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VOLUME XI NUMBER ONE

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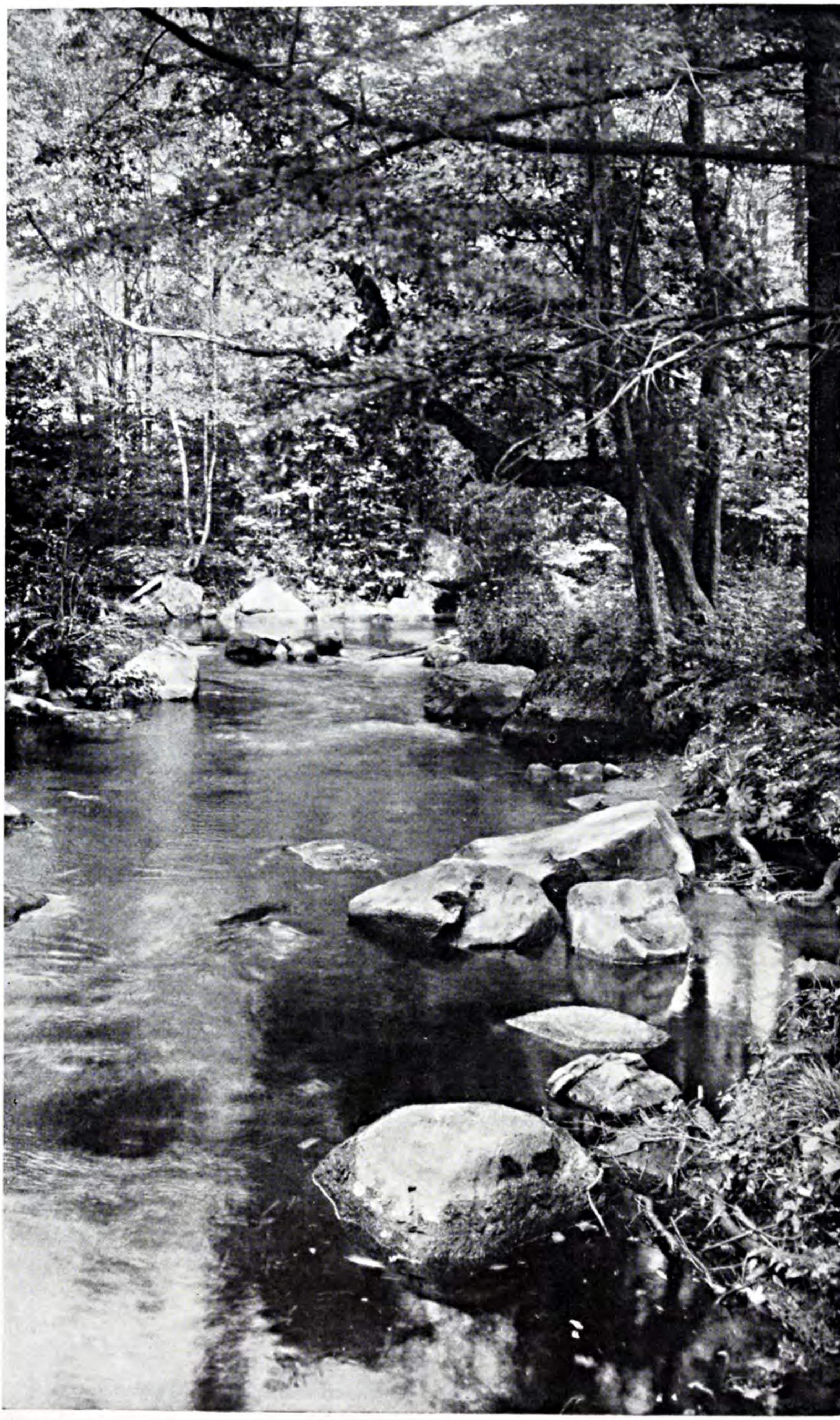
of Amsterdam, Holland

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



Better Crops with PLANT FOOD

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VOL. XI NEW YORK, JULY, 1928 No. 1

JEFF coins a word and gives us his ideas on —

"Bucolicism"

By Jeff McDermid

BACK in our school days we used to shudder at the portentous words of the famous patriotic poem, The Man Without a Country.

He personified an unlovable, homeless wanderer with no comfortable sense of location. So much for the individual; now we think in terms of communities. Patriotism, like General Hancock's much quoted tariff argument, is a "local issue." If we can't be proud of our own community and yet are obliged to live in it, how can we love our country or serve her to the best advantage?

Beg your pardon for attemptting a parody. Let's call it The Town Without a Country, and see if there is any parallel between Hale's lonely expatriate and the forlorn hamlet:

Dwells there a Town with soul so dead
Whose influential ones ne'er said
"This is our own good countryside,
"It's rural welfare is our pride;
"We, too, mark sunshine, frost and showers—
"The farmer's cause is one with ours?"

This defines the need for "bucolicism" which to me means love for the land and its people. Good towns have it.

Town and country relationships and their prejudices and differences form a peculiar American issue. It grows out of the fact that America was founded by farmers for the most part, when food and clothes were the chief demands, besides patriotism and enforced observance of the blue laws. As the nation expanded toward the niceties of living, a portion of our population left the farms and went into relatively different branches of service to humanity.

However much the cities have grown away from the farms, the villages have not fundamentally done so. The cities have got their divorce decree, but the villages are still married to the country. Where they acknowledge and rejoice in their wedlock the result is promising for America.

VILLAGES of 2,500 or less—the kind that range from a court house town to a filling station—numbered 12,900 in 1920 and held nearly nine per cent of the population. In the terms of the civic opera, our "merry villagers" form no insignificant chorus. But they have too willingly taken their cue from Metropolis, the Broadway Star.

The American village in strictly agricultural territory undeniably holds the future balance of power. The degree with which such villages have a true conception of their strategic position, without being patronizing toward their farmer zones, will determine whether we are destined to follow the Goldsmith pathway to the senile status where "wealth accumulates and men decay."

One remedy for the so-called agricultural dilemma lies in regional patriotism rather than national paternalism. Often a sound village policy has more practical power for welfare than an act of Congress.

The village holds this position despite the control of banking and credit facilities in the large cities, and even in the face of the greater power held by these larger places in the means of distribution and sales.

The village territory has the "goods in the original package." It has greater health and more fresh recruits. It has more leisure to build the already growing associations of self-reliant cooperative producers who are advancing a few steps closer to the consumers. But the best trump the village has to play is the one of social and spiritual service.

THE game is on. Already the leaders in the village are doing some mental arithmetic hunting for a common denominator with the men who live out where Main Street becomes the Open Road.

The citizens of Vidalia, Georgia, organized a company to build a tobacco warehouse and a cream depot. Caldwell, Idaho, merchants organized a cooperative plant for the manufacture of dairy products through the sale of $12,000 in preferred stock as working capital. Benson, North Carolina, merchants and corporations pledged a fund to fight the boll weevil. Public markets to encourage the sale of more quality home-grown food stuffs were established last year at Winchester, Kentucky, Eugene, Oregon, Trinidad, Colorado, and La Follette, Tennessee, by the civic clubs.

The moral and spiritual side is receiving attention in many villages in countless ways. At Eaton Rapids, Michigan, the citizens surveyed five townships, and each man was assigned to see that some crippled or underprivileged child had the benefit of its free community clinics. New Albany, Indiana, has some "soft hearted, hard headed" business men. They have assumed custody of delinquent boys who are working on parole under their observance. The St. Croix county, Wisconsin, fair was a failure until revived by New Richmond civic leaders. Similar work was done at Shelby, North Carolina, Bremerton, Washington, and

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Bales which will insure good delivery of the brush are important.

The BROOMCORN INDUSTRY

By C. B. Sherman

Washington, D. C.

BROOMCORN is an important crop on our newer and more iso-ated lands, especially in certain agri-ultural sections of the Southwest. 'or the settlers it constitutes a forage rop much needed at home as well as a ash crop of high tonnage value easily ransported over long distances, by rucks, from points not reached by the ailroads. In Oklahoma, for instance, he crop sometimes exceeds $4,000,000 year in farm value. It is a valiant ioneer among crops, leaving area fter area as they become well settled nd moving ever westward into un-ried fields.

On the other hand, in the manu-acture of brooms, that faithful tool f the American home, broomcorn as been replaced only to a very small extent by substitutes. In spite of the advent of more ambitious kinds of cleaners, the sales of which are often pushed with great enterprise, the demand for brooms has remained surprisingly stable. Even if a new-model cleaner is installed in the house, there is always likely to be a humble broom behind the kitchen door.

The broomcorn industry has been a picturesque one, and even its vocabulary is filled with odd words and terms. Knuckles, hurls, spikes, and crooks are only a few; a salable quality, though not desirable, was long given the market designation of junk, and the whole marketable part of the commodity which is used in the manufacture of brooms is known as brush.

Operations are often as picturesque

as the vocabulary. When there is a scarcity of threshing machines or when the broomcorn has matured rapidly, the danger of loss through overripe brush forces farmers to thresh all night. Much of the harvesting of the standard variety is done by migrant laborers, locally called "Broomcorn Johnnies," who drift into the Texas section in time for this work in July and go North with the ripening of the crop, working through New Mexico, and ending in Colorado in October. The use of migrant labor is now declining and especially in the sections that grow the dwarf variety an exchange of labor among growers is now preferred.

Street Markets

Heavy production of broomcorn in certain localities resulted in unique street markets in many of the "broomcorn towns." The street market at Lindsay, Oklahoma, was long one of the most picturesque as well as one of the most important. It attracted hundreds of buyers during the busy season. The streets were filled early in the morning, for many farmers hauled at night or even during the previous afternoon, often 20 miles and more, over the hot dusty roads, in order to get the best locations on the street. Neighbors often helped to haul. Sometimes a grower would bring his entire crop of several wagonloads to this market at one time, especially if there were enough to make a carload. When the market was good, buyers passed busily from wagon to wagon examining the bales and examining the corn by sampling or "pulling" the brush. If the market was not good and the buyers were indifferent, the farmers got discouraged. Growing anxious to get back to their farm work, they would take the best offer made rather than spend another day on the market. When a farmer's whole crop was involved in such a transaction, the results were discouraging.

Gradually these broomcorn street markets are becoming a thing of the past as modern methods place in the hands of the farmers information that enables them to hold their product for a favorable sale, and in various other ways this pioneer crop is becoming as standardized as is the modern cowboy.

As recently as 1917 broomcorn was still marketed by much the same methods as those employed in the earliest periods of the industry. Authoritative market news, grading rules, and other means of bringing about more economical distribution, that had been developed for many important commodities, emphasized the absence of similar advantages for broomcorn. This lack was much felt by growers, dealers, and manufacturers and by the agencies that financed the crop, so that at about this time the United States Department of Agriculture received urgent requests for aid in solving their marketing problems.

Success in handling broomcorn is largely dependent on proper care during harvesting. Even with the most efficient systems of distribution it is impossible to overcome the handicap of an inferior product. Studies of methods of harvesting, threshing, and curing broomcorn in their direct relation to its marketing were therefore conducted by G. B. Alguire, of the Department of Agriculture, and his full account of the methods in use with suggestions as to their weaknesses and possible improvements became the foundation of much of the progress of the industry since that date. It is largely through his efforts that most of the far-reaching improvements in the industry have taken place.

Detrimental results of poor threshing were found by Mr. Alguire to reach far from home. Seed in brush is of no value to the manufacturer, adds to his cost of producing brooms, and interferes with the uniform dyeing of the brush. It must be removed at the factory with hand-fed threshers and hauled from the factory as waste. Moreover, original freight charges are increased by the seed shipped to market with the brush. These additional costs lessen the profit derived from the industry and are reflected in lowered prices for the raw material.

Methods of cutting have a distinct effect on marketing. New methods are tried out from time to time, which are watched by Mr. Alguire, and, if successful, results are made widely known.

Storage was found to be a weak point. Storage facilities are not always essential to successful marketing at country points, but are always desirable, especially in countries of rainfall, and they have a marked bearing on the movement of the crop. In the terminal markets, storage facilities are essential.

Open-air storage prevails in certain sections and is both cheap and convenient, but it cannot be recommended. It is practised extensively by farmers and shippers where rainfall is generally light. Many hesitate to spend the money necessary for sheds or warehouses when not seriously inconvenienced by their lack, but serious losses occur when unfavorable weather does come. Fortunately, the use of storage sheds is now increasing.

The bulk of the crop is raised by farmers whose financial credit is somewhat lower than that of farmers in the older and more settled sections where more dependable crops usually are grown, and as broomcorn is of limited use and is easily overproduced, it is a commodity of highly fluctuating price tendencies, which make the security on such loans rather unstable. The lack of generally recognized grades for broomcorn long operated against a stable system of financing so that bankers have been likely to base the security necessary to protect themselves on the ability of the client to pay rather than upon the sale value of the broomcorn.

Furthermore, the crop is comparatively expensive to raise and borrowed money usually is necessary to produce the crop and prepare it for market. This borrowed money is often as much as can be obtained for the broomcorn at marketing time if for any reason the market is glutted. The banker, therefore, has been forced to carry an unusually heavy financial responsibility in financing broomcorn production and frequently has been compelled

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The method of cutting the standard variety of broomcorn.

Potash *in* Fertilizers

By J. N. Harper

NEW facts about fertilizing crops come to light each year, in consequence of which fertilizing practices eventually change. These new facts are developed from new approaches or as the result of the refinement of old methods of experimentation.

When agronomists began to test out fertilizers years ago the procedure was simple. Single materials were applied. Combinations of two and three materials were used with no conception of the proper relationship of the different plant foods in these materials.

Trials of single elements of plant food did not lead to definite information because a soil's deficiency of a single element could not be ascertained without first making sure that other elements of plant food were not limiting factors by applying them in abundance. Nor could the real value of any one element of plant food in a fertilizer mixture be ascertained unless it were known what constituted a proper balance of the applied fertilizing elements. This the earlier investigators did not know and had to find out.

Since the possible variations of three elements are many, it, of course, requires much time and work to try out all of them. In fact, earlier tests amounted to little more than marking out the field of experimentation to be covered. Over this field the research students are now working with much yet to be done.

Potash in fertilizers was not at first given the prominence that agronomists are now ascribing to it. This change has come about as a result of a nearer approach to the truth about the proper balance of plant food elements, and also because of a clearer appreciation of the fact that potash is a factor in creating resistance to plant diseases.

Formerly agronomists were disposed to rate the availability of the potash belonging to the soil more highly than agronomists do today. Now it is better understood that soils containing fairly large supplies of potash do not have enough available potash, as a rule, to meet crop requirements, therefore, best results are secured when potash is applied along with other fertilizer materials.

Potash for Drouth

Applied potash has come to be recognized as an important factor during dry periods. At the National Fertilizer Association convention in 1927, Sir John Russell, director of the famous Rothamsted Experiment Station of England, said that potash was good insurance against crop loss from drouth even where a soil has enough potash to meet crop needs during a season of abundant moisture. While it is true that potash is effective in dry seasons, it is, however, true that where there is a deficiency of potash in a soil potash will give largest returns when there is plenty of soil moisture.

In studies made by Fred W. Morse reported in the *Journal of Agricultural Research*, Vol. 35, No. 11, it is stated that both soybeans and millet on soils not receiving potash gave yields that varied directly with the supply of soil water. But where potash was applied millet was not much affected by lessened supplies of water. Soybeans were affected by both potash and

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A prosperous vegetable farm in northern New Jersey.

NEW JERSEY Experiment Station

By Roger DeBaun

Editor, New Jersey Agricultural Experiment Station

THE New Jersey State Agricultural Experiment Station was established at New Brunswick in 1880—the fifth in the United States—under the directionship of Dr. George H. Cook, who brought to the position a fund of information gained through agricultural experience at home and a close study of experiment stations and agricultural schools abroad. Years previously he had completed the first accurate geological survey made of the state, and during this work he had made extensive notes on what he observed of farms and farming. In 1888 the College Experiment Station was established at New Brunswick.

The period of Dr. Cook's directorship was also the period of darkness for eastern farming, when the products of our depleted soils had to face the competition of those from the newly opened, fertile lands of the middle west. Though the difficulties of our farmers exhibited themselves in the markets, Dr. Cook saw that the fundamental problem was one of soil fertility and the secondary problem one of crop adjustment. With the 98.4-acre farm of the agricultural college he began the testing of and experiments with fertilizers.

More than half of Dr. Cook's first annual report is given over to the results of these tests intended to prevent chicanery in the fertilizer business and at the same time familiarize farmers with the best materials to use for the feeding of their plants. Field tests of fertilizing materials begun on the college farm six years before the establishment of the experiment station were continued on an increasingly large scale, and it was the practice of Dr. Cook and his associates to carry personally to farm groups the results obtained. So effective was this extension work that visitors from other states were amazed at the technical language used by our research men at farm meetings and understood by their audiences.

Dr. Cook also is said to have made one of the first introductions of soybeans into this country. At any rate, he showed our farmers how to grow them successfully, which is the important thing. In his report of the work of 1880 he discusses ensilage, opening his statement, "The preservation of fodder-corn in its green state in silos and its value as a feeding stuff is a subject of great interest to farmers and is exciting much attention at the present time." Later, his experiments showed New Jersey farmers both that it could be done and that the product was of great value in feeding dairy cattle.

Dr. Cook died in 1889. Of him, John M. Thomas, president of Rutgers University—with which the experiment station is associated—said: "The services of George H. Cook have alone been worth more to the state of New Jersey than all the appropriations Rutgers has ever received from both state and federal governments."

Fortunately, the station had in Edward B. Voorhees an able successor to the great pioneer. He had been associated with Dr. Cook and was therefore thoroughly familiar with the work in hand. From 1892 to 1911 he drew around him a corps of capable scientists and, as did his predecessor, laid great emphasis on soil fertility experiments while at the same time developing research in associated major problems.

In 1893, as the result of field trials in seven counties, Dr. Voorhees showed that the nitrogen contained in the crimson clover crop but six inches high on April 24, was the equivalent of 648 pounds of nitrate of soda, an amount equal to that contained in 10 tons of average quality manure. The importance of this discovery to New Jersey farmers is appreciated when it is realized that at the time, 85,000 tons of horse manure costing $127,500

A corner of the campus, New Jersey Agricultural Experiment Station—Dairy and Animal Husbandry Building (left), Administration Building (center), Poultry Building (right).

were annually imported from another state to certain sections of four of our potato, sweet potato, and tomato counties, and that though valuable for its nitrogen, the manure was objectionable in other respects for use on potatoes. The following year it was shown that even on poor, sandy soil a crop of cowpeas contributed nitrogen equivalent to 437 pounds of nitrate of soda. Dairymen of the state with their comparatively limited pastures were faced with difficulties in keeping their stock supplied with enough succulent matter. In 1896, Voorhees began his study which later contributed a soiling system of crops and rotations that would provide a continuous supply of succulent food for dairy animals from May to November. This, together with the herd improvement supervision of the station, was one of the factors later important in making the average milk production of our cattle take rank with that of the four leading states of this country.

Dr. Jacob G. Lipman, Director.

In 1911 Dr. Voorhees died, and again the state was fortunate in having for the vacancy a man who knew her agricultural needs and who had the ability necessary to carry on and expand the great work that had been started. As Cook and Voorhees had done before him, Dr. J. G. Lipman in assuming the directorship laid tremendous emphasis on soil research. He was already nationally known for his work in soil chemistry and soil microbiology. Soil cylinder experiments begun in 1898 by Voorhees he had augmented by a series of field plots in 1908 to test different nitrogenous materials as to nitrogen availability in a rotation of corn, oats, wheat, and two years of timothy, half of the plots limed and the other half unlimed. From this work the experiment station was able to show our farmers that not only can excellent crops be grown with chemical fertilizers and green manures unaided by stable manure, but also that this can be done continuously over a long period of years. Because of the scarcity and high cost of stable manure this was an important contribution in the never-ceasing effort to put our soils in a position to stand the strain of the intensive cultivation necessary to put our farmers on even terms with those of more fertile regions.

At one time there was a rather general belief that magnesian limestone was injurious to farm land. From 20 years of testing, Dr. Lipman and Professor A. W. Blair were able to show our farmers that calcium and magnesian limes are equally good. For 10 years during this period, Professor Blair investigated the influence of potash on potatoes and was able therefrom to show our potato growers that the potash requirement of this crop is higher than that of most other crops.

In 1912, it was observed at the experiment station that sulfur makes the soil acid, and investigation by Drs. S. A. Wakeman and J. S. Joffe revealed that a microorganism, Thiobaccilus thiooxidans, is responsible for the phenomenon. This discovery was of particular importance to our potato industry. From it was evolved inoculated sulfur, which is of value in controlling potato scab, a disease that had been ravaging our potato crops. This same material was shown by Dr. Lipman to be of use in converting insoluble phosphates of the soil into available phosphoric acid.

Little New Jersey ranks third in the United States in acreage of commercial tomatoes, having in 1926 a total of 32,000 acres. She has held this or a higher rank for years. Investigation by the experiment station showed, however, that improvements could be made in the use of fertilizers and, accordingly, experiments were begun on farms in various parts of the state.

Three years later Professor L. G. Schermerhorn made a report that contained information worth many dollars to the producers of our three million dollar crop. It was to the effect that the mineral sources of nitrogen, (nitrate of soda and sulfate of ammonia) are superior to organic sources and that a 2-8-6 formula gives nearly as high a production as one richer in nitrogen. A fertilizer carrying 4 per cent nitrogen, for example, gave an increase of only 200 pounds of tomatoes to the acre, and cost $3.70 more than one carrying 2 per cent of nitrogen. That quantity of tomatoes was worth $2.00. The loss, therefore, from using the higher analysis fertilizer was $1.70 an acre, an appreciable item when the acreage runs into the thousands. The need for this information is indicated in the fact that 43 different kinds of mixtures were in use in New Jersey in 1920.

It was Schermerhorn who in 1925 proved that our sweet potato growers could reduce their percentage of long, spindly potatoes by making sure that adequate quantities of potash were used.

Important Peach Work

The contributions of the experiment station regarding the various manipulations of vegetable plants from seed to market, the prevention of hot-bed diseases, the control of insects, and the improvement of varieties are numerous. Suffice it to say that Byron Halsted, botanist, whose works are standard references throughout the United States, was one of the New Jersey Experiment Station staff. He established principles of plant breeding and identified and classified a large number of plant diseases, suggesting practical control measures for many.

Small as she is, New Jersey ranked third in peach production in the United States in 1926. However, it is doubtful if this industry would have its present significance in the state if there had been no experiment station. The San Joe scale threatened to annihilate the fruit growing business early in this century. John B. Smith, entomologist, worked out the successful control of this insect in New Jersey through the use of lime sulfur sprays, and gave suggestions which resulted in the manufacture of one of the best miscible oils known for combatting the pest.

Means had to be found for checking

Asparagus is grown on a grand scale in New Jersey.

One of the orchards which help New Jersey rank third in peach production.

the inroads of leaf curl, brown rot, borer, curculio, and scab on peaches. They, without the scale, were sufficiently destructive to make further peach growing a doubtful enterprise. There was imperative need for a spray material that could be used safely on peach foliage in order to combat the scab and brown rot. The value of self-boiled lime sulfur as a summer spray for peaches was discovered by Professor Scott, of the U. S. Department of Agriculture, but its use in New Jersey was demonstrated and perfected by M. A. Blake and A. J. Farley. Although a very effective fungicide it was disagreeable to handle and apply, and in 1925 Professor Farley invented what is now known as "New Jersey Dry-Mix Sulfur Lime," which is still the unsurpassed treatment for brown rot and scab of peaches.

Through the combined work of John B. Smith, T. J. Headlee, Alvah H. Peterson, M. A. Blake, and A. J. Farley, mastery of the curculio, borer, and leaf curl in New Jersey was gained and demonstrated. Peterson's work on the peach tree borer resulted in the perfection of methods for using paradichlorobenzene, the use of which was suggested by E. B. Blakeslee of the U. S. Department of Agriculture in 1919.

Many former methods of harvesting and marketing had failed to meet modern requirements by 1910. The railroads would no longer furnish shelved cars for transporting peaches in 16-quart Delaware baskets. The 6-basket carrier was the package demanded in the markets. Blake and Farley worked out definite methods for packing a carrier and invented a peach crate press and demonstrated new methods in harvesting, packing, and shipping peaches.

Famous for Varieties

A new danger, however, had been foreseen by the horticultural department in 1914. All of the early varieties of peaches ripening up to the time of Elberta because of various faults, were predicted to become unpopular within 10 years. Not only did events prove this to be correct, but extensive plantings in Georgia, the Carolinas, Arkansas, California, and Missouri after the World War paved the way for terrific competition against New Jersey peaches. Better early varieties in New Jersev were of urgent necessity. Accordingly, Blake and C. H. Connors began peach breeding on an extensive scale.

Varieties from all parts of the world were collected; from these, some were selected for crossing, and thousands of seedlings were grown. As many as 30,000 blossoms were emasculated and pollimated by hand in some seasons. Old methods of covering a few blossoms with paper bags were discarded; whole trees were covered with cheese-cloth tents. The entire work was conducted on a scale never approached in peach breeding anywhere else in the world! In order to obtain breeding material superior to standard varieties, which was to be then pollinated under the tents to obtain crosses for still further improvement, it was necessary to bring to fruiting age hundreds of trees and observe all such characteristics as blossoming and ripening dates, hardiness, productivity, color of skin and flesh of fruit, its edible and keeping qualities, and many other factors.

So extensive and all-inclusive did this work become that the New Jersey Station now has the greatest collection of varieties and strains of peach trees growing anywhere in the world. Early success in developing varieties superior to the standard sorts grown in the state has not slackened the breeding efforts; rather it has stimulated even greater efforts, so that still better varieties will be ready for growers within the next few years. By means of these new introductions New Jersey growers will be able to place on the market peaches of higher quality. The once popular but faulty, white-fleshed, semi-clingstone Carman, for example, is now superseded by Golden Jubilee, a large, yellow, freestone peach of good flavor and good market qualities.

