulbs and other outdoor blooming plants and the marked increase in acreage devoted to their culture has come an added desire for information relative to cultural directions, remedies, and preventives for diseases and insects, as well as definite information as to the kind and amount of fertilizer, if any, to apply.

During the extremely dry summer of 1930 there were many instances where peony plants wilted, turned brown, and dried up before their normal season for such signs of maturity. This premature browning and drying naturally caused much concern among growers, and many were the inquiries as to its cause. In some cases the growers attributed such browning to the use of fertilizer and in order to

This field received no fertilizer. All of the plants were treated alike and yet those on the left have turned brown and the tops are dying, while those on the right are still vigorous. The answer is different varieties.

ascertain, if possible, the cause or causes, an investigation was conducted among a large number of peony growers.

Realizing that peonies are moisture-loving plants, it was felt that some of this browning was due to the extremely dry weather, but not all of the injury could be attributed to the drought.

Cutting Weakens Plants

Another factor that contributed to the lack of vigor in the plants is the practice of cutting blooms to be sold as cut flowers. This is a very common practice in many of the Southern States as it adds a right nice income to the grower. But it weakens the plant so that there is a noticeable lack of vigor the following year.

Experimental work at Illinois showed that "peony plants from which the flowers had not been cut the preceding season averaged about 28 saleable blooms, while those from which all the flowers had been taken, leaving two leaves on each branch, produced about 14 flowers. Plants from which half the blooms were cut yielded about 21 flowers the second season. The report concludes with this statement, "So much foliage is lost in the removal of flowers that when the cutting is heavily done there is a marked decrease in the vigor of the plants the following season."

Further evidence of this is disclosed in the remark made by one of the workmen on a peony nursery when asked if the browning and drying up of the foliage meant that there was some disease present or any injury suffered by the plants. "No," he replied, "the plants always look like this late in the summer. You see we cut the flowers off in May and that weakens the plant so that they brown or dry up much earlier in the season." This man has been associated with peonies for nearly 15 years, so he should know something about their culture.

As the investigation proceeded, it was found that plants turned brown and dried up on fields that had received no fertilizer. Again it was clearly shown that no particular fertilizer or combination of fertilizers could be blamed for this apparent injury. The same browning was noticed in plants that had received applications of bone meal alone; a 3-8-5, 2-8-10, 4-8-10, etc., commercial mixtures. Thus the analyses were not the main factor nor was fertilizer apparently to blame.

Two other facts were brought out very forcibly in this investigation that showed that there are many contributing causes to this browning or premature ripening.

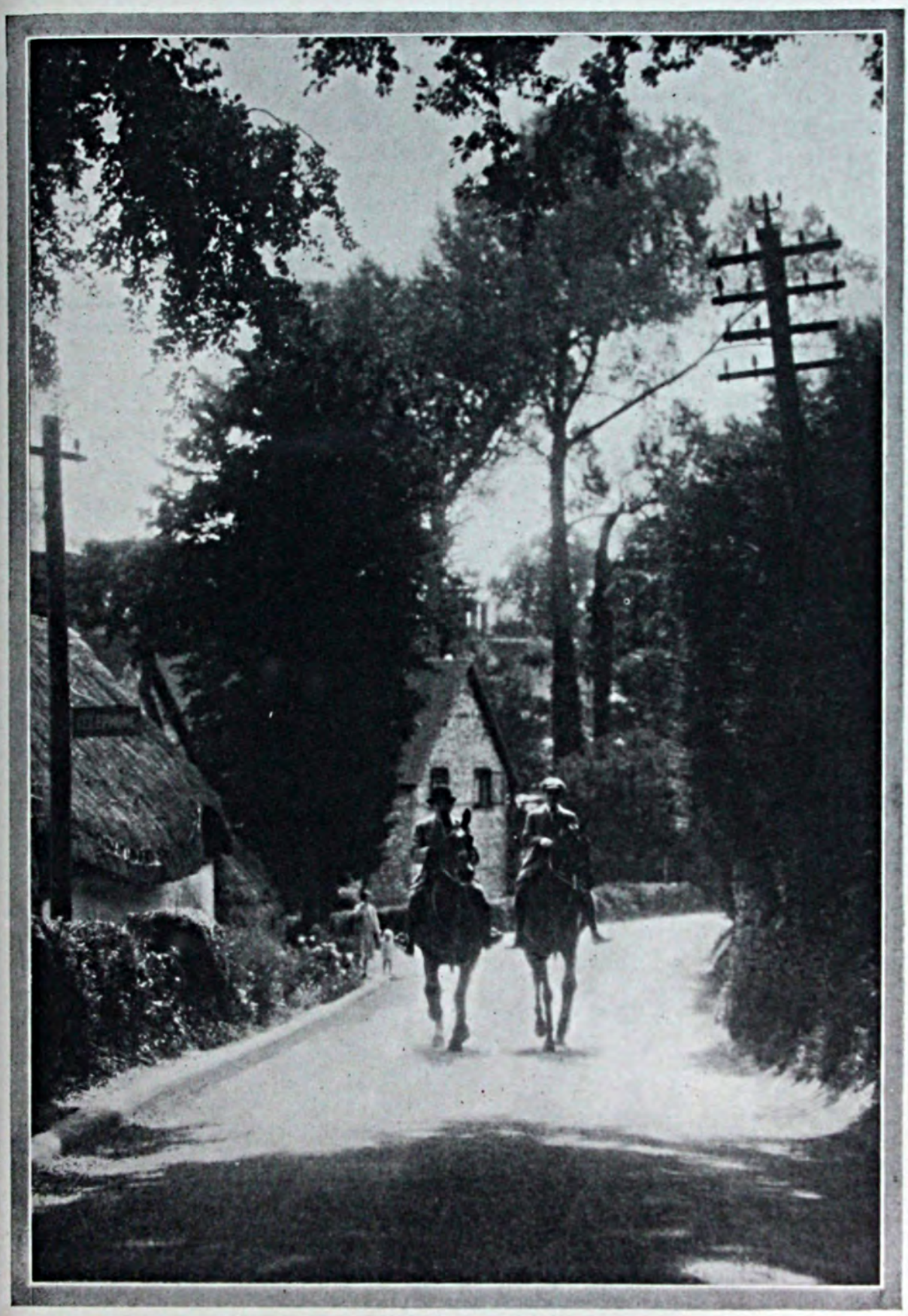
There is a vast difference in varieties as to the time of their maturity. Some varieties turn brown early in the season, comparatively speaking, while others retain their green color until late in the fall. This fact had not been observed by some of the growers, but when called to their attention they agreed that this was true.

Source of Stock Is Important

Also there is a wide difference in vigor between plants, that is stock, purchased from the Northern States and stock from the Southern States. This fact answered many of the inquiries relative to this early drying up of the foliage. In the Northern States the season is too short for any wholesale cutting of blooms for sale as cut flowers whereas in the Southern States many blooms are cut to catch the Decoration Day market for cut flowers. Recalling the facts disclosed by the Illinois Experiment Station it is evident, then, that stock from the Northern States should be more vigorous than that from the Southern States.

This reason for the early browning and drying was found in many cases, and as a result of the facts disclosed by the investigation, many growers will renew their "seed stock" by purchases from some of the Northern States.

(*Turn to page* 47)



SPRINGTIME IN ENGLAND

Ewing Galloway, N. Y.

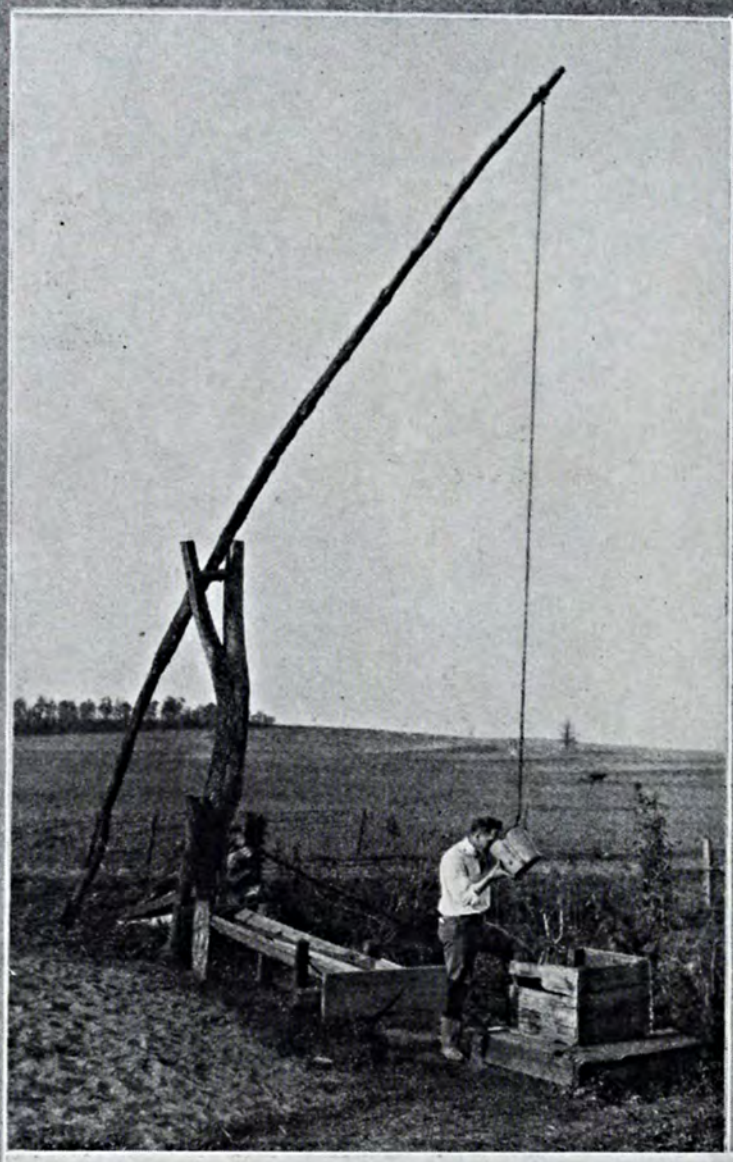
PICTORIAL

Left: Ten minutes for repairs.

Right: Cleaning up a healthy appetite.

Right: Willing hands—
not wanted.

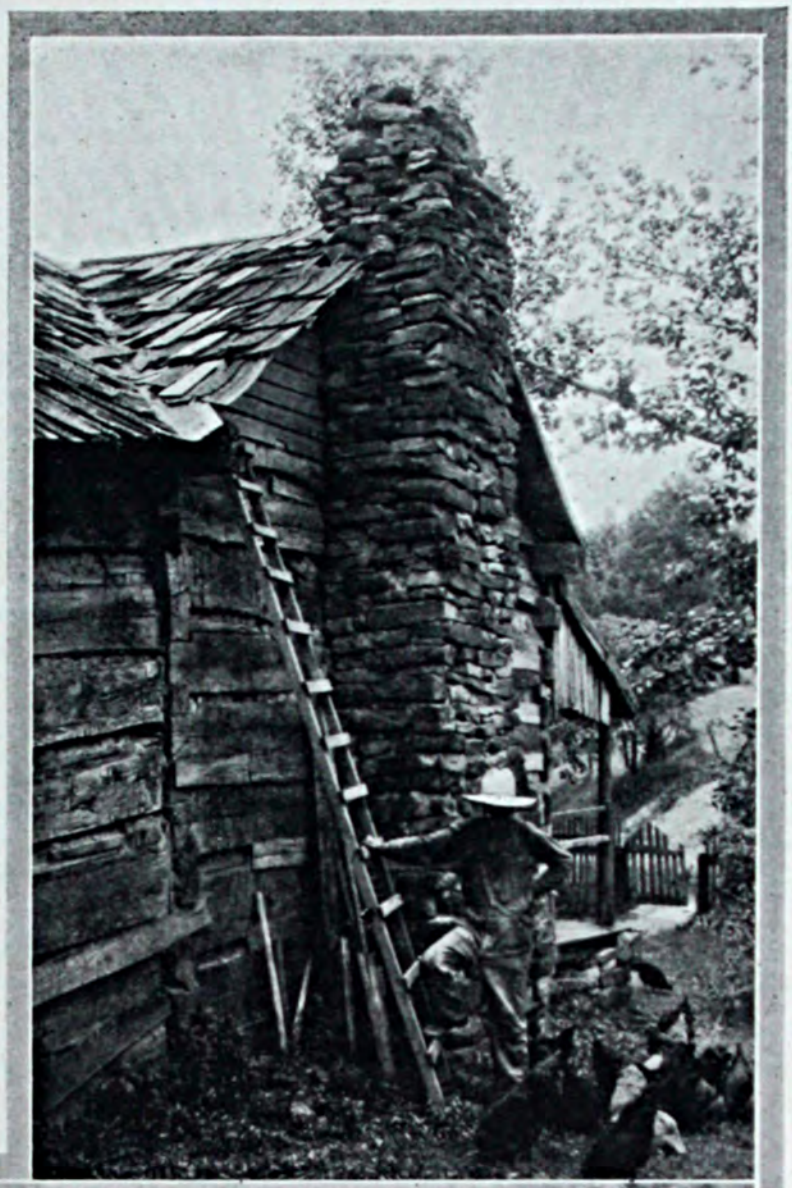
Left: A Sunday
morning job.



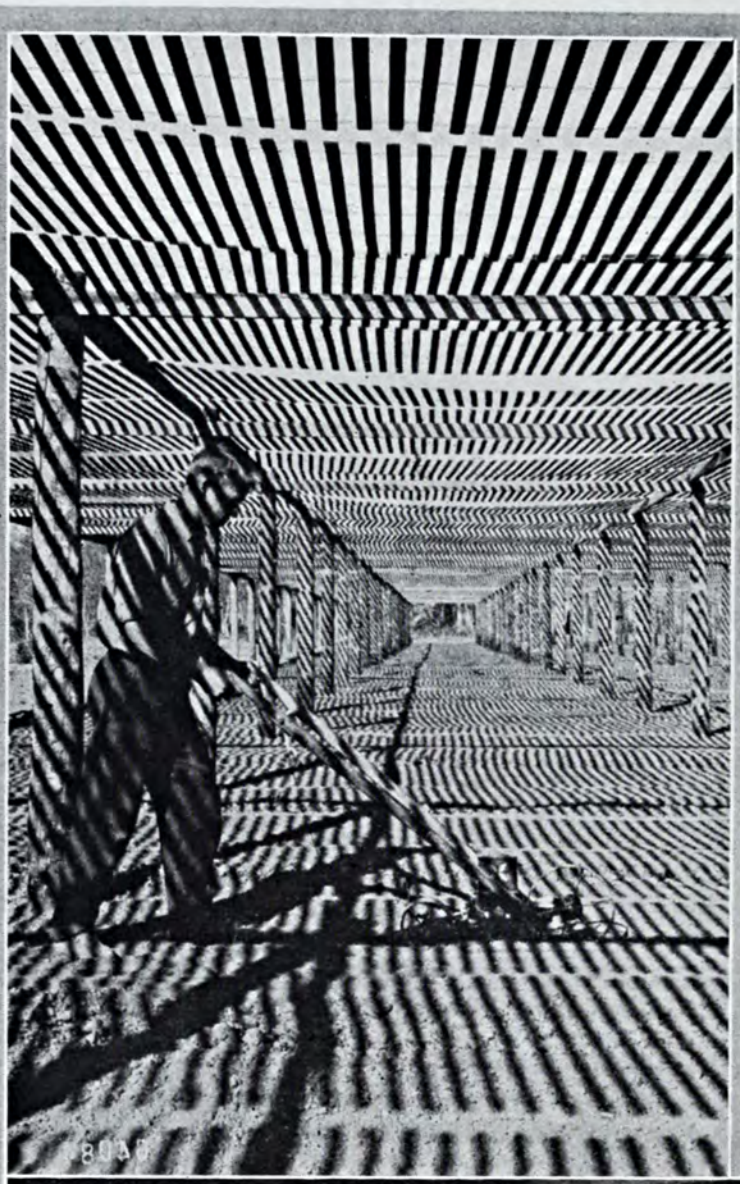
Left: This well sweep is still in use in Daviess county, Indiana.

Below:
Henry W. Marshall, Tippecanoe county, Indiana, plants soybeans in the turning space at the end of the corn rows. The beans are later cut for hay or seed.

Right: A farm home in the Ozark Mountains.

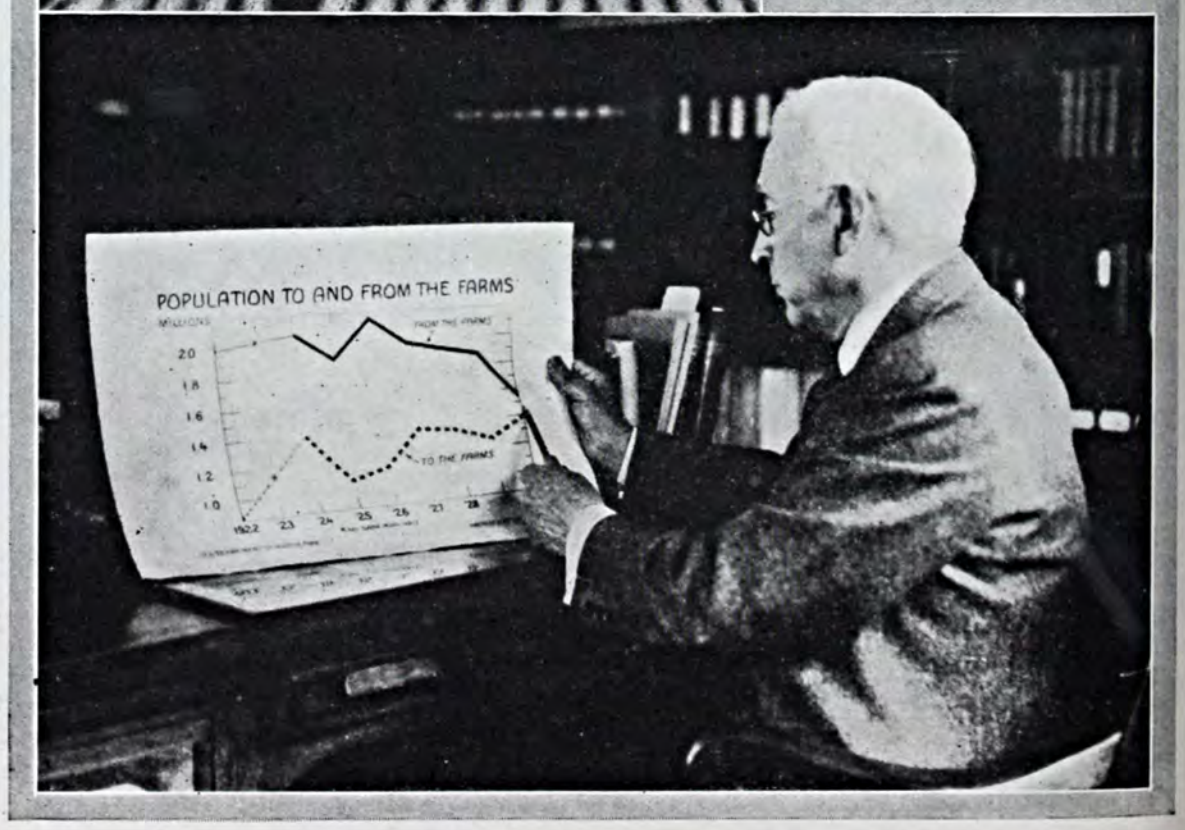


Below:
Mr. and Mrs. John C. Hunt of New Baltimore, Ohio, found they had to lend a hand in caring for the five lambs born to one of their ewes.



Left:
Planting time, in one of the nurseries of the United States Forest Service in the West. The queer combination of shadows is caused by the lattice roof, which provides partial shade for tender young plants that would be hurt if exposed to the direct rays of the sun all day in mid-summer. The lattice roof will be removed in the fall.

Below:
Farm population in the United States made a gain for the first time in 10 years, according to Dr. C. J. Galpin, population expert of the U. S. Department of Agriculture, who is shown studying the chart he has prepared for the year 1930. The chart reveals that during 1930 almost as many people went back to the farms as left for cities. Although the farms lost 150,000 people during the year, the surplus of births over deaths gave a net increase of 200,000 people on farms during the year. The farm population on Jan. 1, 1931, was 27,430,000.



The Editors Talk

A World Congress

Periodically authorities critically and patiently look out over the world, analyze the causes for its depressions, and devise ways and means for curing them. For this purpose ninety-two National Agricultural Associations from twenty-seven countries will gather at Prague, Czechoslovakia, this summer to discuss world agricultural policies with a view to organizing agricultural production in different countries so as to equalize the supply with the demand for farm products. The occasion will be the Fifteenth International Congress of Agriculture, June 5-8, held under the auspices of the International Commission of Agriculture.

Professor Dr. Ing. Vlad. Brdlik, president of the organization committee, has asked the U. S. Department of Agriculture to bring the Congress to the attention of agricultural scientists and leaders in this country. The Department suggests in an announcement to the press that American agriculturists who may be traveling in Europe at the time of the Congress will find it to their advantage to include Prague in their itinerary. The Congresses are held every two years in different countries under the patronage of the Governments of the countries in which they are being held.

The program this year is separated into seven sections entitled: agrarian policies and rural economy; agricultural education and extension; agricultural cooperation; vegetable production; animal production; agricultural industries; and "the rural woman."

The section on agrarian policies and rural economy will consider the possibilities of organizing agricultural production in different countries with a view to bringing about an equilibrium between supply and demand of agricultural products, and the measure and means by which the expenses of production may be decreased. The importance and possibility of research on the formation and forecasting of agricultural prices will also be considered.

The section on agricultural education and extension will consider "services of agricultural consultations on an individual basis; methods employed and results obtained; and modern methods for promoting progress in rural districts by means of radio, motion pictures, agricultural expositions, and other agencies for making known the results of research." The section on agricultural cooperation will consider education in cooperation, the means employed, and results obtained. The section on vegetable production will consider national and international legal protection of new plant production, and the actual status of the question of inoculating the soil.

The section on animal production will consider heredity and its control in individual animals in order to improve their economic yield, and the possibilities of raising fur-bearing animals in connection with farming. The section on agricultural industries will consider methods and importance of the industrial utilization and conservation of potatoes and other vegetables. The mission of the woman in the struggle against the rural exodus will be the principal topic of the section on the rural woman. The feeding of the farm family by means

of products grown on the farm will also be considered by this section.

Undoubtedly nothing is more desirable or urgently needed at present than an equilibrium between production and consumption, but equally so there is nothing so difficult to accomplish. It therefore takes courage and vision to embark on what must prove to be a very stormy sea before anything like an equilibrium is accomplished.

We hope, however, that out of this Congress some tangible idea of practical world policies may develop. We wish the Congress every success.

Quality Stands the Test

Commenting on citrus shipments, the Florida Grower had the following to say:

"Heavy shipments in November resulted in declining market values. Both orange and grapefruit markets reached the point where only fruit of good quality and desirable sizes brought reasonable returns."

This condition of affairs was not unforeseen, for as far back as June, 1930, many competent observers pointed out that buyers always demand quality in years when the market is abundantly supplied. However, many growers figured that Mother Nature would be good to them and single-handed would produce a bountiful crop of large bright fruits with smooth texture and fine flavor. Now as never before these growers realize that faith without work applies in the citrus grove.

Mother Nature was kind as she usually is when man cooperates, but some growers in their zealous endeavor to cut costs practiced false economy. Last spring, for instance, many growers applied only nitrogen rather than the usual complete fertilizer. In spite of the fact that growth and bloom foretold a big crop, many growers cut down on their fertilizer per acre. Others went off at a tangent in this or that direction that may have seemed logical and cheaper at the time but failed to give results.

The chief complaints against Florida fruits this season were the usual ones during big crop years—small sizes and bad appearance. The appearance of the fruit, a very valuable sales asset, was poor due to neglect or ineffective spraying. With fertilizer applications per acre cut down, each tree got less, and when this was apportioned between the unusually heavy set of fruit, there was not enough "food per fruit" to form, develop, mature, and finish the heavy crop. The prevalent idea that trees and young fruits need largely nitrogen in the spring and can be later smoothed and finished with potash in the summer, like hogs allowed to run on pasture and later fattened on corn, has contributed much to the poor quality of this and other crops of fruit of past years. The young fruits need potash and phosphate when their cell structures are being formed. Quality goes further back than the young fruit; it may be greatly influenced and improved by growing the proper kind of fruiting wood the previous year—wood that has stored in it nourishment for the flowers and young fruits.

While many growers are reproaching the government, the railroads, marketing agencies, and everybody else that happens on the scene, there are others who are marketing a quality crop of fruit that is returning a reasonable profit in spite of the flood of low-grade, unclassified fruit on the markets. Very likely this latter group sprayed as usual and applied extra applications of high-grade fertilizers to support the trees under their heavy load, thereby pushing a large portion of their crop into a class that returned a profit.

Adjustments Possible

A long time ago a certain gentleman is reported to have taken other gentlemen to the seashore to prove to them that he could not influence the tides of the ocean.

In a more useful way it is being gradually proved that industry cannot influence, at least in a short time, the economic tides of the world. If it wants to reduce losses to a minimum or to make a profit in its own particular business, then one part of its job is to adjust itself to the incoming or outgoing economic tide.

V. B. Hart, Extension Professor of Farm Management, Cornell University, has aptly called it the "Handwriting On the Agricultural Wall" by which he means that there is a lot of information available about what farmers can expect in the future. He points out that "The writing on the wall is going to mean dollars and cents to farmers who read it and plan accordingly," and, that "there is certainly trouble ahead for the farmer who does not." And incidentally, there is trouble ahead for any industry which, on the basis of a manufactured optimism, disregards the plain handwriting on the wall.

The handwriting that Professor Hart calls particular attention to is:—

First: The country is in a period of generally declining prices.

Second: Indications are that we can expect the general price level of the country to return to at least a pre-war level during the next ten years.

Third: Labor will be relatively high.

Fourth: This means more fertilizer in order to save labor.

Fifth: Retail prices will be relatively high as compared with farm prices.

The meaning of this handwriting and its influence on the agriculture of New York State and the adjustments to be made by farmers are clearly discussed by Professor Hart in the Extension Service News, April, 1931, published by the New York State College of Agriculture, Cornell University. He concludes that New York State will continue to be more and more of a dairy State and still less concerned with the production of meat and wool.

Yes, the handwriting is on the wall. The successful man five to ten years from now will have read the handwriting and have made adjustments accordingly. Others will have been content with being merely optimistic and hopeful.

The How of Fertilizer Experiments

In planning experimental work with fertilizers "the check plots should not be left unfertilized; they should receive an application of fertilizer at least as large as the quantity the soil is capable of absorbing and holding in a condition unavailable to the growing crops," says W. J. Spillman, Principal Agricultural Economist, U. S. Department of Agriculture, in a recent issue of *Science,* dated February 20, 1931. And thus in the cause of progress, over many results of fertilizer experiments obtained by an orthodox technology of the past, there now hangs another cloud, for we suspect that fertilizer experiments have been patiently laid out and the experiments conducted for long years with check plots to which no fertilizer at all was ever applied.

And before the world took to changing so often and so suddenly, a lot of advice has been given in all sincerity in the belief that if there was no increase

in the crop yield, the fertilizer in question was not necessary, at least on that crop on that soil.

But this may not be so, for as the author points out, in some cases soils absorb small amounts of phosphate and nitrate fertilizers. Therefore the increase in yield due to increasing applications of such fertilizers does not appear to begin until the quantity applied exceeds the amount that can thus be absorbed.

By a mathematical study of the yields of oats, corn, and wheat grown on experimental plots at Snow Shoe, Pennsylvania, the author deduces that before any increase in the yield of oats was obtained from the use of phosphoric acid, "6.91 pounds per acre are absorbed by the soil and held in a condition unavailable to oats, the corresponding figure for corn being 7.55 pounds and for wheat 10.87 pounds." The method by which this probable soil absorption was determined from the crop yields of the different plots is explained.

Regarding potash, that certain soil types absorb and hold potash fertilizers unavailable to crops has been shown by Dr. E. L. Proebsting of the University of California in an interesting paper entitled "Absorption of Potassium Fertilizers by Peach and Prune Trees," published in the "Proceedings of the American Society for Horticultural Science," 1930. Referring to the point of possible absorption by the soil in one of the experiments, the author states, "The data seemed to favor the idea that most of the potassium has been fixed in the top soil and that little or none was taken in by the trees;" in this case referring to the results of the experiment on prune trees only.

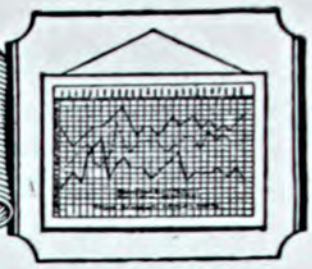
Thus the work of accurately planning and interpreting field experiments with fertilizers becomes more complicated; there is a field of problems yet to be solved. But while the technical questions involved are being threshed out by the experts, at least the plain and simple idea can be understood, namely, that in the case of some fertilizer materials there is a state of competition between the soil and the crop to get the fertilizer material applied to the soil. If the soil succeeds, the crop gets less or none. Therefore a caution and a precaution seem to be both necessary—caution in interpreting the results of fertilizer experiments, especially when no increase in yield is obtained from small amounts of fertilizer per acre, and the precaution to use enough fertilizer materials properly applied in experimental work to permit of possible fixation by the soil.

STRANGE is our situation here upon earth. Each of us comes for a short visit, not knowing why, yet sometimes seeming to divine a purpose.

From the standpoint of daily life, however, there is one thing we do know: that man is here for the sake of other men—above all for those upon whose smile and well-being our own happiness depends, and also for the countless unknown souls with whose fate we are connected by a bond of sympathy. Many times a day I realize how much my own outer and inner life is built upon the labors of my fellow men, both living and dead, and how earnestly I must exert myself in order to give in return as much as I have received. My peace of mind is often troubled by the depressing sense that I have borrowed too heavily from the work of other men.

—ALBERT EINSTEIN.

AGRICULTURAL DEVELOPMENTS



IMPROVED CONDITIONS EXPECTED

Dr. G. F. Warren, widely known economist of the New York State College of Agriculture, expects the automobile and clothing industries to show the first improvement. Real estate, he says, will need about five years to adjust itself to the new low values. He does not predict a return to 1929 prices. The new low price level finds cotton, wheat, barley and eggs priced too low, and he predicts that they will rise in price. Potatoes, however, are now 44 per cent above pre-war and cannot be expected to maintain this high price for the next five years. Some sections of New York State have not experienced a depression, particularly the southeastern part. If they have had a depression, other sections of the country have experienced a calamity. They have been close to market and have avoided the high distribution costs which, Dr. Warren says, must be adjusted.

LACK OF POTASSIUM MAKES SUGAR CANE SICK

Just as men or animals will sicken if they do not get enough salt, so do plants become ill and stunted if they are starved of one or another of the mineral nutrients they need. Experiments performed at the University of Chicago by Dr. Constance Hartt of St. Lawrence University, of Canton, N. Y., show that sugar cane must have its modicum of potassium in order to remain healthy.

Deprived altogether of potassium, the cane plants suffered from decreased growth, dieback, and deficient development of their all-important green coloring matter.

With a little potassium they showed a little growth; with more, better growth; there was a definite correlation between the amount of the mineral supplied and the amount of plant material produced. The only plant part that grew faster on short potassium ration was the root system, and this growth was only in length, as though in search for the missing element; there was no increase in weight even in the roots.

There were internal abnormalities also in the cane plants on a potassium-starvation diet, expressing themselves both in unusual structural elements and in off-key physiological behavior. —Science News Letter, March 7, 1931.

ILLINOIS MAKES SURVEY OF WHEAT GROWING COSTS

It costs about 93 cents a bushel to grow wheat in the St. Louis wheat and dairy area, according to cost figures gathered by the Illinois College of Agriculture. Land in this area, according to the announcement, is valued at about $80 an acre and it takes approximately 12 man hours and 24 horse hours to grow an acre of wheat. Allowing 18 cents an hour for man labor and 9 cents an hour for horse labor, and adding these to the other items of expense, an acre of wheat producing 18 bushels costs $16.75 in the St. Louis area.

In east central Illinois where land varies in value from $125 to $175 an acre, it costs about 88 cents a bushel to grow wheat, according to figures kept by a group of farmers for the college.—*Marketing Activities, March* 4, 1931.

USE MORE FERTILIZER ON REDUCED ACREAGE

Proper Fertilization Will More Than Double Labor Efficiency, Says C. B. Williams

Despite all the harsh words directed at them, cotton and tobacco are still the two chief money crops of North Carolina farmers. The thinking farmer does not forget that five-sixths of the annual production value in North Carolina comes from crops and about two-thirds of this comes from the main cash crops of cotton and tobacco.

"This does not mean that other crops should not be grown and that they do not make farming a safer and more profitable business," says C. B. Williams, head of the agronomy department, North Carolina State College of Agriculture and Engineering. "But as our farming is now conducted we must face facts and realize that the prosperity of our farmers and of a large group of persons depending on the farmers' income is affected by what happens to cotton and tobacco."

More Attention to Reduced Acreage

Mr. Williams fears that because of poor business conditions, many growers this year will seek to do away with some of the practices that tend to make good acre yields. Some growers will even increase their acreage to cotton and tobacco and depend on acreage rather than intensive cultivation to pay a profit. This is all wrong, he says. It were better to cut sharply the acreage of cotton and tobacco and to put more intensive effort on the reduced acreage.

Fertilizers, he says, usually return from two to three dollars profit for every dollar expended when used with cotton and tobacco and the right amounts and kinds should be used again this year despite the depression. On coastal plain soils, the efficiency of labor in growing cotton is increased 2.37 times by the use of fertilizers and 2.84 times in the piedmont section. More pronounced results are secured with tobacco. It is poor economy to cut out fertilizers this year, he declares.

LAWN NEEDS SPRING TONIC TO HELP OVERCOME WEEDS

A good way to fight weeds in the lawn is to feed them. This is the seemingly paradoxical advice of turf specialists of the United States Department of Agriculture. Feeding the weeds gets results, the experts say, because the fertilizer that feeds the weeds also feeds the grass and stimulates such vigorous growth that the grass, which thrives with frequent cutting, will run out the objectionable weeds.

For lawn fertilizer, the specialists say, it is hard to beat well-rotted manure. For the spring dressing it is a good plan to compost manure with leaf mold and sod or other vegetable wastes, and then sift in with a coarse screen to remove lumps and bunches. A top-dressing is a spring tonic for a lawn. In the fall it is not so necessary to compost manure or to remove lumps and undecayed matter.

The forage men advise an application of 4 or 5 pounds of either the muriate or the sulphate of potash and 10 to 15 pounds of superphosphate for each 1,000 square feet of lawn. This should be repeated every two or three years.

A good nitrogen fertilizer for early spring is composed of cottonseed meal and either nitrate of soda or sulphate of ammonia. Use 4 or 5 pounds of the meal to each pound of the concentrated fertilizer, and scatter the mixture over the lawn at the rate of about 15 to 20 pounds to each 1,000 square feet.

We can understand why a fool and his money are soon parted, but where he gets it is what gets us.

Foreign and International Agriculture

Green Manuring in Germany

By H. R. Cox

Extension Agronomist, New Jersey Experiment Station

THE areas in Germany where green manuring is most extensively practiced are to the east and northeast. Most of the people interviewed by the writer on this subject were located in the Province of Brandenburg, of which Berlin is the center. These remarks probably apply, however, with a fair degree of accuracy to all the other provinces in which green manures are grown.

The soils of eastern and northeastern Germany are predominantly sandy. Furthermore, the season is comparatively short and the rainfall none too abundant, with frequent droughts in midsummer. It is not a grass country, therefore, and is at a disadvantage in livestock production. The shortage of manure is one of the reasons why attention was directed years ago to green manures as a means of maintaining the organic matter content of soils. It must be understood that the liberal use of commercial fertilizer is an essential feature in utilizing green manures successfully.

It is noteworthy that green manures are grown only in those districts where extensive rather than intensive farming is practiced. The crops grown, other than green manures, are principally potatoes, roots, small grains, and forage. Excepting for certain vegetable crops grown on a field scale, notably potatoes and cabbage, the vegetable industry of Germany is confined very largely to intensive market garden farms on which stable manure is relied upon to maintain the organic matter.

The outstanding crops used in green manuring are lupines and serradella. Both are frequently raised for their seed, however, in which case

This German farmer is standing in a crop of serradella growing in rye stubble in August.

they cannot be considered any more of a green manure than a seed crop of soybeans would be with us.

There are two kinds of lupines in Germany, the yellow and the blue. The latter will not tolerate as high a degree of acidity as the former. In fact yellow lupines seem actually to prefer a rather high degree of soil acidity. It is the yellow kind that is largely used for green manuring.

Occasionally the yellow lupine is seeded in early spring to occupy a large part of the growing season. This is considered a wasteful use of the land and is practised only where land is poor and its value low. A much more common way of using lupines is to sow them, alone or in mixtures, in summer after a grain crop has been harvested. The seed is often sown on the stubble and plowed down shallow. The crop is turned under in the late fall or the following spring. Since the rate of sowing is heavy, about 200 pounds to the acre, and since the seed is in demand for feeding purposes, the seed cost is fairly high, a fact which probably prevents the more extensive use of lupines as a green manure.

The Serradella Plan

Where used as green manure, a serradella crop is usually sown in early spring in standing winter rye. Seeding is done preferably when the soil is moist, and the seed is usually harrowed in. The crop is allowed to grow during the summer and fall following the grain harvest and is plowed down in the late fall of the following spring. Thus it is used as a companion green manure crop in much the same way as sweet clover in parts of our Midwestern States. Serradella has the advantage of being quite tolerant of unfavorable soil conditions. This scheme of using serradella is preferred, therefore, on the poorer and lighter soils to the sowing of lupines after grain harvest, as described above.

The serradella plan, however, has certain disadvantages. In the first place the field is apt to become more or less weedy after grain harvest, and serradella is not preeminently fitted to fight weeds. The German farmer has apparently a more pronounced aversion to weeds than have our own farmers, so that this is to the German a weakness of the serradella scheme. Further, a period of drought in midsummer after grain harvest is apt to be damaging to the stand and growth of serradella. This was the case in 1930 when the unusually dry weather of June and July greatly reduced the stand. In spite of these disadvantages, serradella may be used in this way as a companion green manure crop at comparatively low cost for seed and labor. The plan will probably persist to a greater extent than will the lupine scheme.

Other Crops Used

There are certain other crops that are used to a lesser extent as green manures. Like the two previously discussed, they are generally made to occupy the summer and fall season after grain harvest. One of these is black medic (Medicago lupulina). This crop is used in the same way as serradella, as a companion crop; but it has pronounced soil requirements, tolerating only a slight degree of acidity, so that its use is confined to the better and heavier soils of low acidity. Other crops occasionally used as green manures include field peas, beans, the cereals, sweet clover, and vetch, both hairy vetch and spring vetch. Hairy vetch is feared as a weed in small grains, which greatly limits its use. Sweet clover is reported as being grown in some parts of Silesia, seeded either in winter grain or after grain harvest.

There is considerable variation in the rotations involving green manures. Often two or more rotations are used on a farm. The German farmer has an intelligent understanding of the quality of his soil and makes a conscious effort to adapt the various sections of his farm to the most favor-

(*Turn to page 56*)

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

"Phosphate Deficiency in the Soils of Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 240, *Jan.*, 1931, *Iver J. Nygard.*

Soils

"Soil Management for Apple Orchards," State College of Agr., Raleigh, N. C., Ext. Cir. 184, *Mar.*, 1931, *H. R. Niswonger.*

Crops

An addition to the data accumulated on the use of complete fertilizers in orchards is to be found in Bulletin 241, "A Study of Apple Tree Growth," by Edmund Burke, H. E. Morris, and F. M. Harrington of the Agricultural Experiment Station at Bozeman, Mont. The experiments reported were started in 1914 and while the results have shown that a nitrate fertilizer gave the most marked improvement, the trees showing winter injury at the time of applying fertilizers recovered more quickly where a complete fertilizer was used. The experimenters found that although the limiting factor in these Montana soils was nitrogen, the results with complete fertilizer further indicated that in some cases when nitrogen was supplied, phosphorus and possible potash became limiting factors. As a result of the experiments the Montana station is recommending: "When the soil is low in organic matter at the beginning of the building-up process and the trees are young, 2 pounds of nitrate of soda should be added to the soil around each tree early in the spring. If the trees are of fair size and bearing, from 6 to 10 pounds of complete fertilizer, 10-6-4, should be added to each tree early in the spring. Where trees are making a fair growth, a 6-10-4 fertilizer can be used instead of the 10-6-4. The 6-10-4 fertilizer is the one to use after the first year's treatment with a 10-6-4 fertilizer. There are growth and fruiting habits, however, which have a bearing upon the foregoing recommendations."

"Tenth Annual Report, Period Ending Dec. 31, 1929," *Calif. Dept. of Agr., Sacramento, Calif., Monthly Bul.* 12, *Vol. XVIII.*

"Blackberries and Dewberries," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 427, *Jan.*, 1931, *Harold Mowry.*

"Corn Growing in Michigan," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 210, *Jan.*, 1931, *H. C. Rather and J. R. Duncan.*

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XIII, No. 3, *Feb.*, 1931.

"Lodging in Oats and Wheat," Agr. Exp. Sta., Wooster, Ohio, Bul. 471, *Feb.*, 1931, *F. A. Welton and V. H. Morris.*

"Bloom Period and Yield of Apples," Agr. Exp. Sta., Wooster, Ohio, Bul. 472, *Feb.*, 1931, *C. W. Ellenwood.*

"Oats in the Northeastern States," U. S. D. A., Washington, D. C., Farmers' Bul. 1659, *Mar.*, 1931, *T. R. Stanton and F. A. Coffman.*

"Department of Agriculture and Immigration," Richmond, Va., Bul. 280, *Apr.*, 1931.

"Relation of Foliage to Fruit Size and Quality in Apples and Pears," Agr. Exp. Sta., Pullman, Wash., Bul. 249, *Feb.*, 1931, *J. R. Magness, F. L. Overley, and W. A. Luce.*

"Head Lettuce in Western Washington." Agr. Exp. Sta., Puyallup, Wash., Bul. 19-*W New Series, Jan.*, 1931, *H. D. Locklin and Geo. A. Newton.*

Economics

"Types of Farming in Michigan," by E. B. Hill, F. T. Riddell, and F. F. Elliott, presents a wealth of information which should be of value to any-

one interested in the agriculture of the State. This study, published as Special Bulletin No. 206 of the Michigan State College of Agriculture, deals primarily with the division of the State into type-of-farming areas, and the analysis of typical farming systems within each area. Although devoted entirely to analysis of types of farming in Michigan, the bulletin should be of interest to those engaged in similar work in other States because of the method of analysis which is presented.

"Alabama Economic Review," Alabama Polytechnic Institute, Auburn, Ala., Vol. 1, No. 5, Apr. 1, 1931.

"Economic Problems of California Agriculture," Agr. Exp. Sta., Berkeley, Calif., Bul. 504, Dec., 1930.

"Georgia Agricultural Outlook for 1931," State College of Agriculture, Athens, Ga., Vol. XIX, Bul. 396, Dec., 1930, Kenneth Treanor.

"A Cooperative Movement to Promote Farm Financing Methods for the Development of a Safe Farming System," State College of Agriculture, Athens, Ga., Vol. XIX, Bul. 397, Jan., 1931, J. Phil Campbell.

"Present and Prospective Development of Farming Systems in Western Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 239, Dec., 1930, Sherman E. Johnson.

"Current Farm Economics," Agr. Exp. Sta., Stillwater, Okla., Series 49, Vol. 4, Bul. 2, Apr., 1931.

Diseases and Insects

"Cantaloupe Powdery Mildew in the Imperial Valley," Agr. Exp. Sta., Berkeley, Calif., Bul. 507, Feb., 1931, P. A. Miller and J. T. Barrett.

"Treatment of Lime-Induced Chlorosis With Iron Salts," Agr. Exp. Sta., Berkeley, Calif., Cir. 321, Mar., 1931, J. P. Bennett.

"Potato Spraying and Dusting Experiments in Florida, 1924 to 1929," Agr. Exp. Sta., Gainesville, Fla., Tech. Bul. 222, Nov., 1930, L. O. Gratz.

"Pumpkin Bugs in Citrus Groves," "Spraying for Citrus Whitefly," and "The San Jose Scale," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 428, 429, 430, Jan., 1931, J. R. Watson.

"Gummosis and Psorosis of Citrus Trees," "Treatment of Gummosis and Psorosis of Citrus Trees," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 431, 432, Apr., 1931, Arthur S. Rhoads.

"Apple Spraying," Agr. Ext. Ser., Raleigh, N. C., Ext. Cir. 183, Mar., 1931, H. R. Niswonger.

"Frankliniella Fusca Hinds (Thrips) on Seedling Cotton," Agr. Exp. Sta., Clemson College, S. C., Bul. 271, Mar., 1931, C. O. Eddy and E. M. Livingstone.

"Oil Sprays for Dormant Use," Agr. Exp. Sta., Pullman, Wash., Bul. 247, Jan., 1931, Anthony Spuler, F. L. Overley, and E. L. Green.

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19 PER CENT OF WORLD'S FERTILIZER USED IN U. S.

The United States, with about 6 per cent of the world's population, used approximately 19 per cent of the world's annual output of commercial fertilizer and ranks second only to Germany as a consumer.

P. E. Howard, chemical engineer of the fertilizer and fixed-nitrogen investigations unit of the Bureau of Chemistry and Soils, United States Department of Agriculture, estimates the world's annual production to be worth $592,235,000. Mr. Howard bases his estimate on assumed values of $160 a ton for nitrogen in the warehouses of the producer, and a value of $50 a ton each for phosphoric acid and potash. Such figures are only approximate, however, because unit values of fertilizer vary over a wide range, he says.

The manufacturer of more highly concentrated fertilizers and their increasing use, are the most outstanding recent developments in the fertilizer field, according to Mr. Howard, who points out that the total amount of plant food used by American farmers increased 45 per cent from 1914 to 1928 and the amount of plant food in the average fertilizer increased from 12 or 13 per cent in 1914 to 17 per cent in 1928. Today the farmers of the United States are using fertilizer with nitrogen content increased 100 per cent, with an increase of 40 per cent in potash and 16 per cent in phosphoric acid.

High Potash Fertilizers Make Southern Sweets Profitable

Baldwin county, Alabama, has been famous for its Green "Sweets" for June and July shipments. Recently, efforts have been made to get a superior variety introduced. After failure in the county, due to improper fertilization and lack of disease-free stock, Tom Mitchell of Foley, Alabama, set out in 1930 to demonstrate that the Big Stem Jersey variety could be profitably grown in Baldwin county.

After Mitchell secured disease-free seed stock, he then gave thought to the matter of correct fertilization and concluded that he should use from 1,000 to 1,500 pounds per acre of 4-8-15 (NPK). His results were so encouraging that he was induced by his fellow growers to produce 2,000 bushels of certified seed stock for planting in 1931. Ten acres of vine cuttings were planted the last week in July and fertilized with 1,200 pounds of 4-8-15.

Mr. Mitchell had very unfavorable weather on the potatoes due to so much rainfall, as shown by the official weather report for Silver Hill (9 miles from Foley) which is given below:

Month	*No. days rained*	*Total rainfall*	*Precipitation High*	*Low*
Sept. . . .	15	8.56	1.51	.2
Oct. . . .	9	4.43	2.65	.12
Nov. . . .	8	6.90	3.15	.3

It will be seen that during the three growing months it rained 32 days with a total rainfall of practically 20 inches varying .12 of an inch which was the lightest rain to 3.15 inches, the heaviest.

During the flood period in November just before the potatoes were dug, water completely covered a part of Mr. Mitchell's field and some places were submerged for nearly a week. Yet, when dry enough to dig, not one potato was rotten. Mr. Mitchell attributes this almost unbelievable fact to the fertilizer analysis, as all of his neighbors' potatoes, fertilized with the old standard fertilizer, 4-10-7, rotted in the field.

His crop was not damaged in the least by the rainfall, and from these late plantings 200 bushels of certified sweets per acre were produced. Mr. Mitchell is the only man in that section who has seed potatoes for sale and says the high potash saved his crop.

In 1931 Mitchell and all other growers who will plant this variety will use high-potash analysis fertilizer, generally 4-8-15.—T. W. Allen, Troy, Alabama.

Better Peonies

(*From page* 30)

In summing up the reasons for the early browning and drying of peony foliage, they might be listed thus in the order of their importance: source of stock; lack of moisture; heavy cutting of blooms; forced growth so that stalks are very succulent; and planting too deeply. In no case during the investigation could there be found any instance where fertilizer was definitely blamed for the apparent injury to the plants.

—AND SO WE SHOT HIM!

Alkali Ike: "What's happened to the tenderfoot stranger wot was here last week?"

Texas Pete: "Poor feller. The second mornin' he was here he wus brushin' his teeth with some of that foamy tooth paste and one of the boys thought he had hydrophoby an' shot him."

Potash Paid in Ohio

By Rensselaer Sill

Ohio State University

PRODUCING a 20-bushel increase in wheat yields and a boost in alfalfa hay production of 2,938 pounds per acre, an 0-20-10 fertilizer applied at the rate of 350 pounds per acre was shown to be of considerable value in a series of demonstrations conducted this summer in Ohio by D. P. Miller, county agent for Darke county, and D. D. DuBois of Neave township.

Plots not treated with fertilizer produced 25.95 bushels of wheat per acre, an 0-20-0 fertilizer produced 31.67 bushels, an 0-20-10 made 45.82 bushels, and an 0-20-20 fertilizer raised the yield to 40.93 bushels. The alfalfa yields were also increased by applications of fertilizer. The untreated plots yielded 6,980 pounds of hay per acre, the plots treated with 0-20-0 produced 8,925 pounds, the 0-20-10 made 9,523 pounds, and 0-20-20 fertilizer yielded 9,918 pounds.

All the fertilizer was applied at the rate of 350 pounds to the acre and four quarter-acre plots were used in the demonstration which was started, according to County Agent Miller, in September, 1928. The soils in the tests were uniform and the yields were carefully measured.

In speaking of the demonstration, Miller states that for $4.92 worth of 0-20-0 Mr. DuBois received 5½ bushels of wheat and 1,945 pounds of alfalfa hay per acre; for $7.14 worth of 0-20-10 he received 20 bushels of wheat and 2,543 pounds of alfalfa hay; and for $9.30 of 0-20-20 he obtained 15 bushels of wheat and 1½ tons of alfalfa hay. The extra profit paid by fertilizing may be seen by multiplying by 10 the yields obtained on one acre with say an 0-20-10. Then for $71.40 worth of fertilizer the yields would be increased by 200 bushels of wheat and 13 tons of alfalfa hay on 10 acres.

New Life for Flower Beds

By R. B. Hull

Extension Department, Purdue University

NO matter how beautiful an arrangement of perennials you may have in your garden, they finally reach an age at which a rapid decline in vitality may be expected. When that stage has been reached, it is usually the better plan to give the entire bed a thorough renovation. It is very difficult to do a good job of working in compost and commercial fertilizer on an old bed. A top-dressing of compost forked in between such plants encourages them to form a shallow root system which is always a great disadvantage especially during hot, dry weather. On the other hand, it is not difficult or costly to spade up the best plants, with a good supply of dirt about the roots, and lay them out in an open space for a few hours. This opens up the entire bed, and a liberal supply of compost can be quickly and thoroughly forked deeply into the soil. At the same time work in 20 to 25 pounds of one of the high-grade "complete" fertilizers to each 1,000 square

feet. Old plants will put on new vigor in their new homes and repay you with twice their former crop of blooms.

This practice has another point strongly in its favor and that is that the plants which are to be saved and put back in the new bed can be given room in proportion to the present size of their crowns. Most perennial beds are planted too close to begin with, and after a few years it is difficult to cultivate between the plants and there is a disastrous competition for adequate supplies of food and water. Tufts of blue grass also become firmly established in such a manner that it is almost impossible to remove them except by an occasional renovation.

If the bed is to be enlarged, or some of the old varieties discarded in favor of new ones, it is still possible to make the entire area appear like an old, well-established planting. This can be done by giving the new plants ample room and using an interplanting such as Canterbury Bells in the more open spaces. Well-rooted plants in many colors are always available and they have few equals for flowering effects the first season. Canterbury Bells are biennials and most of them will die out after blooming. This leaves plenty of room for the young but permanent varieties to expand. Perhaps a real spring housecleaning for at least one room of the flower garden would bring a new lease on life to some of your oldest and dearest friends.

Know and Grow Alfalfa

By J. R. Beck

County Agent, Polk County, Dallas, Oregon

QUEEN alfalfa continues to find her niche in the farming operations of district after district where a few years ago her production was considered impractical. Way out in the Willamette valley of western Oregon where the cooling breeze from the Pacific Ocean tempers the climate, Grimm alfalfa has increased by leaps and bounds since 1923 until now it is grown by hundreds of farmers.

Yet, there are more hundreds that have not been persuaded of the advantages in the production of this wonderful legume. C. W. Irvine of the Farmers' State Bank of Independence realized this condition and arranged two contests for the people of Polk county in which his bank is located. The first one was for the school children to get them interested in talking alfalfa at home. This was a slogan contest, and 69 boys and girls sent in slogans with stories substantiating them. "Know and Grow Alfalfa" by Bernice Blodgett of Monmouth was awarded first prize and $25.00 in cash. Cash prizes were also paid to second and third places.

The second contest announced by Mr. Irvine is to be judged in June, 1931, at which time an alfalfa cultivator will be awarded to the farmer who has the finest field of alfalfa seeded in 1930.

As a result of these two contests, and of the previous two years' two silver trophy contests staged by the Dallas Chamber of Commerce, more than 14,000 pounds of alfalfa seed were planted in May and June, 1930. This was enough to seed 1,200 acres, which is greater than the total acreage seeded prior to that time in the entire county.

The Farmers' State Bank is in a typical dairy community, and Mr. Irvine is a thorough believer in feeding the products of the farm on the farm.

A Cherry Festival

(*From page* 24)

mercial fertilizers.

It seems to be apparent that a quantity of potash must be put into the fertilizers to make high production in the orchards permanent. There seems to be no question that the addition of potash in orchards where high production is being sought influences wood growth and helps fruit production to a great extent. Commercial fertilizers such as 10-6-4 and 7-8-5 are now being used in many of the orchards. Many orchardists who are using this practice are beginning to see that the procedure is the right one to maintain good soil and yields.

Mr. Julius Chapin, prominent grower on the Leelanau peninsula, has made a very thorough study of orchard practices in his region. I am quoting him in saying that 32 per cent of the producers are using a complete commercial fertilizer, containing nitrogen, phosphoric acid, and potash. From his observations about 52 per cent of the farmers are depending on minerals as their supply of plant food elements. The others maintain fertility by using barnyard manure or cover crops which are plowed under in the spring.

Southern Potato Profits

(*From page* 18)

caked in the hot Southern sun, and it was only by the use of extreme care in cultivation that the crop grew as it did. The yields, while in line with the 1930 crop, were below the average yields of normal years for the Charleston area.

Probably the most outstanding feature of the tests was the comparison of the two series—the nitrogen remaining at 5 per cent in the first series and being increased to 7 per cent in the second series, with the potash going up two units at a time in each case. Comparing corresponding plots in series one and two, nitrogen shows comparatively little effect in raising the yields, while the additional potash

Good, early soils, properly balanced fertilezers, and intelligent farm management make crops like this.

in every case gave large increases over the checks.

As was mentioned, a rather large deposit of oyster shell was found in Plot 3. This shell was evidently deposited by the Indians or by some of the pioneer settlers of the Island, and much of it had disintegrated, and was broken into tiny particles. The presence of this "lime" in the soil had much to do with the decrease in No. 1 potatoes found in the plot and the appearance of considerable "common scab" on the tubers.

This series of tests, along with hundreds of others on potatoes and other truck crops, carried on in many parts of the United States, has helped pile up proof that potash in considerably larger doses than have been used is not only essential but is necessary if farmers are to stay in the highly competitive game of "trucking."

The Inquiring Mind

(*From page* 15)

Asa Gray, Hon. William Miller Beardshear, Dr. T. E. L. Beal, Dr. H. J. Detmers, Rev. LeRoy Titus Weeks, Dr. Charles Cleveland Nutting, E. W. D. Holway, and Spencer Ambrose Beach.

A report of Dr. Pammel's activities from December to October, 1930, shows the strenuous life he led and his determination to make his services of the greatest possible value to the people of Iowa and elsewhere. On returning from a visit to Cuba, he worked, in the space of nine consecutive months, one thousand, three hundred and thirty-two hours more than is commonly required of a professor. During that period he also attended and spoke at some 172 meetings and "hikes." When out on the road he was constantly collecting botanical material for the College. Up to that time (October 1930) he had made a weed survey of more than half of the counties of the State, along the same lines as the Soil Survey. Incidentally, he made a study of the honey plants, which he incorporated in his useful book on that subject.

His demonstrations of destruction of weeds were extensive and instructive. For instance, he completely demonstrated the destruction of the European Morning Glory, or "Creeping Charlie," quack grass, and Canada thistle, with sodium chlorate. More than thirty years ago he advised farmers how the pestiferous morning glory might be eradicated, and he believed that had they followed his advice, there need have been no trouble with it today. These activities entailed a great deal of correspondence and necessitated the writing of many newspaper articles and the answering of innumerable questions pertaining to economic botany, pollination of flowers, and the identification of weeds and poisonous plants.

Dr. Pammel even conducted numerous Sunday-hike parties in the parks of Iowa, and he made an interesting and impressive innovation by opening them with religious exercises before delivering his address on Conservation.

At many places he also made public exhibits of weeds. One of these, at Ames, showed the plants used by the North American Indians, and another, of Bible plants, was followed by a descriptive address regarding them, and an acknowledgement of the contribution people of the Bible country made to our civilization.

Considering his splendid and successful efforts for the establishment of State parks, it is creditable and fitting that one of them was dedicated Pammel State Park. Space does not permit us to mention every example of the tremendous energy, enthusiasm,

and perseverance of Dr. Pammel in the furtherance of his special subjects and enterprises; but in conclusion, we are glad to add the following appropriate words of an address delivered by Dr. Morehouse of Drake University on the occasion of the dedication of Pammel State Park:

"Iowa has had comparatively few outstanding scientists. It is not apropos to enumerate them at this time; but no matter how long the list, or how selective the group, or whatever criteria applied, Dr. Pammel is certain to a star position therein. Proof of my statement is found in the star indicating his preëminence in 'American Men of Science.' After enumerating his achievements, characteristics, and abilities, his work as a teacher receives the greatest weight in the summation of his character. . . . He exemplifies the ancient adage: 'In Nature's infinite book of secrecy, a little I can read.' Intellectual honesty has been his guiding principle. His great passion is to disseminate knowledge. He successfully exalts his subject and the art of teaching. His kind, sympathetic nature, his clear succinct exposition and his determination to master the subject-matter integrate to make a teacher comparable to Mark Hopkins, Louis Agassiz, and Asa Gray."

Dr. Pammel has left a glorious record treasured in the hearts of all who knew him and profited by his work. We hope that some day in the near future it will be graven on an imperishable monument erected on the campus of Iowa State College or in Pammel State Park.

Fertilizers and Disease Control

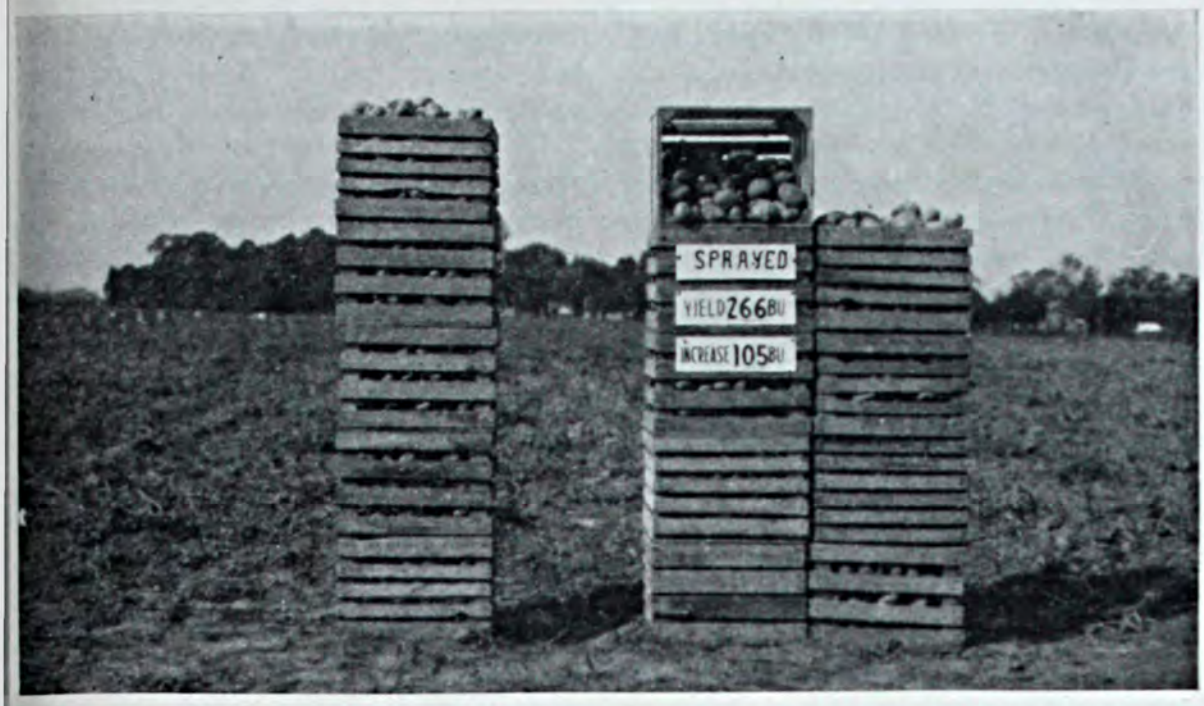
(*From page* 25)

It is at once apparent that the increase consisted principally of the higher grades. The expenditure of $7.99 for potash returned $92.33 to the grower. An important factor in this increase was the scarcity of black fire, a physiological disease, in the potash plot. The lower leaves in the plot receiving no potash were severely affected by this trouble.