The distribution of desirable new peach seedlings to the fruit growers of the state was organized under the direction of Farley, and thousands of trees have been distributed to hundreds of New Jersey fruit growers. The results of this work are just beginning to be seen, and an increasing number of young trees of these improved varieties will come into bearing in the next few years. More than 15,000 trees of Golden Jubilee alone were distributed to New Jersey growers in the fall of 1927.

While the peach breeding was in progress the horticultural department also conducted a program of carnation breeding and dahlia and rose culture. Improved strains of carnations have been developed. Professor Connors,

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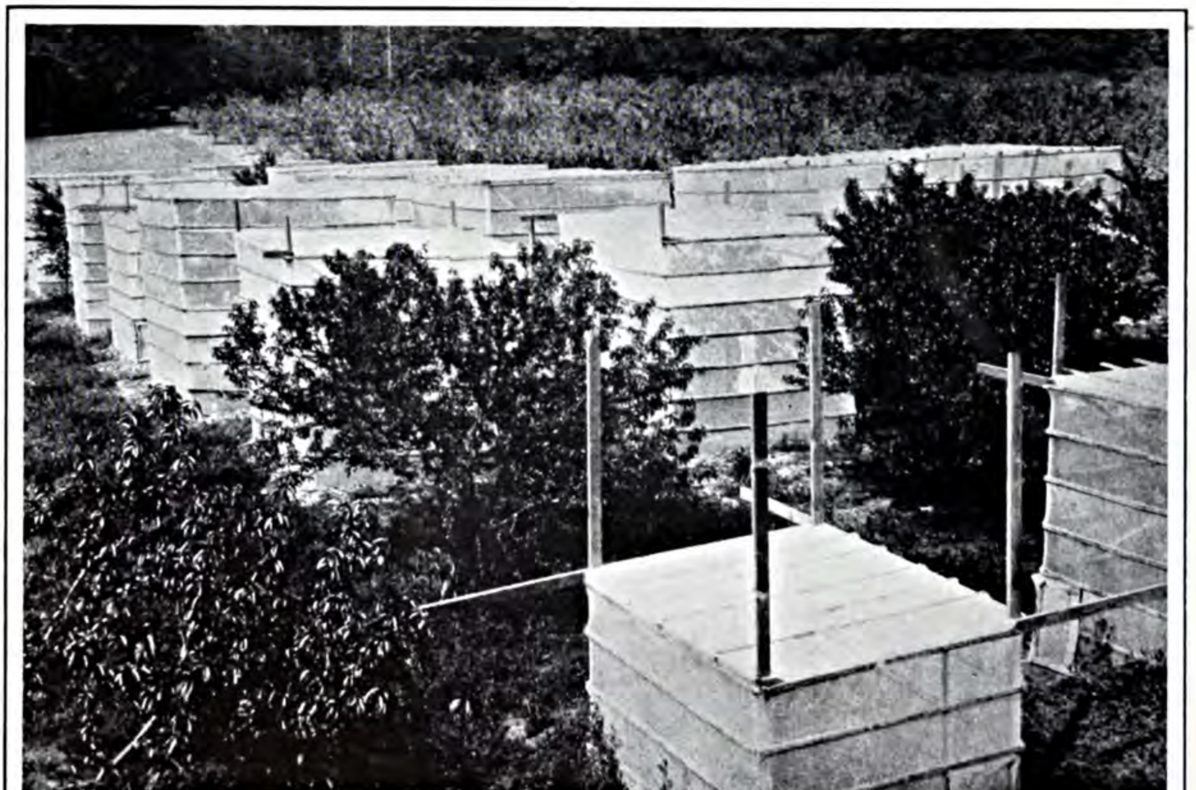

Whole trees are covered with tents to prevent insect cross-pollination in peach-breeding work.

Business *in* Farming

By Robert Stewart

Dean, College of Agriculture, University of Nevada

SECRETARY JARDINE has said, "The American farmer is a business man. He has greater capital investment than the average retail merchant. His business is vastly more complex than that of the average retail merchant."

What is the significance of the statement that the farmer is a business man? The mere fact that he has large capital investment does not make him a business man. The fact that the farm is no longer self-sufficing, that the farmer now sells most of what he produces and buys materials for his own needs make him of necessity a business man.

As a business the farming industry is concerned with the manufacture of a necessary commodity, food for human consumption. The farmer's business is, therefore, more comparable with that of a manufacturer than with that of a retail merchant.

In any manufacturing enterprise the economic production of the commodity is the *first* essential. The sale and distribution of the commodity is important, but unless the commodity is economically produced, no possible method for marketing or distribution can produce a profit or make the industry a success.

The cost of producing crops, meat, milk, eggs, or butter varies widely on the farms of America. Most farmers do not know what their costs of production are.

In 1919 the Government made a study of the cost of producing wheat in the wheat belt in Kansas, Missouri, Nebraska, Minnesota, South Dakota, and North Dakota. A study was made of the cost of producing winter wheat on 284 farms and of producing spring wheat on 197 farms.

The average cost of producing winter wheat was \$1.87 but the cost of production actually varied from \$1.00 to \$8.20 per bushel! The average cost of producing spring wheat was \$2.65 per bushel, but the cost of production varied from \$1.10 to \$14.40 per bushel! These data are of tremendous significance and fraught with great possibilities for farming as an industry, indicating as they do, the possibilities of economic production.

Why produce more efficiently when such action on the part of the farmer will only add to the surplus and further depress prices? In this connection the complaint of a Kansas farmer is pertinent. "The farmer was producing 18 per cent more in 1924 than he did before the war, yet the purchasing power of farm products was 25 per cent less than in pre-war days."

Efficient Production

The farmer must realize that abundant production may not be efficient production. Wheat produced at a cost of \$8.20 per bushel will add to the abundance of wheat available for consumption, but it is produced at a very serious loss to the farmer. It were far better for every one concerned had it not been produced at all.

The automobile manufacturer who by certain adjustments in his business management is enabled to reduce the costs of producing valves from 8c. to 3½c. is producing efficiently by economic management.

He is not concerned with the average price of producing valves, but he is concerned in reducing his own cost of producing them to the lowest possible amount in order that he can meet better the stiff competition of his competitors.

Cost of production studies in Nebraska show that 39 per cent of the cost of producing wheat was for the use of land; 31 per cent of the cost was taken up in growing the crop—plowing, harrowing, discing, seed planting, and cultivating; 18 per cent of the cost of producing the crop was for harvesting; 6 per cent was for the use of machinery; and 6 per cent for other miscellaneous items which do not readily fall under either of these heads.

A similar study of the cost of producing corn in Nebraska showed that the use of land consumed 42 per cent of the cost of production; growing the crop of corn, 37 per cent; harvesting, 13 per cent; the use of machinery, 6 per cent; while miscellaneous items consumed an additional 3 per cent.

Similar studies in Georgia for the cost of producing cotton gave the following results: use of land 9 per cent; man labor 52 per cent; 16 per cent for mule labor; 3 per cent for implement cost; 1 per cent for interest in cash; 2 per cent for seed; 14 per cent for fertilizer; and 6 per cent for ginning, bagging, etc.

Grow Large Crops

It is quite evident that the use of land and labor form two of the most important items entering into the cost of producing crops. Anything, therefore, that will reduce either of these items will reduce the cost of producing crops and hence increase the individual farmer's profit.

The high cost of the use of land is due in part to over-capitalization in some sections and also to excessive taxation. These evils both must be corrected before farming can be placed on a profitable basis.

But since the use of land forms one of the most important items entering into the cost of producing crops the farmer cannot afford to produce small crops on his own farm. He must concern himself with high acre yields.

The importance of growing large crops on the individual farm cannot be over-emphasized. The individual cannot afford to grow any other kind. The statement is frequently made that the farmer cannot afford to grow large crops for he gets less for a large crop than he than he does for a small one.

For example, Ely and Morehouse in a recent satement say, "A general good season may bring a bumper crop, a fact that is heralded by the metropolitan press as a sign of prosperity of the farmers and the nation. As a matter of fact a bumper crop usually brings ruinously low prices."

However, two potato growers of Salmon, Idaho, last fall sold their large crop of potatoes from 200 acres for $143,100, while a potato grower of Oakley, Idaho, produced an $800 an acre crop on a 75-acre field.

Beating the Average

Whenever all growing conditions are extremely favorable and a large crop of any commodity is produced by every one, the inefficient as well as the efficient, the *composite farmer* does receive less for his large crop than he would for a smaller one.

The real problem, however, is for the individual farmer to study his methods of production and to control his production so as to produce individually high yields all the time and thus reduce his cost of production as compared with the average of the neighborhood.

If the wheat farmer by a practical method of soil treatment is enabled to increase the crop producing power of his soil by the purchase of additional raw material as fertilizer and converts this into a finished product he may make money.

If the yield of wheat is increased to

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Indiana County Agricultural Agents and members of Purdue Agriculture Extension Department taken at Annual June Conference 1927.

Working Together

By L. E. Hoffman

Assistant County Agent Leader, Purdue University

INDIANA county agents practise what they preach when it comes to working together. Last year every agent in the state was a member of the Indiana County Agents Association.

Organized for rather vague reasons a decade ago, the Association has developed in recent years into an efficiently working group which is demonstrating its ability to build up and place on a higher plane the job of the county agricultural agent.

In matters pertaining to the welfare of the agents or their work, the State Agricultural Extension Division looks to the Association for help and advice. The Association works in close cooperation with the Extension Division. Committees from the Association assist in arranging programs for the state conferences, held each year in January and June. A large part of the January meeting is given over to business sessions of the Association.

To make county agent work more effective the Association has succeeded in bringing about changes in the county agent law whereby counties are allowed to appropriate a larger budget for extension work, making it possible for the agent to obtain steno-

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LEFT TO RIGHT: H. E. Abbott, Vigo County, Terre Haute, Sec.-Treas. Indiana County Agents Assn.; E. G. Bird, St. Joseph Co., South Bend, Pres of Ind. Co. Agents Assn.; C. U. Watson, Morgan Co., Martinsville, Vice-Pres. Indiana Co. Agents Assn.

A POTATO CLUB

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College

WHAT is a 300 bushel per acre club? The first year of its life it consists of men who believe they can raise 300 bushels per acre. After that it is a group of men who have actually produced 300 bushels of potatoes per acre.

Its principal object is that of stimulating greater production per acre. Incidentally it has a big object in making competition keener in all steps pertaining to successful potato growing. In addition it centralizes interest in potato growing or on some particular common point. As another object it brings together a group of farmers who are the leaders in potato production. When a group of men of the type mentioned get together their exchange of views is of the greatest value.

In 1927 it was proposed that the Hartford county, Connecticut farm bureau should have such a club. In this county an excellent vegetable committee was available and this committee met with the county agent and the vegetable specialist to draw up plans.

Afraid to Start

One would think it would be an easy matter to go out and get men to join such a club. In response to a circular letter sent out, no one was willing to answer. It, therefore, fell upon the writer to go out and interview growers whom he knew could measure up to the requirements of such a club. In one day's work 11 men were signed up. With this as a starter it was not difficult to obtain the total number of 27. This was more than enough as 12 or 15 are all that is really needed.

During the season one visit or more was given to each grower's farm by either the writer or some members of the county farm bureau. The crop was inspected and some ideas were obtained on what could be expected from the crop. In no sense was very close supervision given. This club is a farmers' club and should be conducted as a farmers' club. It is not a piece of experimentation, but is just a piece of excellent potato growing work.

Public Interested

Some attention was given throughout the season to the spread of information about this club and its progress so that growers throughout the county and state might know what was going on. At digging time each grower was permitted to determine what acre of his total acreage should be dug. Closer supervision was given at this time by the county agent or his assistant. The five 100-foot row sections from the acre were measured by these agencies and weighed. From the weighing of these five sections the yield per acre was computed.

To make the work interesting from the growers' angle, merchants were approached on the subject of donating prizes or money so that prizes could be given. Several of the largest and most influential firms in the county very gladly volunteered contributions.

From the 27 growers who had entered, six dropped out of the contest because they felt they could not show 300 bushels per acre. Of the 21 left, 15 or 71 per cent had yields of 300

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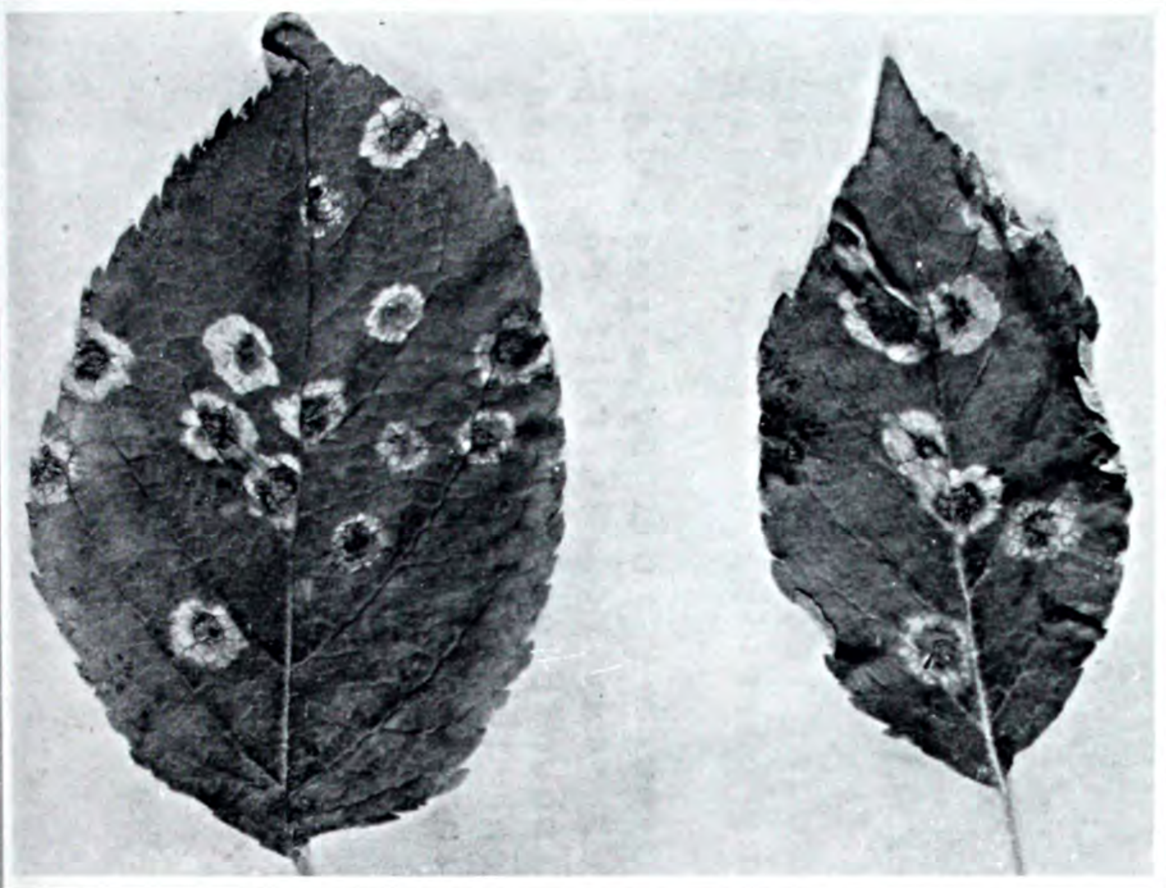

Cedar rust on upper side of apple leaves.

Cedar Rust *of* Apples

By T. J. Talbert

College of Agriculture, University of Missouri

CEDAR rust is found in practically all of the orchard sections f central, eastern, and southern nited States. The disease appears, owever, to be most serious in the uthern part of the apple growing istricts of the several eastern and entral states. The states reporting the reatest injury are West Virginia, Alaama, Virginia, Indiana, Illinois, New ork, Ohio, Kentucky, North Carona, Missouri, Kansas, Arkansas, Neraska, Iowa, and Wisconsin. In the entral and eastern parts of the couny, where apples grow in the vicinity of the red cedar, the disease is generally serious and of great economic importance.

The different commercial varieties are more marked with reference to varietal resistance to cedar rust fungus than to most fruit diseases. In general, the varieties most susceptible to the disease are: York, Rome, Wealthy, Jonathan, Benoni, Red June, Minkler, Smith Cider, and Payne's Late Keeper. The most resistant varieties are: Winesap, Stayman, Delicious, Arkansas, Grimes, Transparent, Maiden Blush, Northwestern Green-ing, and Duchess. Ben Davis, Gano, Aikin, and several other varieties are considered moderately susceptible.

The first appearance of the disease on the leaves is indicated by small, light yellow colored spots. These spots gradually become larger and usually of a brighter orange color. The leaf tissue, though affected by the fungus, does not die readily, but generally remains alive during the greater part of the growing season. The region of the leaf in which the infection occurs becomes swollen or enlarged, and when the leaf is seriously affected, the whole leaf is enlarged considerably and the edges may curl back in an unusual manner.

Leaf infection occurs early in the season when the leaves are small. Exact dates cannot be foretold accurately, as the infection each season depends greatly upon weather conditions. In general, however, the first infections occur April 1-15 or at the time when the first apple blossoms open, and the period of infection usually extends until the latter part of May or first week in June. As the leaves grow older, they gradually develop a resistance to the disease, and rarely does leaf infection occur after the first of June.

The disease affects the fruit much in the same way that it affects the leaves, although the yellow or orange colored spots are larger. Cup-shaped pustules or aecia resembling those on the lower part of the leaf surface are developed upon the fruit. The cedar rust spots on the apple generally occur near the calyx end. The spores which are carried by the wind undoubtedly alight on this end of the apple more often than upon other parts of the fruit, because the calyx end is turned upward early in the season.

When the foliage of the apple trees is affected seriously for several years, the vigor and vitality of the trees are greatly impaired. Such weakened and devitalized trees become easy prey for diseases like blister canker, root rot, and crown gall. Fruit tree borers, woolly or root aphis, and San Jose scale are also able to make greater headway and do much more injury to trees suffering from a lack of nourishment on account of defoliation. Apple trees so injured generally die in a few years.

The fungus has two hosts or food plants, the red cedar and the apple, including the crab-apple. Cedar rust is confined to the red cedar. Other evergreens are not affected by this fungus and may be grown near apple orchards without danger of injury. On the red cedar the fungus produces brown, corky-appearing galls which are commonly known as "cedar apples" or "cedar flowers."

In the spring during rainy or damp weather about the time the apples bloom, the mature cedar apples or cedar balls on the red cedars produce jelly-like horns or appendages. These appendages contain numerous teliospores which germinate, producing small spores called sporidia. Upon the drying out of the appendages following rains, the sporidia are blown to the young leaves and fruits of the apple. These spores germinate readily on the leaves and fruit of the apple under favorable conditions. The low temperatures often experienced during April and May are very favorable to the germination of the sporidia.

The spores may be carried long distances by the wind, in some cases as far as 5 or 6 miles or even farther. Generally, however, they are not carried in injurious numbers over 1½ or 2 miles. Since the prevailing winds in the spring are from the west and southwest, apple orchards situated east and northeast of red cedar trees will generally show the greatest infection. No matter what the direction, however, if red cedar

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A Roadside Market

By Guy A. Peterson

Madison, Missouri

MANY a traveler on ıe P. P. O. O. ghway is tempt- to stop at ichardson's odern roadside arket in the wn of Alhambra near San Gabriel, ılifornia. This is just what Charles ichardson intended when he built ch an attractive structure in place the old brush shed that once housed s marketing activities.

The new market.

Richardson, who also has a bid to me for his work in naming the faous Klondike watermelon, built his st roadside stand back in 1914. This ıs before the idea of marketing garn and orchard products along the ghways had become so widespread er the country as it is now. His st stand was only a makeshift affair, t it served its purpose well. Enough oducts found their way to the conmer across the counter in this old ed to pay for the erection of the ost complete market place in San ıbriel, and probably the most comete individually owned establishment that kind in the West.

The new mart is 50 feet de and 216 feet ıg, comprising grocery, meat ırket, vegetable and, bakery, taurant, and uit market. ır modern ırtments give the central elevation of the structure a pleasing aspect and they add materially to the income of the property as well. One ground floor compartment has been fitted up as an electric shop and is rented out, but the remainder of the huge structure is managed by Mr. Richardson himself.

The building was put up some five years ago when the P. P. O. O. boulevard was widened and it became necessary to wreck the original stand because it occupied the land needed for street improvement. The same selling practices as were used in the development of the enterprise are employed now. These can be summed up in the single statement by Mr. Richardson: "We aim to give prompt and courteous service to our customers. We further aim to please by producing and selling products of the highest quality at the lowest possible price consistent with such quality."

Richardson studies his customers and tries to market his products in the way they like to buy them. An illustration of this is his method of selling turkeys. As he has found that it is much easier to market this fowl alive and on the foot than dressed over the counter, he orders (*Turn to p. 60*)

The old market.

Making Sands Fertile

By J. J. Lacey

Huntington, Indiana

THERE are hundreds of thousands of acres of sandy land in Michigan, from which the pine forests were cut in the early days, which now yield only a precarious existence for the men who farm them. The men who took over the land after the timber was cut off little knew what was in store for them, else much of the land would never have been cleared. The sandy soil produced good crops for a few years, due to the humus which had been accumulating for centuries, but a few years of cropping simply wore the land out.

The Pennsylvania Railroad passes through immense tracts of this land, and in 1916 the railroad officials bought a typical sand farm near Howard City and began experiments to determine if possible what could be done to make the land more profitable.

The original plan involved the testing out of various soil treatments i small plots, but the Great War cam on and with it an insistent deman that every available acre be put t work producing food. It was de cided to operate the land on a practi cal farm basis.

The late D. L. Hagerman was agri cultural agent for the railroad at tha time, and he decided that if they coul do anything worth while on the farm it would be better as a demonstratio to consider the entire farm as a uni and to operate it permanently on tha basis rather than on the small plo basis. Accordingly he set out to de vise a crop rotation and a system o farm management that would sho results on this farm without too muc cash outlay.

The rotation calls for at least on legume on all of the land each yea a cover crop during the winter, th return of the greatest possible amoun of organic matter, and carries wit it the recommendation of the gen erous use of fertilizers. The import ance of these factors can b appreciated when we remember tha

ABOVE: A good crop of rye.

RIGHT: A view of the farm buildings.

It must be remembered that the plan has been in operation for only a few years and that 10 years hence much greater yields can reasonably be expected, since the land is being improved each year. Incidentally, the farm paid its way last year, and the records show that the labor income, that is, the amount of money left for the operator after all necessary expenses have been paid, amounted to $938. This amount is not high, of course,

ABOVE: This picture was taken when much of the corn in the corn belt was less than knee high.

RIGHT: A scene in the sand country.

this sandy soil was wretchedly poor in fertility at the start and is subject to shifting when the wind blows. It was necessary to anchor the soil in place through the use of cover crops and virtually to rebuild the soil before any profit could be expected.

How well the rotation and the system of management has succeeded in a few short years may be gathered from an inspection of the photographs here reproduced. The picture of the corn was taken when much of the corn down in the corn belt was less than knee high. Furthermore it was a dark green color that meant strong, lusty plants. The rye field looked good for 20 bushels to the acre. I saw a field of alfalfa on the farm that yielded two tons to the acre last year. Potatoes have yielded as high as 140 bushels, and peas and oats as high as 32 bushels.

but considering the fact that the land cost only $10 to $14 an acre and that the soil fertility had been almost exhausted before the railroad took the farm over, it is wonderfully encouraging.

Livestock on the farm consists of 14 Guernsey cows, two sows, three horses, and 125 hens. The cows and chickens supply the bulk of the income. Potatoes, beans, rye, and vetch are sold, and seed corn and sweet clover seed may be sold at times.

The Rotation

The four-year rotation is as follows: Peas and oats, seeded to sweet clover; sweet clover for hay or seed or pasture, seeded to rye and vetch; rye and vetch, seeded again to rye and vetch; then a cultivated crop such as corn, potatoes, or beans, and the land again seeded to a legume crop such as alfalfa. If the alfalfa gets a good start, it will be allowed to remain for four years; if not, the land will be disced the following spring and started again on the first year of the rotation.

The land was acid in reaction when this experiment was started, but clover and alfalfa are now grown, thanks to the application of five yards of marl to the acre over the entire farm and to the use of manure and fertilizer. The marl is taken from a deposit on the farm.

Concerning the use of fertilizers, Mr. Hagerman once stated:

"We make no apology in recommending the consistent use of commercial fertilizer. The majority of sand land has been cropped until it contains little or no humus. Its mineral elements have leached out till there remains little else of the soil than finely pulverized rock.

"Commercial fertilizers provide an economical and successful means of returning these missing elements and thereby establishing successful stands of legume or grass crops. The investment per acre in the application of commercial fertilizer is small and the immediate returns invariably pay back the initial cost and net above 100 per cent profit over a four-year rotation.

"Fertilizers are the most practical means of paying back to Mother Earth the minerals of which she has been robbed by years of careless farming. A high-grade complete fertilizer should first be used, followed by the use of good acid phosphate as the legumes, green manures, and stubble are plowed under and the amount of livestock kept on the farm increases.

"The careful conservation and use of stable manure is most essential and it should be applied each spring on the cultivated crops or new seedings. However, most farms in the lighter soil areas are under-supplied with livestock and the belief that the fertility of a farm can be built up and maintained without the use of commercial fertilizer at present prices is usually unfounded."

Mr. Hagerman did not live to see the fruits of his labor, for his work was cut short by his untimely death some four years ago. His brother, B. O. Hagerman, is carrying on in his place. D. L. Hagerman had the work close to his heart, for the last words he said to his brother were these: "Either prove or disprove the Keystone rotation."

All indications are that the merits of the rotation have been well established. It is impossible for one to appreciate the change that has come over the farm without actually seeing the place and comparing the crops grown with those grown on the same type of sand farms near-by which have been farmed with little or no attention to the problem of the maintenance of the soil.