Some crops like peas when planted on soil infected with the root rot organism are able to withstand the attacks of diseases when heavy applications of fertilizer are used. Sugar beets are able also to better withstand attacks of root rot when properly fertilized.

If profitable yields are to be secured from applications of fertilizer, certain other diseases must be controlled either by exclusion or by protection with fungicides. When virus diseases like mosaic infect a crop, growers fail to get the expected response from fertilizer applications. Sometimes the growers are unaware of the presence of these diseases and thus conclude that fertilizer is of little value or caused a reduction of yield. Diseases reduce yields and lower quality as well.

Plants must be healthy if responses are to be obtained from better crop production methods. This is not only true of tobacco troubles, but equally true of cereal smuts, potato virus diseases, blights and hopperburn, tomato blights and wilt, melon leaf spots and bacterial wilt, raspberry mosaic, curl and anthracnose, and other diseases. One can aptly compare fertilizing healthy and diseased plants to feeding healthy and tubercular infected cows. No good dairyman would expect a sick cow to pay big dividends on purchased concentrates. Neither should plant growers expect big profits from



Increases in yield of more than 100 bushels per acre frequently can be credited to spraying.

applying nutrients to sick plants.

Frequently we find that results similar to those obtained in Ohio on potatoes emphasize how fertilizers and disease control must go hand in hand. Proper spraying increases the yield by protecting the plants, thus permitting them to utilize to the fullest extent the nutrients supplied in the fertilizer. Increases in yield of 100 bushels or more per acre as shown in illustration II are not uncommon. In fact each crop usually has one or more serious diseases which must be successfully combatted in order to obtain profitable yields.

For Alfalfa Apply Limestone Well in Advance of Seeding

(*From page* 26)

that on the cabbage land the limestone had had sufficient time to correct acidity, while that applied in the spring ahead of alfalfa had not had sufficient time to accomplish its work.

Numerous instances have been noted where alfalfa did poorly on soils of rather high lime requirement, even though the limestone applied should have been sufficient. Almost invariably, however, it develops that the limestone was applied but a short time before seeding alfalfa and so had had insufficient time to correct the acidity.

Even though it is more tolerant of soil acidity than alfalfa, red clover responds to the application of lime some months in advance of seeding time. For red clover if more than one ton of limestone to the acre is needed, it pays, when reasonably convenient, to put it on during the preceding fall. The more expensive forms of lime, burned or hydrate, owing to their quicker action, need not be applied so far in advance of seeding legumes. However, these quick forms of lime also must be mixed thoroughly with the soil in order to give the best returns.

As a result of such observations and experiences, farmers are advised to apply limestone on soils needing two tons or more to the acre for alfalfa a year

or more before seeding this crop. It is good practice to apply one-half of the lime needed for alfalfa in the spring after plowing for an intertilled crop to be grown that year. During seedbed preparation and cultivation of the crop the limestone becomes intimately mixed with the soil and so does its work. After plowing in the fall or early the following spring the rest of the limestone needed is applied. While making the seedbed for alfalfa or a nurse crop this lime is mixed with the soil where it corrects acidity and thus completes the preparation for alfalfa.

The use of limestone in this way applied well in advance of seeding the crop has produced many acres of excellent alfalfa. It is fully appreciated, however, that liming regularly for clover in short rotations over a period of years together with an adequate application of lime direct for the crop are the ideal preparations for alfalfa.

Tomatoes for Canning

(*From page* 22)

Date Planted May 22, 1930
Date Harvested August-September

Plot No.	Fertilizer Treatment	Yields per Acre (tons)	Value per Acre @ $11	Cost of Fertilizer	Net gain for Potash
1	1,000 lbs. 2-12-0	9.8	107.80	14.18	....
2.	1,000 lbs. 2-12-6	10.9	119.90	17.48	8.80
3.	1,000 lbs. 2-12-12	12.5	137.50	20.75	23.13
4.	1,000 lbs. 2-12-18	11.7	128.70	24.05	11.03

Fertilizer Costs:—2-12-0 = $28.35; 2-12-6 = $34.95; 2-12-12 = $41.50; 2-12-18 = $48.10.

Crop Prices:—$11.00 per ton flat rate.

Remarks:—The crop matured early and Mr. Tickle had the first load ready for the canner. Due to dry weather his yield was cut slightly, but he made his last picking about September 25, with the last picking a very large one. Unfertilized tomatoes were still going in to the canner late in October, but Mr. Tickle made his entire crop in about 30 days and avoided all danger of frost.

So all in all there is little opportunity to hedge in the matter of applying commercial fertilizer to the canning tomato crop. It is rather a matter of finding out the requirements which will best fit each special case as it confronts the tomato grower. Certain general recommendations can and always will be made, and with these as a guide the progressive grower will proceed to test and retest until he finds the analysis and rate per acre which shows him the maximum returns. The minimum rate per acre at present is about 500 pounds. It is also fairly certain that those who use less fertilizer per acre and those who use none are paying in reduced yields for their failure to invest in this kind of plant food. It is possible to apply 500 to 700 pounds of a commercial fertilizer per acre and reasonably expect to obtain a real profit on the deal after the cost of the fertilizer and the extra cost of applying it have been deducted.

Narcissus Production

(*From page* 17)

of soils in the Northwest, but most of the planting will be found on sandy loam, silt loam, and muck soils with the major part of the acreage on the loams. The growers find the muck soils, if well drained, especially desirable for sizing up the smaller bulbs.

Hundreds of the hardy varieties are found in this section, but only a few are grown in quantities. The principal varieties arranged according to their present importance are King Alfred, Golden Spur, Emperor, and Victoria. Other prominent kinds include Von Scion, Sir Watkins, Spring Glory, Minister Talma, and Glory of Sassenheim.

Most all of the American growers have adopted the row system of planting. They feel the wide Dutch bed involves too much hand labor. In the furrow, which is opened by double moldboard plows, the bulb grower may set one, two, or three rows of bulbs. The twin row, with the individual rows about five or six inches apart, has been the most commonly adopted. It is usually three feet from the center of one pair of rows to the center of the next pair.

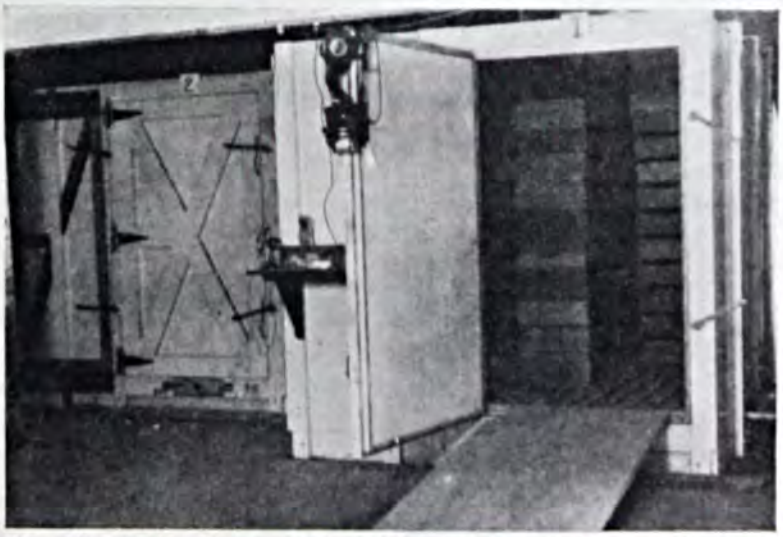
Some of the bulb men scatter the fertilizer in the bottom of the row and rake it in before placing the bulbs. Others scatter the fertilizer on the soil of the half-filled furrow above the bulbs. Fertilizer practices vary, but the 3-10-10 and 3-10-7 mixtures are the most common commercial fertilizers applied to the loam soils. For muck soils a 1-10-10 analysis would be satisfactory. These are scattered at the rate of about 1,000 pounds per acre of bulbs. On the loam soils it is a rather common practice to distribute 300 pounds of some nitrogen fertilizer along the rows early in the spring.

Manures are often applied to the green manure crop which is turned under in the spring before the bulbs are planted the following fall.

As soon as the fall weeds start growth, the soil is gradually worked in over the rows until by midwinter there is a good ridge over the bulbs. During the spring and early summer, the ridge is worked down, thus keeping the rows fairly clean. One or two row weedings by hand are usually sufficient. The centers are kept clean by shovel cultivators.

The nematode or eelworm and the two bulb flies are the only pests of importance. The former is eradicated by giving the bulbs to be planted the standard hot-water treatment at intervals. Crop rotation is also of value. The bulb flies are controlled by fumigating the planting stock.

Harvesting starts as soon as the tops have turned yellow. A few fields are still dug with forks or small shovels,



Two fumigation boxes, each with a capacity of 387 cu. ft., used by the Puget Sound Bulb Exchange. (Note false slat floor, the pans on the side of box in which the Calcium Cyanide is spread, gas mask, and fan.) Courtesy U. S. D. A.

but all the larger growers use modified potato diggers or similar machines constructed for this special purpose. The bulbs are placed in large shallow trays or baskets and hauled to well-ventilated sheds where they are cured two or three weeks before grading starts.

Grading consists of sorting the bulbs into three general classes. These are the over-sized bulbs which are used for propagation stock, the medium-sized bulbs that are sold for forcing in the greenhouses and for yard planting, and the smaller sizes to be planted back to size up for future sales. Later, both the salable stock and the planting stock are resorted into various sizes. All defective bulbs are destroyed.

Pacific-Northwest-grown bulbs are sold throughout the country mainly by bulb salesmen. In this they are following the same general practice as established by the European bulb growers. These salesmen, whether sent out by the associations or larger growers, call on the bulb dealers, chain stores, and the larger greenhouses. Orders are taken during the winter and spring months for delivery the following fall. The smaller independent growers who usually carry a large number of varieties sell direct to the customer, either by the buyer calling at the farm or through a catalog.

Other bulbs now being grown in this section but in much smaller numbers than the daffodils are the bulbous iris, tulip, hyacinth, and various lilies.

The one weak point is that the industry has been built up under the protection given by the Federal quarantine. Should the Government see fit to remove this, it would be difficult, as yet, for the smaller American growers to continue at a profit. Given time to learn the business, the American grower should be able to meet foreign competition, if necessary, and then the future development will depend on quality of the stock offered and the general market conditions.

Green Manuring in Germany

(*From page* 44)

able rotations of crops.

In most of the territory of Germany in which green manure crops are grown, the potato is the most valuable crop. It usually happens, therefore, that potatoes follow the green manure. Furthermore, the larger part of the stable manure is applied to potatoes.

On one farm in Brandenburg which was visited in the summer of 1930, a rotation followed on the lighter soils was as follows: 1, rye; 2, lupines as green manure; 3, potatoes. On the better and heavier land of this farm the following rotation was followed: 1, rye; 2, rye, with serradella as companion green manure crop; 3, potatoes; 4, oats or barley. This four-year rotation is sometimes extended to a five or six-year rotation by seeding clover with the barley or oats. Another rotation followed in this section on the better soils is as follows: 1, rye or wheat with serradella; 2, potatoes; 3, oats or barley.

It is probable that under many conditions it pays better to harvest a crop for seed or forage for home consumption than to utilize it as green manure, assuming that the crops so utilized are efficiently handled and the resulting manure properly conserved. Further, some observers feel that green manuring is somewhat on the decline in Germany, one cause assigned being that the cost of plant food in commercial fertilizer is less than formerly. There are many localities in that country, however, where the practice of green manuring undoubtedly pays, and we may expect that it will continue in these regions for many years to come.

Better Sweet Corn

(*From page* 10)

$22.50 per acre for the respective plots.

These demonstrations confirmed the diagnosis of the Hoffer stalk test in every case. The plots were given this test again in 1930 and showed that the extra potash had materially reduced the amount of iron in the nodes of the corn plants.

In 1930 the Hoffer stalk test was used on 138 sweet corn fields in central Maine. This work indicated that 16 per cent of the fields could have profitably used more nitrogen, while nitrates were ample in 84 per cent of the fields. Where fertilizers containing less than 7 per cent potash were used, 23 per cent had normal nodes, 45 per cent had medium amounts of iron, and 32 per cent had heavy iron. Where fertilizer with over 6 per cent potash had been used, 34 per cent of the nodes were normal, 58 per cent had medium amounts of iron, and only 8 per cent had rather heavy iron. These latter cases were where heavy applications of extra nitrogen had been made during the summer.

An Industry Rebuilt

(*From page* 9)

certain melons which differed in appearance from the rest and which did not seem to be infected with the wilt. These melons apparently were the results of crosses with other varieties. This was the first definite step toward development of a resistant strain. Seed was saved from the resistant melons and they were grown in the years following to determine if their resistance was inherited. From those melons have been developed two of the new resistant varieties grown on several farms the past season. They are the results of continuous inbreeding, or self pollinating, of some of the plants grown from the seed found by Dietz and Elmer. These choice selections are known officially on the records as "Iowa King" and "Iowa Belle." Iowa King has been inbred for five years and Iowa Belle three years.

Iowa Belle is a round melon of large size with tough rind and with sweet, crisp flesh which will delight growers generally throughout the United States.

The third newly developed variety, "Pride of Muscatine," was produced by planting a small field with commercial Kleckley seed and self pollinating literally thousands of flowers. This work was not done in the usual routine way often thought of in connection with scientific research. All of the self pollination of the flowers had to be done in the gray dawn of morning while the rest of the world slept. Only between 4:30 and 6 o'clock in the morning were conditions right for proper selfing. The flowers previously had been bagged with sacks before they opened to keep out any foreign pollen. Then when the flowers were open and pollen had formed on the stamens, the workers dragged themselves out of bed before daylight and started to work. At this time the chill night air had checked the work of insects so that no other agencies were working to carry pollen; only the pollen transferred from the staminate flowers to the pistillate flowers of the same plant by the scientists would have any part in this production scheme.

Nor were resistant, desirable varieties produced wholesale by this method. The disappointments outnumbered the successes a thousand to one. Many of the plants died and only four

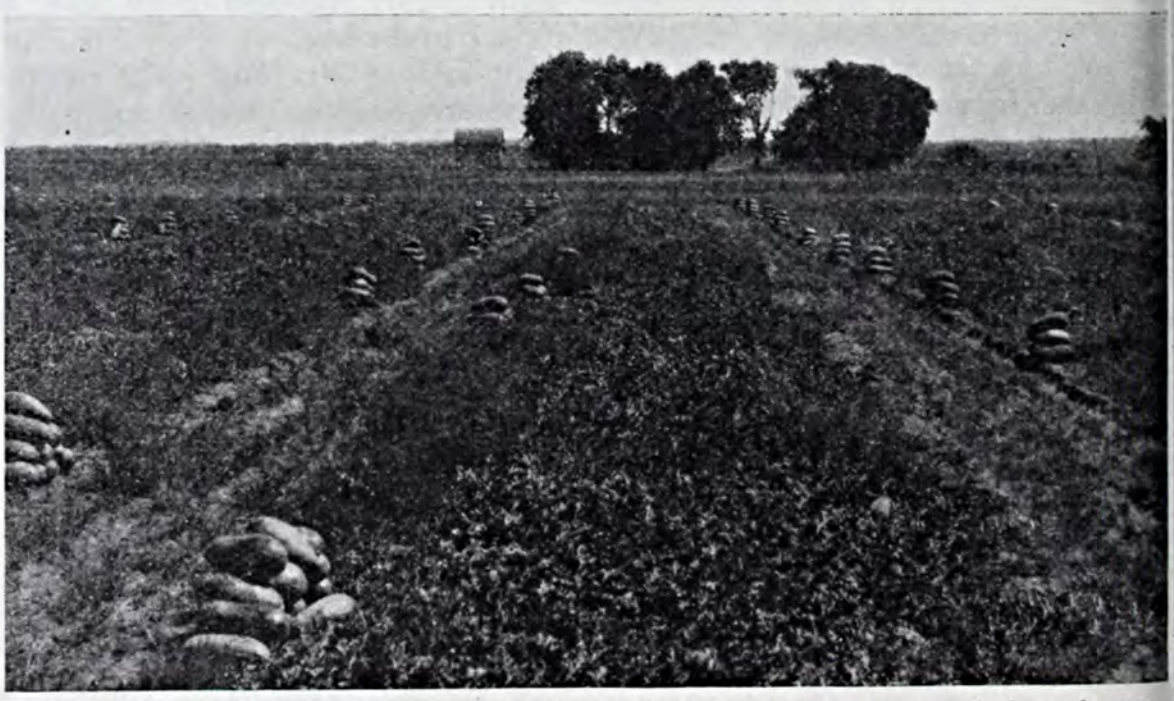
small misformed, ugly-looking melons of the thousands which were "selfed" survived. In 1928 seed from these survivors was planted again on rich soil. One of these proved to be superior to the others and was grown in larger quantities in 1929 so that more extensive tests of its resistance could be conducted. Thirty melons were obtained in 1928. From these 30 melons, 125 pounds of seed were produced in 1929, and the inbreeding was continued to "fix" the type and resistant qualities. Twenty-two acres were planted from Pride of Muscatine in 1930.

These melons have been selected on a commercial as well as pathological basis. Pride of Muscatine has wilt resistance, a tough, thick rind, and fine edible qualities which make it even more desirable than its popular ancestor. Iowa Belle has from one to five per cent higher sugar content than many melons now grown commercially.

Although different men have worked on the problem of developing these resistant varieties, one aim has been uppermost at all times. With machine-like precision and dogged determination the plant pathologists have kept their eyes steadily on the goal of a variety which would resist the little organism which causes wilt. At no time has the project been allowed to lapse. Although the early workers have secured doctor's degrees and have gone to better positions, the work has gone steadily forward, though it was sometimes slow and frequently disheartening.

More than 3,600 pounds of the Pride of Muscatine seed, 700 pounds of the Iowa King, and 125 pounds of the Iowa Belle were produced in 1930. About 500 pounds of this will be held back to guard against possible emergencies such as an unexpected crop failure in 1931, and the other 4,000 pounds will be sold to commercial growers for planting 4,000 or more acres.

In addition to the three varieties which are now being offered for commercial production, the Experiment Station workers have under observation about 125 different pure lines of melons which they are still testing. Some have been developed through crosses of the three proved selections and others are a combination of these



Thirteen hundred melons averaging more than 20 pounds each, or 13 tons, were raised on the two-acre yield shown above. The crop in 1924 was a total loss because of wilt, but for the last five years the field has produced the wilt-resistant types being developed by the plant pathologists. The melons shown are the new "Pride of Muscatine."

crosses with commercial varieties. Some are results of crosses of commercial melons with stock citrons which are now producing red, sweet-fleshed fruit. These latter crosses give promise of becoming valuable in the future.

The future for the melon grower is rosy. Producers in southeastern Iowa recently formed the "Melon Growers' Association of Iowa" which will have as its purpose the distribution of the wilt-resistant seed and rejuvenation of the industry. The secretary of the association, which is incorporated under the laws of Iowa, is a half-time employee of Iowa State College. The association plans to maintain a supply of certified, wilt-resistant seed so that growers will be sure that they are getting resistant seed. Seed will be sold only to members as long as they require the full supply. As soon as there is a surplus of seed, it will be sold to growers outside the association. Certification will be made by the secretary who will inspect all fields from which certified seed is to be harvested and sold. D. V. Layton, who has been helping with the field experiments, is the secretary of the new association.

And in the meantime further work on development of other resistant varieties will be done. The purpose of this continued work is to develop, if possible, better varieties than those now available. The three new varieties are commercially acceptable, but it is thought that varieties having still greater resistance and with more intense redness of flesh and black seeds, fancy points from the standpoint of the commercial trade, may be developed.

Mr. Wilson, who had been county agent among the truck growers previous to taking charge of the field work two years ago, knows the growers. He knows they are interested and want to grow wilt-resistant melons.

"The growers have found out what melons are worth to them since they have been unable to grow them," Mr. Wilson says. "They know they are the most profitable crop they can grow. In addition to that they now have marketing facilities which they did not have 10 or 20 years ago. Trucking has developed to a practical stage while growers formerly hauled the melons out in wagons. I expect to see the melon industry gain in the next five years its status of 20 years ago."

Profitable Trees

(*From page 5*)

Of the 16 orchard soils tested, 12 were apple and 4 peach. For phosphoric acid content these soils ranged from no available phosphoric acid to 96 pounds per acre. The available potash ranged from 36 to 266 pounds per acre. The average of the 12 apple orchards showed 16.2 pounds of available phosphoric acid and 164.6 pounds of available potash per acre, while the peach soils averaged 34.4 pounds of phosphoric acid and 145 pounds of potash.

In all but three of the orchards, which are considered to be among the best in southern New England, the fertilizer treatment for many years has been nitrogen alone. Comparing these with the three orchard soils that have received complete fertilizer for several years we get the following results:

	Plant Food per Acre	
Fertilizer	P_2O_5	Potash
Complete	57.2	250.0
N. alone	12.2	138.8
Difference	45.0	111.2

These tests indicate that where nitrogen has been the only fertilizer treatment the supply of available phosphoric acid and potash in the soil is very low. This may be the reason why clover and the other legumes do not make a satisfactory growth in many orchards. These valuable soil-improving crops need far larger amounts of available phosphoric acid and potash than these soils contain. Acidity tests of these soils show that nearly half of them also are low in lime.

Fertilizer tests were started in these orchards three years ago. Yields of fruit have been obtained, but this is not a long enough period to give a fair picture. It is, however, safe to say that the yields so far indicate a very close relation to the available plant food in the soils.

Knowledge Precedes Action

(*From page* 12)

section have adopted the slogan of the National Paint Manufacturers Association, "Save the Surface and You Save All."

Due to the efforts of the Chamber of Commerce, the Henryetta District is known as a one cotton variety community. Oklahoma Triumph 44 No. 11 strain is grown by 95 per cent of the farmers. Demonstrations conducted proved this variety gave a high dollar return per acre. This variety plus liberal applications of commercial fertilizer produced a superior staple last season. A demonstration conducted on the W. P. Rorex Farm last year showed that no fertilizer gave a yield of 426 pounds seed cotton per acre, but when 200 pounds of 6-8-10 were applied, the yield jumped to 609 pounds per acre. More than 3,000 bushels of certified cotton seed were planted last year.

Some six years ago the Chamber of Commerce started a demonstration vineyard to find out what variety of grapes and what system of pruning were best adapted to the Henryetta District. More than 50 of the leading varieties of grapes were planted. During the third year of the demonstration the vineyard attracted so much favorable comment and had such potential possibilities that the A. and M. College at Stillwater took over the vineyard for experimental purposes. Field days are held annually, and grape enthusiasts come from quite a distance to study the vineyard and gain information.

Demonstration tours have been held each year and outstanding demonstrations of pure seed, terracing, and the use of fertilizers are visited. The 1931 program was started off with a Pure Seed Show and Fertilizer Meet that attracted State-wide attention. Leading pure seed growers from 15 Oklahoma counties had exhibits on display. Fertilizer representatives vied with each other in putting up attractive booths. Agricultural experts from three States appeared on the program. A feature of the day's activities was a picture show where outstanding demonstrations conducted in the district in 1930 were shown. The pictures told an interesting and convincing story concerning the importance of planting pure seed and using commercial fertilizers.

In many instances the demonstrator was present to corroborate the information appearing in the picture. This meeting proved to be the biggest boon in boosting the pure seed and fertilizer movement yet undertaken by

Recently built roads opened up approximately 300 square miles of trade territory and gave the farmers a chance to participate in the program sponsored by the Chamber of Commerce.

the organization. One direct result of the show was the establishment of a potash distributing point at Henryetta.

To give assistance in production was not enough, and so the Chamber of Commerce during the past few years has been responsible for building approximately 30 miles of roads opening up almost 300 square miles of territory. Twice every year the business men of the city hold good-will meetings in every well-organized community of the district, spreading the gospel of pure seeds and commercial fertilizers.

As the proof of the pudding is in the eating, so the results of the agricultural program are measured by the agricultural displays at the Henryetta District Fair. Although the fair is only six years old, it ranks today as one of the leading fairs of Oklahoma. Last year 15 communities had collective exhibits on display. The exhibits were sufficient evidence that the program of pure seed and the judicious use of commercial fertilizers had been successful. Knowledge preceding action has proved to be the right course in this instance.

Piety Plus

(*From page* 4)

not be squandered. It consists of a few old theological memoirs by pious men of an earlier day. They came into the possession of the family through a distant Michigan relative who was himself a preacher among the pioneers. I presume he married more folks for nothing and used up more baptismal water out of frozen creeks than history will ever record. Anyhow, he "kept" well, as the old lady said of an elderly friend, and came through the orthodox ordeal without losing his pink cheeks or his gracious and honest smile.

Oftener than you might suppose I glance at these volumes he left behind. Two or three of them are hard-

boiled and copper-riveted expressions of faith, with no concessions. On the other hand, they are not wishy-washy, which is a comfort sometimes. Two volumes are there by Rev. Alfred Brunson, born in Danbury, Connecticut, in 1793, which are decidedly human documents. He was a soldier with Perry and Hull, mentions Put-in-Bay and Detroit, and makes you see Chief Tecumseh quite clearly. Later he went into the Western Reserve of Ohio as a circuit rider, and finally ended up in Illinois and Wisconsin. As a boy I read his escape from the wolves and his fights with the rowdies with zest, although passing up some of the hell fire, more useful to me in later years.

THERE is another hairbreadth religious book on my shelf by that ancient "primate of the prairies," Peter Cartwright. He came from Virginia and Kentucky into the Sangamon country of Illinois when Abe Lincoln split rails and courted Ann Rutledge. He was a foe to slavery, but opposed the ardent and mistaken efforts of some abolitionists.

Cartwright says in his book for 65 years he served the Lord in the wilderness. Sangamon county folks may like to hear that he received $60 a year in their parishes and could almost perish on it. Yet he was a redoubtable and practical man, for he winds up by saying that he and his home-spun help-meet raised a family of seven living children on that small dole. When he wrote his memoirs in the seventies, Cartwright had 50 grandchildren, 37 great-grandchildren, and one great-great-grandson. Furthermore, lest we get any wrong ideas as to his example, it happens that three of his daughters married Methodist ministers. This is not a boost for that creed, but evidence that chicken dinners had some effect.

Sandwiched in between Cartwright and another sacred set I find a brown leather volume printed in 1833, which contains some of the longest and driest sermons ever preached by John Wesley. I have counted them and find 56 in all, given on sundry occasions to patient audiences. I presume they are splendid ones, but the type is rather fine. I am not able to discuss them intelligently. I still admire the steel engraving of the noted divine, and have got no further after forty years.

Then comes that modern evangelist and metropolitan social worker, Rev. Samuel Fallows, a Chicago bishop. His story is told by a daughter, and it relates his conversion at a camp meeting, his adventures as a chaplain in the Civil war, and sundry worthy human reforms, including home-brew parlors for the poor, which this most kindly and able minister instituted during his sojourn in the city lately bossed by Bill Thompson. I almost forgot T. DeWitt Talmadge and his trip around the world, but you won't care for more.

On the whole, my mine of pious literature pans out into pretty good

reading. I don't know if you have anything to trade with me which would make it better, for laymen I mean. I have a small collection of science works also, but I do not keep them separated from the religious volumes on grounds of incompatability. I refuse to enter any arguments over the discrepancy between scientific discovery and religious fervor and mysticism. If others who likewise lack the background for it would refrain from pestering people with such riddles, it would leave the field open to folks with ability—and they are too busy to do it!

PIETY on paper and piety plus in action are such different phases of life that we may consider them without invoking any dogmatizing schisms. For I presume that our well-being spiritually and our mutual hereafter soulfully may be considered enough of a personal and relevant matter to bear scrutiny by common eyes. Churches are like clothes anyhow,—we don't all wear the same cut and pattern except in prisons. If we are decently dressed and offend not, that is the function of clothes. In a let-well-enough-alone way, that is also the respective function of churches. It's what we do on week days with what we absorbed on Sunday that settles whether or not we are really good members on the following Sabbath.

Actually, I believe that most younger people attend their favorite church nowadays to get inspiration. The lecture style of sermon in a modern manner appeals to them, while old time dissertations, minus human touches, are less effective.

The old custom of sleeping through services does not prevail so commonly as of yore. For one thing, the programs are shorter and the audience is not so physically weary from outdoor toil. I am at a loss to know definitely whether modern preacher craft may be credited with reducing the snore percentage to any extent, providing we gave them as much time to expatiate as they allowed Rev. Wesley and Jonathan Edwards.

"Getting the power" and prancing with shouts is another mark which has entirely gone from our services. We must be living in a sort of middle ground of emotion—too wide-awake to get drowsy over sermons and too conservative and dignified to do handsprings to the mourner's bench.

While those vehement elders relished the exhibitions of violent bodily contortions during sprees of "the power," it is likely that they would abhor turning our churches into select dancing clubs or athletic carnivals. Personally, I can see no reason why a man should not dance where he prays, or make a difficult basket shot where he contributes to the collection box. We dance sometimes in our homes and practice nifty shots with golf clubs on our lawns. The real danger lies in doing dancing or praying to excess, or in being hypocritical about either.

And as for card playing, who has a more perfect right than a minister, whose work is dedicated to sealing affairs of hearts and diamonds, as well as the final ceremony of spades? And sometimes he needs the clubs, too, although they are harder to make a game in for him.

THIS leads naturally to piety plus. Just what that "plus" might be depends on each one of us. Maybe that's why some preachers can't quite seem to deliver to suit.

Recently there came to our church a noted liberal doctor, one whose utterances on human welfare as opposed to greed and machine dominance have made a national reputation. We expected to be inspired and routed directly to a means of doing some things ourselves that might straighten some injustice. We sat up stiffer than we ever did beside our parents and waited —in vain—for the spark of crackling fire.

On the following Sunday the gritty young divine who occupies our pulpit undertook to fill the void which had

been left gaping by the noted liberal. In doing so, and doing it decidedly well, I "wot not" that he offended some of the purse-proud parishioners. If any of them had corns they must have felt as though a tractor had traveled over them with extension lugs. As I am just proud and not purse-proud, it rather tickled me. Trusting I am no Pharisee, let me enjoy it again with you.

HIS was an economic sermon, on practical salvation for bread-winners while residing in the flesh. That's why it sounded pertinent to some of the sequestered ones, who want preachers to dwell forever on the world to come.

Among his points were these: 1. We should plan production with respect to consumption. He said that if America was smart enough to keep up with scientific progress, it should be keen enough to keep step with economic needs. 2. We should develop an adequate system of employment exchange. He said that if we can handle ten million shares daily in a stock exchange we ought to be able to do the same for labor. 3. Publicity for all incomes was advocated, particularly improving wage scales by "pitiless publicity for pitiful pittances." 4. Universal sickness, old age, and unemployment insurance was suggested. Here he stirred up more fuss.

In the fifth place he asked for more development of public utility control by public ownership, together with adequate control of self-interest to keep it within decent social bounds. He ripped right into many of the old sacred cows and dehorned them.

No doubt many of us who heard that sermon came away with mixed opinions or aroused prejudices. I do not insert these things here to start any debate, but merely to indicate that some ministers can get a little "plus" into their piety, or make a game in clubs.

We often hear it said that the old rip-snorting editorial writers have faded out into syndicated strips of balderdash, which means that the editorial pages are less human and convincing, less apt to develop leadership. Maybe some of the ministers have equally answered the call of standardization.

But now that summer is upon us with its tantalizing calls to the greens and the gardens, it takes a pretty good performance at church to keep simple-minded men like myself from straying away into the ozone. Returning traits of boyhood beckon from every bird's nest and whisper from many brooks.

Quite lucky indeed are those who have a minister ready to go fishing or golfing, nature faking or hiking. Here is yet another piety plus aspect which substitutes the potent love of living for the dreaded and impotent fear of damnation.

I HAVE no shred of doubt that if I step up to Saint Peter as he stands by the shiny portal (providing of course) and remark to him that the weather is first rate and that the fish should be biting right smart, he will throw wide the entrance, lower the drawbridge, and let me pass without glancing at my visé. No man who has ever worked with line and sinker will lose his camaraderie.

And barring the use of saxophones, I should not object to an angel with a uke. This is said in no spirit of jazz at Jerusalem, but with a well-grounded conviction that we may be credited up yonder for our plus as much as for our piety.

Which does not at all conflict with the doctrines of my aforementioned library—that meanness is *minus*.

Aunt Hetty: "Sakes alive! I don't believe no woman could ever been so fat."

Uncle Hiram: "What y' readin' now, Hetty?"

Aunt Hetty: "Why, this paper tells about an Englishwoman that lost two thousand pounds."

ON THE STREET CAR

"Madam," he said, "will you please get off my foot?"

"Put your foot where it belongs," she replied shortly.

"Don't tempt me, Madam, don't tempt me," he countered.—*Postage & The Mailbag.*

An American lawyer was sitting at his desk one day when a Chinese entered.

"You lawyer?" he asked.

"Yes. What can I do for you?"

"How much you charge if one Chinaman killum other Chinaman, to get him off?"

"Oh, about $500 to defend a person of murder."

Some days later the Oriental returned and planked down $500 on the lawyer's desk.

"All light," he said, "I killum."—*Sprague Advocate.*

"That reminds me," said the man who watched the steam shovel at work, "I'm to play golf tomorrow afternoon."

FOUND

Three young men from college walking down the street saw a very old gentleman coming toward them; wishing to display a bit of college humour, the first one said, "Good morning, Father Abraham." The second said, "Good morning, Father Isaac," and the third said, "Good morning, Father Jacob." The old man gazed at the three for a moment, then replied, "Young men, you are mistaken; I am Saul, son of Kish, in search of my father's asses, and behold! I have found three of them."

NO USE TRYING

Johnny: "I didn't bring an excuse for being absent yesterday 'cause ma was too busy to write one this morning."

Teacher: "Then why didn't your father write one?"

Johnny: "Shucks, he's no good making excuses. Ma catches him every time, an' you're smarter'n ma."

"Margaret could have married anybody she pleased."

"Then why is she still single?"

"She never pleased anybody."

MADE GOOD

"What did your boss say when you told him it was triplets?"

"He promoted me to the head of my department."

"What department are you in?"

"Production."—*The Yellow Strand.*

"But surely," urged Jones, "seeing is believing?"

"Not necessarily," replied Brown. "For instance, I see you every day."—*Tit-Bits (London).*

NOT GUILTY

Judge O'Flaherty—"Haven't you been before me before?"

Prisoner—"No, y'r honor. Oi niver saw but wan face that looked loike yours, an' that was a photograph of an Irish king."

Judge O'Flaherty — "Discharged. Call th' nixt case."

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VOLUME XVI NUMBER SIX

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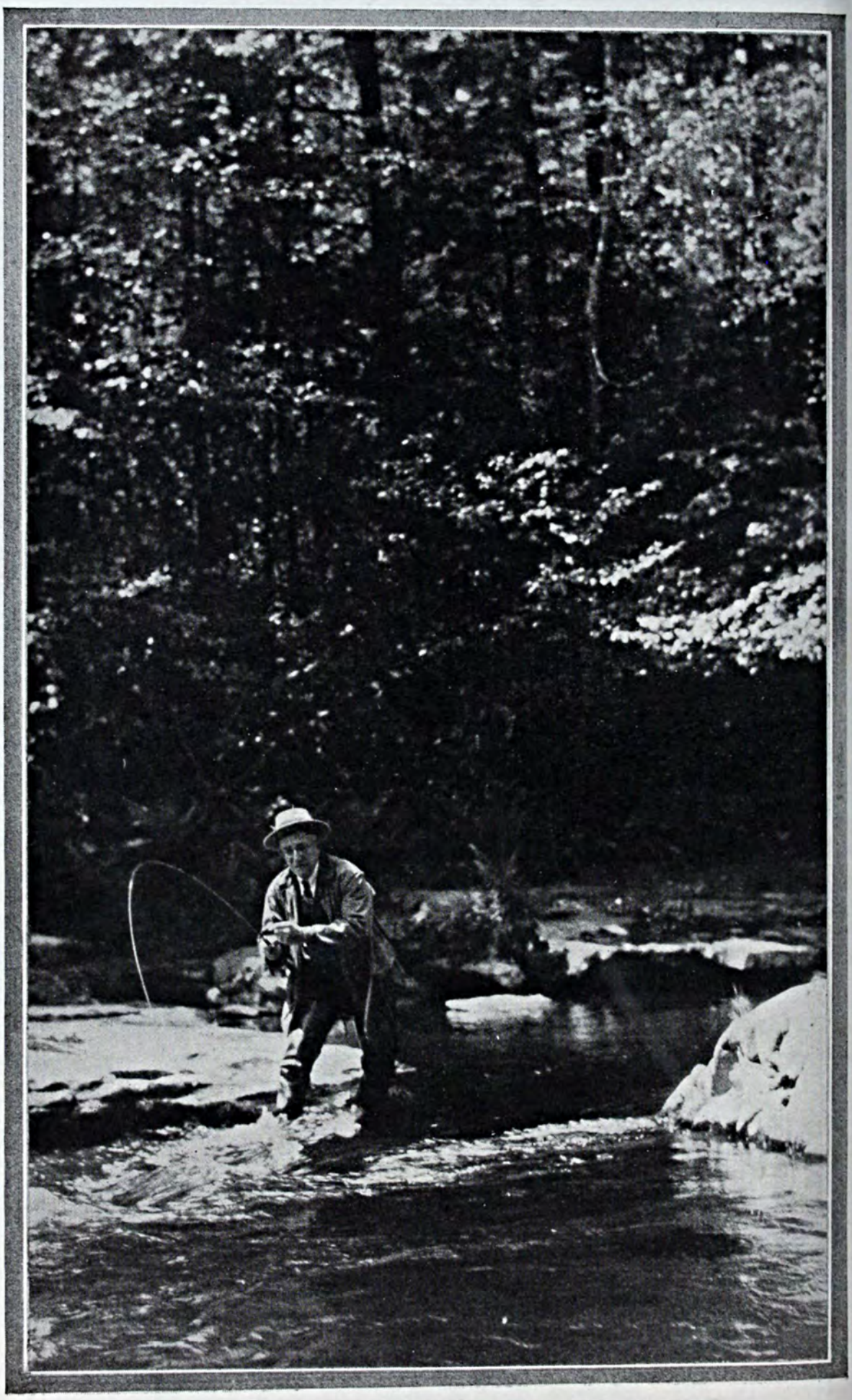
N. V. POTASH EXPORT MY., INC.
of Amsterdam, Holland
Directors: J. N. HARPER G. J. CALLISTER



ALL OF A PROFESSOR'S PROBLEMS ARE NOT FOUND IN BOOKS.

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PUBLISHED MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION, INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK, WITH OFFICES AT 19 WEST 44TH STREET, NEW YORK CITY. SUBSCRIPTION, $1.00 PER YEAR; 10c PER COPY.

VOL. XVI NEW YORK, JUNE, 1931 No. 6

Jeff doesn't believe in long engagements

Come *to the* WEDDING

By Jeff McDermid

"THE road-house guest, he mixed the rest, to the tune of the saxophone," might be the modern version of the old jingle of our high school days, from the Rhyme of the Ancient Mariner. It pictured the wedding guest being detained by a voluble story-teller within sound of the loud bassoon and within sniffing distance of the bridal feast.

Elopements used to be daring escapades because it was so unusual for the swain and his inamorata to get very far from the front stoop by nine o'clock, which in all well-regulated, Victorian-era families was the cat-exit hour. To be sure, the turtle-doves might stray down as far as the corner drug store, where they had those rows of terrible, glaring globes filled with mystic colored liquids, and where they sold root-beer. Or mayhap there was a church "sociable" going on full tilt like a Venetian night, with strings of paper lanterns borrowed from the Bee Hive department

store hung on clothes-lines furnished and spliced by the Ladies' Aid.

This was about the only place a fellow could feed a girl ice-cream, but say, it was *ice-cream!* Thick and yellow, right from the farms that belonged to the parish and that would not quibble over a fat test when the meeting-house needed a new roof.

Mrs. Barnes and Mrs. Jenkins, in fussy, embroidered aprons waited on you and the Best Ever, without expecting a tip or being stingy with the soda-crackers. Or in winter time you would take her to the Odd Fellows fancy-dress ball or to the Good Templars bean dinner. Never strayed very far away from the corporate limits of the snug, little burg where you were fetched up, did you? And courtships were sort of foreordained affairs from the 'teens to the twenties; connived at and encouraged by sly but clumsy friends and parents; so much so that an elopement would not only have been wholly unnecessary but confounded ungrateful, especially to the parson who needed the five bucks for a new dictionary to keep up with the latest cuss words.

THE first girl I ever fell in love with was a bride when I saw her first—at five years old. No scandal to reveal whatever, just moonshine of memory! Mother had a bid to the church to see the couple enter the bonds. I was not invited, but I went just the same. It was curiosity, not cake, that led me thither.

The chief impression I got was wondering how old Cal Smithers, the stock-buyer with knobby nose and ragged whiskers, could happen to be the sire of the siren! He looked very awkward and foolish going up the aisle with his starched shirt and white kid gloves. The Vision glided beside him, and I cannot describe the Victim. The groom was "a personable young man of potential promise," the Clarion stated, but I affirm that mine eyes were scaled as far as he was concerned. 'Tis ever thus at weddings! He taught "commercial college" and the Beauteous One was one of his graduates whom he felt to be better suited to dictate than to take dictation. Anyhow, I can see her yet, and with one exception that occurred before a minister a few years ago in my shaky presence, no "other such an one" has stirred me quite so hard on the left-hand side of my vest.

I regret just one subsequent thing. Last year I visited the old town and somebody pointed out another somebody they said was this same girl. But the kid left in me denied the allegation.

BUT what I assayed to say in the preface was that elopements and abductions, kidnapping and hasty hegiras to thither and beyond by madcap lovers seem to be a trifle more common now than in the doily days. I mean both with and without the tie that rivets.

Or is it perhaps the avidity of the purple press that spreads these items luridly, while the motor mania enables Cupid or cupidity to play his part with a *dash* instead of a *dart?* Again, it may be that the drug stores are serving pickles and putrid literature instead of horehound candy and castoria; or the venerable old, ivy-wreathed wayside inn has become a shrieking half-way house to Hymen? No wonder the Ladies' Aid has started dancing and bridge lessons in the church parlors, to give a latter-day imitation of the lawn parties so katosh in the home-loving Epoch.

Once I went to New York. Absolutely! In between whirls of entertainment by our editorial accomplices, I took that standard bus-ride to see the Knickerbockers for a nickel. All the blessed distance from the Battery to Grant's Tomb I sat beside a couple who actually made frank and foolish love, just as we used to do when the gas-lights were turned out and her mother was snoring! Not only one couple, but several, mind you; and

(*Turn to page* 62)

Testing Pastures

By T. H. Blow

Springfield, Massachusetts

FIVE million acres of pasture land are now available for the 600,000 dairy cows in New England, not including Maine. This is one cow to approximately eight acres. That this area per cow can be reduced to one-half or one-third by adequate fertilization, and the remainder, which at the present time affords little more than exercise ground, can be turned over to growing trees, is not out of the reach of the New England farmer.

Three years' work on pasture tests scattered throughout this territory has made it possible to collect much information in regard to increases that may be obtained with various plans of fertilization. A real story has been told both from the standpoint of increased yields and the sod improvement following same. Pilot tests started in 1928 gave indications of resultant increases in yields, and commercial size demonstrations conducted in 1930 have given production and grazing data, proving that the smaller tests were indications in the right direction.

The following comparison of weights in green grass per acre for two years on 23 farms personally supervised shows a consistent improvement in yield. Where lime was used it was at the rate of 1½ tons per A.

Plot	Treatment per acre lbs.	1929 Yield lbs.	1930 Yield lbs.
1 Check (untreated)		3,565	2,370
2 0-16-0	600	4,429	3,679
3 0-16-0 (plus lime)	600	4,816	4,093
4 0-16-16 (plus lime)	600	6,206	6,210
5 8-16-16 (plus lime)	600	8,025	8,011

It will be noted from the foregoing table that the lesser treatments, plots 2 and 3, gave their greatest response the year after application. The sods showed this very strikingly in many instances. The more intensive treatments on plots 4 and 5, having potash and complete fertilizer respectively, kept up a consistent yield. The check plot continued to get worse, dropping back nearly 1,200 pounds per acre. These yields were made on representative sods on each plot with the second year's weights being taken on an area that had been grazed the year previous.

Unfertilized

400 lbs. 10-16-14 per acre applied April 1, 1930.

These pictures were taken May 16, 1930, on the commercial-sized test on Waveney Farm, Framingham, Massachusetts, where the fertilized sod returned the owner $122 per acre more than the unfertilized returned. There was an increase of 142 per cent in the first clipping.

The pastures in nearly every instance were of the permanent type, a few having been tilled in the past. The sods were of a great variety, ranging from the usual hard hack and cinquefoil to the better blue grass and white clover type. Each step up in treatment had some influence on the vegetation.

The phosphorus and lime combination added some vigor to the dormant grasses and clovers, but was far from outstanding. The addition of potash seemed to give the white clover a new lease on life, with the result that on the majority of the tests the clovers came along with enough stretch to give the cows something to wrap their tongues around. This is very important because many of our pastures are well populated with the clovers.

On the complete plot, the nitrogen induced the grass growth and gave earlier pasturage. However it was quite evident on this plot that unless the cattle were turned on early, or when the grass was not over four to six inches high, the growth of clover was inclined to be subdued. This was very noticeable inside the plot area that was fenced and not grazed during the season. Thus management as well as fertilization plays a large part in good pasture success.

On those plots having seed scattered on top of the sod, a good response was noted, as many of the moss knolls and bare spots were filled in. There is, however, much dormant grass and clover in our present pasture sods that with the proper nourishment would make a great response.

To lend support to the pilot tests and go a step further in securing actual grazing and production information, several commercial size tests of four acres or larger were sponsored by the various fertilizer companies, dealers, and materials people in the Northeast. Nine of these were sponsored by the N. V. Potash Export My., Inc., in the five states mentioned previously.

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These pictures were taken July 3, 1930, on the farm of Ernest Anderson, East Morris, Connecticut. Note the complete change in sod growth with the more adequate fertilizers, 0-10-10 and 5-10-10. Using the check plot as 100, the values of the other plots are given.

Check plot—unfertilized
Value—100

1,000 lbs. 0-10-0, applied early in 1929
Value—267

1,000 lbs. 0-10-0 plus lime, applied early in 1929
Value—333

1,000 lbs. 0-10-10 plus lime, applied early in 1929
Value—533

1,000 lbs. 5-10-10 plus lime Nitrogen only in 1930
Value—733

Kudzu

The South's Neglected Crop

By P. O. Davis
Editor, Alabama Polytechnic Institute

THE stepchild of Southern agriculture is kudzu. To date it has received little attention and considerable ridicule. Men who were considered authorities on agriculture have pronounced it a pest and advised farmers to "leave it alone." One writer went so far as to say to farmers that "if you plant one vine it will take your place."

Consequently farmers have been skeptical about it. They have been, and still are, literally afraid of it. In a figurative way they have guarded their farms and ordered kudzu not to enter.

In doing so they have condemned a rare crop. No other crop equals its combination of advantages. Furthermore, it is not a pest. Spread is easily prevented, and it can be killed with little effort.

But why should a farmer want to get rid of kudzu? He may want to discontinue it on a field, but certainly he does not want to destroy it entirely on his farm. Getting rid of it is like driving away a good friend.

The following are a few reasons why every farmer who can produce it should want it:

(1) It is an exceptional soil builder. It literally makes poor soil rich.

(2) It is a splendid hay crop.

(3) It is a dandy pasture.

(4) It is a splendid green feed for poultry.

The Experiment Station of the Alabama Polytechnic Institute at Auburn is ready to testify any time and anywhere that kudzu possesses the qualities and does the things named above. Director M. J. Funchess says "You cannot go wrong planting it."

The Alabama Station made a planting of kudzu in the early spring of 1916. It made little growth that year but covered the ground in 1917 and made a dense growth in 1918. In the spring of 1919 it was plowed under. From that time through 1929 the land where kudzu had been grown produced two crops of sorghum hay, four of corn, and seven crops of oats.

Builds Soil Fertility

The official records show that the residue from kudzu produced 2,536 pounds of sorghum hay per acre in 1919 and 1920. The average yield of four crops of corn following kudzu was more than double the yield on the plot that had not grown kudzu. The average yield of seven crops of oats on the kudzu plot was 7.9 bushels per acre more than that on the plot which had grown no kudzu. In 1929, 10 years after the kudzu was turned under, the kudzu plot produced 9.2 bushels of oats per acre more than the plot on which kudzu had never grown.

A crop which will do these things is entitled to be classed, without further examination, as a first-class soil builder. It is a legume, which means that it belongs to that group of plants which enrich land, if given an opportunity.

But what about hay? The South is well known as an area where farmers fail to produce as much hay as they need; and kudzu is a hay plant. To determine its hay value it was compared with alfalfa. It was found that in both dry and green form kudzu has a higher feeding value than alfalfa. Any farmer who has fed alfalfa has a feeling that it is good enough for his livestock, but yet kudzu is better. This is revealed by analyses of the two hays and verified by animals which have eaten it.

The kudzu experimental work of the Alabama Experiment Station is reported in Circular 57 entitled "Kudzu in Alabama." The authors are R. Y. Bailey and E. L. Mayton. They show, according to experiments, that kudzu produces hay abundantly. They present figures for six years, 1920-1925, inclusive, showing that the yield per acre of kudzu hay on the Alabama Station was 4,875 pounds. The figures include a low yield in 1925 caused by very dry weather from February to August.

Another area mowed twice in 1930, another very dry year, produced 5,647 pounds of hay. No fertilizer was applied to either of the areas mentioned.

Is Relished by Livestock

The department of animal husbandry and dairying at the Alabama Station has done experimental work with kudzu as a grazing crop. During the severe drought of 1930 the milk flow of dairy cows was maintained by changing them from grass pasture to kudzu a part of each day. No unpleasant odor or flavor of the milk resulted.

The Alabama and other experiment stations have found that all classes of livestock relish kudzu as a pasture as well as for hay. It may be used to great advantage and profit as a temporary pasture when regular summer pastures are dried up.

It is especially good to cut and feed poultry in dry weather. In fact it is "especially good" whenever available.

It is well to remember that kudzu cannot be planted in the spring with a view to producing hay that year. It should be allowed to grow at least two seasons before mowing begins, according to Mr. Bailey and Mr. Mayton. In case the soil is very poor three seasons may be needed before it is mowed.

Method of Planting

Kudzu seldom produces seed, hence it must be propagated from plants which are usually called crowns. They are formed by vines taking root at the nodes or joints. A good crown has a bud, or growing point, and well-developed, fleshy roots eight or ten inches in length. If crowns are planted before they dry out, practically all of them will grow, but if allowed to dry out or become very dry, a large portion of them will fail to grow. For this reason it is better to obtain crowns near where they are to be planted. However, this is not always possible.

It must be remembered also that plantings made one year will not produce crowns until two years later. Consequently propagation is rather slow. However, a well-established field produces a lot of crowns, and very extensive plantings can be made within a few years.

"One method of planting that has been used successfully," state Mr. Bailey and Mr. Mayton, "consists in digging holes about 12 inches deep with a posthole digger and setting the crowns, the roots of which have been cut back to about 12 inches in length, in these holes. The soil should be packed around the roots so that the bud of the plant is left slightly above the surface. Another method that has been used very successfully is the furrow method. In this method the crowns are set in open furrows so that the buds are just above the soil surface. This method requires less hand labor and has resulted in better first-year growth than the posthole method, due probably to the fact that the roots are planted whole without trimming.

"Crowns are usually spaced about

10 feet apart each way which requires 435 plants per acre. A good start may be made in less time by spacing five feet apart each way. This thicker spacing is desirable if plenty of home-grown crowns are available.

"The time of planting has not been studied thoroughly. Plantings from the 15th of February to the 15th of March have been very satisfactory. Kudzu plants make little growth the first year and may be smothered out by weeds or destroyed by rabbits. The young plants may be protected from weeds by planting some cultivated crop between the rows of kudzu the first year. If soybeans are used as the interplanted crop, the rabbits will feed on them and do less damage to kudzu plants."

It grows well on most soils. If given time it will get started and make a good growth on very poor and gullied land. It responds to rich land and fertilizer.

No one seems to know how far north kudzu will grow, but it appears now that it is limited, in the main, to the South. It does well in the extreme northern portion of Alabama, which is the north rim of the cotton belt. Perhaps it would do well farther north, but just how far no one is able to say.

It is a perennial known as "porch vine" or "telephone vine" and perhaps other names. It is used extensively as a shade plant around farm homes. From such planting field plantings are now being made.

That farmers generally are interested in the crop is revealed by the fact that the announcement that a new bulletin had been published by the Alabama Experiment Station brought inquiries from 40 States. Most of them asked for more information about it, but a general inquiry was for information as to how to grow it and where to get planting stock.

It is not improbable that the South will become a land of kudzu. It should be grown on every farm where it will grow, for it has too many advantages to be neglected. As more of it is grown there will be richer land, more and better livestock, and bigger returns from farming.

This old Kudzu vine made an enormous growth during an experiment at Auburn, Alabama.

The Pickard Family—everyone a musician and true interpreters of the widely loved melodies of the Old South. Heard in many farm radio programs, the Pickard family is ideally fitted to bring to the radio audience a true expression of homely Dixie songs and dramatic sketches. They come direct from the Tennessee hills where the songs they now play were dear to their hearts since childhood. Left to right: Ma, Bubb, Ann, Dad, and Ruth.

Behind the Farm Radio Microphone

By Jerome J. Henry

National Broadcasting Company, Inc., Chicago, Illinois

EVERY farmer in the United States may attend the same "school" and receive a store of agricultural knowledge limited only by what remains to be discovered by the leading farm specialists of the country. This school of the air knows no bounds in reaching every nook and corner—every homestead and every class no matter where the individual may be in the 3,000-mile expanse of Uncle Sam's farming territory.

Those of us who have learned to rely upon weather reports, timely crop information, market news, statistics, and countless other things by radio need no introduction to this wealth of material. Those who have not shared in these benefits may obtain them at will simply by "tapping" the air with a radio receiving set.

The information is by no means limited to routine reports and statistics, nor is its availability restricted to

farmers. All sorts of timely features are covered by radio stations throughout the country and heard by all classes of people interested in the agricultural industry.

Of particular interest to agriculturists, the largest and most expansive broadcast is the National Farm and Home Hour originating in the Department of Agriculture and Washington studios of the National Broadcasting Company, the Chicago studios of the company, and occasionally the New York studios. A similar branch of the Farm and Home Hour was inaugurated on the Pacific coast January 1 to serve Western farmers in the same way that the National Farm and Home Hour now serves farmers in the East, South, and Midwest.

The National Farm and Home Hour broadcast daily over a network of 37 stations and the Western Farm and Home Hour over seven large Pacific coast stations give a complete coverage of the nation. A typical Farm and Home Hour program offers 20 minutes of news, information, talks, and other vital messages interspersed with musical features planned to please country folks.

Morse Salisbury, chief of radio srevice for the United States Department of Agriculture, has the enormous task of arranging the daily programs of the National Farm and Home Hour.

Musical programs are carefully handled and are the result of studies to learn the types of music and entertainers preferred by rural listeners. A recent statement by Frank E. Mullen, director of agriculture for the National Broadcasting Company, illustrates the appreciativeness of country

An outstanding float of the National Corn-husking Contest parade. Radio listeners heard a vivid description of this and other parts of the parade direct from the scene of the event in northwestern Kansas.

folks for the better classes of music. "Farmers no longer prefer the 'rube' or 'hill-billy' type of music, but are in favor of the selections by foremost composers," he stated.

Contained in the broadcasts for the national radio audience are music and special numbers. Primarily, however, the programs contain sufficient news and information to place the farmer on an equal basis with the business man in obtaining facts concerning his industry.

Market and weather summaries perform a real service, amply described by the words of C. F. Marvin, of the Weather Bureau, who said in a recent radio talk:

"My good friends, I know that the weather has misbehaved shamefully during the 1930 growing season, and that the unusual extremes of heat and lack of rain have brought on serious losses. In a joking way the Weather Man is charged with at least part of the responsibility for all this, and perhaps, he is not entitled to address you as his good friends. However, down deep in your hearts you know he is not to blame, and I confidently believe my words of friendly greeting set in vibration within those who hear me a responsive chord of friendship for me and my staff, notwithstanding the human limitation surrounding our efforts to serve you."

This message substantiates the spirit in which the vital news is offered the public by the United States Department of Agriculture radio service.

An example of feature talks heard in the National Farm and Home Hour was the soil improvement series of January, 1931. Six vastly important soil and fertilizer subjects were discussed by members of the Bureau of Chemistry and Soils. They were: "The Soil Survey and Your Farm," "New Knowledge of Fertilizers," "New Knowledge of Potato Fertilizers," "What You Should Know About Concentrated Fertilizers," "Working With Soil Organisms" and "New Knowledge of Soil Amendments." In addition to hearing these talks they are available for reading by requests addressed to the Department of Agriculture.

Two unshucked "nubbins" who added color to the 1930 National Corn-husking Contest, Norton, Kansas, and were a real attraction in themselves.

Messages of the Federal Farm Board are broadcast over the nation-wide network every Friday noon, the time, 11:30 a. m. to 12:30 p. m., C. S. T., having been chosen for the National Farm and Home Hour in order to reach the greatest number during the dinner period.

It is difficult to estimate the value of the Department of Agricul-

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More Plant Nutrients in Fewer Pounds

By M. H. Lockwood

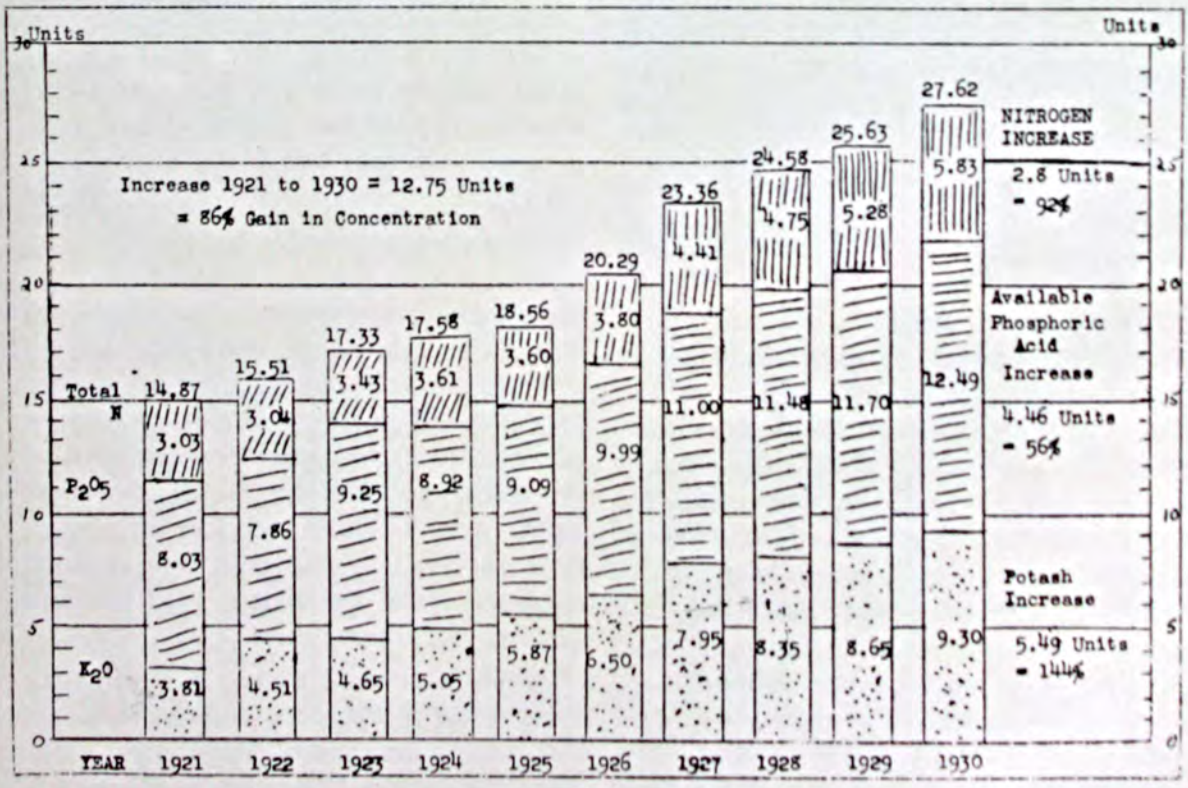
Eastern States Fertilizer Service, Eastern States Farmers' Exchange, Springfield, Massachusetts

Reprinted from the April Eastern States Co-operator

WILL fertilizers containing 40 units of plant nutrients be as common in 1940 as 20-unit mixtures were in 1930? If the record of the past 10 years is any guide, this question may be firmly answered "yes." And this is particularly true as far as Eastern States members are concerned. In fact, it would not be surprising if the average plant nutrient content of mixed fertilizers distributed by the Exchange reached the 40-unit mark by that time.