Can Bring Vast Changes

It may be impossible ever to build the soil up to high productivity as that term is understood in the corn belt, but what I saw on the farm convinced me that this system applied to similar lands in the state and in other states can bring about vast changes in the lives of the people living on them. Any system of farming that will, at little expense, build up a poor sandy soil to the point that it will yield two tons of alfalfa to the acre, is decidedly worth while and of wonderful potential value to the people.

The expense of running such a farm is very low, since the investment is small, and the land works so easily that no more than three horses are required to do the work on 172 acres, 120 of which are cropped. Discing takes the place of plowing as a rule; in fact it is not necessary to plow the land oftener than once in the four-year rotation unless the sweet clover in the second year of the rotation should be so large and heavy as to make plowing advisable.

The policy of turning under or working into the soil large quantities of organic matter each year has re-

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Mexican peons baling the guayule shrub.

Rubber *from* Weeds?

By Uthai Vincent Wilcox

Washington, D. C.

IT was but 50 years ago that Sir Henry Wickham sailed from Brazil, taking with him from its native habitat a quantity of the seed of the hevea—the famous Para rubber tree of the Amazon—and thus laying the foundation of a new and revolutionary era in rubber.

From Wickham's seeds, planted, cultivated, and nourished in the tropical Far East, have been grown the millions of trees whose milk-like latex now supplies more than 90 per cent of the world's rubber demand.

Today, after years of experimentation, a wild Mexican product, transplanted, cultivated, and nourished on United States soil, promises to add another new and revolutionary chapter to the history of rubber; to relieve, in part at least, America's dependence upon other nations for her supply of this essential commodity.

The wild Mexican rubber plant is known as the guayule. It is a little shrub that grows but two or three feet tall and weighs about as many pounds. Commerce knows guayule as a "soft" rubber.

Years ago rubber chemists began to experiment with guayule rubber with a view to expanding its uses, to evolve a product which would answer the rigid requirements demanded in tire work, hitherto filled by the plantation rubbers.

At a recent meeting of the American Chemical Association it was authoritatively announced that all these things had been done. Dr. David Spence, an internationally known chemist, said that as a result of experiments all obstacles had been overcome and that a new product of the guayule shrub had been developed which vulcanized readily, matching when vulcanized, the tensile, elongation, abrasion and other tests now demanded of the best grades of plantation rubber. Also, this new product would meet all the major requirements of manufacture—and these major requirements are the manufacture of tires, and especially tire treads.

Experimental Work

It is impossible in this country to grow our own rubber trees because they flourish only in frostless, tropical latitudes, and the United States contains no such great areas. With the advent of the new guayule product, however, the need of tropical areas disappears, for this useful weed thrives in temperate and subtropical climates. It not only withstands frost, but requires it.

Since 1912 experimental work has been carried on in adapting the wild shrub to United States soil. During the last 14 years the plant has been taken from the hilly limestone slopes of its Mexican home and adapted to the arid environment of our own Southwest. Here, in central California, 200 acres of the guayule shrub have been planted, which are to form the nucleus of America's efforts to grow her own rubber. So successful have been the results that an additional 600 acres are about to be set out.

It is the aim of those responsible for the studies already made that guayule growing shall be in the hands of the individual farmer and land owner, whose planting, cultivating, and harvesting operations will be guided and financed by the central factory organization in his vicinity, which will buy and mill his product in much the same manner as the beet sugar industry is now conducted. Supplied with seedlings from the central organization, the farmer will plant, say, a quarter or a fifth of his total guayule area each year, depending on the type of land he happens to own. Since it takes about four years for a shrub to mature ready for harvesting (uprooting), this rotating process will practically iron out labor peaks and will furnish a regular income.

It has been found that the guayule shrub will continue to manufacture and store up energy in the shape of rubber within its cells even if for any reason, such as an unfavorable market, it is not harvested on schedule time, and conversely it may be harvested earlier if there is sufficient incentive, such as a high market or national emergency. In these respects it differs from almost any other agricultural product and promises to be an attractive crop and most acceptable to the farmers whether in California or the cotton belt.

On the California plantation no irrigation is employed, and it is expected that none will be necessary on any of the farms that may add guayule to the list of their products. The spacing of the plants is designed with special reference to the root system which will exhaust at a given period the available moisture remaining in the soil after the winter rains.

The rubber in the guayule shrub is contained almost entirely in the cells of the thick cortex underlying the bark of the trunk, roots and major branches, The entire shub is uprooted in harvesting. Practically no rubber is found in the wood itself, nor in the small twigs or leaves. In extracting the rubber content the whole plant, roots and branches, is first crushed by a series of crusher rolls in the presence of water. The mass is then fed continuously with additional water to a series of tube mills. These mills, as described by Dr. Spence, contain flint pebbles and revolve slowly on a horizontal axis. Their action on the shrub depends on the rolling motion of the pebbles in the water and results in a disintegration of the fiber and the "worming,"

An automatic planter of the guayule shrub is a big labor saver.

as it is called, of the rubber substances into small, round spongy particles.

These fine particles of rubber, being lighter than water, float on the surface of the discharged liquor from the tube mills, while the bulk of the fiber and other impurities sink and may readily be separated. The rubber "worms" which then rise to the surface of the settling tanks into which the liquor from the tube mills is run are skimmed off and collected. The mass of small "worms" is agitated with more water and then is worked into sheets in sheeter rolls.

16% Bone-dry Rubber

A good average shrub will yield from 14 to 16 per cent of bone-dry rubber on bone-dry weight of shrub. The rubber thus obtained is of the same chemical composition as hevea rubber except that in the mechanical process of extraction approximately 20 per cent of resin is incorporated with the pure rubber. In many manufacturing compounds this resin serves a useful purpose, replacing softening agents that would otherwise have to be milled into the harsher hevea rubber. Whenever it is necessary or desirable to do so, guayule can be deresinated.

If but a quarter of our annual rubber requirements were raised in this country by guayule farmers, it would be enough to stabilize the market and furnish farming areas with a new and profitable product and make the nation reasonably secure against wartime shortage.

Within a year or so the crude rubber demand of the United States will amount to upwards of 1,000,000,000 pounds a year—500,000 short tons. To obtain an annual output of 250,000,000 pounds from farm guayule of the types now available would require a total area of 640,000 acres—1,000 square miles, or approximately a square of thirty-two miles on each side. Of course no such suitable block of land is available in a single piece, but it seems reasonable to believe that a sufficient number of scattered units of area are available to make up the quota.

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LEFT: The effect of an application of complete fertilizer in bringing winter wheat successfully through a severe winter is well illustrated here. Note the contrast between the fine stand where sufficient plant food was applied, at the right, and the very sickly growth which was not fertilized, at the left.

RIGHT: It is usually economic to apply a complete fertilizer for wheat, as indicated by the healthy growth at the left compared to the results obtained to the right where only superphosphate was applied.

WINTER WHEAT

By C. A. LeClair

St. Louis, Missouri

THAT it is sometimes worth while to grow winter wheat without fertilizer, but that it does not pay to harvest the crop from inadequately treated land, has been generally experienced throughout the wheat belt in the past year. Despite widely published results of tests, proving that properly nourished crops can successfully resist unfavorable weather conditions, thousands of acres of winter wheat were sown last fall, without, with the wrong kind of, or with insufficient commercial plant food.

On the other hand, an almost countless number of farmers in Missouri, Kansas, and Illinois, who fertilized generously with complete fertilizer, report from fair to excellent crops. Those who used fertilizer generously are, therefore, getting profits from their fertilized acres, in some cases even in excess of what they would have received in a season when wheat sown any old way would have made some sort of a crop. This is because the use of fertilizer made the difference between a crop and no crop at all for them, which they delivered to a market of under-production at a premium price.

Disastrous seasons for winter wheat, clover and grass, such as we have just passed through, make those who always generously use complete fertilizers, more enthusiastic about this means of increasing farm profits. Others, observing the marked results they secure, will naturally resolve to follow similar practices this fall. On the other hand, farmers who thought they were adequately fertilizing their wheat, when they applied a sack or less of phosphate to the acre last season and then saw "Jack Frost" ruin the crop prospects, are likely to be among the remaining skeptics regarding the effectiveness of commercial plant food as crop insurance.

"The only field in wheat on my farm worth harvesting, is the one I did not fertilize last fall," was a statement made to me by an extensive southern Illinois wheat grower. A visit to his farm showed that literally his statement was correct, but in reality his analysis of the situation was absolutely wrong. After questioning him for detailed facts about his method, it was plain to see that fertilizer was not guilty.

Superphosphate Only

My friend had applied superphosphate at the rate of only a sack to the acre on badly worn upland soil when seeding his wheat. The land had seen no other plant food treatment since the virgin prairie sod had first been broken and the soil had become sour and depleted in humus. This farmer failed to appreciate that it takes nitrogen and potash in available forms, as well as phosphoric acid, to make healthy, strong, well-nourished wheat with sufficiently deep roots and vegetative covering to enable the plants to withstand severe cold weather. Consequently, his crop of wheat died of starvation before it froze out.

This was plain to be seen when one observed the excellent stand on ad-

LEFT: Proper preparation of the seedbed is as important as generous fertilization in producing good yields of wheat. Although the same amount and kind of plant food were applied the wheat on the left was sown on a well-compacted seedbed while that on the right was not.

RIGHT: In addition to the returns from the increased bushels of wheat which fertilizers provide they render another profit in the bigger legume hay crops that invariably result from the treatment.

joining land in better tilth, even though it received no phosphate treatment. What was the history of the latter field? My friend told me that it had formerly been the site of an old orchard and that he had plowed under a heavy growth of sweet clover before planting wheat. Here was soil endowed with more nitrogen and potash and perhaps even phosphoric acid than the field which had been dressed with 125 pounds of superphosphate after years of abuse. The wheat grown upon the old orchard land, therefore, had more nearly a complete ration than that on the "farmed to death," partly fertilized, field adjoining.

My friend intends to apply a 4-16-4 complete fertilizer at double his usual rate of application when putting in this fall's wheat crop. It is good business, therefore, to analyze all the facts and conditions before condemning what appears to be poor or disappointing results from what may be only a partial soil treatment.

At Sedalia, Missouri, on the farm of a man whom for convenience we will call Mr. Brown, half of a 40-acre field of winter wheat was fertilized with a 20 per cent superphosphate and the remainder of the field received a dressing of complete 2-12-2 fertilizer in the fall of 1927. The land was as uniform throughout as any prairie soil could be and had the same previous cropping history. Both kinds of fertilizer were applied at identically the same rate to the acre over the entire field at the time seed was sown.

Any one visiting this field in May, 1928, could not help but learn a great deal about wheat fertilization under Missouri conditions. One could see to the line where the wheat had been nourished with the complete fertilizer in contrast to where only superphosphate had been applied. A close examination of this wheat field further revealed that in places where the operator failed to throw the fertilizer attachment of the grain drill in gear, the wheat failed to survive, but where either the phosphate or complete fertilizer and wheat were drilled together, a uniform stand was the result, particularly in the latter case.

Mr. Brown thus discovered that on his particular soil the use of superphosphate alone did help to bring the wheat through the winter. However, the much healthier growth of the wheat on the part of the field treated with complete fertilizer permitted him to see and contrast the difference between just a mere crop where one element of plant food was supplied and no crop at all where no fertilizer was used.

Land Must Be Prepared

The very best complete fertilizer money can buy cannot do its full work if applied on land improperly "ordered" or prepared. Farmers have cussed fertilizer many times when it failed to give them the returns they had a right to expect, when in reality the trouble was due to other causes. A specific case in point is the experience of a farmer at Medford, Missouri, during the growing season 1927-28.

He had a field which had been in corn two years prior to 1927. Last year part of this field was summer fallowed and the remainder was planted to soybeans. The soybeans were harvested early and the entire field was then prepared for wheat. The same kind and amount of fertilizer were applied on the entire field. The farmer noticed that the seedbed where the soybeans had occupied the grounds was considerably looser than the remainder of the field. (Wheat requires a firm seedbed). Notwithstanding, the wheat made a good fall growth over the entire field, but this spring only that sown on the fallowed part of the field came through the winter with a good healthy growth.

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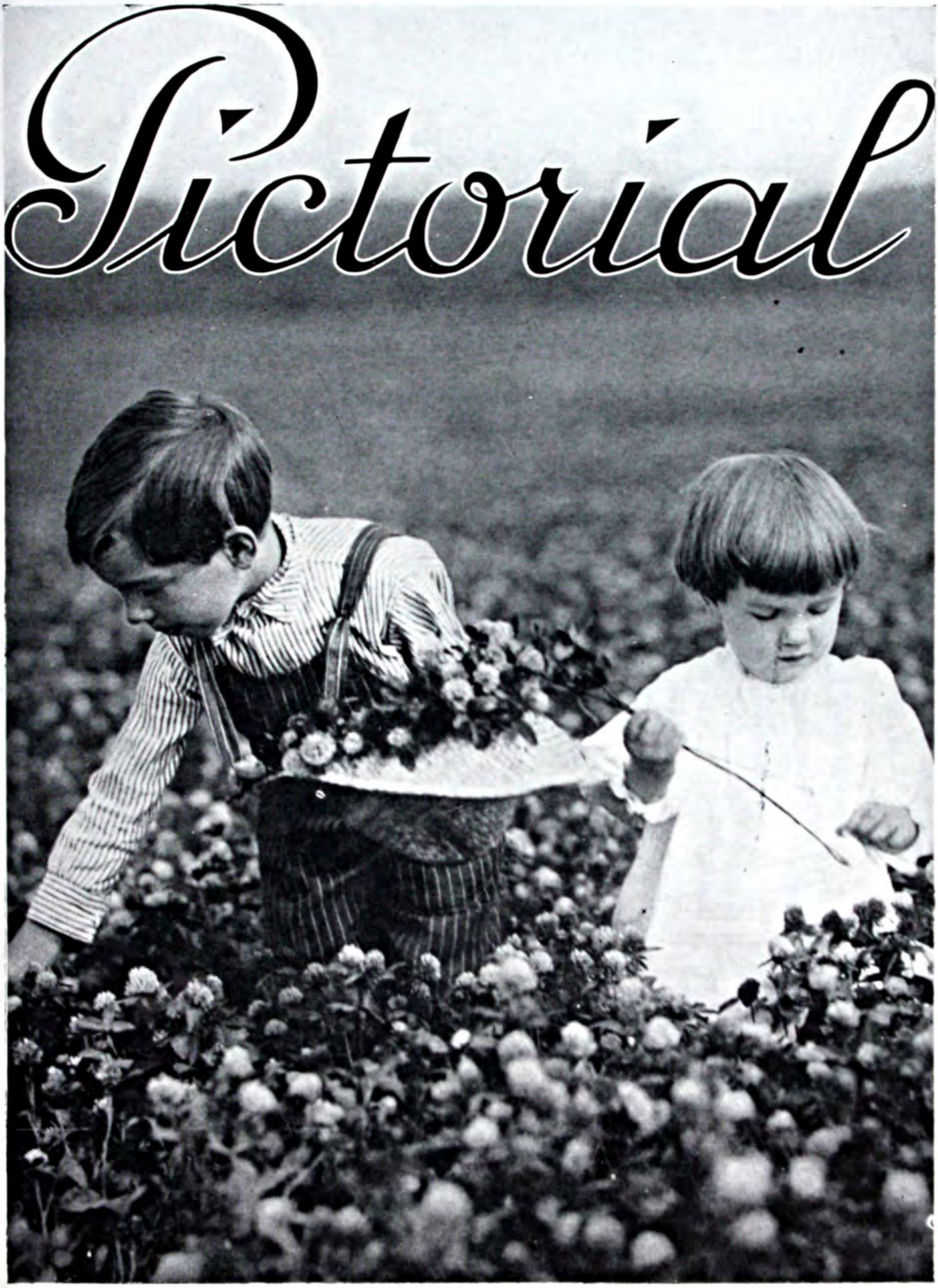
Pictorial



We were as twinn'd lambs that did frisk i' the sun,
And bleat the one at the other; what we chang'd
Was innocence for innocence; we knew not
The doctrine of ill-doing, nor dream'd
That any did.

—Shakespeare.

Courtesy Maryland Extension Service News

A mute story of cooperation and proof that there is merit in the term "horse sense." These two cooperators were discovered in southern Maryland one day when keeping flies off each other's nose proved an agreeable occupation.

The new 4-H club boy uniform consists of white duck trousers, white jacket made of "sweat shirt" material, white felt crusher hat, white soft-collared sport shirt, black tie, and black or white shoes or oxfords.

Dean H. L. Russell, Wisconsin College of Agriculture, dedicating Wisconsin's first school forest. As far as is known, this is the first forest of its type ever planted in the United States.

The activities of the 4-H boys' and girls' clubs are almost as varied as American agriculture itself. Here are members of the Brandon Citrus Club, Hillsboro county, Florida, examining a citrus pest by means of the microscope.

Miss Edith Violet Moore of West Lafayette, Ind., picking strawberries. While not considered a strawberry state in quantity of production, Indiana produces a fine quality of berry for the "intermediate" market.

By Ewing Galloway, N. Y.

Haying on "Mapleton Bench," Utah. This field yielded four tons of alfalfa per acre. Three crops were cut from it during the season.

Miss Mary Brown of Tippecanoe county, Indiana, is a real dirt farmer. Besides being president of a sewing club, a corn club, and a pig club, she helps her father with his farm work.

By Ewing Galloway, N. Y.

By Ewing Galloway, N. Y.

The steamboat, Amy Hewes, backing away from a plantation landing on the Bayou Teche, in the Acadian country in Louisiana.

If apples packed with daintiness bring more on the market, this basket should be worth its weight in gold. Or perhaps this little farm girl is just storing up her "apple a day."

By Ewing Galloway, N. Y.

It doesn't take many of these to make a load. This is a watermelon harvest in southern New Jersey.

Dunlap Likes Kids: Assistant Secretary of Agriculture Renick W. Dunlap snapped while on a visit to the Beltsville Farm of the Department. Mr. Dunlap's daughter is at his left.

RIGHT: Prof. O. E. Reed of the Michigan State College of Agriculture who has just been selected by Secretary Jardine to head the dairy work of the Department. He will take office about September 1st.

BELOW: Henry Tallchief, a full-blooded Osage Indian, is one of the 17,175 persons in the United States who have joined the Better Sires—Better Stock campaign fostered by the U. S. Department of Agriculture. Mr. Tallchief, who lives in Oklahoma, is building up an excellent herd of Shorthorn cattle and is also breeding Poland China hogs and poultry.

As a result of this campaign, which has been carried on for a number of years, there are now three counties entirely free of grade and scrub bulls and there are 44 counties with 100 or more members.

The Editors Talk

Supply and Demand

If you know a boy or girl who is having a hard time deciding what course to take in college this fall, recommend agriculture. According to C. W. Pugsley, president of the South Dakota State College, the demand for well-trained college graduates of agriculture and home economics exceeds the present supply, and the future for profitable employment in these fields is bright.

Mr. Pugsley points out that a list showing the opportunities opening up to graduates in these fields tabulated from inquiries which come to any state college would be a very long one. Outside of the opportunities in farming and farm management, teaching, and extension fields, attractive positions are to be found in 4-H club work, which is absorbing a surprisingly large number of trained workers.

A great demand for graduates in agriculture and home economics comes from employers in activities not ordinarily considered along these technical lines. A banker asking for a graduate who had had considerable work in agriculture, expressed the opinion that many banks could trace their troubles to the fact that they did not know sound and progressive agricultural policies.

Merchants want graduates who know considerable economics and agriculture. Food manufacturing companies, restaurants, hotels, and hospitals are looking for home economics graduates. Farm machinery companies want men who know soils and crops as well as engineering. Engineering companies constructing roads, drainage and irrigation ditches, and bridges are hiring men who have had work in soils as well as engineering. Loan companies making loans on farm lands are constantly in need of men who know agricultural conditions and have agricultural training. Fertilizer companies want trained agronomists. And so on.

Agriculture needs more trained workers. Business needs more workers with agricultural training. Help the boy or girl to decide.

Canada

The charming old city of Quebec provided an historic and inviting background for the eighth and most successful convention of the Canadian Society of Technical Agriculturists. The convention was held in the Chateau Frontenac from June 11 to 14 and was attended by more than 350 agriculturists from all parts of Canada—from the Pacific to the Atlantic.

The meetings represented the leading agricultural opinion in all fields of agricultural activity in the Dominion of Canada, to which opinion the agricultural institutions in the Province of Quebec have contributed for many long years—in fact, since the establishment of agriculture on the North American continent. It was extremely fitting, therefore, that the eighth annual convention of the Society was held in one of the leading, as well as the oldest, agricultural provinces of the Dominion.

Our next issue will contain an illustrated report of the convention of this Society, which is doing much both to stimulate and correlate the agricultural research and teaching of Canada.

* * *

La vieille et charmante ville de Quebec fournit un terrain a la fois historique et attrayant pour la huitieme Convention de la Societe Canadienne des Ingenieurs Agronomes qui a eu le plus grand succes. La Convention, a laquelle assistaient 350 agronomes venus de toutes les parties du Canada—du Pacifique a l'Atlantique—se reunit au Chateau Frontenac du 11 au 14 juin.

Les representants les plus influents de l'opinion agricole dans les differentes branches de l'agriculture du Dominion, assistaient aux diverses reunions. Les institutions agricoles de la Province de Quebec ont d'ailleurs contribue largement depuis de longues annees a cette opinion agricole—en fait, depuis le developpement de l'agriculture dans l'Amerique du Nord. Il convenait donc admirablement que la huitieme Convention annuelle de cette Societe se reunisse dans une des plus influentes en meme temps qu'une des plus vieilles provinces agricoles du Dominion.

Notre prochaine edition donnera un rapport illustre de la Convention de cette Societe, qui travaille si efficacement dans le but de stimuler et de repandre l'enseignement et les recherches agricoles au Canada.

Seeing America First

Railroad companies in the East say, "Go West." Railroad companies on the Pacific Coast say, "Go East." Low fares are an inducement to people to migrate in both directions. It will not be the fault of the railroad companies if the general public do not see America first and all the time.

Not the least interesting part of America, however, is the desert country. Few people know the deserts properly. A desert is considered possibly useless and quite lonely. Not until an artist, a real estate man, and a hotel keeper combine to make it easy and fashionable will enough people know the grandeur, the beauty, and the life that belong to the desert. And when it becomes fashionable, much of the beauty will be gone.

As J. Smeaton Chase says about the dreamy, dreary desert, one falls under its "inexplicable charm."

What is this charm? It can only be felt. Like many of the other intangibles of life, this charm cannot be adequately described. "The fascination of the untamed desert has proved to be too subtle a quality for words of mine to render. That would be true of course of anybody's attempt in any field of nature, but it would be tenfold true with respect to the desert." . . . "No last word on the desert will ever be written; no statement I mean that to those who know the subject in any real degree, will not seem to fail of getting at the essence."

The beauty of the desert is probably largely in its color and expanse, giving a formidable background to the petty things of life. Certainly desert men will never leave it. They are never lonely. They know the life and it is of their mood.

In seeing America first, why not give the desert its due. Why are states so afraid to admit that they have a real desert in their midst. Some day, some one is going to "discover the desert" and what, properly understood, it can do for tired humanity; but for the present we are too busy traveling to the latest new hotel and modern developments of all sorts.

See America first, but see it all and see America in its untamed moods.

Know Your Foods

Each year the Food, Drug, and Insecticide Administration of the United States Department of Agriculture finds it necessary to send out hundreds of letters and many formal citation notices to shippers of fruits and vegetables who either fail altogether to brand their products or label them in an unsatisfactory manner. What a testimonial to a lack of common sense on the part of some producers and shippers!

Foods, like other commodities, must stand or fall on their own merit. The Federal food and drugs act, popularly known as the "pure food law," as passed in 1906 was designed to prevent the sale of adulterated or falsely labeled foods, drugs, and feeding stuffs. It has proved a benefit to consumers and producers alike, for through its enforcement the consumer may feel confident that the products he buys are what they are represented to be on the labels and the producer need fear no competition with low-grade goods masquerading as high-quality goods.

There probably always will be the individual who believes that he can "put one over" on the public. Dr. H. A. Schuette of the department of chemistry, University of Wisconsin, recently stated in a series of radio talks on "Know Your Foods" that adulteration of foods probably began with commerce. Greek writers made complaints. Pliny the Elder stated in 77 A. D. that bakers added white earth to flour. German authorities in the middle ages used the whipping post, ducking stool, expulsion, and other measures to fight the menace. France and England early began a battle for honest measures and pure food products.

Instances of unusual methods to punish offenders include an extract from a decree enforced by a feudal lord in Germany in 1481. It reads:

"Any man or woman who sells watered milk shall have a funnel thrust into his or her mouth and be compelled to drink so much watered milk as in the judgment of the surgeon can be borne without danger to life. Or any man or woman who sells butter mixed with beets, stones, or other objects with the object of increasing the weight, shall be arrested and put in the pillory. Then the butter shall be placed upon his or her head and there remain until it shall have been melted by the heat of the sun. The dogs shall be allowed to lick them, and the people may scold them with any words it pleases them, provided that neither God, the King, nor any person be thereby libeled. If the weather is cold a fire shall be built in front of the guilty one. Any man or woman who sells rotten eggs shall be bound to the pillory and to the street urchins shall be given rotten eggs, that they may therewith pelt the offender, to the amusement of the people, but it shall be forbidden to throw at them any other object than rotten eggs."

We have advanced a long way from such drastic means of punishment, yet every encouragement should be given to the enforcement of our pure food law. The betterment of agriculture is involved.

System

Every successful business enterprise worthy of note owes a large part of its success to efficient organization. The average business man loathes what is known as red-tape, but even today there are cases where red-tape still is the order.

Efficient organization implies elimination of red-tape, reduction of the antiquated, complicated organization methods of the past, substituting in its place modern up-to-date business methods—system.

Systematization of business is not an easy job for every one. Even the efficiency expert whose business it is to put system into business finds many almost insurmountable difficulties. For the average man the undertaking without proper counsel becomes, as it were, an impossibility.

Efficiency experts are indispensable in any modern business. Their work is an important one. Their success depends upon first of all knowledge, but also in a large degree, upon complete submission to the man undertaking the job, giving to him your full cooperation.