The accompanying chart, showing the average plant nutrient content of Eastern States mixed fertilizers from 1921 through 1930, records, in detail, the trend since Eastern States Fertilizer Service began. It will be seen that the average analysis of mixtures, 14.87 per cent plant nutrients in 1921, has nearly doubled in 10 years, reaching 27.62 per cent in 1930. If all the mixed fertilizers distributed by the Exchange in 1921 had been mixed together and analyzed, the analysis would have shown approximately a 3-8-4 grade of goods. At that time the old

WEIGHTED AVERAGE PLANT NUTRIENTS - MIXED FERTILIZER



2-8-2, 3-8-4, and 4-8-4 ammonia basis grades were popular. That was during the period when the 4-8-4 grade led all others in tonnage here in the Northeast. Since then the 2-8-2 has almost disappeared from use. In fact, in so far as Eastern States fertilizers are concerned, it was dropped from the list several years ago, and it is five years since any of the three grades mentioned have been included among Eastern States fertilizers.

The next step was to the 3-12-3, 5-10-5, and 5-8-7 ammonia basis grades. Those have come and gone with their high analysis partners such as the 4-16-4, 8-16-8, and 10-16-14; the latter having been introduced by the Exchange in 1926 and 1927.

Since 1928, Eastern States fertilizers have all been graded on the nitrogen basis with ordinary analysis mixtures such as 4-8-8, 4-10-6, and 4-12-4, all totalling 20 units and their high analysis ratio equivalents 8-16-16, 6-15-9, and 6-18-6, containing 30 and 40 units.

Beginning in 1929 the Exchange has distributed still higher analysis mixtures known under the trade names Ammo-Phos-Ko and Nitrophoska containing 45 to 60 units of plant nutrients. With each step upward for 10 years past it seems entirely likely that the average content of Exchange mixed fertilizers may be as high as 40 units by the end of another 10-year period.

What These Changes Mean

Along with other industries, fertilizer manufacturing and farming are undergoing some radical changes when one stands back and looks at them from the standpoint of decades. And, although it is common for some to reflect on "the good old days," there is more cheer and progressive interest in adopting sane income-increasing improvements and looking ahead at the advantages which come with them.

As the number of livestock decreases, manure supplies decrease. The smaller supplies of manure indicate probable increases in the ratio of nitrogen and potash in fertilizers. This trend is already evident in the chart of average plant nutrients. While potash has increased rapidly and is a relatively inexpensive nutrient, nitrogen has risen less rapidly, probably because of its higher cost. Owing to present production capacity for both by-product sulphate of ammonia and carriers of synthetic nitrogen, together with increased efficiency in natural nitrate refining processes, we may look for lower nitrogen prices for the future. Even with the limited supplies of manure, larger quantities of phosphoric acid can be used with profit as a manure supplement. And even in carriers of phosphoric acid we can see signs of improvement.

Both ammonium phosphate and ammoniated superphosphate seem to have at least slightly superior value when compared with older materials, such as sulphate of ammonia and ordinary superphosphate. They are an improvement mechanically over the older materials. According to tests, the phosphoric acid in them seems to have a higher penetrating ability than that in ordinary superphosphate.

About Minor Elements

We are learning that some of the minor elements have a material effect on crop production under certain conditions, and they are being introduced into the high analysis fertilizers in definite quantities when needed.

The user is paying less for his purchased plant nutrients, hauling and handling less bulk, and cutting his production costs as he finds that machinery will apply a smaller poundage of fertilizer accurately enough, and as he finds, as Eastern States members have, that 40- and 60-unit fertilizers raise as large a quantity and as good quality as did the older, 12-, 15- and 20-unit fertilizers.

With a change from 15-unit mixture to 28 in the past decade, it is not difficult to picture a further climb to 40 units during the next 10 years.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

ON March 9, 1930, the portrait of Professor William Carroll Latta was, on the occasion of his eightieth birthday, presented to Purdue University, LaFayette, Indiana, by the Alpha Lambda Chapter of the Epsilon Sigma Phi, in cooperation with associates, faculty members, former students, and members of rural organizations.

A like honor was done Professor James Troop on January 14, 1931, his portrait being presented to Purdue University by the Indiana Horticultural Society, members of Acacia fraternity, faculty members, former students, and friends. Professor Troop's seventy-eighth birthday was on March 14, 1931. Both portraits were painted by Robert W. Grafton, the famous Hoosier artist.

Years of Service

This well-merited honor was shown Professor Latta in recognition of 48 years of service to Purdue University, from 1882, and he is still active. Professor Troop was honored in recognition of his 46 years of service as professor of horticulture, from 1884 to 1912, and of entomology, from 1912 to date.

Forty-eight and forty-six years of continuous service! That is a long, long time, Gentlemen. It makes Professors Latta and Troop real pioneers, and we rejoice when such men are honored. Too often their services are lightly regarded or forgotten; yet they blazed the way for others to follow and carry on the work with the marvelous resources and improved equipment of the present day.

When we look with admiration at the great dome of a towering State Capitol building, we are apt to forget the men who labored in the dark and damp of the earth to form a firm

PROFESSOR WILLIAM CARROLL LATTA

foundation for the imposing edifice. When we watch a great mogul engine snort out into the night, drawing a long train of magnificent cars bound for the Pacific Coast, we praise the grandeur of the modern railway, but seldom remember the "empire builders" of the past. So, too, when we go the rounds of the twentieth century agricultural college and experiment station, noting with astonishment its wonderful buildings and wealth of appointments in lecture halls, labora-

tories, libraries, judging pavilions, barns, and far-flung fields, we admire and applaud these evidences of progress; but we sometimes neglect to give credit to the pioneer builders of it all.

Hats off to the many brave, persevering, undaunted, far-seeing men, of the Latta and Troop type, who met and surmounted all sorts of difficulties and deterrents in their struggle to make agricultural institutions of teaching and research of inestimable scientific and practical value to the people.

First Faculty Members

In 1882 Professor Latta was the sole member of the agricultural faculty at Purdue. He acted as instructor in agriculture and superintendent of the University farm. At his invitation Professor Troop went to Purdue University in 1884, as professor of horticulture and entomology, and horticulturist and entomologist of the Experiment Station. These two made an effective team and saw expert after expert added to the faculty, until it became a mighty organization for efficient service.

Professor Latta was born at Union Mills, Indiana, March 9, 1850, raised on a farm, and educated in the local schools. Then he attended Michigan Agricultural College, where he received his Bachelor of Science degree in 1877, and his Master's degree in 1882. In 1883, he was made full professor of agriculture at Purdue, and acted in that capacity until 1911. From 1889 to 1923, he was superintendent of Indiana Farmers' Institutes, being appointed to that position immediately after the passage of the Farmers' Institute Act in 1889.

The Institutes under his able supervision aroused a wide interest in agricultural education among the farm folk of the State, which led to legislative provision for the erection of Agricultural Hall in 1901, the first State appropriation for agricultural research in 1905, and the appropriation for the Experiment Station Building in 1907. Later, the Institutes were largely instrumental in securing the passage of the Clore Act establishing the Department of Agricultural Extension in 1911. During the 35 consecutive years Professor Latta has supervised the Farmers' Institute work of Indiana, it also has exercised a potent influence in advancing agriculture, enriching rural life, and promoting community cooperation.

In 1883, Professor Latta began a number of soils and crops field plot experiments. Five years later he laid out the first permanent soil fertility field experiments at Purdue. This inaugurated a system of research which was considered one of the best in the country at that time. These original lines of experiments stand, today, as a monument to the foresight and vision of Professor Latta. He was also the pioneer in the field of agricultural extension in Indiana.

Trail Blazer and Pioneer

Of him, Dean J. H. Skinner has said: "Professor Latta is a capable, sympathetic teacher, wise counsellor, and a good friend of all his students. He has been a trail blazer and pioneer in the field of improved agriculture and rural education. He organized the School of Agriculture, and very wisely laid out the first administered four-year course leading, in turn, to the bachelor's and master's degree. He conspicuously directed the administration of the school until 1907. He has truly left a great impress upon the local community, Purdue University, and the agriculture of Indiana."

During the last few years, Professor Latta has devoted much time to the preparation of the manuscript for a "History of Indiana Agriculture." His services to agriculture and civic and religious activities have been unselfish and unremitting.

Religious matters always have been to him of supreme importance. As a life-long member of Trinity Methodist Church of LaFayette, he has but once in 49 years missed the Easter service, and that was due to sickness. He is a

trustee in every church activity, makes many sick calls, and contributes freely to the Y. M. and Y. W. C. A. His greatest interest in church affairs is to establish, if possible, a cooperative church for Purdue University, as he sincerely believes that worshippers of all denominations should unite in one large church. To this end he has held conferences of all denominations, and another is to be held in the near future.

Professor James Troop was born at Bennington, New York, March 14, 1853, and reared on a farm. He obtained his rudimentary education in the district schools, then entered Michigan Agricultural College, and there was granted the degree of Bachelor of Science, in 1878. The next year he spent in post-graduate work at Cornell University, and the winter following he studied at Harvard. In 1880, he returned to Michigan Agricultural College, became a member of the agricultural staff, and there received the Master of Science degree, in 1882. Two years later, he went to Purdue as an instructor. In that institution his duties were manifold. He taught horticulture, entomology, forestry, economic botany, and even veterinary science. An instructor had to be an all-round man in those early days. Teachers in other agricultural colleges were similarly versatile, and had to "change off" as occasion demanded.

PROFESSOR JAMES TROOP

Emergencies often arose in those days, and were ably met. During Professor Troop's first winter at Purdue, the mercury fell to 34 degrees below zero and killed all of the apple trees in the LaFayette region. Orchardists were dismayed and began looking for varieties that might survive severe winters. This need led Professor Troop to initiate, in 1886, the first horticultural experiment work at Purdue. He planted a hundred or more imported Russian apple trees. Some of them solved the problem. They became summer and autumn varieties in their new Indiana home, and proved valuable as stock for planting in the Northwest.

In 1886, Professor Troop obtained from the Imperial Agricultural College of Japan a quantity of valuable native fruits and seeds, which made a notable contribution to the already large display in the Agricultural Department at Purdue.

In 1885, Professor Troop's bulletin descriptive of over 60 varieties of shrubs found on the college grounds led people to select more suitable plants for use in the landscaping of their home grounds. That year Professors J. S. Budd of Iowa Agricultural College and W. J. Greene of Ohio Agricultural Experiment Station were his guests at the time of the Agricultural Conference, in which they took a leading part. The counsel of those noted

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Potash-Minded

By Luther Fuller

General Agricultural Agent, C. & E. I. Railway, Danville, Illinois

"POTASH-MINDED" is a term that can be applied to an increasing number of Illinois farmers each year. Many of these men discovered that their plan of soil improvement, which included lime, phosphates, and legumes, was considerably improved and hastened by the use of potash, either in straight form or with complete fertilizers.

Field demonstrations with various crops on different types of soil have shown some remarkable results from the use of potash and commercial fertilizers containing potash.

To illustrate, F. L. Kinney, one mile south of Momence, Illinois, in 1930, obtained 41.5 bushels of wheat per acre on brown sandy loam where 315 pounds of 3-18-9 were used, compared with 30.6 bushels from 315 pounds of 3-18-0, and 21.4 bushels from the check.

R. C. Knox, Morrison, Illinois, in 1929, grew 91.4 bushels of corn per acre on brown silt loam where 130 pounds of 0-14-14 were used, 85.9 bushels from 130 pounds of 0-14-6, 75.4 bushels from 130 pounds of 0-14-0, and 76.8 bushels from the check. Here the response is apparently due to the potash in the fertilizer.

W. B. Huffaker, five miles south of New Berlin, Illinois, in 1929, secured 73.5 bushels of corn per acre on brown silt loam where 135 pounds of 0-14-14 were used, 83 bushels from 135 pounds of 0-14-6, 68 bushels from 135 pounds of 0-14-0, and 57.6 bushels from the check.

The use of potash alone gave very profitable results on peat and black sandy loam. Walter DelHotel, West Brooklyn, Illinois, in 1928, grew 51.5 bushels of corn per acre on black sandy loam where 100 pounds of muriate of potash were used, and 17.4 bushels on the check.

J. T. Johnson, Normandy, Illinois, in 1928, grew 60.4 bushels of corn per acre on peaty loam where 300 pounds of muriate of potash were broadcast, and 13.5 bushels on the check.

Henry Lauer, Prophetstown, Illinois, in 1928, grew 54.1 bushels of corn per acre on black sandy loam where 108 pounds of muriate of potash were used, and 28.8 bushels from the check.

These results (*Turn to page* 58)

This picture was taken during one of the stops of the soil-testing train.

Farmers came from miles around to see the cotton-dusting demonstrations.

Prepare *for* Weevils

By C. H. Brannon

Extension Entomologist, North Carolina State College of Agriculture and Engineering

COTTON growers are urged not to wait until the last minute to prepare for the boll-weevil fight this season. Last year we experienced a very dry season which was on the whole unfavorable for heaviest weevil damage. If we have frequent rains during the growing season this year, particularly in July and August, we can look for very severe damage by the boll-weevil.

There is a great deal of discouragement about the price of cotton, but *if cotton is worth growing at all, it is worth protecting from boll-weevil damage.*

It would be obviously foolish to do away with fire insurance because property values have shrunk. It is false economy to raise cotton for boll-weevil food regardless of the price of cotton. Cotton farmers should consider as never before, growing only the acreage which can be properly treated for boll-weevil control. If weevils appear in large numbers and control is properly used, it is an excellent investment. We should not consider blindly the extra cost of weevil control without considering the cost of weevil damage each season and being prepared to dust quickly at the proper time. If weather conditions do not permit heavy weevil damage, machines and poison do not deteriorate if given suitable protection.

Reports showed more weevil activity in North Carolina than in any other States in the Union last year.

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Speaking of

Publicity

By W. H. Darrow

Extension Editor, Agricultural and Mechanical College of Texas

PUBLICITY is something taken seriously by its sponsors, and with a grain of salt by the public. Stated another way, "publicity is your side of the question made public, propaganda the other fellow's." It is unfortunate there is enough truth in the business that these characterizations should have been made. Because these views are rather commonly held to varying degrees by many people, especially those given to some precision of thought, publicity is not always regarded by farm and home demonstration agents as the handmaiden of Extension. Yet it should be, and therein lies the essence of this story.

Viewing publicity in its broadest sense—of making known—at least half of Extension is publicity. The foundation is, of course, the farm or home demonstration which develops thinking men and women as they work out their successes in field or barn or home. To work the rural revolution to which Extension folks are devoting their lives, the number and influence of these demonstrators and their demonstrations must be multiplied. That is why meetings are held, and tours bring the neighbors to view the accomplishments, and why exhibits are placed in fairs and store windows, and why the simple news story is carried in the local newspaper. All this is publicity. The newspaper branch of it is selected for special treatment here because it is the form that gives the greatest effect with a given expenditure of time and effort.

Victimized it may be by the army of press agents who swarm America (some of them in collegiate uniforms) and erring sometimes in its selection of and emphasis to news, the press remains a power in the land. I don't believe all Extension agents realize the extent to which this is true. I shall not attempt to prove the point, but merely to suggest that those who would popularize ideas give some consideration to the greatest popularizer of all. Allies are often helpful.

It Can Be Done

One of our Texas county farm demonstration agents convinced himself of the power of the press in a unique way. "It can't be done," everybody told W. O. Logan when in beginning county agent work in Knox county a few years ago he proposed a campaign to eradicate coyotes. For two years community and county-wide mass-meetings had failed in getting concerted action.

"But it's got to be done," he replied, "you can't develop a paying livestock industry with coyotes running loose." He was informed that he was on a cold trail and that he would soon find that no one would come to his meetings.

But not a meeting was held. Beginning in mid-August Logan inserted in his news notes in local papers each week such items as this: "John Smith of Vera lost two sheep from coyotes last Thursday," or "Mrs. Albert Jones of Gilliland had her chickens raided by

coyotes last week and reports 10 missing," or "A fine Hereford calf belonging to Jack Eberly was killed Saturday night on his ranch near Truscott."

From August to January at least one such item of news was reported in the newspapers every week as the attacks occurred. No advice, no preaching, no articles on how costly coyotes are, no suggestion that they could be killed out—nothing but straight news, facts without opinions.

January first he mailed a letter to 40 representative ranchers stating that if they wished to kill out their coyotes poison bait could be had for a certain price per bait, that it would take from 50 to 100 baits per section, and if interested in poisoning to notify the agent. *Thirty-nine* immediately replied, the commissioners court bought the baits for resale, a U. S. Biological Survey man gave a demonstration, and the howl of the coyote was heard no more that year. A year later a few returned, but the poisoning was done by farmers and ranchers without aid of the agent.

I should also like to say something about the country newspaper as an institution because I have encountered so many people who regard it as a joke. To assume an amused superiority to it, or worse, a studied indifference, is regrettable in the cities and town, deplorable in the open country, and unforgivable in Extension circles. The extent to which this view is held is, I think, a measure of the triumph of urban over rural civilization. If the Extension division has been recruited to urbanize the country, the sooner it is mustered out the better, in my opinion. Relief in the wholesomeness of country life and country institutions, and faith that a satisfactory and cultured rural civilization may be achieved is requisite to understanding and understandable Extension work.

There's news in the little simple things folks do about the farm, such as the training of vines over this cottage in a home demonstration in yard beautification, and the newly sodded lawn, and flagstone walks.

Russell Lord has expressed these ideals well. He used to be an extension editor at Ohio State University and is now associate editor of *Country Home*. He says, "No other country in the world has anything like our country or community newspapers. They are as typically American as the rocking-chair, the town meeting, or apple pie. They are the expression

of our democracy, and wherever it is that our democracy is strongest, they are strongest.

"This is no new thought, but apparently it is one that only lately is coming generally to be recognized in America. It has a bearing on our theme. More than half of the community newspapers in the United States are put out in the 12 agricultural States of the great Middle West. Such community newspapers may neglect agriculture—often they do—but they cannot help depending in great measure on that community consciousness by which the rural town and its outlying farms are drawn together and on that democratic simplicity and simple neighborliness which never comes to full flower far away from the soil.

Speaking of Derision

"Our home paper makes funny mistakes sometimes. Sometimes it admits to its columns the communications of correspondents which without at all intending to amuse, do so. But it is far from being something to laugh at, as a whole; not, at least, in the tone that the big city papers sometimes laugh at it, scornfully.

"Perhaps the most futile of all things is to tell people what they ought not to laugh at. This is not the intention here. We really are not discussing humor at all; we are discussing derision. And we are not even saying that you ought not to deride your home paper and the community which it reflects as accurately as any mirror, if you really feel that way about it. Only, do you really feel that way?

"It is an attitude which, happily, is going out of fashion. The whole community-development movement in America represents a throwing-off of all such foolishness; a realization that city standards are no adequate measure for rural communities and their institutions; a determination proudly to work with what is our own here at home, and with these things to make our home community as good a place to live as any on earth, and for us the best . . .

"Of small, yet great, matters is your home paper the faithful historian, and the only one. Not to respond to and to support such a paper, not to recognize it as a mighty force for community cohesion and progress, and not to try in some measure to repay these services appear, to say the least, both ungracious and unimaginative."

We had a news-writing contest for county and home demonstration agents in Texas last year. One hundred fifty-three entered, and 47 made county exhibits of their local material at the annual Extension meeting. The judges said the news content of the stories written by agents exceeded those written by reporters and editors. That is not strange for it is the agent who has the background and who should place the interpretations on results achieved. It strongly suggests that agents should not delegate all their news writing to others but should furnish local papers at least several short interpretative result stories each week. In Texas we suggest that every agent write each week two typewritten pages double-spaced, containing three to five short stories in addition to any notes on meetings, tours, exhibits, etc., he may give direct to reporters.

The Nose for News

Granted the vision and the will, the writing is not hard, agent opinion notwithstanding. I have found agents are apt to suffer from two ailments. The first is difficulty in recognizing news, and the second the tendency to use the news story as a medium for expressing one's own opinions.

It is said that some folks can fall in the river and come out dry. Similarly some agents can wade through a county-full of constructive, community-building news and come to the office dry. This lack of the nose for news can be overcome. It is simply a matter of getting outside yourself

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The judges who picked the prize-winning scrapbooks were (left to right) Dr. C. E. Millar, Soils Department, Michigan State College; Burt Wermuth, Editor of the Michigan Farmer; E. E. Gallup, State Supervisor of Agricultural Education; and W. W. Johnston of the English Department, Michigan State College.

Potash Scrapbooks

By I. J. Mathews

Winamac, Indiana

PRESIDENT R. S. SHAW of Michigan State College, writing a special message to Michigan high school boys entered in the potash scrapbook contest, said:

"Some of the rarest gems of thought are frequently found in rather secluded places, in the press, in long, wordy addresses, and in published books. This applies also to written expressions relating to agriculture in all of its various phases. The human mind cannot record them all and must needs rely on some form of reference system. A classified scrapbook or clipping file may serve as a means of preserving and rendering available a great mass of material of much value to an agricultural student which would otherwise be unavailable."

"I never realized that there was so much known about potash or that it is so important a plant food," said redheaded Archie Potter, a sophomore in the high school at Mesick, Michigan, whose scrapbook was truly "exhaustive." "The businessmen around town have been calling me 'Potash' ever since I won the free trip to the Future Farmers' Association convention at East Lansing, with my scrapbook."

"Harold Hulburt was about to quit school," said Willis Campbell, teacher of agriculture at Cass City, Michigan,

"when this potash scrapbook announcement came out. But he got interested in this one thing and now he's going on and finish school. Where he dug up all the potash material he did is more than I can figure out."

Harold Hulburt's scrapbook contained some photographs showing how various crops on the Hulburt farm responded to fertilizers containing potash. In one instance he records, "A dollar's worth of potash brought in more than four dollars' worth of crop."

Wayne Wibirt started his with a photograph of the "Potash Pays" alfalfa demonstration on the Keystone Demonstration Farm north of Howard City where the alfalfa letters are still plain the third spring after the potash was applied.

Emmer Mathias asked George Grantham, research assistant in soils at Michigan State College, to write an introduction to his scrapbook.

Both Leslie Hughes and Frank Denning worked out a special design for the covers of their scrapbooks.

As the potash scrapbook contest proceeded, it came to be considered highly both by the educators of the State and the boys themselves. The relation between making an exhaustive scrapbook on an important subject like potash, which is receiving constantly increasing attention each year, to the life of the community in which the boys lived was noted.

Every Book, a Scrapbook

The boys learned that every book we now recognize as such was once a scrapbook, from the dictionary down to the latest novel. The dictionary is but a scrapbook of the words which various races and peoples have invented in their effort to establish a language. The novel is merely a scrapbook of the experiences and ideas of the writer, woven into a plan and presented as the thoughts or words of characters in the story.

Every book is a scrapbook of past experiences and experiments. The collector often displays so much initiative and art in arranging the subject matter and classifying the topics that the reader never suspects that in the beginning these were only scraps or odd bits of information.

Each scrapbook sent in illustrated one or more of the values of keeping a scrapbook, as pointed out by E. E. Gallup, state supervisor of vocational agriculture in Michigan high schools, and Burt Wermuth, Editor of *The Michigan Farmer.*

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These seven Michigan boys, winners in the scrap-book contest, were the guests of N. V. Potash Export My., Inc. at the Future Farmers of America convention at East Lansing, April 30—May 1. Left to right, back row—Wayne Wibirt, Reed City; Clair Gregory, Harbor Springs; Harold Hulburt, Cass City; and Glen Slucter, Hermansville. Front row—Frank Denning, Jonesville; Leslie Hughes, Jonesville; and Emmer Mathias, Mancelona.

The "Arrowhead" at School

By M. J. Thompson

Director, Northeast Minnesota Experiment Station, Duluth, Minnesota

TURN to your map of Minnesota. The northeastern third of the State, north of Lake Superior and shaped like a wedge, is called the "Arrowhead Country."

Duluth, a city of 112,000 is its metropolitan center. Just outside Duluth lies the Northeast Minnesota Experiment Station, a frontier outpost of the University.

This station serves the cut-over country, once an empire of evergreens, but now embracing more than 30,000 farm homes. The station is 18 years old. The great forest fire of 1918 devastated it, a unique experience in experiment station history. As a consequence, it is today a "Prairie Farm," nestling in the Amity Valley, typical of the countless cozy coves along the North Shore.

The first event on the agricultural calendar of the Arrowhead Country each year is the three-day institute, held about April first at the experiment station. This year, the "Tenth Annual Arrowhead Institute" was an elaboration of the old-fashioned institutes that marked the early days of extension work, modified to its regional home. The new auditorium built last year to house it is significant of its influence and growth.

The Arrowhead Institute is administratively a university function; practically, it is a regional enterprise, the "Agricultural Clearing House" of the Arrowhead. Everybody helps. Teamwork puts it over.

Important in this teamwork are the extension force, the 13 agents and farm bureaus of 7 counties, an area as large as the three southern New England States; the Duluth Council of Agriculture, the rural working unit of the Duluth Chamber of Commerce; the Arrowhead Association, working as a regional unit; and the St. Louis County Club, a federation of the Women's Clubs, Commercial clubs, and farm clubs of an area as large as Connecticut. The press, as represented by the Stock & Dairy Farmer, the Duluth Herald, and News-Tribune, provides publicity and financial aid. Finally there is the active help of large industrial establishments, State-wide breed and crop associations, farm clubs, representative citizens of town and country, all functioning through the advisory committee of the Northeast Minnesota Experiment Station.

Come from Miles Around

Five hundred and fifty persons registered for the institute this year. They came from Cook county 125 miles distant; from adjacent Lake county.

Some of them hailed from Pine county, 75 miles to the south, the scene of the never-to-be-forgotten forest fire of '94, but now a land rich in cows and clover. Carlton county sent its quota. The Aitkin and Itasco county groups drove 100 miles. The home county, St. Louis, naturally furnished the bulk of the attendance. Most of the students were actual farmers; others aspired to be. There were farm and city women, gardeners, fruit growers, and florists.

All classes were represented, even the new devotees of "Fur Animal Husbandry." The day attendance of 250 or more would gradually grow to 600 and better each night. The total attendance at the three-day programs was over 2,000.

The social range was just as wide. Among the 300 who sat down to the Fourth Annual Rural Leadership Dinner, the culminating event of the week, there were modest 40-acre pioneers, 4-H heroes, and industrial magnates of the "Zenith City."

To Stimulate Year-round Agriculture

The aim of the Arrowhead Institute is to interpret northern agriculture and stimulate a better use of land for both winter and summer crops—to anticipate a January harvest of pulp and fur off the rougher land and a July harvest of feed and food crops from the tilled acres.

A poultry and fur program came the first day. The second day cattle, sheep, and crops had their innings. Three programs were held the last day, flowers, vegetables and fruits, and fairs.

The St. Louis County Club, working with neighboring farm bureaus, staged the evening programs. There were respectively Lake, Carlton, and St. Louis County nights. The Lakewood Farm Club served the Rural Leadership Dinner, sponsored by the Duluth Council of Agriculture where personal and group honors were conferred.

Farmers Select Honor Roll

Several meetings were scheduled and held, including the annual meeting of the St. Louis county poultrymen, the Tri-county 4-H judging, the Smith-Hughes judging participated in by 7 teams, the veterinary conference on abortion control, and the Arrowhead potato conference. On the last day, the annual conference of county and local fairs was held, and the honor-roll farmers of '28, '29, and '30 formed a fraternity.

For the Senior Honor Roll, five men are chosen each year, one from each county, by the farmers themselves. Each man is selected for some contribution he has made to the agriculture of the region. This is neither a hall-of-fame nor a master-farmer project, but here are some of the accomplishments: one man has cleared three farms; another conquered red clay; a third made a timber farm finance university training for his family; a fourth began the cauliflower industry. The pictures of these men, class by class, grace the

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On the second floor of the auditorium at the Northeast Minnesota Experiment Station is a well-equipped kitchen and dining-room.

Legumes are the corner-stone to an efficient soil-building program. Fertilizer rich in available phosphoric acid and potash assures successful stands of clover and alfalfa on worn-out land.

Rejuvenating Abandoned Farms

By C. A. LeClair

St. Paul, Minnesota

THE business of rebuilding the abandoned farms of America in a systematic way is a comparatively new development. Bond and mortgage companies, banks and insurance firms have always loaned heavily on farm property. For many years, when foreclosures were necessary, the farms reverting back to the loaning firm were disposed of as promptly as possible for what they would bring. More recently, however, extensive loan institutions have established real estate departments, the personnel of which include agriculturally trained experts capable of evaluating farm lands in which their employers have an interest. These field men not only render assistance and advice to mortgagees which help them to dispose of their obligations, but they likewise direct the most economic handling of such farms as must be taken over by their firm.

It has now become the general practice of most farm-loan institutions to handle their properties much after the fashion that automobile merchants conduct the used-car problem. Farms which revert to mortgagors are invariably depleted in fertility and the buildings are dilapidated. Hence, although such properties may be located in favorable places, they are unattractive to both buyers and tenants. For this reason most progressive land-holding companies now follow systematic plans of improving such holdings. In other words, they employ a staff of experts capable of rejuvenating worn-out farms.

The fertility of the land of their

farms is also rebuilt with as much thoroughness as are the buildings of the farmsteads. A corps of agronomists survey the individual fields and recommend the proper fertilizer treatment and cropping system to be followed. Where lime is required to sweeten the soil, it is purchased and applied.

On the thinnest lands mammoth clover is grown with the aid of commercial fertilizer as a means of putting humus in the soil.

Fertilizers Pay

Through the generous use of commercial fertilizers in conjunction with a sound cropping system even the most depleted soils are being put back into profitable production. Thus, not only is the market value of farms enhanced, but the plan has put these holdings in demand by the highest type of tenant. Invariably, even though the tenants invest equally with the holding companies in the cost of fertilizer and lime, they have made from their share of returns more than satisfactory profits. Very frequently the tenants purchase the farms they operate from their share of the earnings. In this way the holding company liquidates its original investment and carrying charge in the property.

The success which holding companies are having in rehabilitating vast acreages of abandoned farms proves conclusively that there is very little wrong with the business of farming. In truth, perhaps, the real explanation of most of the drift of population from the country to the city is represented by the army of misfits who occupy the land. There have always been a lot of common-place farmers in this country who naturally could not survive by practising horse and buggy methods in this modern era. Farming to be successful requires vision and management. Regardless of the type of agriculture practised, there is a definite sized unit which is practical. As Professor E. L. Nixon of Pennsylvania State College says, "A man who grows seven acres of potatoes, eight acres of corn, and keeps six cows simply produces stuff. Whereas, the farmer who perhaps has 20 acres of potatoes, 30 acres of corn, 40 acres of grain, plenty of pasture, and 20 cows makes a living and something besides." In other words, in the latter case he can fully utilize his ability and equipment.

Take the case of Fred C. Dahl of Casey, Iowa, who contracted on a crop-share basis to personally operate a 320-acre farm which had been taken over on March 1, 1926, by one of the large Iowa life insurance companies. This farm in the year of 1925, had

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Even on a run-down, weed-infested farm, a sack of complete fertilizer to the acre applied with a corn planter attachment greatly increased the yield. Note the shock of unfertilized corn at the left and the shock at the right grown with commercial plant food.

A deep, well-pulverized seedbed is necessary for the horse radish crop.

Horse Radish

By E. R. Lancashire

Vegetable Specialist, Ohio State College of Agriculture

HORSE radish has recently been substituted for applesauce by a Pennsylvania man. The substitution was in words only and this eastern grower was talking about gardens when he said, "The production of $300 worth of vegetables from a one-fifth acre farm garden sounds like a lot of horse radish to me."

He was promptly complimented on his use of "horse radish" in place of the more common "applesauce." There was some fact as well as fiction behind his statement too, for one-fifth of an acre of horse radish could easily be worth $300.

The extremely hardy and very pungent-flavored horse radish is an old-timer. It has been used by eastern European people for hundreds of years, and as far back as 1586 it was introduced to England.

Horse radish has been the subject of many a yarn which would compare favorably with the ones told by deep-sea fishermen to their fresh-water brothers of the Middle West. This has been especially true during the past few years when the straight, fleshy roots have sold at 10 and even more cents per pound.

Most anyone can visualize a 10-ton per acre root crop, and horse radish is a root crop. According to such narrators all that is required would be to produce a pound and a half of roots for each foot of row with the rows three feet apart. The trick of securing a 10-ton per acre yield would then be accomplished.

Dreams are all right in their place, but the place is not likely to be a horse radish patch. The 10-ton yield figured at 10 cents a pound would pro-

duce a staggering sum, $2,000. Figured at 15 cents a pound, it sounds still better, $3,000.

A distinguished educator in the vegetable gardening business once said to a group of future vegetable growers, "Figure your income from vegetable sales and divide it by two; figure the expenses and multiply them by two. Perhaps you will not then become over enthusiastic."

Such logic might well be applied to the horse radish business. The 10-ton yield can easily turn out to be five, four, or even two tons per acre. The price paid the past few years has been good, but it could change radically in a single season. The commercial crop in the United States is produced in Missouri, Illinois, New York, and New Jersey. There is room in nearly every garden for a small amount of this root crop, and if the conditions are just right, a small beginning could be expanded until it could become a commercial planting.

Needs Fertile Soil

These conditions include a fertile, deep soil. Deep, sandy loams and rich river-bottom soils like those near St. Louis, Missouri, are especially adapted to horse radish production if they are properly fertilized with generous amounts—2,000 pounds per acre of a good, complete fertilizer such as a 4-12-4 or a 4-10-6.

A ton of complete fertilizer per acre applied broadcast and worked in at least three or four inches deep will meet the requirements for a good yield of horse radish. The application should be made as early in the spring as the soil can be worked and the planting should follow immediately since this crop requires a full growing season. An early start is necessary even though the fleshy roots grow most rapidly during the late summer and in the fall months.

For those who are fortunate enough to have available a supply of well-rotted manure it is advisable to use 10 or even 20 tons per acre for the horse radish crop. If the grower will also apply 750 to 1,000 pounds per acre of 20 per cent superphosphate, the necessary balance will be established between the essential elements—nitrogen, phosphorus, and potash. The amount needed to balance manure properly is about 75 pounds of the superphosphate per ton of manure.

Both the manure and the superphosphate could be applied during the fall and plowed under at that time if the manure was available. In such a case the plowman should distribute the fertilizer and the manure throughout the plow depth. This can be done by standing the furrows on edge. The next spring a deep tillage tool, such as one of the 22-inch discs or the new type of cultivator which stirs the soil to a depth of 10 or 12 inches, can be used.

If the manure is well rotted and if it is reinforced with the amount of superphosphate suggested, the fertilizer program is satisfactory. Any further addition of plant food should be a complete goods such as a 4-12-4 or a 4-10-6. In all fertilizer applications it is best to keep the required balance between nitrogen, phosphorus, and potash.

Must Have Good Seedbed

The next condition upon which a bumper crop of horse radish depends is the planting of 6 to 12-inch root cuttings in a deeply pulverized, loose seedbed. Hard, shallow soils produce crooked roots, the kind for which the market has little use. These root cuttings are ¼ to ½ inch in diameter.

Moisture is essential. A 20-acre field of irrigated horse radish which has been planted each year for the last 12 years has given ample proof of the value of water to this root crop. An acre inch of water applied once each week would meet all requirements for moisture.

The depth of the seedbed is very important. Root cuttings six or more

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NOTHING BEFORE EVER TASTED SO GOOD

PICTORIAL

PEGGY'S COVE, NO
VI

Left: These fishermen are a rugged lot, with jovial spirits. "They whose husbands go down to the sea in ships" are kindly wives, also with jovial spirits. But perhaps there's something significant in the clenched fist of the wife who is being left behind as he goes out to his field in the deep.

Below: A little hay is made, too, in this small Nova Scotian fishing village where the menfolks, in from the sea in the afternoon, store away food for the community oxen. The hay is carted to the barn on a rack improvised from an old fishing net thrown over a pair of poles and propelled by manpower.

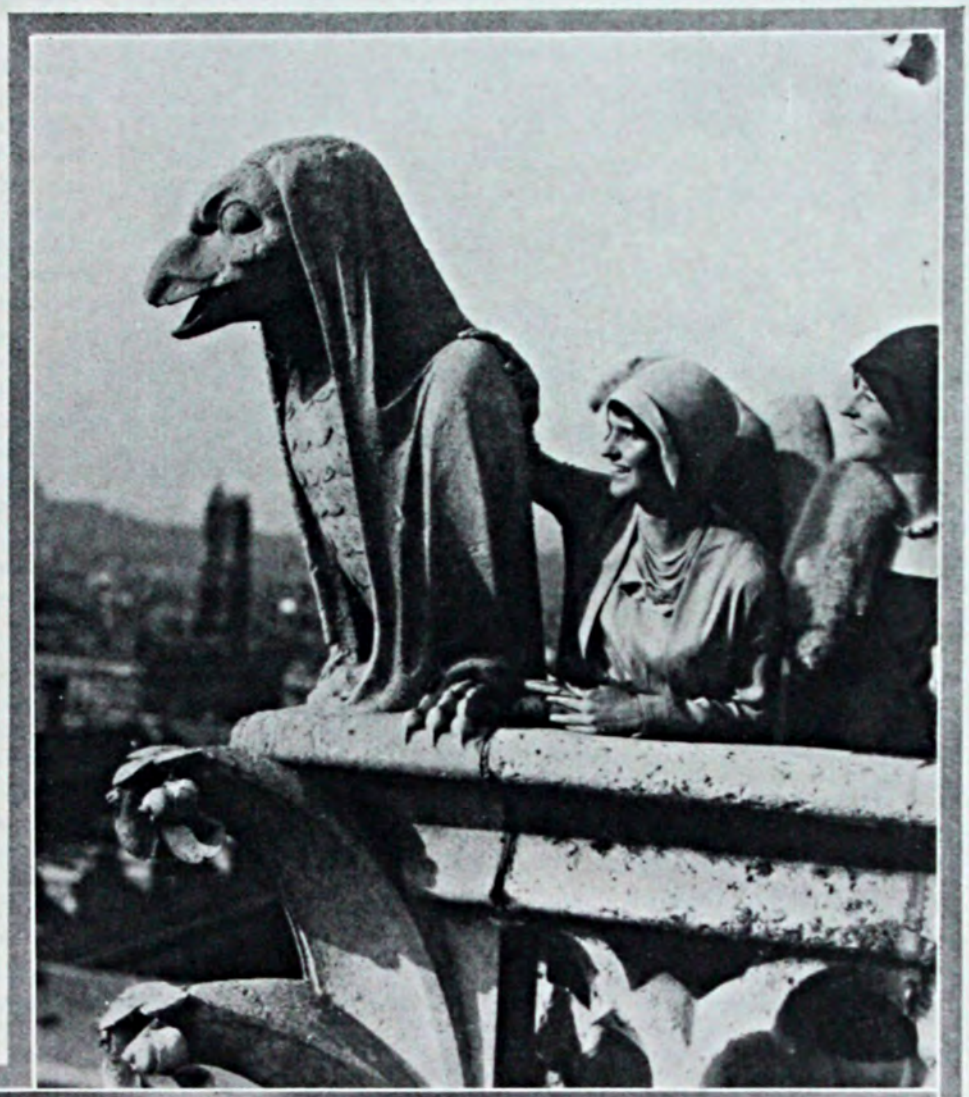
OTIA—A FISHING

Right: Grandma Crooks, ninety years old, of Peggy's Cove, is representative of the sturdy Scotian wives who carry on well into the years. She, like her mother and grandmother, is a fisherman's wife and the mother of fishermen. Even in her old age, she is attached to the homely duties of her simple home.

Below: The weather is a very important subject of conversation. These two old fellows are no longer active with the boats, but they keep the nets in repair and tend their whittlin' except when there is advice to be given. "Sittin' and whittlin' and thinkin's a pretty good pastime," they say.

Canada is rich in vacation lures. Above: A scene near Perce Rock on the Gaspe Coast. Left: Canadian mountains are among the most picturesque in the world.

Europe annually draws a percentage of American vacationists. Right: One of the gargoyles of Notre Dame Cathedral. Below: Ingonish, Cape Breton Island, Nova Scotia.



Left: W. J. Morse of the U. S. Department of Agriculture recently returned from a two-year stay in Japan. He is shown here unpacking a box of black miso, a product made by steaming and grinding soybeans and then fermenting them for two years. It makes good soup. Mr. Morse brought back about 4,000 lots of seed, nearly 400 samples of soybean products, and information on the many ways the Japanese utilize soybeans, in the hope that new outlets for the American crop may be opened.

Below: At the recent 4-H Club Round-up held at Purdue University, this "Demonstration Team" showed attentive audiences what is in commercial fertilizers. By the use of the Hoffer corn-stalk test, they pointed out what happens when the plant obtains a sufficient or insufficient amount of nitrogen, phosphoric acid, and potash.

The Editors Talk

C. S. T. A. Convenes

Canada is holding a rather unique meeting from June 22 to 26 at the Agricultural College, Guelph, Ontario, the oldest Agricultural College in Canada and one of the oldest in North America. The occasion is the Eleventh Annual Convention of the Canadian Society of Technical Agriculturists.

The Society includes all types of agricultural specialists, in soils, crops, fertilizers, animal husbandry, disease control, horticulture, and many other fields. It also includes workers in the Provincial and Dominion Government services and in industry. It is thus an all inclusive convention, in many ways to be highly commended as giving a breadth of view and variety of interest that is often sadly missed in the conventions of some highly specialized workers.

The convention also has an international viewpoint, inasmuch as several speakers from the United States will be on the program. Among such speakers are Dr. James C. Dickson, University of Wisconsin; Dr. O. C. Stine of the U. S. Department of Agriculture and President of the American Farm Economics Association; and Dr. D. F. Jones of the Agricultural Experiment Station, New Haven, Connecticut. Dr. J. B. Orr, the well-known British authority on animal nutrition at the Rowett Research Institute near Aberdeen, Scotland is also on the program. Canada is, of course, intensely interested in the production and price of wheat. Dr. Dickson's address on "Agricultural Development in Soviet Russia and Its Relation to the Wheat Problem" will, therefore, be followed with a great deal of interest.

In addition to a very excellent general program, the special group sessions include the Canadian Society of Agricultural Economics, The Eastern Canada Society of Animal Production, The Canadian Phytopathological Society, Horticultural and Soils Groups.

This convention is held in different parts of Canada each year. Last year the Society met at Wolfville, Novia Scotia. We wish the convention every success.

Nitrogen vs. Ammonia

At a meeting in New York on May 20 the fertilizer industry in cooperation with the fertilizer control officials of New York, Pennsylvania, Maryland, New Jersey, Massachusetts, Connecticut, Rhode Island, Vermont, New Hampshire, Delaware, West Virginia, Virginia and Maine brought to a successful conclusion its efforts of many years to substitute nitrogen for ammonia in registering and selling nitrogenous fertilizers.

The conference was held under the auspices of the National Fertilizer

Association. At the conference were representatives of the fertilizer companies selling fertilizers in these States, agronomists from several States and the State chemists from nearly every State.

In addition to the substitution of nitrogen for ammonia, it was proposed to eliminate fractional analyses in fertilizer mixtures, such as 4½-8-4. This conference was the culmination of an effort which started at a meeting of groups interested in fertilizers at Louisville, Kentucky, in 1927. The recommendations agreed upon at that meeting have been affirmed at later meetings.

While it is highly desirable in the interests of simplification to use only the term nitrogen and avoid fractional analyses, there are, of course, many practical problems to be carefully considered before such a program can be put into effect. These practical problems had to be considered both by the trade and State officials. It, therefore, is a very creditable record that such an agreement has been reached in so short a time.

Congratulations

A soil fertility conference will be held at the Pennsylvania State College from June 24 to 26, 1931. The purpose of the conference is to commemorate the 50th anniversary of the soil fertility plots which are the oldest continuous fertilizer experiment in America, and there is little doubt that this will be an historic meeting.

The plots are very extensive. The series include 144 one-eighth acre plots arranged in four tiers of 36 plots each. The 23 manurial treatments, with the exception of burnt lime, are applied to corn and wheat in a four-year grain rotation of corn, oats, wheat, and hay (mixed clover and timothy). The burnt lime treatment is applied once each rotation to the corn ground. During the first 10 rotations, 1881-1921, no lime was applied except to plots in which it was included in the scheme of treatments. In 1922 and 1923 all plots of tiers two and four respectively, with the exception of two P-K treated plots, and those previously limed, received a dressing of pulverized limestone. With the exception of the plots which receive biennal dressings of farm manure the only source of organic matter has been the roots and stubble of the harvested crops.

These plots rank along side the historic Broadbalk Field of Rothamsted. While experimental methods have changed since the inauguration of this series of plots, much credit is due the pioneers, particularly Professor W. H. Jordan who will long be remembered as the "Father of the old fertility plots." Professor Jordan went to Pennsylvania State College in 1881 as Professor of Agricultural Chemistry. The first Director of the Agricultural Experiment Station, Dr. H. B. Armsby, continued in this position until 1907. Dr. William Frear was appointed Agricultural Chemist in 1885. He was later Vice-Director of the Experiment Station and Chief Chemist. Willam C. Patterson was former Superintendent of Grounds, plots, and farms who joined the staff of Penn State College in 1871 and continued in that capacity until his death in 1909. He supervised the field work of the fertility plots for 29 years. Enos H. Hess was assistant to the Director of the Experiment Station from 1894 to 1901. He prepared the report of the first 16 years' results from the old plots. He also made the first chemical studies of the plots.

Thus the conference in June has an historic background and tradition as a stimulus to the discussions that are to take place. Various well-known au-

thorities from the United States Department of Agriculture and other agricultural experiment stations will be there to discuss various problems. In addition to the old series of fertility plots, similar work at other places, including the 60 acres of pasture at Kylertown seeded in 1929, will be inspected.

While our experimental methods and ideas of soil technology have changed very much since these plots were started, as with the case of the long-established Broadbalk Field at Rothamsted, such plots have a great value in certain phases of work. It is to be hoped that it will be possible to continue the fertilizer treatments for many years. The Pennsylvania State College is to be congratulated on having maintained these plots for 50 years under the same continuous fertilizer treatments.

Why Feed Insects?

It costs the United States $2,000,000,000 a year to feed its insect population, according to J. A. Hyslop, Chief of Insect Pest Survey, U. S. Department of Agriculture. Thirty-six pests cause nearly half of the damage and at least two-thirds of the damage is preventable.

Mr. Hyslop recognizes that monetary estimates of insect damage cannot be precise if for no other reason than the fact that destruction of part of a crop by an insect may enhance the money value of the remainder. But they do serve to indicate the relative destructiveness of the pests.

Heading the list of notoriety in the insect underworld is the boll weevil. On another page in this issue, C. H. Brannon, Extension Entomologist, State College Station, Raleigh, N. C., gives some interesting facts and pertinent suggestions on the control of this marauder.

What Fertilizer for Tree Fruits?

The Northwest Fertilizer Association is to be congratulated on its efforts to obtain actual data on the fertilizer practices in apple orchards by sending out a questionnaire to make a fertilizer survey of Washington, Oregon, and British Columbia.

As everybody knows, there is an increasing difference of opinion as regards the best fertilizers to use on tree fruits. A great emphasis has been laid on the use of nitrogen. Undoubtedly nitrogen normally is among the first limiting factors on most soil types. The practical question is being asked, however, "Is the use of nitrogen alone a sound permanent program?" A carefully conducted experimental work is badly needed not only on apples but on other fruits and on as many soil types as possible. Because of the nature of the crop such experimental work normally requires some years in order to obtain positive results. Then, again, the results themselves may be difficult to obtain since they involve not only yield but many other factors relating to shipping and storage quality, resistance to disease, and other factors sometimes difficult to measure.

A survey of the actual practices of reliable groups in districts where tree fruits are the major crop is therefore of special significance and importance.

The questionnaire being sent out by the Northwest Fertilizer Association will include the growers in the famous Wenatchee and Yakima Valleys where apples are by far the predominant crop. The methods of managing the orchards are intensive. The growers are skilled in their work. Their observations as the result of actual practice are, therefore, worthy of study by anyone seeking an honest answer to the question, "What is the most profitable fertilizer to be used in orchards as a permanent program?"

Already there are evidences among practical men that nitrogen alone is not in all cases satisfactory. It is, therefore, highly important that while the long-continued experiments are in operation more definite information be obtained that in the meantime can be used by orchardists with some assurance of success not only in making a profit from the use of the fertilizer but in maintaining their orchards in the best condition.

The N. F. A. Convention

The Seventh Annual Convention of the National Fertilizer Association will return this year to White Sulphur Springs after an absence of three years at Norfolk, Virginia, New London, Connecticut, and Colorado Springs, Colorado. While other places perhaps have some more alluring features for all the requirements of a convention, not forgetting the golf, perhaps there is no better place than White Sulphur Springs.

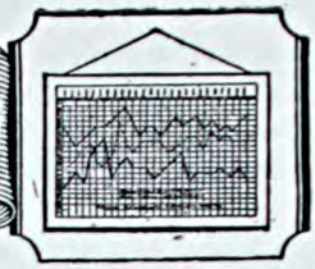
The Convention opens on Monday, June 8, and continues until Friday, June 12. Reports indicate that the sessions on Tuesday will be open to all classes of membership and guests while the sessions on Wednesday and Thursday mornings, either one or both, will be executive sessions of active members. Certainly in present business conditions there is more than ever an urgent need for a practical and definite goal and policy. It is at such sessions that such policies should be developed, but if success is to be achieved, it is important that everybody interested in the success of the industry be represented, and that they know what they want to say and say it.

Among the many problems which the fertilizer industry might well consider are the increasing use of fertilizers on crops in areas where fertilizer is not used or at least used in only small quantities at present. Far too much emphasis has been placed upon three crops, cotton, tobacco, and potatoes. There is an urgent need to spread the fertilizer base so that when the crop prices go down there is something to fall back on. A second problem is that in times of over-production the effect on the quality of the crop and reducing cost of production is an important field to be canvassed, and as much definite data as possible should be gathered.

A third problem is the use of statistics and economics to assist in making adjustments ahead of time. Too often we go on producing and importing on the slim hope that everything is going to turn out much better than it actually does. Can proper statistical work take some of the guess out of the problem? At least it is worth considering and certain it is that there will always be plenty of guess left in any case.

We hope for the Association a successful convention and progress in the solution of the problems facing the industry.

AGRICULTURAL DEVELOPMENTS



NEW JERSEY SECRETARY SEES BETTER FARM CONDITIONS AHEAD

"New Jersey, in 1950, will have more than 1,500,000 acres of land under cultivation and many of our intensive farming operations will be much more common than today," according to William B. Duryee, New Jersey Secretary of Agriculture. "In 1950, agriculture will still be our greatest single industry, with an annual output exceeding $100,000,000 in value. The farmers of the State will have turned over to Midwestern areas the production of grain and other raw products and will be concentrating on the production of finished products such as eggs, milk, and the more intensive fruit and vegetable crops.

"There will be a better understanding and application of the most suitable economic units of area for farms. It is difficult to say whether the average farm will be larger or smaller in area by 1950, but we have no reason to believe that the very large-scale farm project will be of any greater importance than it is today, except where a united effort on the part of a number of farmers retaining their individual initiative will result in greater concentration of output and greater efficiency in production.

"A recent study of large-scale farming operations in the State does not indicate that these large units will crowd out individual farmsteads under the conditions that will exist in the next two or three decades. Lower costs of production will enter into the picture in New Jersey and these lowered costs will result from less human labor. The extent to which human labor is employed will be smaller than at any time since the war.

"By 1950, this generation will have learned its lesson in practical economics and there will be definitely fewer governmental operations intended to aid agriculture artificially. We look forward to an increasing mechanization of agricultural operations, improved living conditions for farmers, and a more equitable system of taxation, under which real estate would carry less of a burden than at present." —*Marketing Activities, May* 20, 1931.

CALIFORNIA ECONOMIST SAYS FOUR FACTORS MAKE FRUIT PRICES

Supply, quality, buying power of consumers, and volume of competing fruits are the four major factors that determine the prices paid for California fruits, according to H. R. Wellman, California Agricultural Extension Service.

Dr. Wellman says that while the trend of production of summer oranges has increased 100 per cent, demand also had increased and the trend of prices had not decreased. This, he says, was brought about by improvement in quality of pack, wider distribution, development of new outlets, extensive advertising, and the active participation of nutrition workers in advocating the wider use of oranges.—*Marketing Activities, May* 20, 1931.

POTASH FERTILIZERS AND CLAY SOILS

Clay soils, by reason of their various geological origins and conditions of weathering, differ somewhat in their potash content. Clays arising from

rocks containing feldspathic and micaceous minerals will usually contain considerable potash. This is usually combined with complex silicates and is unavailable to plants.

Nearly all clays contain large amounts of colloidal materials which have considerable adsorbing power for potash. Sometimes small applications of potash do not give any beneficial result. Being held very tightly by the colloids, this adsorbed potash cannot be easily used by plants. If larger amounts of potash are applied, strong adsorption by the soil is satisfied and the rest of the potash is in a form easily used by plants. Sometimes applications of 125 to 250 pounds of muriate of potash to the acre have not given profitable benefits even on potatoes, leading one to think that potash was not necessary on that soil. Applications of 500 pounds of muriate of potash balanced with sufficient nitrogen frequently gave remarkably favorable results.

Demolon estimates that in cases where organic colloids can be ignored, the maximum adsorbing power of the soil for muriate of potash represents 4 to 5 per cent of the weight of the clay content (clay loams and clays contain 20 per cent or more clay). He adds that in spite of the natural fertility of soils that contain 3½ per cent potash in their clay fraction, it is not surprising that potash salts often give striking results. It is necessary to consider the availability of the potash held in the state of adsorption complexes.—*Professor A. Bruno, Mulhouse, France.*

THE NEED FOR POTASH

With the crops themselves removing much potash from the soil, and the bulk of the produce being sold off the holding, potash fertilizer is much more necessary than formerly, according to H. V. Garner of Rothamsted Experiment Station. Under older systems of farming, where grain and fat stock were the chief sales, and all the roots and straws were kept on the holding, the need for potash fertilizers was not severely felt. However, with intensive truck farming on sandy soils, the need for potash is most marked and forms a governing factor in production, unless great quantities of manure or seaweed are available. Even under ordinary general farming conditions, the greater the acreage devoted to such crops as potatoes, sugar beets, carrots, and onions, the more will be the need of potash fertilizers.

Under general farming conditions, where good manure is abundant, the effect of potash shortage does not readily show itself. The crops probably will be fairly good, but a potash fertilizer would improve them. In the absence of a large supply of manure, however, the effect of potash starvation is obvious, particularly with potatoes. Here, the leaf takes on a dark bronze color, dead patches appear on the margins, and cropping is reduced to a very low level.

The author states that, "until recently farmers who used mixed fertilizers were usually offered a compound which contained too little potash to correct the conditions mentioned above; this state of affairs has improved of late, and 10 per cent of potash in a compound fertilizer, or home-made mixture is quite little enough in cases of marked need."—*Journal of the Ministry of Agriculture (London). February,* 1928.

"To spend less money is not necessarily the best way to reduce costs. When prices are unfavorable, however, the usual thing is for the livestock man to stop buying purebred sires, or for the dairyman to cut down on the purchase of protein feeds, or for the cotton grower to restrict his use of commercial fertilizers. Measures like these may reduce expenditures, but they do so at the cost of quality and yield per unit of land or animal." —*Arthur M. Hyde, Secretary of Agriculture.*

Foreign and International Agriculture

The Best Strawberries I Ever Tasted

By S. D. Conner

Research Chemist, Purdue University

EVERYONE, no doubt, has many an odd and apparently trivial incident that sticks in his memory for years and years, while many things that he would like to remember have faded away. An old philosopher once remarked: "Doubtless the Lord could have made a better fruit than the strawberry, but doubtless he never did." Now, in searching the archives of my memory, I recall sometimes that I could almost agree with him. On the other hand, there were times when I would have been inclined to say the "worst" fruit, instead of the best. For a long time the best strawberries I could recall were those I picked on a hillside pasture in the mountains of West Virginia. I was a small boy; the berries were wild ones, and they were certainly so delicious that today I can see those small, red berries in that bright, sunny pasture.

The scene changes. I am on a railway dining-car. I have ordered strawberries. I had my doubts when they were set before me; I had no doubts after I tasted them. They were without doubt the most unpalatable things I ever put in my mouth.

I have often wondered why there could be so much difference in strawberries. The wise ones will of course say, "Anyone should know that wild strawberries are sweeter than tame ones." Yes, I have heard that, too, and experienced it likewise. Yet, when the wild plants are taken to the garden, lo, the wild flavor is lost. Even in a dish of strawberries from the same patch, there are good ones and bad ones. They are like the little girl: "When they are good they are very, very good, and when they are bad they are horrid."

But I started to tell you about the best strawberries I ever tasted. I am coming to that, but I had to go outside of this country to find them, and they were not wild strawberries either. It was near the small town of Hedel in Holland. It was in an experiment field, and I did not get many of the berries. They were bright red and

A typical farm home near Hedel, Holland.

firm, and oh, so sweet. I am certain I will never forget their delicious taste and flavor. No, it was not the variety, because just a few feet away was the same variety of berries that were pale and flat and insipid and soft and altogether the kind that you would wish you had never seen.

Why the difference? Well, the good ones were heavily fertilized with potash, and the poor ones had no potash. Now I am not so certain what would happen to the quality of strawberries if some other fertilizer ingredient were left out, but I was most quickly and thoroughly convinced that it was disastrous to strawberry quality to leave off the potash, because the berries that had only nitrogen and phosphate were very, very poor.

Hollanders use more fertilizer than the people of any other country, and it is my opinion that no other people in the world are better farmers than the Dutch. Holland is almost all made soil washed down by the rivers Rhine and Muese. Much of it has been recovered from swamps and lakes by raising dykes around it, and pumping the water out. This soil was at first in no need of fertilizer, but after farming it over a thousand years, the Dutch know that it needs fertilizer, and they pile it on in such quantities that the land is like a garden, and the crop yields are very high.

High yields go hand in hand with high quality. The fertilizer used by the Dutch to produce the superfine quality strawberries was 400 pounds ammonium sulphate, 800 pounds 14 per cent superphosphate, and 400 to 800 pounds muriate of potash per acre. Somewhat to our astonishment they called 400 pounds muriate of potash, low potash, while the 800 pounds per acre was designated high potash. In this country 400 pounds is considered rather high. In Holland and France they seem to be convinced that while nitrate forms of nitrogen are best for some crops, ammonium sulphate is much better for strawberries than nitrate of soda, or other forms of nitrogen.

Dr. H. Lindeman, who is one of the best fertilizer authorities in Holland, said that when potash was first tried on the alluvial land of South Holland, a relatively small amount was used per acre and little response was noted. When large applications of potash were tried good response was obtained. This was explained on the basis that soil deficient in potash must first be satisfied before the potash would be available for good crop growth, hence the large amounts of potash used in Holland.

I have since thought about the high quality of wild strawberries, and knowing that there is much potash still in uncultivated soils, I am wondering if it may not be that much of the high quality of the wild fruit is due to the fact that it gets plenty of potash. Straw, which is so much used as a mulch on strawberry land is rich in potash, and no doubt much of the value of straw is due to that element.

PENNSYLVANIA GRADING OF PRODUCTS SHOWS INCREASE

Pennsylvania growers sold $2,500,000 worth of graded and officially inspected products during the past season, according to D. M. James, Pennsylvania Bureau of Markets. This is an increase of approximately $1,000,000 over the estimated value of graded products sold the previous season.

A total of 2,975 carloads of graded and Federal-State inspected fruits were shipped and 44,000,000 pounds of raw cannery products were sold on a graded basis during the 1930-31 period, compared to 2,276 carloads of fruits and 13,000,000 pounds of cannery products during the 1929-30 season.—*Marketing Activities, May* 13, 1931.

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.