Big business is aware of its obligations and responsibilities. It has been converted to the new order of things. The executive in almost any organization today, by pressing the buzzer, can summon to his office on a minute's notice his most vital statistics on sales, credits, costs, personnel, and immeasurable data, the product of system.

What the commercial world has accomplished by the introduction of system into business can also be done by the farmers individually or as an organized body.

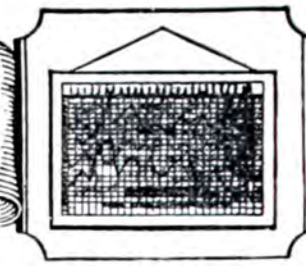
Efficiency in farming is much to be desired; it is easily possible. It must come if farmers of the country are to prosper.

Town and Country

A few Sundays ago in the printed program of services of a large church in one of New York City's most fashionable suburbs, there appeared a rather detailed account of a negro farmers' meeting in North Carolina. The writer of the account had reported the number present, the smoothness with which the farmers carried out their program, and the general interest displayed on the part of those present.

While the church helps to support the little college around which this farmers' field day centered, it is significant to note that the congregation was acquainted with the details of the meeting. This is another indication of the growing bond between town and country, of the realization of the dependence of the one upon the other. It is an omen of a brighter future for American agriculture.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

SAVE MONEY ON MINERAL FEEDS

In recent years many mixtures of mineral feed have been put on the market and sold to farmers, some of them complex and some simple. Most of these, according to Dr. E. B. Hart, of the University of Wisconsin, were not necessary, or at least, he says it is not necessary to pay a high price for mineral feeds. In Wisconsin, he says, the question of supplying minerals to livestock is a rather easy one to solve. In addition to common salt, iodine is often needed—except that chickens do not need extra iodine—and sometimes extra phosphorus and lime are required. This scientist suggests that if iodized salt is used for farm stock two of the most important mineral requirements would be met, and at the present time iodized salt can be obtained at a fairly reasonable price, a ton for about $40, which is enough for 50 head of cattle for nearly a year.

KILLING POULTRY PARASITES

For many years farmers and poultrymen have been sold various nostrums which they claimed would free poultry of external parasites if given to the birds internally either in liquid or solid form. Scientists have long been skeptical of the efficacy of this method of fighting poultry pests and now experimenters in the Department of Agriculture are certain that the only way to get them is to attack directly from the outside. They made 50 tests of preparations advertised to kill external parasites through internal application and found that none of them would do the work. Lice and mites kept up their activities just the same as if no treatment had been administered. The scientists not only tested the mixtures on the market but analyzed them and found their composition and then used the chemicals of which they were made in their tests. These chemicals included magnesium sulphate or epsom salt, sodium carbonate, napthalene, calcium thiosulphate, calcium sulphide, magnesium oxide, sodium sulphate, potassium nitrate, ferric oxide, ferric sulphate, ferrous sulphate, potassium tellurate, potassium tellurite, diethyl diselinide, sodium nitrate, tartar emetic, potassium iodide, sulphur flowers, capsicum, gentian, ginger, fenugreek, garlic, camphor, powdered tobacco, quinine, nux vomica and others. And not in all these did they find one that was effective from the inside in killing external parasites.

A WINTER LESSON

Farmers of Minnesota have been given some valuable information regarding the winter-killing of alfalfa by specialists of the experiment station who have been keeping track of results on plots mowed different numbers of times. They found that on all plots cut three times the killing varied from 50 to 95 per cent irrespective of age, while on the plots cut twice there was no killing. Apparently it is extremely necessary in that climate to leave alfalfa fields with good winter protection.

A Potato Club

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bushels or more per acre. Nine or 43 per cent had yields of 400 bushels or more. The highest yield, 524.4 bushels per acre, was produced by Thomas Burgess. Of those who obtained 300 bushels or more, all were Green Mountain potato growers except one. He grew Irish Cobblers. It is interesting to note that Mr. Burgess was very reluctant to enter this contest and the writer had to urge him considerably in order to change his mind. He felt that he could not compete with men that he named. Not only did he have the largest yield per acre, but from his 8.6 acres he harvested and sold 4,428 bushels. This is an average yield of 515 bushels per acre. Such a yield is not common in Connecticut nor in any other near-by states. In fact for the year 1927 it is one of the top yields if not the highest in the East.

It is further interesting to note that all except one of the growers receiving 300 bushels or more are men who are at present raising tobacco or have been raising tobacco in the past. In other words, their soils for potato raising are tobacco soils.

There is much that can be learned from the answers to questionnaires sent to the growers. The average previous crop was either tobacco or potatoes. The fertilizer for growing the potatoes was found to be a 5-8-7. In every case the amount per acre was in excess of 2,000 pounds. Three of the growers used concentrated forms of 5-8-7 known as the 10-16-14, in one instance one grower using as high as 1,800 pounds per acre of this concentrated fertilizer, but in every case the fertilizer used was practically 5-8-7 or its equivalent.

As to seed, every man used certified seed. The majority obtained their seed from Vermont, with New York and Maine sources tying for second place. In most instances great care was taken in selecting the man who grew the certified seed. Special trips were taken to Vermont, Maine, and New York and the absolute facts found out. If looked at from another angle, it was not only exactly certified seed; the certified men who grew the certified seed had a great deal to do with it.

The vines were sprayed, on an average, more than 10 times. In several instances a combination of spraying and dusting was used. In every instance the spray materials used were home-mixed. The dusts were purchased from reliable sources. The type of machine used for spraying was a tie between the power and the traction type.

To all of this must be added the type of men who are in this 300 bushel per acre club or who were willing to enter such a contest. They are men who believe thoroughly in timeliness of operations, in frequent and thorough cultivation, in the very best of seed, a liberal amount of well-balanced fertilizer, and, above all, that potato growing is a particular job which needs the most careful detailed attention.

THE NEW YEAR BOOK

The 1927 Year Book of Agriculture, second in the series which has been designed to report recent agricultural developments in brief articles, is being distributed.

The volume is very interesting in that it has been written for easy reading and is exceptionally well illustrated. The book is a splended reference for up-to-date facts on all phases of the agricultural industry, and should find its way into the library of any one interested in agriculture.

Foreign and International Agriculture

Peat, Potatoes, and Potash

By B. E. Maynard

San Jose, Calif.

ABOUT 28 years ago on visiting a farmer in British Columbia he called my attention to a patch of potatoes growing on peaty soil, the tops of which were apparently blighted to the ground. He then called my attention to an adjoining plot on which a number of plants had some indications of blight, but on the whole were making a reasonable growth. He then pointed out a third plot adjoining the second, and put the question: "What is the matter with that?" Under close examination no trouble whatever could be found and the plants were entirely free from any evidence of the apparent blight found in the other two.

Asked for an explanation, he stated that the only difference was in the fertilization. The plot on which the plants were apparently destroyed by blight received nothing in the way of fertilizers. The second plot which showed some blight, but otherwise was doing fairly well, received an application of potash at the rate of 75 pounds per acre. The third plot, on which there was no visible evidence of blight and on which the potatoes were making by far the best growth, had received potash at the rate of 150 pounds per acre.

Later on, after the crop was harvested, he reported that the untreated plot had produced a miserable crop of worthless potatoes, not fit to feed to pigs. The plot that received potash at the rate of 75 pounds per acre produced a comparatively small crop, but the tubers were of fair size and quality, whereas the plot that had received potash at the rate of 150 pounds per acre produced an excellent crop of large-size potatoes which were of superior quality.

During the same year the results obtained by another peat land farmer greatly impressed themselves upon my mind. This man had grown potatoes on this land for five years in succession, but in spite of burning over the top soil about every second year and giving the best of care within his knowledge, his crop, though fairly good at first, had gradually diminished to a production of three tons of poor quality potatoes per acre.

Learning of the good results obtained by other potato growers from the use of potash on peaty soils, before planting his sixth crop he applied potash at the rate of 150 pounds K_2O per acre. The result to him was amazing. Not only did the potatoes show the greatest vigor while growing, with entire freedom from any appearance of blight, but gave a production of 15 tons per acre, the great bulk being of marketable sizes and of superior quality. Thus by the use of potash, one acre was doing the work of five.

However, his troubles did not end here, as on trying to sell his crop he found that there was such a strong prejudice against potatoes grown on peaty soil, owing to the poor quality usually produced, that buyers would only offer a price considerably less than that for potatoes grown on the highlands. This lower price he did not feel justified in accepting. Where he had applied potash, the potatoes were the finest he had ever grown on peaty soils, and he considered them equal in quality to the best from the highlands.

Finally he gave some to a prospective buyer with the request that he take them home and test their quality by having them cooked. A day or two later this buyer returned and bought the entire lot, paying him the same price as offered for the best grades of highland-grown potatoes. The use of potash not only increased this farmer's production five-fold, but owing to the great improvement in quality increased the price per pound as well.

One very marked feature commented upon by both these farmers was the freedom from blight among their potatoes where liberal amounts of potash had been used. However, this appearance of blight, owing to the tops dying back in the early stages of growth, may not have been a blight at all, but a condition brought about by potash starvation. At the same time it is becoming well known that plants very susceptible to certain blights may become completely resistant when abundantly provided with potash in a readily available form.

Although at that time, in the two cases given, the application of potash alone seemed to meet all the food requirements of the crop, it was soon learned that phosphoric acid was also lacking in many of these peaty soils. In fact, even then, some very marked evidences of its deficiency were being noted. Today—28 years later—the general practice on these same soils is to use fertilizers high in phosphates as well as potash.

The wisdom of this practice is shown by the maintenance of the high production of these soils under continuous cropping.

Making Sands Fertile

(*From Page* 24)

sulted in changing entirely the condition of the soil. The sand drifts less easily in the wind than was the case when the work was started, and the color has actually been changed to a darker hue. The shifting sand is one of the big problems, even now, for after a crop of clover or alfalfa is seeded the land must be gone over carefully with the cultipacker at right angles to the direction of the prevailing winds in order to prevent the shifting of the soil and the loss of the seed.

The results that have been obtained on this farm would have been impossible without the use of marl (or limestone), legumes, manure and fertilizer. Organic matter and nitrogen may be added to the soil by the use of legumes and manure made from the crops grown on the land, but since farming is simply a mining process as far as the minerals in the soil are concerned, there is only one way to replace them in the earth, and that is to add them in the form of fertilizer. There is no way of catching minerals out of the air and storing them in the soil.

The farmers of Michigan have taken great interest in the demonstration farm, and it is now unusual for a day to pass without several visitors putting in an appearance at the farm. B. O. Hagerman has given hundreds of talks to farmer audiences on what they have learned as a result of their experience on the farm; the Michigan Agricultural College is taking an active interest in the project; and consequently the fame of the Keystone rotation is spreading to all sections of the state. It has done all and more than was expected or hoped of it.

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

Fertile land, that is, land in a high state of productivity, is well-drained, has a favorable texture, is not too acid, and contains an abundance of available plant food and of humus. Information on how to make and keep garden soils fertile is deftly set forth in a new Extension Bulletin 66, by H. R. Cox of the New Jersey Agricultural Experiment Station. The bulletin is short and should prove a ready reference to any one interested in having a good garden.

Market gardeners and farmers who are feeling the growing shortage of manure will be interested in Cir. 95, by R. C. Collison and H. J. Conn of the New York State Agricultural Experiment Station, on making artificial manure from straw. The station was prompted to investigation because of the receipt of many enquiries for methods of preparing artificial manure from straws and other fibrous materials. After experimentation a mixture which will furnish the necessary nutrients to make artificial manure from straw in three to four months' time was worked out. This mixture contains 60 pounds of sulphate of ammonia, 30 pounds of superphosphate, 25 pounds of muriate of potash, and 50 pounds of ground limestone.

"Fertilizer Experiments with Corn," Agr. Exp. Sta., Auburn, Ala., Cir. 52, Dec., 1927, J. T. Williamson, W. H. Appleton, and H. B. Helms.

"The Effects of Phosphorus and Sulfur Fertilizers on Flower Production of Roses and Carnations," Agr. Exp. Sta., Urbana, Ill., Bul. 299, Nov., 1927, F. F. Weinard and P. A. Lebenbauer.

"1927 Report," State Department of Agriculture, Lansing, Mich., Bul. 50, P. O'Meara and H. N. Mills.

"Fertilizer Registrations for 1928," Agr. Exp. Sta., New Brunswick, N. J., Bul. 467, Jan., 1928, Charles S. Cathcart.

"The Principles of the Liming of Soils," U. S. D. A., Washington, D. C., Farmers' Bul. 921, Mch., 1928, Edmund C. Shorey.

Soils

"Soils: An Elementary Treatise," College of Agriculture, Lexington, Ky., Cir. 54 (Revised), Nov., 1927, P. E. Karraker.

"Influence of Crop Rotation and Soil Treatments Upon the Yield of Crops on Norfolk Sandy Loam Soil," Agr. Exp. Sta., Raleigh, N. C., Bul. 225, Mch., 1928, C. B. Williams, H. B. Mann, and R. E. Currin, Jr.

Crops

That the closer the conditions where red clover seed is produced are to the conditions where it is to be used, the greater are the chances of a successful crop, is one of the conclusions drawn in Bulletin 463, published by Cornell University on the "Relative Adaptability of Red Clover Seed of Different Origins." The bulletin is by R. J. Wiggans, who further concludes that practically all nationalities of red clover seed have characteristic properties and that in selecting red clover seed for use, the sources should be carefully noted; if the real value of domestic seed is realized, the supply will soon grow to meet the demand.

"Thirty-Sixth Annual Report, Fiscal Year Ending June 30, 1925," Agr. Exp. Sta., Auburn, Ala.

"Rice Experiments in Sacramento Valley 1922-1927," Agr. Exp. Sta., Berkeley, Cal., Bul. 454, May, 1928, Carroll F. Dunshee.

"Report of the Agricultural Experiment

Station, July 1, 1926, to June 30, 1927," *Berkeley, Cal., Elmer D. Merrill.*

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVII, No. 4, Apr., 1928.

"Report of the Director for the Year Ending October 31, 1927," Agr. Exp. Sta., New Haven, Conn., Bul. 291, Dec., 1927, Wm. L. Slate.

"Fortieth Annual Report for the Year 1927," Agr. Exp. Sta., Experiment, Ga., H. P. Stuckey.

"Bean Production in Irrigated Sections of Idaho," Col. of Agr., Boise, Idaho, Ext. Bul. 68, Feb., 1928, R. E. Brossard and Ralph S. Bristol.

"Commercial Strawberry Growing in Western Kentucky," Col. of Agr., Lexington, Ky., Cir. 216, Sept., 1927, W. W. Magill and Wm. C. Johnstone.

"Sweet Clover for Kentucky," Col. of Agr., Lexington, Ky., Cir. 218, Dec., 1927, E. J. Kinney.

"Chicory Growing in Michigan," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 167, Dec., 1927, C. E. Cormany.

"Corn Growing in Minnesota," Agr. Exp. Sta., University Farm, St. Paul, Minn., Spec. Bul. 118, Feb., 1928, A. C. Arny.

"Thirty-Fifth Annual Report," Agr. Exp. Sta., University Farm, St. Paul, Minn., W. C. Coffey.

"Corn Experiments, 1927," So. Miss. Branch Exp. Sta., Poplarville, Miss., Cir. 76, E. B. Ferris.

"Forty-Eighth Annual Report of the New Jersey State Agricultural Experiment Station," New Brunswick, N. J., Jacob G. Lipman.

"The Effect of Freezing on the Respiration of the Apple," Agr. Exp. Sta., Ithaca, N. Y., Memoir 110, Mch., 1928, D. B. Carrick.

"Twenty Years Growth of a Sprout Hardwood Forest in New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 465, Mch., 1928, J. Nelson Spaeth.

"Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIII, No. 3, May-June, 1928, Whole No. 132.

"Annual Report 1926," Pa. Dept. of Agr., Harrisburg, Pa., Gen. Bul. 436, Vol. 9, Dec. 1, 1926. F. P. Willits.

"The Cotton Contest—1927," Agr. Exp. Sta., Clemson College, S. C., Cir. 94, Feb., 1928, R. W. Hamilton.

"Peanuts in Texas," Agr. Exp. Sta., College Station, Texas, Bul. 381, May, 1928, Geo. T. McNess.

"Bamboos and Bamboos Culture," U. S. D. A., Washington, D. C., Leaflet No. 18, Feb, 1928, B. T. Galloway.

"Preparation of Eastern Grapes for Market," U. S. D. A., Washington, D. C., Farmers' Bul. 1558, B. E. Shaffer.

"Timber Growing and Logging Practice in the Lake States," U. S. D. A., Washington, D. C., Dept. Bul. 1496, Feb., 1928, Raphael Zon, W. B. Greeley.

"Thirty-Seventh Annual Report," Agr. Exp. Sta., Pullman, Wash., Bul. 222, Dec., 1927, Edward C. Johnson.

"Green Feed Crops for Poultry," Agr. Exp. Sta., Puyallup, Wash., No. 8-W New Series, Apr., 1928, M. E. McCollam.

American Potato Journal, The Potato Association of America, East Lansing, Mich., Vol. V, No. 5, May, 1928.

Economics

Bulletin 464, "An Economic Study of Certain Phases of Fruit Marketing in Western New York," by Roger B. Corbett of the New York Agricultural Experiment Station, is a study of the cost of operation of cooperative packing houses in western New York. During the recent cooperative movement in agriculture many cooperative organizations have failed, while many have succeeded. The primary cause of most failures is financial difficulties. It is of prime importance for executives to have information on the cost of doing business. Such information for packing houses in western New York is given in Bulletin 464. Of special interest is the relation between the volume of business and the cost of packing fruit.

"Economic Aspects of the Pear Industry," Agr. Exp. Sta., Berkeley, Cal., Bul. 452, Apr., 1928, S. W. Shear.

"Almonds," Agr. Exp. Sta., Berkeley, Cal., Bul. 453, May, 1928, H. R. Wellman and E. W. Braun.

"Marketing Georgia Peaches," Agr. Exp. Sta., Experiment, Ga., Cir. 82, Mch., 1928, R. M. Middleton.

"Factors Affecting Returns from Potatoes in Massachusetts," Agr. Exp. Sta., Amherst, Mass., Bul. 240, Jan., 1928, Ronald L. Mighell.

"The North Dakota Agricultural Highway," Agr. Ext. Div., Fargo, N. D., Cir. 81, Apr., 1928.

"Virginia Farms Statistics," Div. of Agric. Statistics, Va. Dept. of Agric., Richmond, Va., Sta. Bul. 5, Apr., 1928, Henry M. Taylor.

"Production and Marketing of Spokane Valley Products," Agr. Exp. Sta., Pullman, Wash., Bul. 221, Dec., 1927, George Severance and Neil W. Johnson.

"Farm Costs and Practices in the Production of Walworth County Crops and Livestock," Agr. Exp. Sta., Madison, Wis., Research Bul. 83, Apr., 1928, P. E. McNall and L. S. Ellis.

Diseases

"Diseases of Canning Crops in 1927," Agr. Exp. Sta., Geneva, N. Y., Cir. 99, Leon K. Jones.

"Building up Resistance to Diseases in Beans," Agr. Exp. Sta., Ithaca, N. Y., Memoir 114, Mch., 1928, Donald Reddick.

"Studies of the Nature and Control of Blight, Leaf and Pod Spot, and Footrot of Peas Caused by Species of Ascochyta," Agr. Exp. Sta., Geneva, N. Y., Bul. 547, Dec., 1927, Leon K. Jones.

"Yellows, A Serious Disease of Tomatoes," U. S. D. A., Washington, D. C., Misc. Pub. 13, Feb., 1928, Michael Shapovalov.

"Formaldehyde Seed Treatment for Oat Smuts," U. S. D. A., Washington, D. C., Misc. Pub. 21, V. F. Tapke.

"Johnson Grass as a Weed," U. S. D. A., Washington, D. C., Farmers' Bul. 1537, M. W. Talbot.

"Rose Diseases: Their Causes and Control," U. S. D. A., Washington, D. C., Farmers' Bul. 1547, Alma M. Waterman.

"A Study of Phylloxera Infestation in California as Related to Types of Soils," U. S. D. A., Washington, D. C., Tec. Bul. 20, Feb. 1928, R. L. Nougaret and Macy H. Lapham.

"Clover Anthracnose Caused by Colletotrichum Trifolii," U. S. D. A., Washington, D. C., Tech. Bul. 28, Feb., 1928, John Monteith, Jr.

"Factors of Spread and Repression in Potato Wart," U. S. D. A., Washington, D. C., Tech. Bul. 56, Mch., 1928, Freeman Weiss, Philip Brierley.

"Control of Beet Seedling Diseases Under Greenhouse Conditions," Truck Exp. Sta., Norfolk, Va., Bul. 58, Jan., 1927, Frank P. McWhorter.

"The Early-Blight Diseases of Tomato," Truck Exp. Sta., Norfolk, Va., Bul. 59, Apr. 1, 1927, F. P. McWhorter.

Insects

The "Twenty-Seventh Report," by W. E. Britton, State and Station Entomologist of Connecticut, Bul. 294, contains valuable information on insects, common not only in Connecticut, but throughout New England.

"Paradichlorobenzene Experiments in the South for Peach-Borer Control," U. S. D. A., Washington, D. C., Tech. Bul. 58, Mch., 1928, Oliver I. Snapp, Charles H. Alden.

"The European Corn Borer and Its Controlling Factors in Europe," U. S. D. A., Washington, D. C., Tech. Bul. 59, Apr., 1928, W. R. Thompson and H. L. Parker.

"The Bulb Flies of Narcissus with Special Reference to the Bulb Industry in Virginia," Truck Exp. Sta., Norfolk, Va., July 1, 1927, F. W. Poos and C. A. Weigel.

"The Potato Tuber Worm," Truck Exp. Sta., Norfolk Va., Oct. 1, 1927, F. W. Poos and H. S. Peters.

The Broomcorn Industry

(From Page 7)

to protect himself and his depositors by calling on the growers to liquidate the indebtedness by selling at harvest time, no matter what the prices are at that time.

Advantages to be derived from standardized grades, if generally used and recognized, were so apparent to the Department of Agriculture that work toward standardization and adequate grading was pushed. Special attention was paid to formulating grades in accordance with use by factories of various types of brush. Studies were made in the application of the proposed grades to determine their actual practicability in handling and marketing broomcorn. A laboratory for a thorough study of such factors as quality, length, and dockage in broomcorn was established as a part of the hay standardization laboratory at Kansas City.

The resulting United States standards for broomcorn were promulgated in 1926, and were immediately put into use by the Department in an inspection service conducted in cooperation with the Oklahoma State Market Commission. They have also been used to some extent in other states. As broomcorn has been marketed for decades without and uniform standards, considerable educational work in regard to the standards and their application must be done with producers, distributors, and manufacturers before the standards will be used very generally throughout the industry.

Now that standardized grades have

been established, it should soon be possible to finance broomcorn on well-protected warehouse receipts. The provisions of the U. S. Warehouse Act have already been extended to cover broomcorn warehouses, but as yet there is not a demand for Federal licenses, although one warehouse in New York which stores broomcorn and other products is operating under a Federal license. When we have Federal licensed warehouses for broomcorn stored under recognized grades, the receipts will be accepted as collateral, and growers, dealers, manufacturers, and bankers will be able to carry this commodity more safely through periods of depression, low prices, and poor demand, which will tend strongly to strengthen the whole financial aspect of the crop.

Planting Adjusted

As this crop was originally produced chiefly in New York, Virginia, Ohio, and other well populated states, manufacturers could then operate in the producing areas. Since production has shifted west, transportation has necessarily become one of the big factors in its marketing. Approximately 5,000 carloads are shipped from producing sections each season. Some of the crop goes to the west coast, some to Cuba, and some to Canada, but the greater part moves to our eastern cities. Except for coastwise shipments from Galveston, the crop is handled by rail in box cars by slow freight.

The Department points out and urges various improvements that can be made in transportation. For instance, bales of standard length and width will load in cars without dead space, whereas the odd-sized bales do not. With them, shippers have difficulty in loading to the minimum stipulated weight and are thus compelled to pay higher freight charges.

As fundamental as the need for standardization and grading was the need for accurate and timely market news. Standardization was necessary for the best development of market news, but the necessity for adequate news was so vital that it was given precedence. The commercial importance of the crop had not yet justified boards of trade at the market centers in issuing daily market quotations as a basis of arriving at values, so the dealing was attended with much speculation and with a wide range of prices.

The market news service developed by the Department furnishes dependable information during the movement of the crop from the farms. This service, which covers the six principal broomcorn producing states, includes information regarding receipts, shipments, and storage stocks at various markets, kinds and qualities arriving and most in demand, prices paid for various qualities at home and in other districts, car situation and general marketing conditions. This report is disseminated through about 150 local and farm papers and through trade journals.

Surveys as of January and June, each year, cover the commercial production as shown by shipments reported by railroads, yearly consumption, and the carryover. The summarized reports also include imports and exports and a yearly review of the broom and broomcorn situation. Foreign information secured by the Department of Agriculture relating to broomcorn is particularly complete.

Agricultural leaders, local bankers, and others in a position to advise these farmers, can now ascertain the approximate tonnage requirements for the ensuing year and can aid the farmers to adjust the planting of their one big crop to conform to existing conditions for any year.

"What are you taking those cuspidors home for?"

"I'm taking them home to my dog."

"What kind of a dog have you, anyway?"

"Spitz."—*Drexerd.*

Pages From A Field Note Book

Better Pastures

By R. A. Payne

Northampton, Mass.

IN the December issue of the "Co-operator," Professor J. W. White of Pennsylvania points out that too much of the pasture improvement work has been done top-dressing poor pastures. He shows that there is a profit for the dairy farmer who is willing to make some of his tillable land into real pasture. Joe Hathaway, manager of the Pollard Farm in Northampton, Massachusetts, has been working along this line for four years. His experience is of interest to all dairy farmers in New England who have poor pastures.

Four years ago Joe called in the county agent to discuss pasture improvement. His pasture was the "regular kind" where the cows get sunshine, fresh air, exercise, water, and about two weeks of real feed early in the season. The county agent called in the agronomy specialist from the agricultural college. Top-dressing was discussed and discarded as it was felt that this would be like trying to grow hair on a bald head.

Joe's problem was to get a real pasture so that he would not have to grow green feed and so that the grain bill would not take all of the milk check in the fall. Joe agreed to try white sweet clover. Two acres of the pasture, while rough, were plowed. The land was limed at the rate of three tons per acre. A light coat of manure was harrowed in, and the field seeded with inoculated white sweet clover seed early in May. By the first of August the sweet clover was three feet high, and the cows were turned in. The first few days they ate weeds. Then they started on the sweet clover. In six weeks the nine milking cows had the clover pretty well eaten down and they were shut off so as to give the crop a chance to store up energy for winter.

As sweet clover plants live only two years, more seed was sown the second spring in hopes of keeping the field in this crop. This did not work out, but bluegrass came in without seeding. Early in June of the second year the sweet clover was three feet high. The cows would fill up in about an hour and then would retire to the shade and chew their cuds in contentment. After a few days they refused feed in the barn and then began to leave grain, so Joe cut out all barn feeding. The cows increased on the average 1½ quarts of milk each a day at a time when they normally would have been expected to show a decrease.

Uses Fertilizers

In 1926, Joe took about five acres more of the original unproductive pasture and went through the same process. He added superphosphate at the rate of 500 lbs. per acre to the manure. He found that this gave him a better stand and more productive plants than he had secured with the lime and manure. Last spring, the second year for the sweet clover, he sowed 3 lbs. of white dutch clover seed and about 15 lbs. of grass seed per acre so as to establish a permanent pasture sod. During July this field of sweet clover was taller than the cows and furnished excellent feed well into August.

Joe has found that the sweet clover did away with the necessity of using green feed and he also found that, while the sweet clover alone would maintain production, a low protein grain was needed to keep the cows in flesh. The first piece that was in sweet clover has been in the kind of bluegrass pasture Professor White has in mind for the past two years. The bluegrass on this improved pasture was about 10 inches tall the middle of May, while the grass in the original pasture would not cover the taps of one's shoes. This type of pasture will now pay excellent returns for top-dressing with a complete fertilizer high in phosphorus and potash. This coming season Joe expects that this improved bluegrass pasture will produce at least treble the amount of feed that the whole of the original pasture used to produce.

What Joe Hathaway has done can be duplicated by many of the dairy farmers in New England. He found that his cows would go get the feed if there was some there to encourage them. This has done away with the need for green feed and has reduced the amount of grain needed as well as the protein content of it. His cows are not thin in the fall and so do not need two months of forced feeding to get them in shape. He gets more milk in the fall while the price is good than he did before improving his pasture, And this was done on a rough but plowable pasture similar to thousands of acres in New England.

Lime was the first limiting factor. Every county agent in New England is equipped to test soils for lime requirements and can give cultural directions for growing sweet clover. If manure is not available, a complete fertilizer furnishing at least 25 lbs. ammonia, 80 lbs. phosphoric acid, and 50 lbs. of potash per acre will give results. Joe figures that if his original pasture was worth $12 per cow for the season, his improved pasture is worth at least $42 per cow per year in the saving it makes in feed costs. The first cost may be high, but he feels that the results show a handsome profit.

Tobacco On Wicomico Ridge

By W. L. Myers

Richmond, Virginia

CHARLES county, Maryland, has some mighty good tobacco land and some mighty good tobacco growers. One section in particular might be mentioned, and that is the area around Newburg and along the Wicomico Ridge. The land varies considerably, but runs from loams to fairly heavy clay or clay loam. Red subsoil is favored for the best bright, red-curing tobacco. Growers are divided as to whether to grow tobacco continuously on the same land, using a cover crop during the winter and manure where available, or whether to use rested land. Both methods seem to work well, especially where the land is neither too sandy nor too stiff.

Among other things, the fertilizer used is of importance. Changes during the past two or three years have been in the direction of a better balanced and more concentrated kind. The most popular analysis in that section is now 4-8-10. I was talking with Mr. Julian Ingle and Mr. Henry Steinhauser on this point the other day, and they have been using 4-8-10

or the past two years and will con-
inue the practice this coming season.
: has produced very good tobacco
oth on heavy soil and on loam.

Mr. Ingle grows his crop on a rather eavy type of soil, gray top and red lay bottom, and rests his fields be- ween tobacco crops, manuring the od, and pasturing lightly. Then he ses 400 lbs. of the 4-8-10 per acre rilled in with a wheat drill.

Mr. Steinhauser grows tobacco every year on the same land, which is a medium loam of reddish color. He has been applying 300 lbs. of 4-8-10 per acre, but will use 400 lbs. this year for his 1928 crop.

Some other crops in that section received 4-8-7 last year and cured out yellow rather than the more desirable red. It seems that the extra 3 per cent of potash made this difference.

Potash in Fertilizers

(*From Page* 8)

vater supply in about the same pro- ortions.

In the same report Mr. Morse says, On the soil without potash for years oybeans were slow to mature and nalysis of the seeds, pods, and straw ndicated that with the lack of potash he nitrogen was not translocated free- y from the straw and pods to the eeds".

An Important Truth

In this statement by Mr. Morse robably lies a very important truth hat accounts for the beneficial influ- nce of potash during a dry period. f potash is abundant the translocation f starch and nitrogen goes on in spite f a limited supply of water, thus help- ng to maintain growth processes that therwise would be seriously checked.

Data, confirming the fact reported y Mr. Morse, that potash does not elay but in some instances at least nay hasten maturity, were obtained n cotton tests carried on by the Agri- ultural and Scientific Bureau of the N. V. Potash Export My. in 1927.

Attention was given in numerous ests throughout the South to whether he extra applications of potash af- ected the maturity. It had been held y some that extra amounts of potash vould delay maturity. The reports nvariably said that no delay in maturity had occurred where top-dressings of extra potash had been made. Several reported that where extra potash had been applied the maturity of the crop had been advanced, evidence of which was provided by the size of the early pickings of cotton.

The hastening of maturity by the extra potash is doubtless to be accounted for on the same basis that Mr. Morse accounts for potash hastening the maturity of millet and soybeans, which is, that where there is a deficiency of moisture potash in a measure takes the place of water in promoting the growth processes of the plant.

The top-dressing experiments with potash, for the most part, consisted of 100 pounds of muriate of potash per acre, applied shortly after the cotton was chopped to a stand.

The 40 tests scattered over the South on various soil types were carefully checked. The results varied with different soil types and varied for each soil type. Such variations, of course, are to be expected due to the different soil conditions and to local weather variations.

But taking all the tests and averaging them, there was an average return of \$8.00 for every \$1.00 expended for the extra potash.

In this connection, it may be stated

that the tests were made on an acre basis, one acre receiving the extra potash as a top-dressing being compared with an acre alongside that did not receive the extra potash.

These tests conducted on every leading soil type of the South and under varying climatic conditions, prove that potash is playing an important part in the complete fertilizers applied to crops in the South, and the evidenc of these tests, of course, is that mor potash than is generally contained i mixed fertilizers could be used wit profit.

Potash gives largest returns whe properly balanced with other plan food materials. Therefore, the larges use of potash depends on a liberal us of nitrogen and phosphoric acid.

Rubber from Weeds?

(*From Page 27*)

Considering economy in production it has been the aim of the California experimenters to make guayule a machine grown, cultivated, harvested, and fabricated product from start to finish. By the employment of every modern, labor-saving device, its production can compete with the plantations of the Far East.

It is said by George H. Carnahan, President of the Intercontinental Rubber Company that for the annual making of a billion pounds of crude Para rubber in the East, the continuous employment of 600,000 laborers is necessary, meaning that the output of rubber per man for a year is 1,660 pounds. Against this the same amount of guayule rubber can be produced in the United States, according to conservative estimates, by 40,000 men continuously employed and at high-paid mechanics wages. This represents an annual return of 25,000 pounds of rubber per man, and the ratio of 1,660 to 25,000 is sufficient, Mr. Carnahan says, to cover all labor differences and dispel the bogey of coolie competition.

Although guayule experiments by chemists, botanists, and other trained scientists and engineers of 19 different stations in California and Arizona have been in progress for a number of years, rubberdom generally knew but little of what was going on or of the results reached until the recent American Chemical Society meeting.

Hard-headed manufacturers knev that guayule rubber from wild source in Mexico could only supply approxi mately one per cent of their presen annual requirements, and whethe more could be produced has bee hitherto an academic question of n immediate interest. However, the old timers remember that for the fisca year ended June 30, 1910, total Amer ican imports of raw rubber amounte to 101,000,000 pounds, and of th more than 20,000,000 pounds wer Mexican guayule as then crudely pro duced. Hence there is nothing revolu tionary about contemplating its us today to the extent of at least 20 pe cent as soon as this amount can b made available as a home-grow product.

It is also recalled when plantation grown hevea first came on the marke it was rather difficult to believe that suitable Para rubber could be grow anywhere outside of its natura Amazon Valley. With rapid stride however, plantation rubber forge ahead and the Amazon rubber fade away till now the latter product hardly a factor in the market. Th British reaped a well-earned rewar for their courage, foresight, an tenacity in making possible plantatio rubber. It may well follow that th scientific cultivation of guayule an its machine handling will bring to th nation special financial rewards.

New Jersey

(*From Page* 14)

'ho conducted this work, also suceeded in discovering a way to control ne color of hydrangeas by means of me and aluminum salt treatments of ne soil.

Halsted's achievements in plant isease control set a high standard for accessors to follow, but follow they ave. At least four or five diseases vere so prevalent and virulent that weet potato growing was becoming argely a series of disappointments in his state. Dr. R. F. Poo!e devoted ong hours in field and laboratory to nding some way of saving the industry. Growers were desperate, for n many fields the losses from stem ot alone sometimes amounted to as igh as 90 per cent of the stand. The rst step toward overcoming this isease was the demonstration by Poole n an extensive scale of the resistance f certain varieties. Shortly, afterard, he announced that he had suceeded in getting almost 100 per cent tands of even the susceptible varieties y planting two stems per hill. For curf and ground rot control he emonstrated the effectiveness of sulur in the soil. In addition, he showed rowers, by conducting trials on arious large farms, that by giving roper attention to the kinds of ertilizers used, still better control ould be maintained over these and ther diseases. Thanks to these conributions, New Jersey ranked second n the United States in average yield er acre over a 5-year period, 1921-25, and second in car-lot shipments from 1920 to 1924.

Many years ago, white potato growers were shown the importance of keeping the soil acid and, where scab was prevalent, of using sulfur. Rhizoctonia and blackleg, however, became more prevalent as the years went on, and again the industry was suffering severely. Scab was by no means entirely mastered. Corrosive sublimate and formaldehyde treatments were urgently advocated, but after four or five years it was found that only about five per cent of the seed planted were being treated with these chemicals. So much time and labor were required that growers very generally omitted dipping their potatoes. W. H. Martin, plant pathologist, settled the difficulty by demonstrating the effectiveness of organic mercury dips, which accomplished in a moment what formerly took 1½ hours for each immersion of seed. This year, 1928, nearly 60 per cent of the seed planted in Central Jersey was treated by this method.

New Jersey potato growers have been using 12 to 15 bushels of seed potatoes per acre. G. W. Musgrave and H. B. Sprague of the experiment station showed, after extensive trials, that the greatest net and total yields can be obtained by using 33 bushels per acre, providing all cultural conditions are optimum. Their experiments also showed that from equal quantities of potato seed the net and total yields are larger when the pieces are cut smaller and planted closer than when they are cut larger and planted farther apart. Their work was with the Green Mountain variety, which is extensively planted in this state.

An enormous contribution had been made to the state by the station entomologists in their mosquito clean-up. New Jersey was nationally notorious for her mosquitoes. She had both the fresh water and the salt-marsh mosquitoes and in certain districts the dreaded malarial variety. Thousands of acres of farm land lay idle because of the tremendous swarms of the pest that arose from the near-by swamps and marshes, and whole industrial and residential districts were blighted.

Controlling Mosquitoes

In 1904 Dr. John B. Smith of the New Jersey Experiment Station reported that 260,000 acres of marshland would have to be drained in order to reduce the salt-marsh mosquito to unimportance. He proved for the first time that these mosquitoes migrated long distances over the uplands, reaching points more than 30 miles away in large numbers, infesting seriously more than one-half the state's land surface, and annoying very seriously nearly three-fourths of her population. With these facts in hand the state legislature provided the laws and money so that drainage could be started. As rapidly as funds became available from year to year the colossal task followed. Along the coast, thousands upon thousands of ditches were dug and kept cleaned, miles of dikes built, hundreds of tide gates constructed. Inland, swamps and mud ponds were drained or filled, and, throughout all, unceasing research was conducted to find methods of controlling mosquitoes where the regular methods were impracticable and to develop machines that would reduce the cost of ditching. Dozens of towns were assisted in organizing local anti-mosquito associations that really took an active part in forming clean-up and drainage crews.

Various machines were devised and though far from perfect they aided materially. By 1925, 26,920,000 fee[t] of ditches 10 inches wide and 3[0] inches deep had been dug. Think o[f] it, 5,000 miles of ditches, a very appreciable part of which had been don[e] by hand! Now, however, a ponder-ous digger capable of moving over th[e] marshes has been devised by the ex-periment station and is capable o[f] cutting 40 feet of ditch a minute. Other things are done on a large scal[e] also. In the mosquito breeding seaso[n] of 1924, for example, 320,000 acre[s] of upland breeding grounds wer[e] treated with larvicides.

Although more ditching yet has t[o] be done, that which has been accom-plished shows great results; valuation[s] of residential and industrial district[s] near the former mosquito areas hav[e] grown much more rapidly than thos[e] farther away. The mosquito is now a rare visitant in many parts of th[e] state. The fact that the people's rep-resentatives in the legislature hav[e] continued appropriations is an indi-cation that satisfaction is bein[g] created among the constituents o[f] these legislators.

The large and intensive poultry in-dustry of the state has found itsel[f] beset with many problems. The hig[h] price of land, competition from state[s] where grain is cheap, diseases, an[d] parasites have required a great deal o[f] study in order to develop a system o[f] management and feeding that woul[d] insure profits. One of the contribu-tions of the experiment station was th[e] multiple-unit laying house for 10[0] bird flock units, which economicall[y] uses every inch of space and at th[e] same time provides all the facto[rs] recognized as essential to sanitatio[n]. The almost universal acceptance of [it] by our commercial poultrymen is i[ts] own recommendation. With certa[in] modifications it is a standard all ov[er] the United States.

Our poultrymen were in need o[f]

birds that would give a good return for the expensive feeds consumed. Better laying stock was part of the answer, and, accordingly, the station began laying contests at Vineland and Westville. These are conducted, not as races, but as official trapnesting stations where foundation breeding stock may be selected, officially recorded, and registered. About 33,000 birds have been trapnested at these contests, and to augment this output, Professor W. C. Thompson's department at the experiment station will supervise the trapnesting of 13,500 birds on the farms of the state this year.

A Floating Laboratory

Worms and coccidiosis have been more destructive as the intensity of the poultry industry has increased, frequently bringing ruin to individual poultrymen. Recently, the research of Drs. F. R. Beaudette and J. J. Black, and Professors Thompson and C. S. Platt revealed that control of these plagues could be insured by rearing coccidiosis-free chicks in close confinement during the growing period. In this way the birds are kept away from worm infestations and coccidiosis infection. This one contribution will mean the saving of thousands of dollars a year to our poultrymen.

As with the poultry industry, the dairy industry of the state has found that the high price of land and feed requires the utmost attention to good management and selective breeding if profits are to be realized. Through supervising the advanced registry of the state and disseminating information on correct feeding, breeding, and management the station has brought up the quality of our milk cows so that in average value per head they ranked first in the United States in 1927, and in average production they have stood with the three other leading states. Voorhees' idea of a system of soiling crops for dairy cattle feeding is one of the single contributions that has overcome in a large measure the lack of ample pasture area.

In addition to the main establishment at New Brunswick, the experiment station maintains substations in various parts of the state. A poultry pathology substation is located in the heart of the great commercial poultry farm area at Vineland. Here and at the main station at New Brunswick a total of 90,697 birds were tested last year for carriers of bacillary white diarrhea, and 2,492 were autopsied. The cranberry substation is maintained at Brown's Mills, in the heart of the area where a third of the total cranberry crop of the United States is produced. At this station have been worked out accurate data regarding fertilizers, immersion safety limits, girdler control, and prevention measures for various diseases.

At Barnegat the biologist of this institution maintains a floating laboratory which in reality is a substation for investigations in oyster conservation. Since 1885 these studies for saving our oyster industry have been conducted, for even at that early date it gave indications of being wiped out. Through the work of Dr. Julius Nelson and later his son Thurlow Nelson, in perfecting ways of propagating oysters, this industry, upon which more than 60,000 persons are dependent, has been saved from destruction. These two men, it might be added, are among the world's leading authorities on oysters and their culture.

More Than 700 Bulletins

In its general activities the New Jersey Agricultural Experiment Station has issued more than 700 bulletins. For 15 years it has distributed a monthly periodical, "Hints to Poultrymen," to poultrymen of the state, 12,000 of whom are now on the mailing list. For 24 years its director has been editor of "Soil Science," which he founded and which is the leading magazine in its field. For nine years the station has published "New Jersey Agriculture," a monthly magazine which has the names of more than 16,000 residents of the state on its mailing list. Staff members of the institution have written thousands of articles for technical and popular magazines and thousands of stories for the newspapers of the state.

The farm land of the institution has been increased from the original 98 acres to 800, and the research staff from two or three men to 62, not including a large number of routine assistants.

Much interest and valuable work has been done in developing control and analytical methods, and in soil disinfection, plant physiology, fertilization of pastures, seed germination, animal nutrition, agricultural economics and history, tuberculosis and other diseases, and turf studies. In them lies a story that must wait until the complete history of the institution is written for the semi-centennial celebration to be held in the spring of 1930.

Business in Farming

(*From Page* 16)

20 bushels per acre, the cost of plowing, harrowing, discing, seed, and seeding remains the same as for the average yield of 14 bushels, or $5.70 per acre. The cost of marketing and harvesting is perhaps $5.00; the depreciation on machinery is still the same, or $2.00; while taxes have increased to perhaps $0.97. The total annual expense is $13.67, while the total income with wheat at $1.00 per bushel is $20.00. The land has produced a return of $6.33 which is five per cent valuation on $126.50.

On land producing 40 bushels of wheat per acre the growing cost is $5.70; the cost of harvesting and marketing is $6.00; interest and depreciation $2.00; and taxes $2.54 per acre. The total cost of production is $16.24, while the gross return is $40.00. The land has produced a return of $23.76 which is five per cent interest on a land valuation of $455.20!

On this basis the individual farmer not only can afford to grow large crops, but he can not afford to grow anything else.

The problem then becomes one of so treating the soil as to secure the larger crop in an economic manner. There is now ample evidence from experiment station results to show that this can be done.

For example, the yield of wheat on the thin, cold soils on the Strongville Farm of the Ohio Experiment Station without treatment averaged 13.09 bushels per acre as an average of 13 crops, which compares very favorably with the average yield of wheat in the United States. An application of 160 pounds of acid phosphate, 80 pounds of muriate of potash, 60 pounds of nitrate of soda, and 25 pounds of dried blood costing $6.40 increased the yield of wheat to 29.58 bushels, an increase of 16.49 bushels per acre. Wheat under Ohio conditions has a farm value of $1.00 per bushel. The increased yield, therefore, was worth $16.49 or an increase over the cost of the fertilizer of $10.09 which is five per cent interest on $201.80. Such simple use of a complete fertilizer on these thin, cold soils of Ohio increased the land valuation over $200.00 per acre as determined by the increased interest return and made them approximately equal to the best lands of the state.

Such data indicate quite clearly that the farmer as a successful business man must pay more attention to the problem of increasing the producing power of his land. He can no longer afford to farm marginal land, but must either abandon such land to a state of nature or convert it into high producing land by a judicious system of fertilization.

The day of land exploitation in .merica is rapidly passing. Too often heap land has been held primarily for rise in price and farmed only inci-entally. The successful business far-:er of the future is going to use land intelligently as one of the four economic factors in the efficient production of farm commodities, and its proper use by the farmer will determine in a large measure his success as a business man.

Cedar Rust of Apples

(*From Page* 20)

rees grow near susceptible varieties of pples and if weather conditions are avorable, the attack upon the foliage nd fruit is usually serious.

Since the foliage and fruit of apple rees may become infected in the pring after each rain or damp spell f weather, it is practically impos-ible for the apple producer to spray is orchard often enough to obtain atisfactory control of the disease. It ; true that sprays as they are generally pplied for the control of other dis-ases assist some in the control of cedar ust. Rarely, if ever, will the regular prays be adequate when the cedar rust s serious. It is a well-known fact hat in the springtime the orchardist nay experience, in one week, 5 or 6 or more rainy or damp periods followed by drying conditions and, consequently, as many different disseminations of cedar rust spores. Spraying is, therefore, not a remedy upon which the grower can rely.

Apple growers and investigators are of one accord in the opinion that the only satisfactory way to prevent serious damage from cedar rust is to cut the red cedar in the vicinity of apple orchards. Since the red cedar does not sprout from the stump or stub, one cutting is sufficient. It is important that every red cedar tree within a distance of 1½ to 2 miles be cut if satisfactory protection against the disease is to be afforded.

Winter Wheat

(*From Page* 30)

It develops that a poor seedbed can asily counteract the beneficial ef-ects of good fertilizer. Both the un-ertilized wheat on well-prepared ground and the fertilized wheat on poorly prepared land failed. On the ther hand, the wheat similarly fer-ilized, but sown on a well-compacted eedbed, came through an exception-lly hard winter in good shape.

Wheat is a highly nutritious, con-centrated food, and since a way has ot yet been found to make diamonds ut of sawdust, it is easy to under-tand why wheat plants require a rela-ively large amount of available plant food in order to produce a maximum yield of quality grain. In the case of spring wheat, the crop is always sown as soon as frost is out of the ground in the spring, at a time when the land is cold, and, regardless of its inherent fertility, contains a minimum of available plant food. An application of immediately soluble commercial plant food to supplement what is available in the land is both necessary and profitable.

Winter wheat markedly responds to fertilizer treatment by reason of the fact that it is sown in the late fall and can make use of the plant food supplied at this time and again in the following spring.

Another reason for fertilizing wheat is the large number of insect and disease pests which if not combatted tend to injure or completely ruin crop prospects. Among the most damaging of the insect pests which attack winter wheat is the Hessian Fly. This insect lays its eggs on the young plants in the fall and the larva which hatch in the spring attack the crop. It has been found that if winter wheat is sown late enough in the fall so that the crop comes up after the "fly-free date" it will largely escape injury from this pest. By the "fly-free date," is meant a time late enough in the fall for cool weather to prevent the brooding of the insects.

A Quick Start

The practice of late fall sowing ordinarily provides hardly sufficient time to enable it to produce enough foliage for successfully passing through the dormant winter season. It is very helpful, therefore, to hasten late fall growth of winter wheat to a maximum by a generous application of commercial fertilizer at the time of sowing. Through the use of fertilizer for wheat it is possible to fool the fly and give the crop sufficient growth to withstand the rigors of even the most severe winters.

Again, in the spring, fertilized wheat is enabled to make a strong growth by reason of its well-spread root system developed through the proper nourishment it received the previous fall and the protection from freezing afforded by the foliage. This condition, together with the effect of the abundance of available phosphoric acid supplied by the fertilizer treatment, insures quick maturity of the crop. In addition to these benefits, the constituents supplied in properly balanced complete fertilizers have been found to not only increase the number of tillers so that the wheat stools better and thus forms more heads, but also to increase the number of flowers that develop into plump seeds in the heads.

Wheat, like other small grain crops grows best in cool weather, especially if the soil contains plenty of moisture. In the wheat belt this condition is most likely to exist at the outset of the spring growing season, after which time warm and dry weather prevails. The effect of a fertilizer treatment in hurrying the crop to maturity lends assurance that the crop will be made under most favorable weather conditions.

Among the diseases which most severely attack wheat and reduce yields is rust. Wheat rust generally commences its ravages in the latter part of the growing season and takes its toll most severely on the least sturdy or immature fields. Here, again, the effect of proper fertilization with the healthy plant growth it establishes speeds the crop's maturity so that it escapes injury from rust.

Similarly, well fertilized grain by its quick start and rank growth forges ahead of noxious weeds. The shade provided by a well-fed wheat crop smothers many weed pests, helping a grower to harvest grain with a minimum of weed seed dockage.

Quality Grain

All in all, a generous use of commercial plant food applied to wheat insures a maximum yield of quality grain by providing against losses from winter-killing of starved seedlings. Fertilizers permit seeding after danger of the Hessian Fly is past. It enables from less seed, through increased stooling, the production of a thicker stand of stalks, and increases the plumpness and number of kernels in every wheat head. Similarly, it effects the maturing of the crop before injury from late spring rust or drought can cut the yield. Finally, this last important benefit, fertilizers bring on the harvest of the crop early enough to enable the clover, grass, or alfalfa sown with it to continue to develop. Unfertilized grain is frequently so slow in maturing that its combined shade and draft on the soil moisture injures or completely ruins the succeeding grass or legume crop prospect. Since the sod crop following wheat is the so-called rest crop and keystone to a successful crop rotation, farmers who have failed to adequately fertilize their wheat nurse crops sometimes are forced to forego their profits from the grain by cutting it for hay in order to save the clover or grass. Generous use of fertilizer avoids the necessity of such a sacrifice by permitting the harvest of the grain before its demands on the soil could injure the grass or clover seeded with it.

How much a farmer may invest in fertilizer for wheat to obtain maximum profit is dependent largely on the circumstances under which the crop is grown.