THE Report for 1930 of the Tobacco Substation at Windsor, Connecticut, by P. J. Anderson, T. R. Swanback, O. E. Street and others, recently issued as Bulletin 326 of the Connecticut Agricultural Experiment Station, is a valuable contribution to tobacco literature. The report describes the careful work done and results of potash fertilizer experiments, nitrogen fertilizer experiments, fractional application of fertilizer, manure as a supplement to commercial fertilizer, cover crop experiments, the relation of magnesia to the burning qualities of cigar leaf tobacco, effect of topping and suckering on development of the tobacco plant, influence of plant trimming on weight of seeds, curing experiments, tobacco insect studies in 1930, fertilizer losses through leaching measured by lysimeter experiments, the use of coke in heating tobacco sheds, and fire-curing tests on stalk tobacco.

Space does not permit a full review here of all the work coming under these headings. However, an indication of the thoroughness of the work and the particular attention given to the question of the effect of fertilization on quality of tobacco may be briefly summed up in some of the findings of the potash fertilizer experiments.

These tests were planned and have been carried over a period of years to compare the relative merits of the potash carriers—sulphate, carbonate, and nitrate of potash. So as to have the fullest information on the subject, records were kept from start to finish on the acre yields, percentage of grades, grade index, and chemical analyses of the crops grown with potash from the various carriers.

Cigars were made, through the courtesy of one of the large cigar manufacturers, with the tobacco grown on a cottonhull ash formula as contrasted with others raised on the same fields, with other sources of potash "(standard commercial fertilizer mixtures)." The smoking quality of the cigars from the various fields was tested by Dr. Anderson and the experts from the manufacturing company. They could detect no "consistently favorable influence on the burn, taste or aroma of the cottonhull ash cigars as compared with the others." Dr. Anderson concludes his discussion of cottonhull ash as follows:—

> "Final conclusions as to the relative value of cottonhull ashes and other potash carriers must await the continuation of these experiments through a series of years. There is nothing in the results up to the present to indicate that this material is in any way superior to some of the others."

Regarding the yield and grading of the tobacco from the plots having different potash carriers, Dr. Anderson writes as follows:—"The results indicate that as far as yield and grading are concerned it makes little difference which carrier or combination of carriers is used." Elsewhere he mentions that "the only difference which may

possibly be considered sufficiently large to be significant are the average lower yield and higher grade index on the carbonate plots."——"That it makes little difference which of the three or what combination of the three carriers is used to supply the potash requirements of the tobacco crop. The yield per acre and the grading of the crop are essentially the same."

The sorting records lead to the conclusion that shortage of potash adversely affects the grading of the tobacco more than the yield.

In the analysis of the tobacco it is shown that increases in amount of potash up to 300 lbs. of K_2O per acre have given an increase of potash in the leaves, of about 1 per cent for each 100 pounds of fertilizer potash. For three successive years there has been a steady decline in the percentage of K_2O in the leaves, when all special carriers of potash are omitted from the fertilizer. A steady decline in the percentage of K_2O in the leaves—though less pronounced—is noted where only 100 lbs. of K_2O per acre were applied.

Another significant fact—which agrees with their previous results—is that the percentage of CaO varied inversely as that of the K_2O.

The other work described in the report will prove quite as interesting to tobacco growers and the bulletin will undoubtedly prove a valuable reference to everyone interested in increasing profits from tobacco through improving quality and yields.

Fertilizers

"Commercial Fertilizers Agricultural Minerals (1930)," Dept. of Agr., Sacramento, Calif., Spec. Pub. 104, Feb. 1, 1931.

"Analysis of Commercial Fertilizers," Agr. Exp. Sta., Lexington, Ky., Bul. 298, Dec., 1929, H. E. Curtis, H. R. Allen, and Lelah Gault.

"The Relation of Nitrate Nitrogen and Nitrification to the Growth of Tobacco Following Timothy," Agr. Exp. Sta., Madison, Wis., Res. Bul. 105, Dec., 1930, R. P. Thomas.

Soils

"Soil Survey of Lee County, Georgia," U. S. D. A., Washington, D. C., No. 4, Series 1927, J. W. Moon.

"Soil Survey of Wadena County, Minnesota," U. S. D. A., Washington, D. C., No. 25, Series 1926, J. Ambrose Elwell, Mark Baldwin, W. W. Strike, G. A. Swenson, P. R. McMiller, J. S. Hall, E. A. Fieger, S. N. Hill, and J. H. Ellis.

"Soil Survey of Claiborne County, Mississippi," U. S. D. A., Washington, D. C., No. 23, Series 1926, B. H. Hendrickson and J. E. McKeehen.

"Soil Survey of Rankin County, Mississippi," U. S. D. A., Washington, D. C., No. 27, Series 1926, Robert Wildermuth, E. W. Knobel, A. L. Gray, and Grove B. Jones.

"Soil Survey of Clay County, Nebraska," U. S. D. A., Washington, D. C., No. 8, Series 1927, R. C. Roberts and Ralph Gemmell.

"Soil Survey of Franklin County, Nebraska," U. S. D. A., Washington, D. C., No. 31, Series 1926, F. A. Hayes, Louis A. Wolfanger, and E. A. Nieschmidt.

"Soil Survey of Burke County, North Carolina," U. S. D. A., Washington, D. C., No. 22, Series 1926, W. D. Lee and S. R. Bacon.

"Soil Survey of Watauga County, North Carolina," U. S. D. A., Washington, D. C., No. 1, Series 1928, W. A. Davis, W. B. Cobb and R. E. Levereux.

"Soil Survey of Davie County, North Carolina," U. S. D. A., Washington, D. C., No. 5, Series 1927, R. C. Jurney and S. R. Bacon.

"Soil Survey of Hardin County, Tennessee," U. S. D. A., Washington, D. C., No. 21, Series 1926, W. J. Latimer, J. A. Kerr, A. L. Gray, J. W. Moon, and A. W. Goke.

"Soil Survey of Navarro County, Texas," U. S. D. A., Washington, D. C., No. 20, Series 1926, M. W. Beck and E. H. Templin.

"A Study of the Influence of Herbaceous Plant Cover on Surface Run-Off and Soil Erosion in Relation to Grazing on the Wasatch Plateau in Utah," U. S. D. A., Washington, D. C., Tech. Bul. 220, Mar., 1931, C. L. Forsling.

"A Laboratory Study of the Field Percolation Rates of Soils," U. S. D. A., Washington, D. C., Tech. Bul. 232, Jan., 1931, C. S. Slater and H. G. Byers.

Crops

"Proceedings of the Sixty-Third Convention of Fruit Growers and Farmers," Dept. of Agr., Sacramento, Calif., No. 1, Vol. XX, Jan., 1931.

"Monthly Bulletin," Dept. of Agr., Sacramento, Calif., No. 2, Vol. XX, Feb., 1931.

"Monthly Bulletin," Dept. of Agr., Sacramento, Calif., No. 3, Vol. XX, March, 1931.

"The Forty-Third Annual Report," Agr. Exp. Sta., Fort Collins, Colo. For the Short Period 1930.

"Raspberry Investigations, A Preliminary Study," Agr. Exp. Sta., Fort Collins, Colo., Bul. 367, Jan., 1931, Richard V. Lott.

"Barley in Colorado," Agr. Exp. Sta., Fort Collins, Colo., Bul. 371, Dec., 1930, D. W.

Robertson, Alvin Kezer, F. A. Coffman, J. F. Brandon, Dwight Koonce, and G. W. Deming.

"Miscellaneous Tropical and Sub-Tropical Florida Fruits," Agr. Exp. Sta., Gainesville, Fla., Bul. 223, Jan., 1931, Harold Mowry and L. R. Toy.

"Annual Report for the Fiscal Year Ending Nov. 30, 1930," Agr. Exp. Sta., Amherst, Mass., Bul. 271, Feb., 1931.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., No. 4, Vol. VIII, April, 1931.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., No. 5, Vol. VIII, May, 1931.

"Proceedings of the Seventeenth Annual Meeting of the Potato Association of America," The Potato Association of America, East Lansing, Mich., 1931.

"Emergency Pasture and Hay Crop," Agr. Exp. Sta., St. Paul, Minn., Cir. 33, Sept., 1930, R. F. Crim and H. K. Wilson.

"Making the Home Lawn," Agr. Exp. Sta., St. Paul, Minn., Spec. Bul. 130, July, 1930, L. E. Longley.

"Report of the Holly Springs Branch Experiment Station, 1930," Agr. Exp. Sta., A. & M. College, Miss., Bul. 286, Dec., 1930, T. F. McGehee and Otis B. Casanova.

"Tomatoes for Canning," Agr. Col. Ext. Serv., Ohio State University, Columbus, Ohio, Bul. 114, Jan., 1931, E. R. Lancashire.

"Muck Soil Investigations," Agr. Exp. Sta., Logan, Utah, Bul. 224, April, 1931, LeMoyne Wilson and George Stewart.

"Progress Report, Carbon County Experimental Farm, 1927-30, Inclusive," Agr. Exp. Sta., Logan, Utah, Bul. 225, April, 1931, I. D. Zobell and George Stewart.

"Department of Agriculture and Immigration," Richmond, Va., Bul. 281, May, 1931.

"A Year's Service of Research," Agr. Exp. Sta., Madison, Wis., Bul. 420, Feb., 1931.

"The Effectiveness of Rhizobia," Agr. Exp. Sta., Madison, Wis., Res. Bul. Jan., 1931, O. N. Allen and I. L. Baldwin.

"Cabbage," U. S. D. A., Washington, D. C., Farmers' Bul. 433, Oct., 1930, L. C. Corbett.

"Strawberry Varieties in the United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1043, Feb., 1931, George M. Darrow and George F. Waldo.

"Growing and Utilizing Sorghums for Forage," U. S. D. A., Washington, D. C., Farmers' Bul. 1158, Nov., 1930, H. N. Vinall and R. E. Getty.

"Potato Production in the South," U. S. D. A., Washington, D. C., Farmers' Bul. 1205, Mar., 1931, William Stuart.

"Tomatoes for Canning and Manufacturing," U. S. D. A., Washington, D. C., Farmers' Bul. 1233, Nov., 1930, James H. Beattie.

"Permanent Fruit and Vegetable Gardens," U. S. D. A., Washington, D. C., Farmers' Bul. 1242, Nov., 1930, W. R. Beattie and C. P. Close.

"Citrus Fruit Growing in the Southwest," U. S. D. A., Washington, D. C., Farmers' Bul. 1447, Nov., 1930, A. D. Shamel, C. S. Pomeroy, and R. E. Caryl.

"Oats in the North-Central States," U. S. D. A,. Washington, D. C., Farmers' Bul. 1581, Oct., 1930, T. R. Stanton and F. A. Coffman.

"Growing Sweet Corn for the Cannery," U. S. D. A., Washington, D. C., Farmers' Bul. 1634, Dec., 1930, J. H. Beattie.

"Sugar-Beet Growing Under Irrigation in the Utah-Idaho Area," U. S. D. A., Washington, D. C., Farmers' Bul. 1645, Feb., 1931, S. B. Nuckols.

"Flaxseed Production by Power Farming Methods in the Northern Great Plains," U. S. D. A., Washington, D. C., Farmers' Bul. 1650, Nov., 1930, A. C. Dillman and E. A. Starch.

"Sweetclover in Corn Belt Farming," U. S. D. A., Washington, D. C., Farmers' Bul. 1653, Jan., 1931, M. A. Crosby and L. W. Kephart.

"Peanut Growing," U. S. D. A., Washington, D. C., Farmers' Bul. 1656, Feb., 1931, W. R. Beattie and J. H. Beattie.

"Winter Legumes for Green Manure in the Cotton Belt," U. S. D. A., Washington, D. C., Farmers' Bul. 1663, Apr., 1931, Roland McKee and A. D. McNair.

"Methods of Eradicating Buckthorn (Rhamnus) Susceptible to Crown Rust (Piccinia Coronata) of Oats," U. S. D. A., Washington, D. C., Cir. 133, 1930, S. M. Dietz and L. D. Leach.

"Suggestions for the Management of Spruce Stands in the Northeast," U. S. D. A., Washington, D. C., Cir. 134, Nov., 1930, Marinus Westveld.

"The Spread of Cranberry False Blossom in the United States," U. S. D. A., Washington, D. C., Cir. 147, Jan., 1931, Neil E. Stevens.

"Monantha Vetch," U. S. D. A., Washington, D. C., Cir. 152, Jan., 1931, Roland McKee, H. A. Schoth, and J. L. Stephens.

"Methods of Seed Production from Sugar Beets Overwintered in the Field," U. S. D. A., Washington, D. C., Cir. 153, Feb., 1931, John C. Overpeck and Harry A. Elcock.

"Transplanting Sugar Beets in Utah and Idaho," U. S. D. A., Washington, D. C., Cir. 156, Feb., 1931, S. B. Nuckols.

"Experiments on the Processing and Storing of Deglet Noor Dates in California," U. S. D. A., Washington, D. C., Tech. Bul. 193, Sept., 1930, A. F. Sievers and W. R. Barger.

"Effect of Irrigation Water on Vigor and Vitality of Seed Potatoes," U. S. D. A., Washington, D. C., Tech Bul. 216, Nov., 1930, W. C. Edmundson.

"Inheritance of Winter Hardiness Growth Habit and Stem-Rust Reaction in Crosses Between Minhardi Winter and H-44 Spring Wheats," U. S. D. A., Washington, D. C., Jan., 1931, Karl S. Quisenberry.

"Cooperative Extension Work, 1928," U. S. D. A., Washington, D. C., Dec., 1930, C. B. Smith.

"A Bibliography of the History of Agricul-

ture in the United States," U. S. D. A., Washington, D. C., Misc. Pub. 84, Nov., 1930, Everett E. Edwards.

"Classified List of Projects of the Agricultural Experiment Stations, 1930," U. S. D. A., Washington, D. C., Misc. Pub. 89, Nov., 1930.

"Workers in Subjects Pertaining to Agriculture in State Agricultural Colleges and Experiment Stations, 1930-1931," U. S. D. A., Washington, D. C., Misc. Pub. 100, Mar., 1931, Mary A. Agnew.

Economics

"Rice Farming in Arkansas with Financial Results for 1927," Agr. Exp. Sta., Fayetteville, Ark., Bul. 260, Apr., 1931, Orville J. Hall.

"Series of California Crops and Prices, Barley," Agr. Exp. Sta., Berkeley, Calif., Bul. 512, Apr., 1931, E. W. Braun.

"Systems of Farming in Northwestern Minnesota," Agr. Exp. Sta., St. Paul, Minn., Bul. 268, Aug., 1930, L. F. Garey and F. F. Elliott.

"Economic Review of New Jersey Agriculture," Agr. Exp. Sta., New Brunswick, N. J., Bul. 73, Apr., 1931.

"An Economic Study of the Small-Fruit Industry in Oregon," Agr. Exp. Sta., Corvallis, Ore., Bul. 274, Jan., 1931, George L. Sulerud and Milton N. Nelson.

"Farmers' Experiences and Opinions as Factors Influencing Their Cotton-Marketing Methods," U. S. D. A., Washington, D. C., Cir. 144, Jan., 1931, T. B. Manny.

"Marketing the Commercial Crop of Early Potatoes," U. S. D. A., Washington, D. C., Cir. 149, Jan., 1931, J. W. Park.

"Wheat Futures, Volume of Trading, Open Commitments and Prices, from January 3, 1921, to December 31, 1929," U. S. D. A., Washington, D. C., Statistical Bul. 31, Nov., 1930.

"Cold-storage Holdings, Year Ended December 31, 1929, with Comparable Data for Earlier Years," U. S. D. A., Washington, D. C., Statistical Bul. 33, Mar., 1931.

"The Agricultural Outlook for the Southern States, 1930-31," U. S. D. A., Washington, D. C. Misc. Pub. 102, Dec., 1930.

"Measuring Hay in Stacks," U. S. D. A., Washington, D. C., Leaflet 72, Feb., 1931, W. H. Hosterman.

Insects

"The Sources of American Corn Insects," Agr. Exp. Sta., Wooster, O., Bul. 473, Mar., 1931, C. R. Neiswander.

"Cotton or Weevils," U. S. D. A., Washington, D. C., Misc. Pub. 35, Jan., 1929, J. L. Webb and F. A. Merrill.

"Tiphia Popilliavora Rohwer, A Parasite of the Japanese Beetle," U. S. D. A., Washington, D. C., Cir. 145, Nov., 1930, J. L. King and J. K. Holloway.

"Macrocentrus Gifuensis Ashmead, A Polyembryonic Braconid Parasite in the European Corn Borer," U. S. D. A., Washington, D. C., Tech. Bul. 230, Mar., 1931, H. L. Parker.

"A Revision of the American Species of Empoasca Known to Occur North of Mexico," U. S. D. A., Washington, D. C., Tech. Bul. 231, Jan., 1931, Dwight M. DeLong.

"Insects of the Pecan and How to Combat Them," U. S. D. A., Washington, D. C., Farmers' Bul. 1654, Jan., 1931, G. F. Moznette, T. L. Bissell, and H. S. Adair.

"The Gipsy Moth and the Brown-Tail Moth," U. S. D. A., Washington, D. C, Farmers' Bul. 1623, Dec., 1930, A. F. Burgess.

"The Corn Earworm as an Enemy of Field Corn in the Eastern States," U. S. D. A., Washington, D. C., Farmers' Bul. 1651, Jan., 1931, W. J. Phillips and George W. Barber.

Diseases

"Diseases of Grain and Their Control," Agr. Exp. Sta., Berkeley, Calif., Bul. 511, Apr., 1931, W. W. Mackie.

"The Mosaic Disease of Beets," Agr. Exp. Sta., Pullman, Wash., Bul. 250, Mar., 1931, Leon K. Jones.

"Resistance to Fusarium Wilt in Garden, Canning and Field Peas," Agr. Exp. Sta., Madison, Wis., Res. Bul. 107, Feb., 1931, J. C. Walker.

"Onion Diseases and Their Control," U. S. D. A., Washington, D. C., Farmers' Bul. 1060, Feb., 1931, J. C. Walker.

NORTH CAROLINA FINDS APPLES COSTS FIFTY CENTS A BUSHEL

Brushy Mountain (North Carolina) apple growers can produce their crops at a cost of 50 cents a bushel, according to H. R. Niswonger, extension horticulturist in the State, after conducting a series of cost-finding demonstrations with four prominent growers in the Brushy Mountain area.

The cost of growing the apples to maturity was 23 cents a bushel; picking the crop cost 5 cents a bushel, and all overhead charges amounted to 22 cents a bushel. The four growers kept records on 7,250 trees from 8 to 20 years old. They were of the Limbertwig, Delicious, Stayman, and Bonum varieties, and produced 7,530 bushels of marketable fruit last season. The cost of production was somewhat higher than usual due to the poor crop.—*Marketing Activities, May* 20, 1931.

Control Flower Garden Insects

By C. H. Brannon

Extension Entomologist, North Carolina State College of Agriculture and Engineering

INSECT pests attack plants in the flower garden and often cause serious damage or complete destruction. There is an insect pest for practically every kind of plant, and garden plants are no exception. The damage to field crops and orchards often attracts wide attention, and much effort is directed toward control measures in the field each year. Most folks who have flower gardens seem to consider insect pests as necessary evils from which there is little or no relief.

It is true that all these problems have not been solved and that control is sometimes difficult or impossible, but in the majority of cases there is an effective, simple, cheap control for insect pests which attack flower plants.

Before any attempt is made to control any insect, it must be determined whether the pest is a chewing insect or a sucking insect. All such pests fall in one of these two classes. Chewing insects such as caterpillars, leaf-eating beetles, grasshoppers, etc., are controlled by applying a stomach poison to the plants, such as arsenate of lead. In the case of sucking insects a contact insecticide must be used; such as nicotine sulphate. Sucking insects such as plant lice or aphids, thrips, scale insects, etc., are not controlled by stomach poisons, as they suck their food from within the plant. A contact insecticide kills by contact either through its burning action, poisoning through the breathing pores, or by suffocation.

Insecticides can often be applied as either a spray or a dust, but in some instances it is necessary to use a liquid spray for results and in other instances dust is best. Care must be observed in properly mixing any poison, as the plants may be severely injured if an insecticide is applied too strong. Do not spray or dust promiscuously. Use only the recommended poisons in the right proportion. Applications must be applied thoroughly and at the proper time. Remember that poisoning is a control and not an eradication. One can not hope to destroy all the pests for the whole season. Therefore, in many instances, several applications will have to be made to protect the plants.

A satisfactory spray for most chewing insects is as follows:

Three teaspoonfuls of arsenate of lead and one gallon water, or five teaspoonfuls magnesium arsenate and one gallon water.

For plants having glossy or smooth leaves, a small piece of soap (one ounce) can be added to the spray to help the poison to adhere to the plant.

Although the above proportions are recommended for most plants, tougher plants will stand the spray twice as strong. It must be borne in mind that delicate and bright-colored flowers are subject to injury by the stronger sprays.

A satisfactory dust for most chewing insects is:

One ounce (or one part) arsenate of lead and 4½ ounces (or 4½ parts) hydrated lime; or one ounce (or one part) magnesium arsenate and three ounces (or three parts) hydrated lime.

For sucking insects the following poison is recommended as a spray:

Nicotine sulphate, 1 to 1½ teaspoonfuls; water, one gallon.

As a dust:

	10-oz. lots	5-lb. lots
Nicotine sulphate	½ oz.	¼ lb.
Hydrated lime	9½ ozs.	4¾ lbs.

Nicotine dusts should be used immediately after being prepared or

stored in an air-tight container.

In applying contact poisons one must remember that the material must actually come in contact with the body of the insect.

Lime sulphur or oil must be used to control scale or mites on shrubs.

Care must be observed in using any insect poisons. Children should be kept away from such poisons. Household pets or any other animals should also be kept away from them.

For spraying, small air-pressure sprayers will be found most desirable. For dusting, small blowers can be used.

Fertilizer Trials in Grant County, Indiana

By M. D. Butler

County Agent, Marion, Indiana

AS they improve both the feeding value and quality of corn, as well as the yield, potash and phosphorus have repeatedly proven their worth in a series of field demonstrations conducted by men cooperating with the extension service in Grant county, Indiana. These trials have run over a period of three seasons and for conditions as found in that part of the corn belt, prove the value of potash.

In 1928 the county agent established several trials on different farms. On each of these farms livestock is fed and clover grown in each rotation. The feeding methods of farmers in this locality ordinarily are sufficiently heavy to require importing feed to supplement native grown crops. This practice has been going on for years and now presents a situation different from that in localities practicing the selling of cash crops annually. The continued sale of pork and beef has naturally depleted the phosphorus supply of the soil to the point where this element is a limiting factor in growing either a grain or grass crop, and for several years leading farmers have been fertilizing their wheat and seedings. It has been only recently, however, that a similar opinion prevailed in reference to potash.

The trials of 1928 on corn gave as much evidence in favor of potash as in favor of phosphorus, while the results of the 1929 trials are still more favorable for the use of potash. Some of the local cooperators attribute this to "too many heavy tractors," or the "excessive spring rains of 1929," supposing that these facts locked up available potash, making the benefits of the applications of muriate of potash more noticeable.

For example the demonstration on the farm of John Scott in 1929 showed the check plots produced an average yield of 65.3 bushels per acre, a 3-0-16 produced 66.7 bushels per acre, a 3-12-0, 59.3 bushels per acre, and an 0-12-12 produced 70.7 bushels per acre. This being a well-managed soil naturally high in nitrogen, it was not surprising to notice a loss from the use of nitrogen. However, it was surprising to notice an increase of five bushels per acre in favor of an 0-12-12.

During 1930 the results of the tests were similar, in that they indicated a more than expected advantage in favor of potash and in all but one test showed a loss when nitrogen was used on good land after a crop of clover or sweet clover. On the poorer soils of that region nitrogen showed a quicker early growth but no corresponding increase in yield.

Horse Radish

(*From page* 30)

inches long are planted in a slanting position of less than 45 degrees and the top of each cutting is placed three inches below the level surface of the field. The soil should be firmed well about the newly planted roots. This is done so that the roots will not have a chance to dry out and so that they will begin to grow as soon as possible. The slanting position is used in planting so that the roots will come in contact with as much of the surface soil as possible. This is especially important when the surface soil is shallow.

It is important to remember that root cuttings are fixed in their habits of growth. The new roots always grow out of the end of the cutting which was growing downward at the time it was dug the fall before. On this account the root end of a cutting is always cut off obliquely and the stem end is cut at right angles to the long way of the root at the time it is trimmed from the mother root. Another item worthy of mention is that unless all the roots are removed from the field at digging time there is very likely to be a volunteer crop the following spring.

As to horse radish varieties, the Maliner Kren or the Bohemian are supposed to be superior to the common kinds. But the best method of solving this problem is to start in a small way with the best roots obtainable and select side roots from the longest, fleshiest, whitest, and most desirable roots each year. Constant selection will usually result in an improved strain of horse radish. Commercial supplies of root trimmings are usually hard to find. It is largely a matter of each grower saving his own supply.

A full growing season is necessary for a large yield of horse radish. The plants are very hardy and will stand temperatures somewhat below freezing. Since the upper end of the root is planted three inches deep, it is sometimes found that a crop of early cabbage can be grown on the same field. Such a practice may prove unprofitable, however, if the soil is lacking in organic matter or fertilizer in amounts sufficient to meet the needs of companion cropping.

As soon as the cabbage crop is removed, the horse radish crop is kept free from further competition. Companion cropping would have a greater chance of succeeding if water could be supplied through surface irrigation, subirrigation, or the overhead method of irrigation.

All weed competition in a horse radish field must be eliminated early in the season. Weed control is the main reason for cultivation. If the growth of weeds is effectively prohibited from the beginning and if the upper inch or two of soil is loose and free from soil cracks, the horse radish crop will do as well as the other fac-

A quick-maturing vegetable can sometimes be planted as a companion crop with horse radish. Early cabbage is an example.

tors controlling it will permit. Shallow, level cultivation, often enough to control the weeds, is usually all that is required in a deep, fertile soil.

Some professional European growers trim the side roots from the main roots during the growing season in an effort to obtain a larger number of high quality, saleable roots. The object can be accomplished, but the risk of damaging the crop is great.

Planting distances used in horse radish production are usually 10 to 12 inches between the plants in the row and three feet between the rows. The plants grow to a height of about two feet. The leaves are arranged in a rosette and they are erect, long-stemmed leaves with dark green, narrow, tough leaf blades.

At the season's end the roots are usually plowed out and the tops and side rots are trimmed off. The latter are saved for the next year's plantings. The fleshy, main roots are washed after they are trimmed and are marketed in barrels. The crop can be stored until needed by holding it in a cool, moist place. It is important to see that the roots are kept from shriveling as this lowers the quality and the amount of money which they will bring when marketed.

The side-root trimmings which are to be used the next season to set out the new plantings are marked at the time they are removed from the main root so that the grower will always be able to tell which end to place down and which to keep toward the surface of the soil. The top end is always cut off squarely and the other end receives a slanting cut.

The roots are then tied in bunches and packed in moist sand. They too are held in a cool, moist, root cellar until the following spring. Roots can be left in the field all winter although this is rarely done. Two-year old horse radish roots become woody and so are of poor quality.

Average yields are poor standards to go by in the vegetable business because such yields usually are just high enough to pay for the cost of production on the several crops. To enter the horse radish business in a big way because of rumored large scale profits is hardly advisable. This would be especially true if only average methods were to be employed.

The best of cultural care, including the use of generous amounts of fertilizers and manures, will usually produce far better than average yields. If added to these factors there is a naturally deep and fertile soil available in a climate where the growing season is 140 or more days long there should be little trouble in making a reasonable amount of horse radish acreage profitable.

Potash Scrapbooks

(*From page* 24)

To the boys and girls of Michigan, Burt Wermuth wrote:

"There are two important reasons why a boy or girl should develop the habit of making scrapbooks. The first is that it fixes the habit of looking for things or ideas—the spirit of the pioneer, the discoverer, the inventor, of all those men and women responsible for the progress of the race. Then the material in a good scrapbook must be classified, that is, put in where it belongs. Now, people who keep on finding new things or ideas and know the proper place to put them just naturally become the most useful and valuable citizens in any

community or nation."

"There are many values derived from keeping a scrapbook," Mr. Gallup wrote addressing the boys entered in the Potash Scrapbook contest.

"1. It keeps one mentally alert for everything that is said and written upon the subject of his major interest.

"2. It leads to a careful organization of the thoughts expressed upon one's major interest.

"3. The accumulation of information after a period of time is surprising and satisfying to one who keeps a scrapbook.

"4. For the student, it gives an opportunity to organize material so it is easily accessible and in the form in which he can make best use of it."

The potash scrapbooks submitted were judged by Dr. C. E. Miller of the Soils Department, Michigan State College, Professor W. W. Johnston of the English Department, Michigan State College and Burt Wermuth, editor of the *Michigan Farmer*. They were graded on five points: initiative, completeness, neatness, arrangement, and thoroughness.

The eight boys who were awarded trips to the Future Farmers of America convention at East Lansing were: Archie Potter, Mesick; Leslie Hughes, Jonesville; Emmer Mathias, Mancelona; Wayne Wibirt, Reed City; Glen Slucter, Hermansville; Frank Denning, Jonesville, and Clair Gregory, Harbor Springs.

Rejuvenating Abandoned Farms

(*From page* 28)

been leased to a number of neighbors, due to the fact that it was impossble to get a good class of renters interested, as the soil was depleted, the fields gullied and full of cockleburs, and the improvements inadequate for the proper kind of tenant. The landlord's net returns for the year of 1925 were considerably less than $1,000. This was discouraging, but an arrangement was made with Mr. Dahl whereby the landlord would furnish commercial fertilizer and sow mammoth clover. On the most depleted soils mammoth clover aided by commercial fertilizer increased the fertility to a degree which in a course of three years more than tripled the production of this land. In fact, the year of 1928 showed a gross return to the landlord of $3,465.07, and since then this has been one of the outstanding farms of that locality in the way of production. Mr. Dahl is still occupying the property, has eradicated the weeds, built up the soil to a high state of productivity, and has taken considerable pride in keeping the premises in good condition otherwise. Mr. Dahl's returns from the land were even more than those of the landlord, as he received three-fifths of the small grain while the landlord only received two-fifths share.

Since an income of $1,600 on the farm is equivalent to a $3,000 income in the city, it is easy to evaluate farm possibilities versus city opportunities—the man considered. Manual effort and hard work applied to farming will usually reward a man more than the same energy sold for a wage. The reason is that a farmer does not have anyone making a profit on his labor. The profit of his enterprise is his own. He loses his maximum return, however, as many frequently do, when they sell their wheat for a cent a pound and then buy it back as bran and other feed at one and one-half cents a pound.