When an application of 300 pounds of complete fertilizer makes the difference between a crop worth harvesting and no crop at all, as was the common experience in the winter wheat belt during the past season, the return per dollar invested in plant food is almost phenomenal. The profit on the fertilizer must then be figured with consideration of the losses to the farmer it prevents. For example, what is a farmer's loss per abandoned acre of wheat:

Value of seed wheat	$1.50
Preparing the seed bed and cost of plowing	5.00
Taxes and interest on investment in land (6 months)	2.50
Value of clover and grass seed sown with wheat	4.00
Value of average wheat crop in prospect	20.00
Value of increase due to treatment on succeeding clover and grass crop that the fertilizer would have provided	18.00

Conservatively, the cost of enough complete fertilizer to bring a crop of wheat and catch of grass and clover through the winter is about $6.00 per acre. The loss of a crop of wheat through winter-killing, together with the clover and timothy sown with it, makes the dollar invested in fertilizer capable of avoiding this situation, actually return at the rate of $6.00 for every dollar spent for fertilizer. This does not include the cost of again preparing the soil and the cost of the seed sown, if it is possible to get a catch crop planted following the wheat failure.

$5 for $1

In sections where the soil is of sufficient natural fertility to produce some sort of a crop of wheat even in most unfavorable seasons, the returns per dollar invested in fertilizer, although not as great as on the poorer land, are still big. Here, largely, in the extra yield and improved quality of grain and the following hay crop rests the farmer's profit. A fair estimate of the returns which intelligent users of complete fertilizers get from its use on such soils follow:

Gain in yield 10 bushels, worth	$10.00
One ton more hay from residual effect of fertilizer	20.00
	$30.00

Under the above conditions every dollar invested in fertilizer returns five. Even averaging the cases where the wrong kind, improper amount, or misapplication of fertilizer is made with those instances where it is properly used, one of the state experiment stations finds that every dollar farmers spend for wheat fertilizer returns three on the investment. In view of these facts and since statistics show that at present only half as much fertilizer to the acre is now used for wheat as has been found to be most economical, it is almost impossible to conceive the prosperity in store for the wheat belt when sufficient amounts of high analysis plant foods are more generally employed.

A Roadside Market

(*From Page* 21)

his holiday supply of birds and lets them out on his hillside farm along the El Camino Real road just a few miles from the famous San Gabriel Mission. People by the hundreds who see these turkeys roaming on the hillside think of Thanksgiving dinner and for some reason prefer to get them at the farm rather than to buy them at the roadside market, in spite of the fact that the fowls are handled in exactly the same manner in both places.

Richardson still raises much of the bunch vegetables, beans, and squash that are sold in his market, but the rising value of land has made it more profitable to buy the greater part of the produce he sells. This was not always the case, however, for it is said that in his lifetime Richardson has raised more melons than any other man in California. Hundreds of acres of land in the vicinity of Los Angeles that are now covered with valuable buildings were once green with the foliage of melon plants that he cared for.

Probably Richardson's greatest service to the market garden industry, however, was not so much the example of success in building his market place as was the popularization of the Klondike watermelon. A friend of his gave him the seeds from a "sport," and it is the descendents of this original oddity that are today being shipped to consuming centers by the hundreds of carloads. He planted the first seeds and gave them the necessary start, but a man by the name of B. F. Meyer helped him to decide upon the name.

A Cooling Sound

The name was chosen partly because it had a cooling sound and partly because the Klondike regions of Alaska were just being opened up at the time. The discovery and naming of this popular market variety of melon with its excellent shipping qualities did not prove to be a golden mine for Meyer and Richardson because they were not in the seed business, but no doubt many melon growers who have raised the luscious variety have struck "pay ore" with it. In the meantime its originator enjoys nothing more than to tend his market place by the side of the road and be a friend to man.

A carload of "Klondike" watermelons about to be shipped out of the Imperial valley, with one of its most ardent admirers looking over the consignment.

Working Together

(From Page 17)

graphic help. Contracts have been made enabling agents to purchase gasoline and automobile accessories at reduced rates.

That the Association has endeavored to put the job of the county agricultural agent on a higher plane is shown by the appointment of committees on advanced study, standards for county agents, and a code of ethics. Each year the Association sends some of its members to neighboring state conferences so that they may bring back any new ideas or methods that are being used in these states.

The success of the Indiana County Agents Association has been due in no small part to the officers who have been selected to lead it. These men have been untiring in their endeavor to have the organization accomplish some real definite achievement. The officers for 1928 are: President, E. C. Bird, South Bend; Vice-President, C. U. Watson, Martinsville; Secretary-Treasurer, H. E. Abbott, Terre Haute.

"Bucolicism"

(From Page 4)

Compton, California. Community recreation buildings have been erected within the past year by several towns, including Bluffton, Indiana, Wrens, Georgia, Girard, Kansas, and Waterloo, Wisconsin.

Getting out the stay-away voter, encouragement of parks, playgrounds, and athletics to stimulate health and recreation, charitable and hospital campaigns, conservation and public safety programs are other noteworthy signs of a new civic consciousness in the country towns.

They met their own problems. They put little faith in vague blocs or vaguer blockheads. Their inward purpose has been more intensely and vigorously patriotic than the average political platform dares to express or hopes to achieve. It is that foreign policy of "self-determination" made over for a domestic emergency.

Cynics have jibed at the village service clubs that meet on weekday noons in the dining rooms of the leading hotels and listen to speeches by some celebrity who happens to be caught there between trains.

A few years ago when they first hung up their society emblems near the fish and game picture above mine host's golden oak sideboard, these fellows were thinking in terms of home trading and mutual back-scratching. But time has changed their sentiments, and they are trying as best they can under their own local conditions to make the motto, "We build," a living force in their neighborhood.

Incidentally, in reaching out to know their own agriculture better they have found that patronizing does not instill patriotism, and that farmers are as anxious to give and serve as to be the recipients of gratuities or the objects of social charity. Few towns that possess wide-awake and discriminating service clubs among the tradesmen and professional group are branded as Towns Without a Country.

America's selfish, countryless towns make a somber and a pathetic picture. Their smugness, drabness, and dreariness choke and stifle the surrounding countryside like miasma from the bitter marshes. They are doing woful things to the agricultural census and not infrequently providing breeding grounds for illiterates, imbeciles, and the criminal insane.

CASUAL surveys of the villages may be misleading. They may be with or without the reeking, fly-specked pool hall or the helter-skelter store. They may or may not have paved streets. They may possess a "great white way" and a picture theatre, or they may have neither. The measure of their real patriotism does not begin or end in material things, although it partakes of them.

Disgust at decadent villages on the part of ambitious, idealistic youth is evident in every such countryside. Indeed, the Town Without a Country is morally responsible for a great share of the exodus of rural youth from an environment that is being exploited or neglected.

In our haste to assign it all to the lure of the bright lights and the Big Job, the average citizen has overlooked the part played by the "impossible" village in the depopulation of rural America.

Magazines, free delivery, traveling libraries, and the radio have given the farm youth tantalizing contacts with larger social forces. If his own social center does not reflect a tolerable share of the modern essence of life, the youth's desire is to move out and reach it somehow.

Would he pack his grip and face the "city slickers" if his only solace there were a hall bedroom and the snarls of a factory foreman? If his own narrow-visioned village had offered some worthy inducements, it might at least have halted his first impetuous rush and kept him nearer home.

What a redemption would such a stemming of the outbound human tide bring to our back-waters! It would save the keenest young minds for country problems and give leaders to a wobbling agricultural cause. It would set up more good schools, hospitals, and libraries, and supply better churches for the inland empire where the sinews of America are made.

It would educate village merchants and bankers in the true economics of rural life. It would secure more good local markets for the farmer and provide the wage-earner with better and cheaper foods. It would cut down useless freight and express hauls to and fro and out and back again. Best of all, it would cure provincialism and paternalism by a sound dose of practical patriotism.

Of course there are obstacles. Theory and practice are not always in tune for the towns. These things should be noted in justice to those who have tried and failed and to give credit to the ones who have met and overcome them.

NO town lives to itself alone. It must forever reckon on the neighboring village as a flattering imitator or a busy rival. "Dollar days," street carnivals, and hectic competition built on trade advantages only are attended by dangers. Over-emphasis upon public improvements that pyramid local taxation charges often buys provincial power too dearly. On the other hand there has been little thought put upon a division of the social and spiritual responsibility and community service between such rival villages.

Every town cannot support a hospital, nor can it overload itself with the cost of a modern high school. Yet perhaps within the range of the rural territory to which this village and one or two more villages belong there exists a real need for both. The time is coming when villages will work in harmony for a sensible division of these and other services, instead of utterly

ioring them. "Putting a lot of
o" into a civic scheme is an old an-
er to the rivalry question. When
orted to without a balanced social
ogram it is found that the contents
the public "pepper box" makes am-
tious burghers cough up excess taxes.
iese must be "passed on." As a re-
lt the town is "passed up" by the
rmers, for whom the lure was laid.

ONE of those observing drummers
who "make" country towns re-
ntly tried to sell a chemical fire en-
ne to the selectmen of such-and-such
village. No, they couldn't afford it
w; he had arrived too late. They
ould have to make the old hose cart
for another few years because they
d just installed "a dandy new siren."
This is typical of many other such
ttlements—long on the alarm, but
y on preparedness; ready to make a
ise, but futile in action. On the
me day a fire department in another
nall place about ten miles distant
ved a valuable farm house from de-
ruction with their modern motor
uipment.

"The farmer makes the town" is a
te remark. Conversely, some one
ots back the challenge, "The town
ikes the farmer!"

As a matter of fact, neither assump-
on is quite correct. No farming
mmunity, however prosperous, can
tirely overcome the provincialism of
stubborn, selfish town. No town
ay hope by modernity or materialism
one to re-make an agricultural area
at is socially or economically de-
dent.

Cooperative institutions in agricul-
re, if they are sound and a means to-
ard a reduction of risks and hazards,
ist be studied and welcomed by vil-
e seers and town philosophers. True
ricultural cooperation means as
ich to the village as to the farming
eas surrounding it.

Cooperation has gone through its
ctic period of slush and sentiment;
s been led astray by gerrymandering
politicians, and discredited because it aimed to build from the top down.

There is now a Division of Cooperative Research in the United States Department of Agriculture, whose function will be to help build these enterprises from the bottom upward, from the soil and the seed to the flower and the fruit. From a radical revolt led by irresponsibles and discontents it has become an avowed government policy, with bank discounts, warehouse receipts, and trade acceptances at its daily service.

Collective selling by farmers is far in the lead of collective buying by farmers. It was the bogey of collective buying that prejudiced so many villagers against anything that signified organized trading by farmers. When a farmer is working alone in the disposal of his main cash crop, pitted against all sorts of vague conditions, he more readily turns for relief in some form of organized buying than is the case where he sells his goods through a cooperative that insure him fair prices and market stability. In the latter case he is as independent as the city wage earner to buy at retail as he chooses, with more ability and inclination to purchase freely.

Where a village banker or merchant cannot endorse a given cooperative association his wisest policy is to keep his hands off and his mouth shut. The average farmer is so badly singed and blistered already with divers premature cooperative explosions that he is sensitive about the subject, and a pretty experienced judge besides.

There is another force that is rapidly coming into village life in the agricultural regions, and this is the industrial movement countryward. Manufacturing zones are slowly shifting in the middle west from congested, high-rent, and high-living centers out to small villages. Sometimes this is to get cheaper food and lower rents for factory hands; frequently to obtain certain advantages in distribution, or perhaps to save overhead and taxes.

In many such towns the blast furnace and the grain binder operate on adjoining properties, and the smoke stack and the silo are twin pillars of prosperity. Of all the places in Wisconsin, for instance, with more than 2,000 inhabitants, fully 60 per cent have at least one industrial plant that runs throughout the year. Some of the world's best-known, advertised, manufactured wares are made in little country towns, utilizing local hydro-electric power and employing numberless farm people during the fall and winter.

This phase of the town's development bears directly upon its function as a service station to the agricultural territory around it, and serves in the same way to bring the hitherto citified artisan into closer touch with the producer of food.

On the one hand it will show the farmer that one does not have to plow and reap or face adverse weather conditions in order to be a real producer of the world's necessities. His sons who find casual winter employment in the industrial village near home get a real taste of the rigor and discipline of routine factory management without the separation from family ties and the grave problems that perplex the boy who uproots himself entirely from the soil.

On the other hand, the industrial employe notices that chin whiskers and "rube" dialect are the exception rather than the rule in modern farming. He learns that a farmer does something besides plant the seed and watch it grow. He begins to sense that there is as much technical complexity, perhaps as much applied chemistry, in agriculture as in steel welding or battery manufacturing. Of a summer evening he drives out in his car and learns to call the farmers by their first name or he rubs elbows with them at churc lodge or high school commencemen

The Labor Union has had no pow to stay the willing hands of factor men in certain western communiti where fire or flood threatened to d stroy the crops and possessions of the rural neighbors. The Farmers' Unic has never uttered a radical prote when farmers flocked into a facto town to stem the tide of a brok dam.

This betokens a movement which of mutual benefit to soil, skill, and s ciety. In this relation between far and factory it is no longer true th familiarity breeds contempt.

AGRICULTURE and Manufa turing are the two greatest forc in America by which men live. The forces are meeting on a better ar more satisfying plane in the village

The greatest industrial experimen have thus far been performed in b cities, but gradully it is coming pass that the most successful facto sites are located in country towns th have established the best form of rur relationships. The slothful, provi cial, narrow-minded trading post dc not invite capital nor offer social pri ileges. The rural-minded facto owner is seeking the rural-minded v lage, but he wants an alert and ind pendent one.

Thus the Town Without a Count becomes a Town Without Anythin It comes back again to what it w intended to be—a fair place to born in if v can't avoid it, b a mighty po spot to engend patriotism or ra a husky family.

Watch for Jef article next month.

A Few Whinnies

THAT'S RIGHT

Bridget and Pat were studying the law of compensation.

"Accordin' to this," said Bridget, "whin a man loses one sense his others are more developed."

"Sure an' Oi've noticed it," exclaimed Pat. "Whin a man has one leg shorter than the other, begorra the other's longer."—*Fine Arts Shopper.*

"So your name is George Washington," mused the old lady.

"Yassum," replied the small colored boy.

"I'll just bet you try hard to be like him, don't you?"

"Lak who?"

"Why, like George Washington, of course."

"Ah kain' help bein' lak Jahge Washington, cause dat's who I is."

Passenger: "Why are we so late?"

The Porter: "Well, sah, de train in front is behind, and we was behind befohe besides."—*Fyr-Fyter News.*

Bobby: "Daddy, a boy at school told me that I looked just like you!"

The Dad: "That so?—and what did you say?"

Bobby: "Nothin'. He was bigger'n me."—*Eastern Breezes.*

Henpeck: "Doctor, my wife's dislocated her jaw. If you're passing out our way some time next week, you might drop in and see her."—*The Kablegram.*

FINE DISTINCTION

"Is dem aigs fresh?" asked Mandy of her dusky grocer, pointing to a basket of eggs.

"Ah ain't sayin' dey ain't," answered the grocer.

"Ah isn't askin' you is dey aint," retorted Mandy heatedly, "Ah is askin' is dey is."

"Change at the Junction, ma'am," said the ticket seller to an old lady.

"Now, don't be funny, my man," said the old lady. "I'll take my change right now."—*The Penn Mutual News Letter.*

Sandy entered a small tailor shop and said: "I see your sign says: 'Suits pressed 2 shillings.' Here's one shilling, press this suit on one side only. I am having my picture taken in profile."

"I want to buy some powder," said a shopper recently.

"Certainly, madam," replied the cash boy, 'Face, gun, baking, or bug?"
—*The Phi Chi Quarterly.*

"Don't cry, little boy. You'll get your reward in the end."

"S'pose so. That's where I allus do git it."

"Hey, you!" yelled the traffic officer at the amorous driver, "Why don't you use both hands?"

"I'm afraid to let go of the steering wheel," grinned the irrepressible youth at the wheel.

Better Crops with PLANT FOOD

August 1928 10 Cents

The Pocket Book of Agriculture

Timken Sweeps On!

EVERY one familiar with the industry knows how extensively Timken Bearings are used in farm implements, tractors, trucks and other agricultural equipment. Timken Bearings are today a conspicuous factor throughout the whole industry.

Timken's position is indicated not alone by the *number of makers* who equip with Timkens. It is indicated not alone by the *prominence of the makers* who equip with Timkens. It is indicated not alone by the *points of application*, for there are Timkens at all of the important points in many of the leading makes. Timken's position *is* indicated by the combination of all these factors.

Why this remarkable trend to Timkens? Simply performance on the job, made possible by Timken *POSITIVELY ALIGNED ROLLS*, the Timken tapered principle, and Timken electric steel. The *user* knows what that means in dollars saved. His experience with Timken-equipped machines, over a period of years, has proved conclusively that Timken rigidity, stamina, and endurance are the strongest insurance against lost time, constant attention, and upkeep expense. Timken's position in Agriculture was inevitable. Every month sees more manufacturers featuring Timken power and lubricating economy, Timken thrust-radial capacity—*Timken long life and low cost.*

Is the universal acceptance of Timken Bearings due to advertising, merchandising, salesmanship? They have helped, but only because they tell of the superiority of a superior product. Clear superiority is what has put Timken in the lead on the farm, as in other important industries. Timken's position was inevitable. Timken sweeps on — to dominance!

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

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

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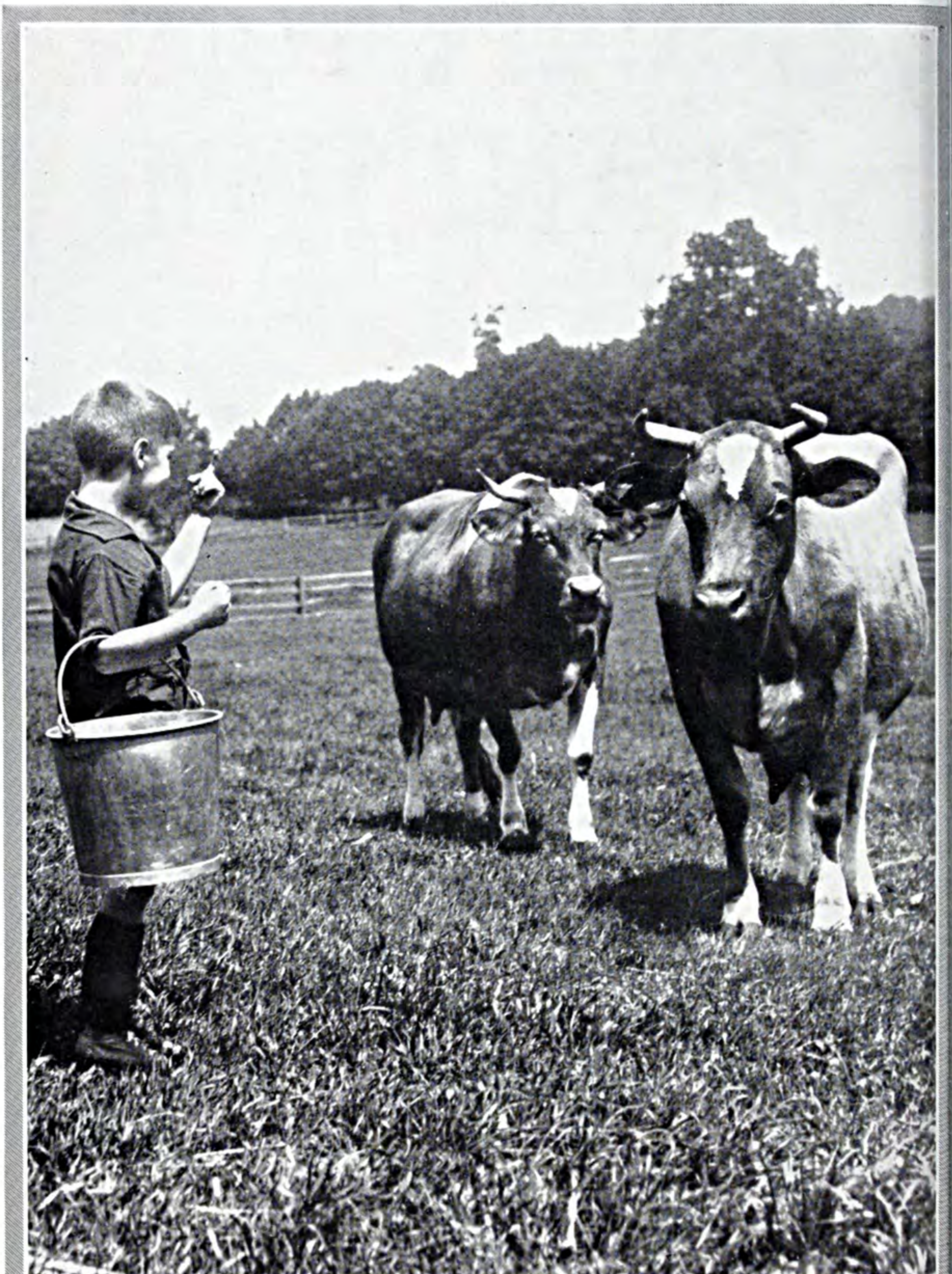

"Just a quart, please!"

Better Crops with PLANT FOOD

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EFF says it's easier to flower eeds than to weed flowers—in

Gardening

By Jeff McDermid

BEFORE you can be quite certain that you are a purposeful gardener, I am afraid you must drag down the dictionary gain. Don't assume too much because the neighbor's hens visit ou regularly.

If you find upon investigation that you are indeed growing leraceous and esculent herbs where none of that family thrived efore, then perhaps you can take courage. However, you'll have be very circumspect and cautious about announcing it, because have found botanical relationships confusing in the extreme hen I least suspected it.

For instance, I once grew a row of hard that was beautifully mixed with mb's quarters, and in the same sea- n I spent much time removing the tter and labored incessantly likewise separating pigweed from my spin- ch. To my dismay I found that all our of these noble leafy plants belong to the same botanical tribe. They were all *Chenopodiaceae*, otherwise known as goosefoot plants. We might have enjoyed a salad of lamb's quarters or a mess of pigweed greens just as much as we relished the two other more fortunate members of the family whose names stand in the "social register." You can't dismiss this case by saying that "a weed is a plant out of place." The pigweed and the spinach were about fifty-fifty in the rows anyhow, and I can't undertake to prove which seed got there first.

Of course, if it hadn't been for good old Linnaeus and his Species Plantarum of 1753, aided and comforted by the modern seed catalogs, we might have kept on growing all these kindred herbs in cosmopolitan confusion without having the neighbors call us lazy. All plants are vegetables anyhow, and in *my* garden it is much easier to flower out the weeds than it is to weed out the flowers.

SOME day I shall write a brochure on the subject, Why Do You Garden, And If So, When. My garden would make an ideal laboratory to follow out the theme of such a thesis. My wife wonders why I garden, and the neighbors wonder when.

As most of the worthy bulletins on pastoral arts come from experiment stations, I do not hesitate to give you the last word on oleraceous and esculent herbs, not to mention foolproof perennials and accidental hybrids. My garden is an experiment station or it is nothing—perhaps both! And my right to write is undisputed. If this treatise doesn't win your confidence, pass on to some other oracle.

In my philosophy I recognize five kinds of gardens and gardening, viz. and to wit: winter and summer; absentee or mental gardening; and the formal and informal. The winter and absentee systems require no tools, but for the three other kinds I advise building a machine shed.

In my winter gardening I empty more cigarette packets than seed packets. My urge for winter gardening has the added thrill that comes because my seed and nursery catalogs arrive on the rural delivery by the same red-faced carrier who brings my bills and the bulky South Dakota bibles. He is the Santa Claus of my pip dreams, and the government pays hin to bring me solace amid the snow He showers upon me the stimulus c Henderson and Ferry, the neighborl backslapping of the Seed Sage of Shen andoah, and presents me with a pictu gallery of wonder-berries beyond com pare.

He makes me forget the quackgra roots of literal life while I revel in th land of lithographs. The main reaso why I never imbibe spring bitters a tonic is because those gorgeous cat logs in the dormant season have give me the needful bracer.

As an overture to the opening num ber of spring's song, give me a doze showy vermilion and green catalog Their promises and their price lists a both precious to me. I inherit th trait from a goodly race of Scotc forebears who investigated but seldo invested. I may finally pick out m seeds at a grocery store for a nickel throw, but somehow I never regr the fun of planting the catalog stu I never bought. This constitutes m winter garden.

ABSENTEE gardening is the mo painful of all. It arises part from envy and partly from admir tion, and carries with it a sense horticultural inferiority complex.

I visited a glorious Canadian exper mental farm garden at Guelph la July. I found myself engaged in a sentee gardening within five minut of interviewing the florist. Borde take my fancy, and he had the nice strip of Tagetes Marigold you ever sa under a brilliant sun, flanked by ri bon rows of white alyssum and a bl belt of ageratum. I filled my eye a my note book. I dreamed about t transformation to be made in my ow prosaic plot by this imported ide brought home duty free to gladd the neighbors and foil the dandelion

The nearest approach to that sha

(*Turn to Page 62*)

Corncobs

By Arthur P. Chew

United States Department of Agriculture

AS yet the packer, saving all of the hog but the squeal, is more lvanced in util- ing by-products ian most other indlers of farm ommodities. /hether he will old his advan- ige is a question. hemists in the ureau of Chem- try and Soils of ie United States Department of griculture have ecently made ome startling iscoveries as to ie possibility of sing cereal astes. They are hot on the trail of what is in the corn- cob, and it looks as if that lowly ob- ject and similar products might turn out to be treasure trove.

Corncobs contain among other things a sub- stance called lig- nin. Dr. W. W. Skinner, assistant chief of chemical research of the bureau, recently told a congres- sional committee that lignin, with respect to indus- trial possibilities, holds a position like that held by

> **MANY USES**
>
> **Dr. W. W. Skinner, of the Bureau of Chemistry and Soils, Department of Agriculture, in the above picture, is pointing out some of the products made from the lowly corncob. They include (1) a block of insulating material (2) a wax model of a corncob somewhat exaggerated in size (3) various corncob products in bottles (4) plastic material used for printing plates, etc. (5) silk dyed with material obtained from the corncob (6) insulating material for use in radio and other electrical equipment. The United States annually produces 35,000,000 tons of corncobs.**

coal tar a century ago. That was an eye-opener, for the story of coal tar is not eclipsed by anything in the Arabian Nights.

Coal tar is the by-product of coal distillation in the manufacture of illuminating gas. Seventy-five years ago it was wasted in enormous quantities. Chemists discovered its master substances. They learned how to tear apart its carbon compounds, and rearrange them so as to form new compounds of great utility. In this way many new substances, possessing hitherto unsuspected physical, chemical and biological characteristics, were created. Mauve, the first coal tar dye, was produced by Sir William Perkin in 1856.

Eventually coal tar, in its raw state a sticky, evil-smelling mess, yielded perfumes, cool flavors and medicines, and also dyes, drugs, and explosives. Thousands of substances not found elsewhere, or not otherwise cheaply available, are now extracted from coal tar by chemical industries whose aggregate capitalization runs into the millions. That miracle will be hard to beat.

Like a Romance

When Doctor Skinner hinted it may one day be beaten by the miracle of the corncob, he was suspected of romancing. But skepticism soon changed into interest. As evidence of what the future may hold, Doctor Skinner showed the congressional committee three brilliant and perfectly fast dyes made from lignin in the Bureau of Chemistry—the first dyes ever got from a grain by-product. But dyes are not the only interesting or valuable things that the chemist gets out of the corncob. He gets cellulose, pentosans, adhesives, ethyl alcohol, glucose, xylose, and carbon. A briquette of soft coal can be bound with corncob adhesive.

It is not unreasonable, according to Doctor Skinner, to imagine the time when we may ride home from wor in a car fitted with electrical equip ment made from corncob plastic an painted with corncob lacquers, ente a home built with corncob board an covered with corncob shingles, ex change our work coat for an eas jacket made of corncob textile an colored with corncob dyes, seek a easy chair made with corncob prod ucts, read the evening news from paper made of corncob pulp an printed with corncob ink, toast ou toes before a fire of corncob briquett and soothe the senses by smoking corncob pipe.

Hidden Treasures

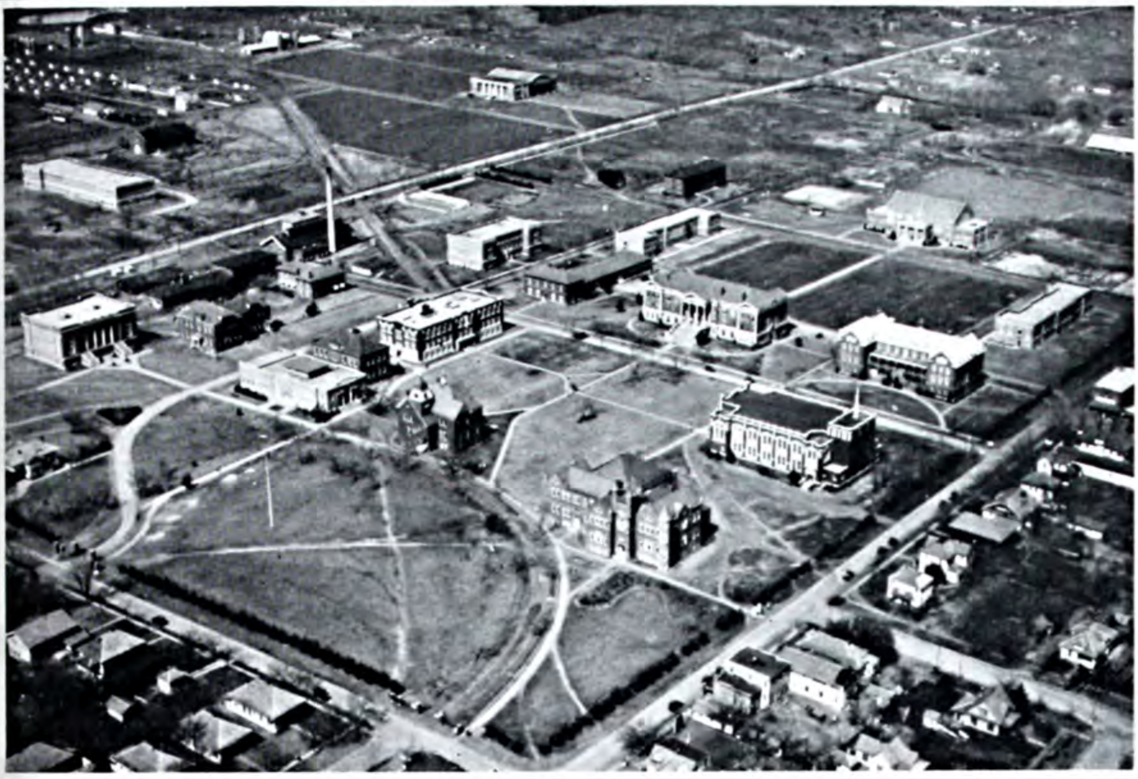
Lignin is the most promising sourc of new values from the corncob be cause, like coal tar, it is a comple carbon compound capable of bein combined with many other substance Its chemical composition, in othe words, distinctly favors the hope o discovering in it new sources o wealth. Another of its recommenda tions to the pioneering chemist is i great abundance.

Lignin is an important part no only of corncobs but of straw, oa hulls, cottonseed hulls, and other ce lular materials. It makes up from 2 to 30 per cent of the dry matter i such farm by-products. Today it the greatest of all unutilized farn wastes. Tomorrow it may be wort more than the other parts of th plants in which it is found.

As yet lignin has yielded only dye albeit much better dyes than the firs ones extracted from coal tar. But th chemist has only just begun the stud of its possibilities. And already he pretty confident that in lignin th world has been overlooking a big be

Other constituents of the cornco have already been made to deliver u some of their hidden treasures. Be sides lignin, the corncob contains pen tosans and cellulose. These sub

(*Turn to Page 55*)



OKLAHOMA Experiment Station

By Clement E. Trout

Editor, Oklahoma A. and M. College

WHEN the great plains area west of the Mississippi was settled, an island of territory was left vacant while the homesteaders occupied the surrounding land. This island was the Oklahoma Territory set aside by the Federal government for the Indians who were moved in from other states. When the good land in the adjacent states had passed into private hands, however, settlers began to demand that the Oklahoma territory be opened.

Finally in 1889 a large tract was opened to settlement in the famous run. By 1893 most of the unoccupied territory was settled. Unique in history is the sudden transformation of this large state from open prairie occupied by a few cattlemen and Indians to a settled state.

With the establishment of the territory in 1890, all public institutions had to be organized. Events moved fast and almost unbelievable progress was made in a few months. The Agricultural Experiment Station was begun as a part of this rapid development.

The Oklahoma Agricultural Experiment Station was authorized as part of the State Agricultural College by the first territorial legislature which met in 1890. The action also located the College and Station at Stillwater in Payne county. The land for the Station was selected in July, 1891; a director, Dr. James C. Neal of the

Florida Experiment Station, was elected in August; an agriculturist and horticulturist, A. C. Magruder of the West Virginia Station was elected in November; and the first land broken on December 2, 1891.

The land was virgin prairie sod. The state was just being settled and a multitude of problems faced the new Station. The first bulletin of the Station outlines some of the conditions as follows:

"The records of temperature, rainfall and sunshine for the Territory are too meager to be of much value; the soils have not been analyzed, and very few experiments made heretofore with fruits, crops or vegetables, hence it will not be practicable to follow a rigid program in a new and untried soil and climate.

"The growth during one year of a few fruit trees, indicates a possible special adaptation of the Territory to orchards and certainly this one point deserves the prominence I shall give it, in planting, as soon as possible, three trees of every variety known to do well in similar latitudes and supposedly like climates.

"The soils of Oklahoma being so unlike those of adjoining States, the prairie grasses form a sod that it said to act peculiarly during the first years of cultivation, and it is a commonly received saying that no crop will ever do well on winter broken sod, or, as it is usually expressed, 'Winter breaking ruins the land.'"

Began With Virgin Soil

When Magruder began work he found 160 acres of land available, 120 acres of which had never been broken and 40 acres were "one and one-half years from the sod." The first work included intensive tests of varieties of tree fruits, 260 varieties of apples,

Cotton plots on the Experiment Station Farm, Station buildings in background.

The staff of the Oklahoma Agricultural Experiment Station.

RIGHT: Director C. T. Dowell.

171 of peaches, and others in proportion being planted; small fruits; grasses; and the staple crops, corn, wheat, oats, and sorghums.

Thus work began on the Oklahoma Station. Now there are about 38 members of the staff, 250 acres in the main station; and branch stations or cooperative work is carried on at 10 other points in the state. Emphasis has changed from the first attempts to find out what crops and varieties of crops would grow in the Territory to more fundamental lines of research. Housing facilities and equipment are now fairly adequate and more building is under way.

Dr. C. T. Dowell, the present Director of the Station has been in charge since 1921. Among the prominent men who have been directors of the station at some time are Henry G. Knight, now with the U. S. D. A., and John A. Craig, author of the well-known text-book on stock judging. In all, the Station has had nine directors.

While the Station has been hampered by lack of funds, the last session of the State legislature appropriated $40,000 per year for the work. The largest amount received from the State before this time was $17,500 per year. The Federal funds have also been increased. With this aid the Station has made more rapid progress during the past three years than in any other like period of time in its history.

Experiment Station projects now include work in Agricultural Economics, Crops and Soils, Animal Husbandry, Agricultural Chemistry, Dairy, Entomology, Home Economics, Horticulture, Plant Pathology, and Poultry.

Adapted Crops Developed

Among the important accomplishments of the Station have been the development of Darso, which is now one of the important sorghums, especially valuable in unfavorable seasons; and of Oklahoma Triumph 44, a variety of cotton that is rapidly gaining general distribution. Fundamental work on the soft pork problem done a number of years ago has been a contribution of national importance.

A number of projects are now in progress which promise to throw light on fundamental problems. The study of the factors which effect the toxicity of cottonseed meal, resulting in the discovery that heating wet meal under pressure seems to decrease the toxicity, may have far-reaching results for animal feeders. A study of the effect of iron on nutrition is giving results of wide significance.

Experiments carried on for the past three years to determine the most satisfactory way of preparing grain sorghums for hog feed have already shown that this dry-land crop can be made the basis for hog production on a large scale.

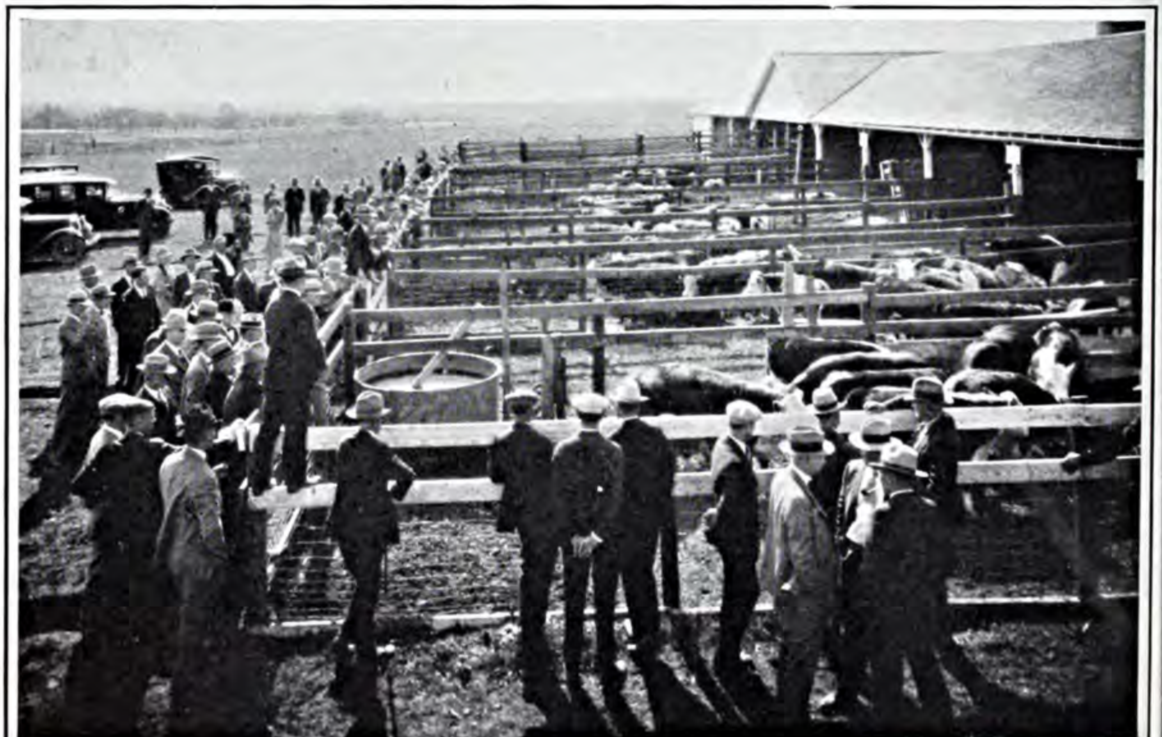
Pecans are native to Oklahoma and many farms have groves of the wild nuts. Improved methods of top working these old trees have been developed at the Station. Many farmers are following these methods and changing their native groves over into better paying varieties. In the aggregate this will mean many dollars to the farmers of the state.

While dairying is just gaining prominence in the State, the Oklahoma Station has done some work of national interest as that of the use of gelatine in ice cream.

Soil Tests Important

The oldest soil experiment at the Station is a continuous wheat test comparing manured and unmanured plots. The 1928 season is the thirty-third year for the test. Average yields on the two plots for the first 28 years are 21.31 bushels per acre on the manured plot and 12.58 bush-

(*Turn to Page* 58)



Steer feeding experiment results being announced at the annual feeders' day, 1928.

Vhen the wheat head egins to form, the ungus grows very apidly and absorbs ll the food substance f each wheat kernel n the head except the uter coat. Finally it roduces enough spores o entirely fill the kernels.

PROTECT YOUR WHEAT SEED *from* STINKING SMUT

By E. K. Walrath

Westminster, Maryland

STINKING smut of wheat, or bunt, is the worst disease of wheat in our principal wheat-growing regions. It is important wherever wheat is produced in this country, and it is estimated that the annual loss attributed to this disease amounts to 25,500,000 bushels.

Strictly speaking there are three classes of smuts—first: smuts similar to the stinking smut of wheat where infection occurs when in the seedling stage; second: smuts similar to the loose smut of barley, where infection occurs only when the plants are in blossom; third: smuts similar to corn smut where young growing plants may be infected by spores grown by diseased plants nearby.

Smuts of the third class can be controlled only by destroying the diseased plants as soon as they appear. Those of the second class, commonly known as loose smuts, are carried within the seed and can be controlled only by dipping in water hot enough to kill the smut spore, yet not hot enough to kill the seed itself.

Stinking smut, or bunt, belongs to the first class, that is, infection occurs only in the seedling stage, and therefore it cannot and does not spread from plant to plant in the field.

The disease, in spite of control measures that have been known and recommended for many years, is very serious. The wheat grower may prepare a good seedbed on well-drained, fertile soil that has been abundantly supplied with a well-balanced fertilizer. He may sow the best seed that can be bought; he may have ideal weather conditions for a big crop, and yet stinking smut or bunt may rob him of his profits by injuring the milling quality and reducing yields. No method has as yet been devised to get rid of the decaying, fish-like odor of stinking smut. So tenacious is the odor that is imparted to the flour that buyers do not want smutted wheat. They grade it at the bottom of the scale as to quality and price and in many cases positively refuse to buy it or handle it for the farmer.

Control Methods

This disease can be prevented by heeding the control methods as developed by our agricultural experiment stations and the United States Department of Agriculture. Their recommendations are practical and if employed will limit or entirely prevent the enormous losses now suffered by wheat growers.

If some of the dust from a smut ball is examined under a powerful microscope, the stinking smut will be seen either as smooth or rough seed-like spores or germs. They are so small that there are enough in a single smut ball to infect every kernel in a measured bushel of wheat.

The spores of the stinking smut or bunt are scattered over healthy wheat in harvesting, threshing, cleaning, or seeding. They may stay dormant even for years on the rough surface of the seed. The same conditions of moisture and temperature in the soil that sprout the wheat also germinate the spores of this disease. A cold, wet soil, however, is most favorable to their development.

A wheat grower may have stinking smut in his fields and not be familiar with the disease, but at threshing time he will note a strange odor about the fields or barn. If this smut infection in the fields is at all serious, he soon finds kernels coming from the separator that look somewhat like wheat. They are, however, filled with black, greasy, vile-smelling dust. This is stinking smut. If his field infection is low, he may not know that he has the disease on his farm until the grain buyer detects the odor, or shows him the so-called smut ball or infected kernel in the screenings.

When the stinking smut spore germinates, it sends out very thin root-like threads. These grow into the small wheat seedling before the first shoot breaks through the ground. Once the disease is inside the tissue, the plant is doomed. The tiny root-like threads live on the plant and grow up within the stem.

When the wheat head begins to form, the fungus grows very rapidly, and absorbs all the food substances in each kernel in the head, except the outer coat. Finally it produces enough spores to entirely fill the kernels.

To control stinking smut in wheat, seed that is to be planted should be cleaned by a strong fanning. This removes the smut balls which otherwise might be crushed by the feed wheels of the drill, thus spreading the disease in the soil to the seedling plants. The cleaned seed should then be thoroughly treated with a copper carbonate dust at the rate of 2½ to 3 ounces per bushel. This dust should be well spread over the wheat so that every kernel is coated. More than 1,600 smut spores have been counted on a single kernel, which indicates the thoroughness with which the dust must be applied in order to be effective. Machines have been designed to do this easily and cheaply. Home-made devices have been made with barrels mounted on standards. A mixing-board is inserted within the barrel so that when the barrel is revolved the grain is well coated with the copper carbonate dust.

Farmers treating grain for smut must be warned to treat the seed out-of-doors, or to wear a dust-mask or wet sponge. They should stand on the windward side of the machine and take time to be careful, because inhaling the poisonous dust will cause sickness.

Other precautions include checking up on the rate of seeding. Treated wheat runs slower in the drill. It should not be allowed to stand in the drill or become wet. Any excess dust should be cleaned out of the drill often, and the drill wheels rocked before starting.

There are other losses of the wheat crop which must be reckoned with. Vast areas of wheat are subjected to the ravages of the Hessian fly, and annually large areas suffer severe damage from winter-killing. Both of these robbers are possible causes of large losses ranging from 10 to 75 per cent of the crop.

The Hessian fly is best controlled by delaying seeding until after the fly-free date.

A heavy root system and good top growth enable the wheat field to catch and hold snow and resist winter-killing by rapid changes from freezing to thawing.

The use of fertilizer plays an important part in overcoming these two losses. Grain farmers very often use too little fertilizer for best returns on their investment. In fertilizing grain a farmer should fertilize for two crops —the grain crop and the hay crop which follows.

To obtain the highest yields and the best quality of wheat and the most

This wheat field in the Shenandoah Valley, Virginia, shows the effect of a fertilizer high in potash in safeguarding wheat against injury from winter-killing. The wheat on the left was fertilized; that on the right was unfertilized.

profitable crops of clover hay, right amounts of the right, high-analysis fertilizer must be used. Potash and phosphoric acid are essential for a good growth of clover. Lime should be used if the soil is acid, and the seed inoculated if clover roots previously grown on the land have not shown an abundance of nodules.

In the East

There are two chief wheat-growing areas in which fertilizers are used. One is in the East and includes Pennsylvania, Maryland, Delaware, Virginia, and West Virginia. The other is in the West and consists of Indiana, Illinois, Missouri, Ohio, and adjacent territory. The soil, systems of farming, and fertilizer requirements in each area are different. No one fertilizer recommendation is good for all soils.

On many farms in the eastern wheat-growing region, there is a big opportunity for the profitable use of fall fertilizers containing nitrogen, phosphoric acid, and the proper percentage of potash.

On the Coastal Plain (the area between the Piedmont and the Atlantic Coast) of Delaware, Maryland, and Virginia, are more than 2,000,000 acres of Sassafras soils. Wheat, corn, clover, and grass are common crops, but the yields of wheat are low. After 15 years of work, the agricultural experiment station of Delaware says that the wheat yields on these soils can be profitably increased by the use of fertilizers.

This experimental work shows that where no fertilizer was used on wheat the yield was 10.4 bushels per acre. When complete fertilizer was used, the yield was 23.3 bushels, but with a smaller amount of complete fertilizer, 18.5 bushels. A complete fertilizer, of course, means one that contains the three essential plant foods, nitrogen, phosphoric acid, and potash.

That all of these plant foods were necessary for wheat on this soil is shown by the fact that when nitrogen was omitted the yield dropped 6.2 bushels per acre; leaving out the phosphoric acid decreased the yield 8.4 bushels; without potash, the yield was 8.4 bushels less. Potash is needed on many of the Coastal Plain soils if good crops of wheat are to be grown.

With regard to quality, the results showed that variation in quality may be reduced from 103 per cent to 5 per cent by the use of the proper fertilizers.

The increased yield of clover from the use of a complete fertilizer on the wheat was 2,130 pounds per acre. When nitrogen and phosphoric acid only were used on wheat and the potash omitted, the increase in yield of clover that followed the wheat was only 409 pounds per acre. This shows the necessity for potash on these soils to produce good crops of clover hay.

The necessity for potash applies particularly to all sandy and sandy loam soils that receive only moderate amounts of manure, and all land that because of heavy cropping or lack of manure, has become depleted in fertility. All of these soils under these conditions should receive a mixed fertilizer containing from 5 to 10 per cent of potash, and the average application is 250 to 600 pounds of mixed fertilizer per acre.

On stock farms on some of the heavier silt and clay loam soils of the Piedmont where large amounts of manure are used, less, if any, potash will be required. On these heavy Piedmont soils, however, if large amounts of superphosphate alone have been used continuously, or on grain farms where little manure is produced, a complete fertilizer will give profitable results.

In the West

On many soils of the western wheat area, fertilizers pay on wheat, and have a very profitable effect on the clover crop which follows. This is shown by results of experiments conducted by

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UTAH *Knows Her* Onions!

By Guy A. Peterson

Madison, Wisconsin

THERE is a bit of old world romance connected with the onion seed industry in Davis county, Utah, for it was largely due to a simple discovery on the part of a missionary plant hunter in Spain that the profitable practice of producing certified onion seed was started in Utah. The story of the change from California seed to Spanish seed and finally to Davis county grown seed and the development of the Davis county onion bulb industry from a production of 13 cars in 1921 to one close to 700 carloads in 1927 was told to us by Wm. J. Thayne. Mr. Thayne is now the county agent at Provo, Utah, but for seven years was the agricultural advisor of Davis county.

W. J. Thayne.

"Although some onions have been grown in Davis county for many years," said Thayne, "the history of the modern industry dates back only to 1921 when E. E. Smith, one of our Bountiful farmers, spent the winter in California and learned about the Sweet Valencia onion that was being grown in the Golden state. Smith was one of our best onion producers as he had been growing a few for the local markets and had been securing large yields from our fertile lime soils. He saw the possibilities of growing a mild onion that would not only surpass the strong Giant Gibraltar in quality but would in addition produce a higher yield than could be secured in any other section of the United States.

"When Smith returned, we took the matter up with the truck gardeners of Bountiful. As a result they pooled their orders for 55 pounds of California seed which produced an excellent quality of sweet onion pronounced the best that had ever been grown and sold on the local market. As we had far more onions than could be disposed of locally, our growers formed a pool of their crop and agreed to sell it collectively. We appealed to the agricultural department of the Union Pacific railroad for assistance in finding an outside market, and they furnished us with a list of all the commission houses in the United States. The

Onion seeds are dried in crates.

Davis County Farm Bureau wrote to these possible markets, and a sample of the matured onion was sent to each firm. Letters that explained the merits, grade, method of packing, and method of shipping the Utah onion were also sent by the secretary of the Salt Lake Chamber of Commerce, the county agent, and the state commissioner of agriculture."

As a result of this advertising, the pool of 85 cars sold for the profitable net price of 85 cents a cwt. to the growers. That fall some of the bulbs were held over winter, and a start was made in producing home-grown seed when they were set out early the next spring. The beginning did not prove successful, however, for the yields were too low to be profitable.

Growers Incorporate

Early that winter Thayne called a meeting of the growers which resulted in their incorporation under the new Utah law permitting the formation of non-profit, non-stock organizations to protect their incorporators. One of the provisions of this law that would be an excellent addendum to many state cooperative statutes makes it a misdemeanor to spread false information about a cooperative enterprise.

The newly-formed cooperative ordered about 400 pounds of seed direct from Europe for the second year's planting. This was secured through Senator Reed Smoot who took the matter up with the U. S. consul in Spain. That year the 126 carload pool was sold through the association to the highest bidder at $2.25 per cwt. Because this was so profitable, onion growing was stimulated to such an extent that Utah was put on the onion map along with Idaho, Texas, and Washington.

In order to provide seed for the increased demands coming to the association, Thayne and Smith petitioned the president of the Mormon church to have one of Bountiful's onion growers, who was then on a mission in England, given a leave of absence for a month to tour Spain and France for the purpose of studying onion seed production in these countries. As the president gave his consent, George B. Mann Jr. left his missionary post to become a paid envoy of the Davis County Vegetable Growers Association. It was well worth the cost, for he assisted the organization in securing the second 400-pound shipment for the third year's onion planting and picked up many ideas that the members adopted to more than double their yield of onion seed.

Chief among these recommendations was the simple one of slicing off an eighth of an inch from the crown end of the onion bulb just before setting. This allowed many more sprouts to come through, thereby greatly increasing the number of seed stocks. It seems that the tough skin of the onions that will store well is strong enough to keep many of the sprouts from breaking through, but once these sprouts have started they will go on and develop seed stalks.

Reach Success

The first successful seed crop of any importance was harvested in 1925. Since then Utah has produced nearly all her own seed and exported much in addition, for it seems to be the consensus of opinion that this seed produces better onions than any seed the growers have been able to get in Spain.