Again, farmers of this country who are fertilizing their pastures and think in terms of cows per acre are not seeking or even thinking about the agricultural problem. On the other hand, in localities where the farm is viewed in

terms of acres per cow and a belief that as many as 30 acres per head are required, the cost of production of milk and meat cannot lead to anything but a farm problem.

The art of soil management the world over, but especially in the United States, is rapidly coming into a new level of efficiency. Pioneers, such as Leibig, a hundred years ago wrote the primer which told the story of the importance of N. P. K. (Nitrogen, Phosphorus, and Potash). It has always prevailed that great teachers are invariably ahead of the masses. Hence, it is not surprising that even today we find agricultural authorities stating that in certain parts of this country farmers are still only in the phosphate stage as regards the proper use of plant foods. Only market gardeners and a few of the most advanced staple crop farmers have, as yet, learned how to properly employ complete fertilizers containing, in addition to N. P. K., those other essential elements which Dr. Oswald Schreiner and others of the present generation have demonstrated are beneficial to crop growth.

Farm Practices Changed

Indicative of the changes in farm practice which have been tried and found sound, during the memory of the writer, may be mentioned the method of cultivation to conserve moisture. Movement of moisture by capillarity in the soils was once considered of major importance. Frequent cultivation of hoed crops was at one time recommended to conserve it. Today farmers cultivate, to be sure, but they scratch the surface only sufficiently deep and only when needed to destroy weeds. In other words, every farmer now realizes that weeds remove far more moisture from the land than evaporates from the surface.

In the matter of soil fertility management, there have developed equally startling changes concerning what is considered economic. The time was when farmers were taught to build up the fertility of their land toward some undefined goal. Incidentally, wherever this advice was followed it benefited the soil to be sure, but the farmer not so much. Today, on the other hand the most respected agricultural colleges and experiment stations offer as their advanced recommendations, that the crops grown and not the soil should be fed.

In other words, high school graduates in agriculture are made to see that if, for instance, the soil of a farm is inherently capable of producing 50 bushels of corn and the farmer desires to raise 70 bushels to the acre, he can do this quickest and with the most profit by applying enough commercial fertilizer when planting his crop to make the extra 20 bushels. In succeeding seasons he will find it pays to repeat the process. Thus, the old rule for sound farming of the past wherein the back-breaking, expensive practice of treating the land with tons of pulverized stone and turning under gold dollars in the form of green manure crops, with the exception that the tilth of the land would be improved, is today recognized as uneconomical. Everyone now knows that if immediately available commercial fertilizer increases yields of grain, the land itself will be enriched at the same time, not only by the large crop residues returned to the soil, but by the fertilizer residues as well.

The Ohio Experiment Station shows that the effect of adequate applications of commercial fertilizers are enjoyed markedly at least throughout a four-year rotation. At the West Virginia and Rhode Island Experiment Stations it has been demonstrated that where necessary yields can be profitably maintained and the humus of the soil actually increased without applying any farm manure but employing fertilizers only. Hence, regardless of the type of agriculture, soil fertility can be permanently maintained, and even where lands have been abused, they can be rebuilt by the intelligent use of commercial fertilizers.

Sunflowers for silage and potatoes are grown at the Northeast Minnesota Experiment Station.

The Arrowhead at School

(*From page* 26)

walls of the station auditorium. The farmers themselves form a service group of "Minute Men" in rural progress.

The Junior Honor Roll is a recognition with diploma of the 4-H boys and girls who have led their respective counties, sometimes the State, in such enterprises as potato or garden culture, calf or sheep rearing, sewing or baking.

The Community Honor Roll is an effort to bring to the group the same recognition for community advancement that has come to the individual for personal accomplishment. For example the judges awarded the Lakeland Farmers Club the Reclamation Trophy because they did the best job of reclamation in all the Arrowhead. They cleared 300 acres of land. The Breeders Trophy went to Twin Lakes Club, Carlton, for the best job of livestock improvement. Here 16 herds are ready to be accredited as free from abortion.

The Arrowhead is in transition from forest to farm. Conifers yield to clover; barley supplants birch; potatoes replace pine. These changes cost heartaches and discouragements. It is right in itself to recognize merit and reward it. And if it awakens hope and ambition in others; if it renews faith in the industry, the land and homes in this northern frontier, it is worth all its costs.

Testing Pastures

(*From page* 6)

The treatments varied with the different farms, and all materials were purchased by the farmers. The grades included a 4-12-4, 5-8-7, 5-10-10, 10-8-8, 8-8-8, 10-16-14, and 8-16-16. A requirement of 30 pounds per acre of each of the plant foods was used as a minimum. All of these paid the farmer a good return on his investment, varying in returns from $12 to $122 per acre over the unfertilized check plot. This return was after all costs

for fertilizer, labor in spreading, and cost of grain and other supplemental feed were deducted.

The drought had a part to play on some of the lighter soils, decreasing the number of grazing days. This was true in the two Connecticut tests and one in Massachusetts. All of these got away to a good start in early feed, but were slowed up as the season's dry weather continued. This would indicate the need for very early spring application on the light soils, so as to get the maximum measure of the fertilizer applied.

The three winning tests in the New England section were on good sods, which had a reasonable amount of moisture. Waveney Farm, Framingham, Massachusetts, won the contest in this territory. They applied a 10-16-14 fertilizer on April 1 at the rate of 400 pounds per acre. The sod was at least 50 per cent clover and had recently been in mowing. Their return was $122 per acre. At turning-out time there was 5,592 pounds more green grass per acre on the fertilized than on the unfertilized plot. Full details on all the tests are being published in bulletin form and will be available at an early date.

It would seem to be good farming practice to consider the pasture area on the farm one of the most remunerative crops when properly managed. Years of continuous grazing have mined the plant food from the soil and very little has been returned. The plant food removal of many years cannot be returned in one application of fertilizer. It will have to be a process for rebuilding for future years. Many farmers of today have proven beyond question that it is possible to lower the area of pasture per cow one-half and even to one-quarter the present requirement by liberal fertilization and intelligent management.

There should be no one plan recommended to fit all cases and each farmer should be encouraged to fit a plan to his needs and approach the question with an open mind. The simple plan, however, of fencing and fertilizing the pasture, using only the better sods and rotating the dairy herd, will go a long way in helping him reach the ultimate goal of *Better Pastures.*

The Inquiring Mind

(*From page* 17)

scientists must have been welcome and valuable. Professor Troop recognized that it is most important for every experiment station official to keep in touch with the work of others in the same line of research, and that the comparing of notes and exchange of ideas and experiences is of great mutual benefit. That, today, is as necessary and important for all experiment station workers as it was in the early eighties.

Noting that the severe winter of 1884-5 seemingly increased the hordes of injurious insects, Professor Troop gave the matter serious consideration. Leaf-rollers had greatly damaged strawberries; saw-flies had stripped the leaves from raspberry bushes; and the currant saw-fly, plum curculio, and codling moth were present in undiminished numbers. These pests, therefore, were studied and combated. There was, also, at that time a widespread difference of opinion among horticulturists regarding the effects of cross-pollination in strawberries and raspberries; therefore, Professor Troop undertook experiments with 12 different varieties of each and ascertained some

facts of scientific and practical value.

Old records state that in October, 1884, the most interesting feature of the agricultural exhibit at the Indiana State Fair was a collection of injurious insects arranged by Professor Troop. In December, 1884, it was reported that Professors Warder, Latta, and Troop represented Purdue at the annual meeting of the Indiana Horticultural Society. On that occasion Professor Troop read a paper entitled, "What We Owe to the Entomologists," after the discussion of which a resolution was adopted requesting the Legislature to enact a law creating the office of State Entomologist. That request was granted, and it is interesting to note that in 1899 Professor Troop was appointed to that office in which he ably served until 1905.

Received Honors

In 1895, Professor Troop was elected secretary of the State Horticultural Society, which position he held until 1902. It was in recognition of his services as secretary and his valuable contributions to the programs of its meetings for many years that the Society on January 14, 1931, presented his portrait to Purdue University.

In 1917, the leading orchardists of Indiana called for a spray calendar for the codling moth. Up to that time there was supposed to be a distinct interval between the first and second broods of this orchard pest. Professor Troop, with the cooperation of his former students, conducted a series of experiments in a number of scattered orchards throughout the State and as a result found that there is no distinct interval between the late emerging codling moths and the earlier moths of the second brood. As Professor Latta has said: "Professor Troop was the first entomologist to demonstrate the fact, by a series of experiments, that there is practically no break between these broods, thus making the breeding season of this insect a continuous performance from early spring until fall, making it advisable and necessary to keep the spray pump going throughout the season."

Among many other creditable activities of Professor Troop were some important experiments relative to fertilization which he directed some years ago. They were conducted by Dr. William Stewart and have been pronounced by Professor Laurenz Greene, present chief in horticulture at Purdue, "as one of the first and most important contributions to our knowledge of fertilizers for greenhouse plants." Professor Troop has also written many instructive bulletins and reports on horticultural and entomological subjects and in 1911 was the author of a valuable text-book on "Melon Culture."

As secretary of the State Horticultural Society, he received honorable mention for the exhibit provided by the Society at the Paris Exposition and a medal of honor for an exhibit in horticulture and entomology made at the St. Louis Exposition. He acted as judge of the horticultural exhibits at many fairs, including the St. Louis Exposition, and lectured acceptably and instructively at numbers of meetings in Indiana and elsewhere. For several years he was secretary of the Association of State Entomologists.

Sought No Notoriety

What has been said partially tells the story of the long years of service rendered by Professors Latta and Troop. They have willingly and satisfactorily worked quietly and unassumingly, without seeking notoriety, thanks, or applause. They say little of themselves, but a host of ex-students, farmers, orchardists, educators, and research workers esteem them for their multifarious accomplishments, versatile abilities, sterling integrities and lovable natures.

Of each of them we may say, in the words of Shakespeare:

"He was a scholar, and a ripe and good one;
Exceeding wise, fair spoken and persuading."

Potash-Minded

(*From page* 18)

supplement our program of encouraging a practical system of soil improvement. For three years the Agricultural Department of the Chicago and Eastern Illinois Railway has operated soil testing trains over its lines in cooperation with educational agencies. Thousands of samples of soil have been tested for lime and phosphorous needs for hundreds of farmers in 24 Illinois counties. In addition to the trains, the railroad maintains a free soil-testing service at Danville, Illinois, for all farmers living in territory along its lines, and farmers are continually availing themselves of this opportunity to have their soil tested without cost.

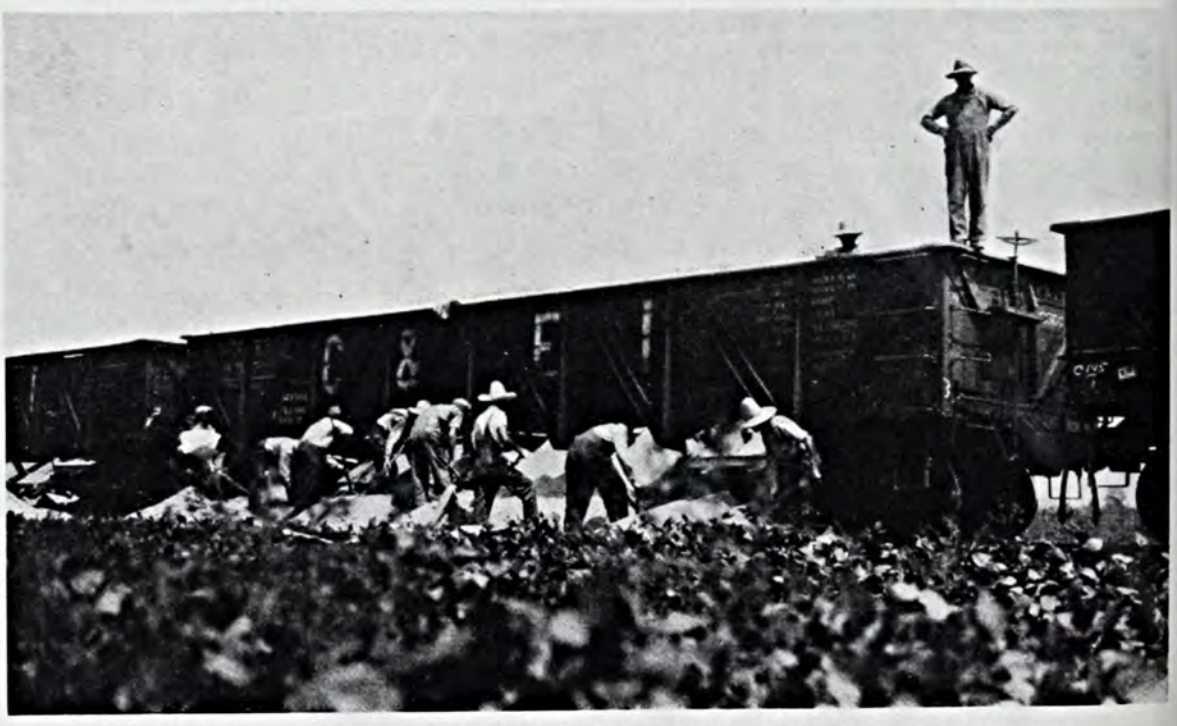
During the year 1929 the soil-testing cars stopped at 48 towns, but during the year 1930 they were not operated over such a wide territory. Previous to the scheduled stop of the train, farmers in the vicinity of the station were notified by letter of the soil tests the train was prepared to make, and generally when the train pulled in, it was met by a crowd of farmers, each with a box or basket of small sacks containing soil samples.

The laboratory car was equipped for testing about 500 samples at one time. On one side there was a long counter, holding racks for the testing bottles. Potassium thiocyanate was used in testing for acidity and the Bray test in testing for available phosphorus. In addition a number of tests for potash and nitrogen were made on cornstalks by the Hoffer method. These tests resulted in the farmers getting complete and accurate reports on the lime and plant-food requirements of their fields.

Farmers Learn to Make Tests

Since the testing of soil samples by these methods was quite simple, the farmers were invited to assist in the work, and many made their own tests under the supervision of the soil specialists on the car. Farmers brought in from one to 220 samples each.

Proof of the effectiveness of the soil-testing work is evident from the



This trainload of limestone is being unloaded on right-of-way from side-dump cars.

records of limestone and commercial fertilizer carload shipments unloaded at stations on the C. & E. I. Railway, which show a 58 per cent increase for limestone and a 47 per cent increase for fertilizer in 1929 over 1928. During the year 1930, the increase was not so great, due principally to the drought and depression in agriculture, but showed an increase of 20 per cent in limestone and 28 per cent in commercial fertilizer tonnage over 1928. In addition, a large tonnage of ground phosphate rock was used. Phosphate rock has been popular with Illinois farmers for a number of years.

Limestone occasionally was handled in train-load lots. These special trains were stopped at any point on the railroad convenient to the farm, where the landowner was permitted to unload his limestone, in some cases just across the fence from the field on which it was to be applied. The limestone was loaded in side-dump cars and all farmers having cars in the special train cooperated in getting it unloaded on the right-of-way.

We are now cooperating in field demonstrations with potash and various fertilizer mixtures on various crops on different types of soil. Field meetings of farmers in the communities where the fertilizer demonstrations are located will be held when the plots are checked for results.

Behind the Farm Microphone

(*From page* 12)

ture's radio service to the thousands of listeners who have been brought from isolation to within the current of modern agricultural progress. With its plan of acting also as the mouthpiece for nearly every important branch of organized agriculture, the Farm and Home Hour presents a startling coverage of the nation's agriculture packed into brief daily periods at a convenient time.

The broadcast every Saturday noon is devoted to a special program by one of the important farm organizations. The schedule for 1931 will bring a National 4-H club program to listeners on the first Saturday of each month in addition to musical periods by the United States Marine Band. During 1930, club members from 17 States appeared before the NBC microphones for these programs. The American Farm Bureau Federation presents a program on the second Saturday; National Grange, third Saturday, and Land Grant Colleges, fourth Saturday.

Of outstanding seasonal interest is the National Farm and Home Hour plan to bring to the radio audience direct reports of important agricultural events such as the International Livestock exposition, National Dairy show, American Country Life conference, National Corn-husking contest, and many others.

Attracting unusual interest, the National Corn-husking contest for 1930 deserves comment. More spectacular than many leading football games, this greatest of all farm sporting events attracted 40,000 spectators who are but a handful compared to the number who heard an "ear by ear" account of the huskers over the radio. Staged in western Kansas, only 60 years ago the last frontier where Indians battled to quell the invasion of settlers, the corn-husking event presented less hardship but probably more thrill than did the battles of early Homesteaders in the Jayhawkers territory.

Following the huskers with microphone in hand, Wallace Butterworth, the Farm and Home Hour announcer, gave one of the most picturesque descriptions of a sporting event ever broadcast while a mob of people covering the productive, well-managed

Kansas cornfield watched their favorite contestant as he progressed down the long corn rows hitting the bumpboards at a feverish pace in an effort to bring the championship to his home state. Probably no more colorful display of farm sporting interest has ever been shown, and although 40,000 watched the event, many more thousands would have lost a wholesome thrill but for the employment of radio to bring a simultaneous description from away out on the Kansas plains to their homes in the East, South, West and North.

Entertainment programs on the air perform a service for country folks which is unparalleled. They have been instrumental in bringing about an appreciation among rural people for the best in music, and have served to make many hours in isolated farm homes happy and enjoyable.

These principles are not forgotten in planning the National Farm and Home Hour which has been referred to as the "Nation's Bulletin Board of Agriculture," and many a wearisome statistical talk of importance has been attentatively heard because the audience knew it would be followed by a choice bit of entertainment.

Among the artists who contribute to the broadcasts especially planned for country folks are well-known orchestras, singers, soloists and dramatists. Numbers are chosen to appeal to as wide an audience as possible, and the nation-wide radio period serves to bring about a feeling of close relationship among farmers separated by many miles—tillers of the soil with different problems, but all with the same eagerness to learn, and with a common source of livelihood from the wide expanse of farming territory. Truly, radio is playing a major part in serving an American farming class that is responsive to teaching which, when applied, finds responsive acres.

Speaking of Publicity

(*From page* 22)

and looking at things from the other fellow's view-point. What does the typical country citizen know about this demonstration? Does it have any interest or importance for anybody else? What would the town citizen think of it? These are good questions to ask in achieving a perspective of one's work. Whether it results in a news story or not, it is a good habit to acquire. News is anything interesting and timely, and the more people it will interest the bigger news it is.

Perhaps a greater pitfall of agents who aspire to cooperation with newspapers is the expression of opinions in news stories. To be self-centered is a human frailty, and Americans are natural propagandists. We are forever wanting to educate someone, which usually means that we wish him to adopt our views. Extension work seems to have been intended as a form of education in which the farm people educate themselves through demonstrations of their own making. The part of the local newspaper would then seem to be the circulation of ideas born of demonstrations to the end that demonstrators be increased until a body of growing, thinking, self-reliant sovereign citizens is developed, capable of leading itself and of solving its own problems.

At any rate expression of opinion in news stories is bad journalism. Editors oughtn't to print them. If they do it's because they are big-hearted, or that they, too, believe in exhortation as the plan of rural salvation. The editorial column is the place for opinions. As long as agents subject themselves to the rules of the newspaper game by submitting to editors nothing but

A. B. Jolley, Dallas county farm demonstration agent, gets the record of a leading poultry flock demonstrator for publicity purposes. The story of how H. H. Jobson (left) developed a flock of 750 white leghorns that laid an average of 120 eggs each in the first eight months of the year to lead all the demonstration flocks in the county is the kind of news that builds better farming.

straight news to be used and placed as is other news, according to its news value, they need never fear of overdoing newspaper pubilcity. On the other hand, one opinionated propaganda story is one too many.

There it stands, the country newspaper, a power of varying degree, but always potentially strong, in 90 per cent of counties in which Extension work is done. Whether one passes by on the other side, or manfully tries to do his part in using the tools at his command to build a better country life, the small weekly newspaper still remains, amidst all its confusion of ink pots, a symbol of progress and an opportunity for service.

Prepare for Weevils

(*From page* 19)

Weevils can cause just as much damage in North Carolina as any other cotton State, and just as often as we have frequent rains in July and August, we are going to have to dust cotton to control the boll-weevil.

There is no way of predicting boll-weevil damage. Our winters are not cold enough to prevent sufficient weevils from coming out of winter-quarters to cause very serious damage. The weevils breed rapidly and though few emerge large damage can result when conditions are favorable during July and August.

There is a machine for cotton dusting suitable for every type of land and every size acreage. If you buy a machine be sure to get a good make suitable for your own conditions. Do not buy a worthless machine; there are several good makes on the market. See your county agent about a good machine and poison. Growers are urged not to put this matter off until the last minute. There is a marked tendency to think nothing of the weevils until they begin to show in the field; then we see all kinds of articles in the papers about farmers being "alarmed"

at weevil damage. *There is no reason for alarm. The weevil is nothing new and it is here to stay.* Therefore, the quicker we become acquainted and prepared for weevil control the better off we will be. The boll-weevil will be present as long as there is any cotton grown in the South, therefore, why not consider the problem seriously.

Fruit growers must spray each season if fruit is to be harvested. Practically every crop grown must be protected from insect damage. Cotton is no exception and the quicker we realize the importance of intelligent weevil control methods, the sooner we can count on a full yield of cotton.

Insect pests collect a tax of over $2,000,000,000 in the United States each year. How long will the South continue to contribute large sums to this huge tax?

Come to the Wedding

(*From page* 4)

apparently it was the public custom, just like discussing the Farm Board is with us in the corn-belt.

I think I understand it. Parlors are getting scarcer and flats are getting tighter with less room for sentiment, so that the cave dwellers are driven to prehistoric customs in search of mates.

I can sum it up by saying that our courtrooms are overcrowded because our courting rooms are not so plentiful at home as of yore! A fellow really ought to get acquainted with a girl in the vicinity of the dining-room and kitchen, even if he has to argue a couple of hours with the old gentleman before he tires him out and retires him. It sort of adds the perspective for prospective matrimony to hold hands with Her in the corner underneath the enlarged crayon picture of her grandmother.

I do not bemoan this nightly wandering of romancers because of the higher cost of refreshment obtained outside the domestic zone, although it also has to be considered in dull times. But I refute the charge that nuptials are consummated best in a sea of sodas or that dance marathons induce permanent felicity.

But I suspect that we are going to have weddings even in years of suspended circulation of coinage. I don't disapprove of petting in poverty, and indeed it might act as a real antidote to some of that easy-street romance that has taken so many of our good nuptial intentions into the scrap heap.

Some of us who got spliced on fifteen dollars a week and lived through it without busting any dishes at each other are in a position to advise others that a poor beginning makes a populous ending. I have a friend who enjoys twenty years of wedded life and eight children, and his wages have never been up to the Lithuanian union scale. Yet he smiles broader and laughs louder and easier than another friend of mine who was born with a silver spoon and married a diamond tiara! It isn't how much you marry, nor how often, but how well.

In fine, I think that marriages begun in times when the economic index curve is worrying the furniture dealers may possess certain distinct advantages to the high contracting parties. Wages will be low, but waste will be less. Jobs will be scarce, but baby carriages will be cheap. In any case it's disposition more than depression that eclipses the honeymoon.

Marriage is pretty much of a tragic tension, according to Count Hermann Keyserling, who sees the chief solution of it in a gradual growth of the spiritual essence of humanity rather than a continuation of the exalted Ego. I am happy to learn that he is not entirely despondent about this universal custom of civilization, and if he is not ready to give it up as a bad job, fel-

lows with limited experience in matrimony certainly should not be pessimistic.

Experience, by the way, doesn't always seem to count for as much in matrimony as it does in plumbing or in teaching farmers how to farm. In fact, it often seems to be the ones with the least experience in wedlock who claim to know best how to make it work successfully.

This particular contribution to the world's digest will carry no hints on the following things, to wit: farm relief, stock market tips, outlooks in economics, or advice to the love-lorn or the love-worn. In great jeopardy I might assay a fling at one or all of the first three subjects, but the Egyptian sphinx would be a Will Rogers of loquacity compared with me on the subject of matrimonial advice.

I recall with mixed feelings the episode that happened to my aunt when she sympathized and condoled too forcefully and frequently with a neighbor lady over an "indulgent" husband back in the pre-Volstead era. My poor aunty took things too literally and came back a trifle too strong in her condolences. Although my aunt wanted to assign the case to the Associated Uplift Agencies, she herself came out in need of the Red Cross. She took the solemn oath of non-interference wearing bandages. This shows that an outsider is no judge of the wearing qualities of the nuptial knot. Whether it is a clove-hitch, a slip-noose, or a scaffold-bend makes no difference to the casual third party.

Boarding-houses are probably responsible for more marriages than any any other single agency. It is the general procedure for making surveys to study well the causes that lead to certain conditions. Sentiment would be rejected in any business survey, so we must take it for granted that love sickness is not so much a cause of wedlock as indigestion and unlovely hall bedrooms.

I recall five young college instructors of robust mien who entered with me upon a deliberate boarding-house pact. They had never heard of Doc Wiley's famous poison squad and the dire results of being research victims in the pure-food campaign. No more hearty set of fellows were ever assembled around a squawky phonograph than those ambitious boys. They each and severally abjured matrimony and wanted to wait with patience until their dream-ships came to port laden with the visions of a voyage.

I WAS the first to succumb, perhaps being a weaker vessel. They gave me an easy chair for a wedding gift. One by one these men have either died or gone into matrimony. The local minister walks by the boarding-house every day, ready to rush first aid to the latest victim of the system. He is there either to administer the sacrament or ease them gradually into better rations via the bridal-biscuit route.

When you attack the first attempts of a young woman to balance rations for a husky young man on the Wolff-Lehmann or the Savage feeding standards, you are missing a nice point. The tough and leathery nature of boarding-house provender requires a certain gradual adaptation when one enters the relatively more congenial cuisine. By the time Wifey has become an adept at mixing batter and biscuit dough, the toxic effects of the erstwhile menu have worn off. Furthermore, the bride who can cause a too sudden change for the better in the young husband's rations has such a cruel cinch on the

saddle that it becomes galling. Humility for the bride and hunger for the groom is essential to the national transition from boarding to housekeeping.

"Living with the old folks" is the thing that puts quickest the tarnish on the wedding silverware. I doubt if it is any improvement over boarding-houses. In a boarding-house one quit on ptomaine reasons or cuss at the waiters. But when you sign up to join a ready-made family, you reef yourself in a couple of granny-knots, not to mention the proximity of that joker's favorite, the dominating mother-in-law.

Although I learn that present, dull economic conditions are forcing more such doubling up of families, I believe it is a mighty poor way to cure the depression. It's simply taking a quiet little boxing-match and turning it into a war zone! I am confident that "there should be a law, etc.," so I may turn it over to our legislative committee on public welfare. One law more won't make such a radical difference in the ultimate enforcement anyhow.

LONG engagements likewise should be made illegal. Too many, old, bachelor choir singers are claiming exemption because they have proposed and been temporarily accepted. Although it doesn't ease them off any on the income tax, it gives them a sort of immunity that galls the one in fetters. Inviting these selfish suckers out to dinner never seems to hasten the desired climax of conjugality. They will praise the roast and ask for recipes, but that's about as far as it gets with them.

Speaking again of long engagements, I have appended a list of such miserable exhibits that abound to tantalize us and interrupt our economic slumbers. Herewith a list of postponed marriages is given, a list that will stir the ire of all respectable citizens, and make them wish for justices of the peace in shoals and ministers of grace to defend us.

These flirtations have been going on long enough. The bans have been pronounced in public and the orange blossoms are withering for want of the ceremonial. I would be willing to "give them away" and buy the rice to douce them with. So would you, as per the following citations:

Labor and Agriculture.—Supposed to be well mated by natural experiences and kindred lives, yet pulling apart and refusing to unite for the general public welfare. The eight-hour-day, the lazy hired man, and the lock-out are obstacles.

Statesmanship and Politics.—Said to be of the same racial stocks, desiring the same results, and both eating at the public crib. Chief obstacle, expediency.

Starvation and the Surplus.—Settlement of a suitable dower would solve a national problem. A case for the police or the hospital. Shortage of means no obstacle.

Schools and Education.—Supposed to be married already, but probably a fake wedding. Children half-baked and very ungovernable. A sad case for the clinic.

Farm Relief and Agricultural Stability.—Love at first sight and remorse subsequently. May yet be united if their relations are kept out of it.

Prohibition and Temperance. — A little too much of the old Adam and a mixture of the ancient Eve. Will be a splendid wedding in the Garden of Eden at the Millenium.

I was almost tempted to add Essay Writing and Solving the Nations' Problems or even Better Crops and Plant Food, but the hopes for the latter are so bright that they do not belong in the list of the standpatters.

SO good luck to you all this fair June day, whether you are sending or receiving engraved stationery. I have got through a difficult subject without dipping into biology, which is more than can be said of some folks.

MORE EVIDENCE

Judge (after charging jury): "Is there any question that any one would like to ask before considering the evidence?"

Juror: "A couple of us would like to know if the defendant boiled the malt one or two hours, and how does he keep the yeast out?"

During an intense love scene in the movies, when the hero was doing his stuff, wifie nudged hubby and said:

"Why is it that you never make love to me like that?"

"Say," he replied, "do you know the salary that guy gets for doing that?"

AGREED

Prospect: "I can't see you today; come back Friday."

Salesman: "I won't be in town Friday."

Prospect: "Neither will I."

Telephone Operator: "I have your party. Deposit five cents, please."

Souse, at pay station: "Whazzat?"

Operator: "Please deposit your money."

Souse: "Listen, girlie, wat I wan's a conversah'n from a fren', not financial advice from a stranger."

—*Wright Engine.*

"Keep away from that there loudspeaker thing, Alfie," said grandma, sternly, "that fellow what's speaking has got a nasty cough."

INQUISITIVE MEN

Daughter—"I'm sure you will like Jack, father. He's a fine young man."

Father—"Has he got any property?"

Daughter—"Oh, you men are so curious. Jack asked me the same thing about you."

Gentleman (coming round the corner): "What are you putting that muzzle on your little brother for?"

Tommy: " 'Cos I'm sending 'im for some candy."

IN A ROSY FOG

"Next to a beautiful girl, what do you think is the most interesting thing in the world?"

"When I'm next to a beautiful girl, I'm not worrying about statistics."

Sir Harry—"Man, Sandy, you're not looking a day older since I saw you last season. What would be your age now?"

Sandy—"Weel, I count ma sheep and I count my siller, but I never count ma years—ye canna lose onny o' them."

First Picnicker: "Isn't this an ideal spot for a picnic dinner?"

Second Ditto: "It must be. Fifty million insects can't be wrong."

OLD TIME JAMES

Taxicab Driver: "Where do you get that 'Home James' stuff? This is a taxi—see!"

Passenger: "Pardon me, my error. Home, Jesse James!"

Printed in U. S. A.