Mayor Ernest Madsen of Bountiful told us that this certified, home-grown seed has resulted in very uniform crops of onions with average yields of over 900 bushels per acre for all the Bountiful growers. Madsen, by the way, was the first secretary of the onion association and is one of Bountiful's two bankers. The secretarial duties take much of his time, but he has been well repaid for it because his bank deposits have increased by more than fivefold since the organization was started.

Stephen Rhodes, a 4-H club onion grower at Farmington, succeeded in producing 1,200 bags or 2,400 bushels from a single acre to break the world's record and win a scholarship to the Utah Agricultural College. Young Rhodes did not fare so well the next year, however, because his plot was flooded and the plants were scalded. There is a possibility, too, that the decreased second-year yield might have been due to a lack of readily available plant food. Most onion growers in other sections of the United States use liberal applications of commercial fertilizers, but Thayne says that thoroughly pulverized barnyard manure applied the year before the onions are planted has given satisfactory results for Davis county growers. The crop is a new one, so it is possible that there is enough readily available plant food for onions to last a limited time, but from all indications the point will soon be reached where it will be profitable to apply commercial fertilizers even to these fertile soils.

Madsen took us over to the farms of Wm. W. Winegar and Clarence Roberts, for these men who were Utah's first onion seed growers now produce more seed than is used in the entire Mormon state, in spite of the fact that Utah has become one of the leading onion states in the Union. Though they operate separate farms, their practices are very similar. They both keep up the high natural fertility of the soil with liberal applications of manure from the Salt Lake City packing center.

Nothing but globe-shaped, dark-skinned onions three inches or more in diameter that have been certified by a state inspector are used for seed production. The ground is put into excellent condition the latter part of March because the crown-sliced bulbs are set as early in the spring as possible, at intervals of three inches in rows 2½ to 3 feet apart. They are then covered to a depth of about two inches and irrigated up. As it takes about 170 of the 100-pound sacks or around 8½ ton to set a single acre, the initial bulb cost is no small item, amounting as it usually does to more than $400 an acre.

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Mr. Winegar's field that produced 400 lbs. of onion seed per A.

Tomorrow's Farmer

By W. A. Freehoff

Waukesha, Wisconsin

RECENTLY the editor of a leading farm paper, who is himself a successful Ohio farmer, predicted that in the very near future a great many large corporations would spring up which would operate on a more extensive scale than is possible for the average farmer. This statement caused wide-spread comment and was quite enthusiastically assailed from many quarters. Somehow the idea has taken firm root in this country that the ideal farming system is one based upon a foundation of the small land-owning operator, and that centralization is impractical and undesirable.

Students of social and political economics do not believe that the British system of tenant farming is the proper thing for us, but apparently all is not well with the owner-operated farm idea. There is a tremendous political turmoil over the whole agricultural situation, which finds the corn belt in direct political opposition to the commercial East. Farmers of the Midwest have come to believe that unless they are given systematic political help they will be unable to operate with sufficient profit to make it worth while. Their leaders, when forced to admit that a great many farmers actually have accumulated a great deal of wealth and a large number are able to operate with profit, claim that the biggest material accumulations have been made because of the large rises in the value of land.

Regardless of what land may be worth today, if a farmer paid say half its present value 30 years ago, he is actually confronted with a very much smaller overhead than the man who invests on today's figures. Theoretically, of course, the two have the same overhead because if the man who bought 30 years ago were to sell now and put his money out at interest he would probably be doing better than if he continued farming.

The Transition

At the present time American farming seems to be undergoing transition from the development period of the day of cheap land, low taxes, and cheap labor to the day of high-priced land, high taxes, and expensive labor. When the transition is fully accomplished, we may well pause to give consideration to what the farmer will then be able to do. The actual mechanics of farming are different today than they were in the times of our forefathers, and there is a mechanical transition going on which indicates even greater use of mechanical power. Should this be the case, it is quite logical that the farms of tomorrow will be owned and operated by corporations which have money enough to swing such a proposition.

Take the one item of electricity. Today in my own community, and this is by no means as fully developed along this line as many other sections of the country, electrical current has become an everyday proposition. The farms are lighted by electricity and electric motors have almost totally displaced the stationary gasoline engine. The farm wife operates her household machinery by electricity and even does her cooking by means of "White Coal."

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Note the irrigation ditch cut through the peat soil after the potatoes were planted.

Record Potato Yields

By J. T. Rosa

California College of Agriculture

THE Delta section, near Stockton, California, has made a wonderful record in potato production—three "World's Record" crops in four years. Record "busting" began in 1924, when Mr. Fred Rindge produced 57,762 lbs. on a surveyed acre. In 1926 Zuckerman Brothers on another tract nearby grew 62,400 pounds on one acre, and in 1927 Mr. Rindge again broke the record with 64,700 pounds from a single acre. The significance of such yields can be seen from the fact that the average for the United States is a shade under 7,000 lbs. to the acre.

A few years ago I saw a statement that the Delta section of California was about through, as to potato growing. If such were the case, it is certainly showing signs of a healthy

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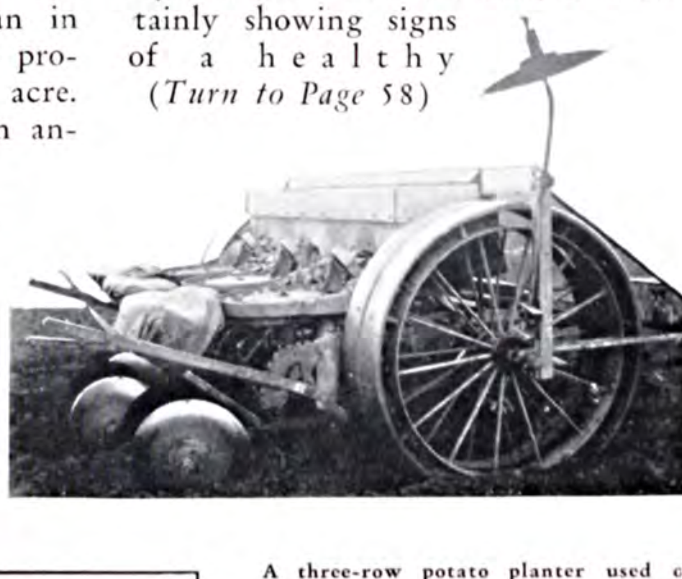

A three-row potato planter used on the Zuckerman ranch. Labor-saving devices decrease cost of production.

The result of an experiment to show the effect of potato disease upon yield. Right: 1 sack from mosaic-infected plants. Left: 5 sacks from healthy plants.

After being drained and then farmed under a system of balanced fertilizer treatment, hundreds o thousands of acres of originally barren peat lands in the North Central States have been made to pro duce as fine potatoes and delicious truck crops as any raised in America.

The Quality Era

By C. A. LeClair

St. Louis, Missouri

"WHY don't more people use leather garters?" I asked a haberdasher who attempted to sell me a pair of them after I had expressed dissatisfaction with the service rendered by the ordinary elastic type.

"They do!" he replied. "We are selling more of them every day. Still at present only one man in twenty is ready to pay the premium for the comfort and economy that the leather type affords."

People are more or less victims of habit. We become accustomed to paying a certain price for an article and more or less disregard the adages, "You get what you pay for" and "The best is the cheapest in the end." However, it is rapidly coming to that point, regardless of the field of endeavor, where special effort applied in the production of the highest quality goods pays the biggest returns, be cause people are quickly learning hov to judge the best and demand it.

With the beginning of the twenti eth century mass production had bee an outstanding characteristic of Amer ican industry. Farmers naturally ac quired the same habit. How man bushels of grain can I produce, o what is the cheapest way to produc a pound of pork, have been the typic aims of average farmers. The resul was at times an over-production o nondescript stuff and a dearth of tha for which people were willing to pa a premium.

As people prosper and their stand ard of living rises, their taste im proves. Since 1920, throughout near ly the entire world, the standard o living has steadily advanced with th result that authorities now predict tha it will not be long until people, who, heretofore, were content with rye bread, will demand loaves made of wheat. This will, of course, increase the demand for wheat the world over with a corresponding tendency to increase the price per bushel. Coincident with the quality buying inclination of the public which has been constantly growing during the past decade an ever-increasing number of farmers have arisen to the occasion and find that the production of quality products is as contributory to their profit as is quantity production. They have observed that the market has not been, nor is it likely to be for some time, saturated with products grading the best.

Feeding Value

Most all the corn, much of the hay, and a large per cent of the grain and other crops, are fed on the farms where they are raised. Farmers themselves, therefore, can well afford to consider the feeding value as well as the yield of their feed crops. For instance, a yield of one and one-half tons of hay to the acre is considered satisfactory by most livestock farmers. Such a crop is ordinarily harvested with modern machinery and stacked in the field. The loss of feeding value due to exposure prior to feeding it is frequently overlooked, and the producer rests content with the mistaken idea that his per capita production is a maximum under his conditions. It may be that he does farm with profit under such a system of management. However, it is not uncommon for a neighbor, with very little more expense and effort to enjoy a harvest of a half ton greater yield of hay per acre which has as much as 50 per cent more feeding value. It does not take a cost accountant to figure out which of these farmers profits most.

That a ton of hay grown on one farm may be worth twice as much as the same weight of hay grown under less favorable conditions on a neighboring farm, is an established fact. This is because the plant food content of the soil has a marked effect on the composition of crops produced upon it. Poor soils generally grow crops deficient in mineral constituents, as well as in digestible nutrients. The relative value, therefore, of crops grown on good land, as compared with those raised on unfertile soil, can not be measured adequately with a scale, but the animals to which the respective forage is fed, respond proportionately. For example, when cattle are turned into a pasture, part of which has been fertilized previously, the animals instinctively graze the well-nourished grass. Again, a dairy cow fed for a week on hay grown on sour, run-down soil and then offered for a like period roughage of the same variety grown on fertile acres, invariably causes the dial of the milk scale to move toward heavier production.

It is well known that all soils are not equally fertile. On the other hand,

Animals respond to well-nourished grass and clover.

more farmers should realize that it is largely within their power to bring their fields to a maximum state of fertility through the use of commercial fertilizers. In fact, no other course is practical under present agricultural conditions. At present there is hardly a farm in the United States whose acres are not more or less deficient in some or all of the essential plant food elements, and for every dollar invested in their improvement, profitable returns can be secured.

Through selection and plant breeding, the yield of corn in the State of Wisconsin, for example, has been practically trebled, as compared with what the same acres yielded a generation ago. Similar results with this and other crops have been accomplished in other states. At the same time it is well known that the best strains of grain do not yield in proportion to their capacity in many localities and on some depleted soils they even fail to produce seed. The reason for this condition is that these elite varieties demand the treatment they deserve. Or, saying the same thing in another way, the agronomists are just a little ahead of the preparedness of farmers to make the most of their offerings. The element of quality is something which necessitates nursing and husbanding. Hence, the highest yielding, most nutritious crops, can be grown to best advantage only on land in a high state of fertility and maintained in that condition by enrichment with commercial plant foods.

Fertilize for Quality

Proof of the influence of fertilizers in improving the food value of crops is multiplying daily. For instance the yield and quality of the finer grades of canning peas have been materially improved through proper fertilization of the land upon which this crop is grown. Similarly, the sugar content of beets has been raised, and the palatability, color, and keeping qualities of fruits have been improved by a judicious use of balanced commercial fertilizers.

In some localities farmers have made admirable progress in the use of modern methods of efficient production. During the past 10 years thousands of acres of raw peat land in the state of Minnesota, which had been originally considered as just so much waste space, have been drained and fertilized so that the choicest quality produce reaching the market now hails from these lands. These peat soils at the outset were recognized as being inherently out of balance as regards their plant food resources. Hence, farming them without supplementary treatment with commercial fertilizers was not even considered. To the credit of the Minnesota Agricultural Experiment Station, which had by investigation worked out a fertilizer treatment to fit the conditions, goes the discovery of this great agricultural possibility.

The discovery of ways to use what were formerly considered marginal farm land in many of our northern states, is another quite recent achievement. Agricultural experiment stations in each of the several far northern states have taught their constituents how, through the use of quick-acting, soluble commercial fertilizers, it is possible to successfully grow quality crops in sections on the fringe of, or even beyond, their original habitat. Here, where the growing season is relatively short, the effect of fertilizer by actually increasing the resistance of growing crops to frost injury, together with hastening their maturity, is responsible for the extension of the staple crop culture area hundreds of square miles.

The full extent to which the use of commercial fertilizers effect our daily bread is almost unbelievable. Everyone knows how the wheat belt moved from the Atlantic Sea Board States in colonial days, westward, largely by reason of the lands on which wheat was first grown having become worn out through lack of supplementary treatment. Today the great wheat states are the Dakotas, Minnesota, Missouri, Kansas, and Illinois. To be sure, wheat is grown to some extent in other commonwealths, but these states are holding their own in production and even increasing their yields. By using commercial fertilizers, farmers of the Central West have been able to make wheat production permanently profitable on the nation's last frontier of virgin soil.

Coincident with facilitating the permanence of wheat culture, has come the improvement of its quality by proper use of commercial fertilizers. The effect of fertilizers on the composition of wheat has been actually measured by scientists. In the great wheat state of Kansas, tests at the Moran Station showed that treatment of the land with superphosphate fertilizer not only increased the yield of winter wheat six bushels to the acre but that the weight per bushel of the wheat from the treated land was increased as much as three pounds.

Veteran millers in Missouri and Illinois have found that fertilized wheat in these states frequently weighs 10 and even more pounds to the bushel heavier than unfertilized wheat grown in the same neighborhood. They say it is possible to identify a load of fertilized wheat by the color and plumpness of the berries even before the grain is put to a test. However, the effect of fertilizer that counts most is the way it increases the gluten content of the wheat. Fertilized wheat makes the best flour and so it is not always the cook's fault if a cake falls.

In determining the full value of the farm products for human and animal nutrition, the amount of vitamins they contain is now also taken into consideration. Knowledge about the factors in growth which effect the vitamin content of foods is as yet relative-

To insure high quality grain it must be carefully shocked and promptly threshed direct from the field. If this cannot be done, it always pays to stack the grain until it can be put through the separator.

ly meager. However, it is of interest in this connection that some recent experiments conducted at the Ohio Agricultural Experiment Station at least indicate that wheat which had been generously fertilized with superphosphate or a complete fertilizer high in available phosphoric acid, was comparatively rich in vitamin "B." Vitamin "B" is known to stimulate the appetite and digestion, and hence contributes to good health.

A poor baker can take the finest ingredients and through careless mixing and baking produce an unpalatable loaf of bread. Similarly, a farmer can cut the finest prospective crop of alfalfa at the wrong time and harvest a very poor grade of hay. Three-fourths of the nutrients in alfalfa hay are in the leaves. Hence when the crop is cut in the bud stage and properly cured, almost twice as good hay is obtained as compared with that secured if the stand is allowed to mature to the seed stage when many of the leaves are shattered.

Unfortunately, weather conditions at harvest time and before the crop can be housed cannot be controlled. However, forecasts are available and other precautionary measures can be employed to largely avoid undue exposure and depreciation of a crop in the making. The marked effect of needless exposure in deteriorating agricultural crops is astonishing. For instance, the Colorado Agricultural Experiment Station found that alfalfa hay lost almost one-third of its weight after exposure to rain. Such a loss is even more costly than the mere shrinkage of weight indicates, for it is at the expense of the most digestible portion of the crop. Similarly, it was found at the Indiana Agricultural Experiment Station that corn fodder exposed to the weather in shocks for a little over a month depreciated one-fifth and more in feeding value. Hence, it should be realized that quality crops once obtained may, through carelessness, quite easily deteriorate. This applies not only to staple crops but also to everything raised on the farm.

It is a well-known fact that Florida citrus growers can produce a more delicious orange than California growers. Yet California oranges are consumed in larger quantities than the Florida product. This is largely because California producers overcome a handicap by providing that their product reaches consumers in a more uniformly graded and branded package. A visit to any large city market reveals the needless waste resulting from careless packing of perishable vegetables and fruits. All of this can be avoided to the ultimate reward of the grower.

There is, therefore, a fertile field open to farmers of the United States to increase the returns from their labors through the employment of methods which will provide for greater care in harvesting and more thorough grading of their products. The example of what farmers of Denmark have done in this regard should be proof of the fact that it will pay big to give as much attention to quality production as is now given to quantity production.

Quality Counts

Farmers who grow the best of everything are invariably the ones who are making good at present, and they too, will profit most in the future. To produce quality products, requires the use of quality materials. High-producing dairy cows are worthy of the best feeds. It requires the best commercial fertilizers to grow the most nutritious feeds. In other words, quality counts in everything that is bought as well as sold. If seed is of a higher germination test, a brand of fertilizer in better mechanical condition, twine of more even twist, it is well worth more than materials of lesser productive value. A fundamen-

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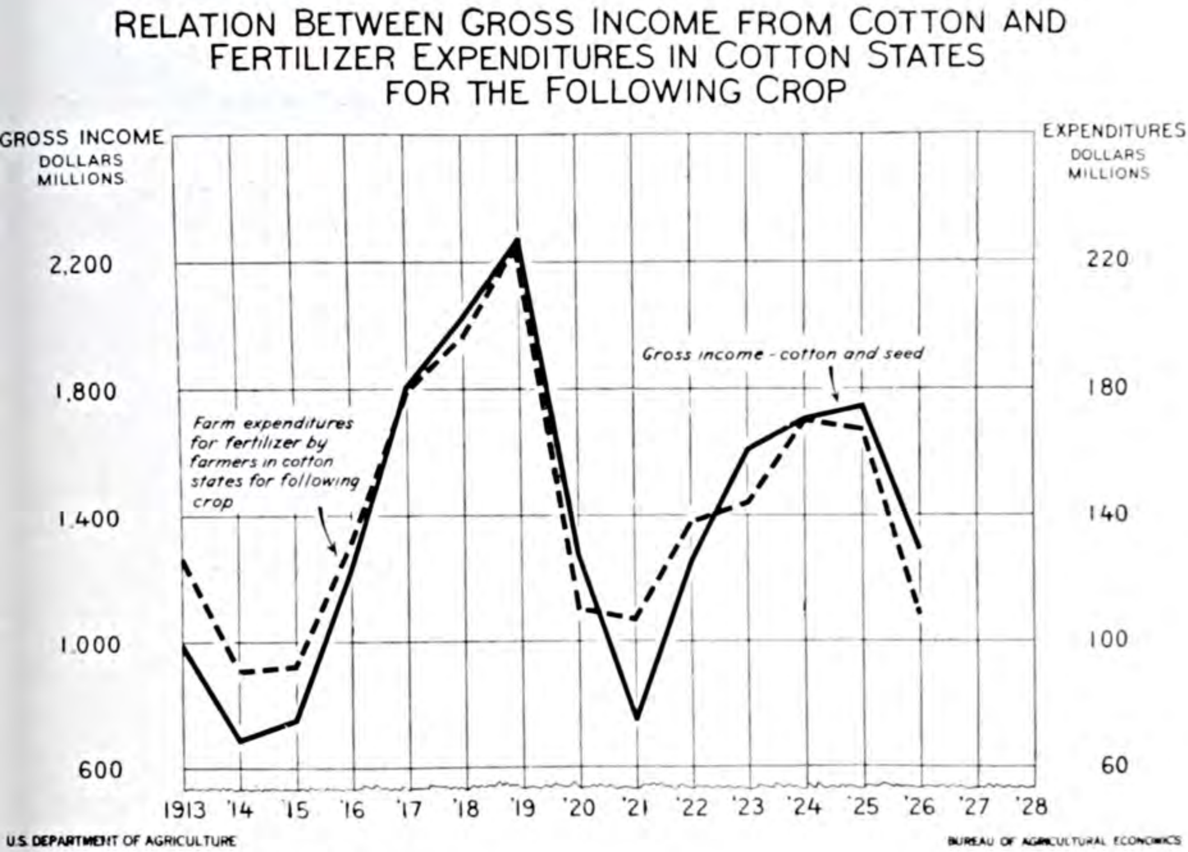

Vice Versa

Cotton depends on Fertilizer
Fertilizer depends on Cotton

By Frank George

United States Department of Agriculture

THE income from farm production in any given year in a large measure determines succeeding purchases, according to L. H. Bean, Department of Agriculture economist who has recently made a study of short-time inter-relationships between agriculture and business.

Stated differently, Mr. Bean declares, farmers tend to buy on the basis of income already earned rather than on the basis of prospective conditions or earnings. The fertilizer industry, for example, finds the farmer a good prospect or a poor one depending on what the harvest has brought. This is obvious from an examination of the accompanying chart in which the annual gross money income from the cotton crops since 1913 is compared with the estimated expenditures for fertilizer by farmers in the cotton states, these expenditures being made mostly during the planting period in the spring, while the income is derived mostly during the harvest of the preceding fall months.

The relationships would be still greater if income from other crops grown in the cotton states were included, but the comparison is regarded as sufficient to illustrate that the income from the major crop, cotton, practically determines the amount later spent for fertilizer.

Making Sands Fertile

(Editor's note: In the last issue of BETTER CROPS WITH PLANT FOOD, *under the title "Making Sands Fertile," we ran a story of the Pennsylvania Railroad's experimental Farm near Howard City, Indiana. Since the story appeared, a clipping from the Chicago Daily Drovers Journal giving the results of some of this year's experiments has been sent to us. We print it herewith as a very interesting supplement to our story.)*

HOWARD CITY, MICH., June 27. —Hay weights made here indicate that combinations of phosphoric acid and potash will produce a big increase in the yield of sweet clover on Plainfield sand. The tests were carried out on the Pennsylvania Demonstration Farm, two miles north of here, where for the past eight years the Hagerman Bros. have been demonstrating the Keystone rotation, which is especially adapted to farming sandy soils.

Thousands Visit Farm

The system was first projected by D. L. Hagerman, the first agricultural agent for the Pennsylvania railroad in this territory. After his demise his brother, B. O. Hagerman, was put in charge of the farm to carry out the rotation, which includes rye and vetch and also sweet clover. All the fields have been marled. During the last two or three years it has become increasingly evident that this soil, technically designated as Plainfield sand, responds also to applications of all three plant foods, but particularly potash and phosphoric acid on the alfalfa and sweet clover. Thousands of Michigan farmers trek to this farm every year to view the results of systematic, practical treatment.

Peas, Oats Seeded With Clover

During 1927 sweet clover was seeded with field peas and oats on a field that lies south of the buildings. This field has never been treated with commercial fertilizer. This showed up as a very good stand last summer when the county agents of central and northern Michigan met here to inspect the farm. It came through the winter in good shape.

In May of the current year, Gerrit Posthumous, the resident manager, laid out four plots to test the efficacy of applying phosphoric acid and potash alone and in combinations, as a top-dressing.

The green weights made indicate that neither one used alone produced the result that the two did when taken together in an 0-8-16 formula. The acre receiving no fertilizer produced 7,180.8 pounds of green hay, the acre receiving 350 pounds of 0-0-16 (pure muriate of potash) produced 12,262.2 pounds of hay, while the acre receiving 350 pounds per acre of an 0-8-16 produced 13,389.2 pounds of green hay. The dry hay weights will be computed later.

Results of Treatment

From the results it will be observed that straight acid phosphate depressed the yield, pure muriate of potash increased the yield 71 per cent over no treatment, while the 0-8-16 combination applied in a 350-pound dose increased the green hay weight 86½ per cent over the ground that received no commercial fertilizer.

Shoes were put on both the near and far ends of the cutter bar, thus cutting the sweet clover about eight or nine inches high, to promote a second growth. Weights will be made of the increase in second growth produced by the various fertilizer treatments.

Stacking Beans

By Y. P. Bhosale

Ithaca, N. Y.

MANY a time, in the fall, it so happens that the bean crop is ready to be hauled into the barn or to be threshed from the field when a shower comes, preventing the handling of the crop. Such rains make it necessary for the farmer to turn the beans, which have been pulled, quite often. This means more money spent for labor, not considering the loss caused by the actual damage to the beans.

There are farmers who plan to plant their bean fields to wheat if the beans are harvested in time. Frequent showers prevent the farmer from removing the beans from the ground until it is too late to sow the wheat. If he still sows the wheat, it is at such a late date that there is a loss in the yield due to winter-killing.

The McNaughton system of curing beans enables a grower to successfully harvest beans even under adverse conditions. The additional expense required to cure by this method is very slight.

In this method the beans are pulled when ripe with a bean puller and thrown into a windrow with a side-delivery rake, there being two pulled rows or four bean rows in a small windrow. As a general rule two of these windrows are thrown together, making eight bean rows in one large windrow.

When the beans are in windrows they are stacked four windrows at a time. Then across the field, between two of the large windrows, is driven a wagon carrying straw and some steel posts. The first post is set about 2½ rods in from the end and is followed by other posts at intervals of about 5 rods.

Steel fence posts that are seven feet long are used. They are strong and just about right in height. Poles can be used, but they must be very strong. It is best to use steel posts because they can be bought at a reasonable price, are easily set, and could be used for a long time and still have some value.

A post is driven into the ground and a forkful of straw placed around it. The straw is placed in such a manner

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Beans stacked like this allow early seeding of wheat.

What I *Did* *with* Waste Land

By T. S. Nored

Paris, Tennessee

TWO years ago, I purchased a small tract of land near my home. A part of this land was an old field, which had not been cultivated for several years, was considered worthless and unfit for cultivation, was grown up to briers and bushes, and was considerably gullied. It was sandy loam underlaid by a red clay subsoil, where erosion had left nothing but the subsoil.

I put in spare time through the winter cutting briers and bushes, filling the gullies with them, plowing off the banks and covering the brush until I could cultivate across them. My next step was to make three terraces across the hillside, with just enough fall from the center to each end to drain the water each way before breaking over and washing more gullies. Where my terraces crossed the filled-in gullies, I built the terrace higher and stronger.

I was now ready to prepare for a crop. I double-cut the land with a disk-harrow, broke it deep with turning plow, disked again, and harrowed until a fine seed bed was made.

Part of the piece was planted to corn, fertilized with 200 pounds of a 10-4-4 fertilizer to the acre in the drill. The balance which I had cleared off was set to sweet potatoes, fertilized with 400 pounds of a 10-4-4 per acre. I finished cleaning-up and planting the balance of this field to cowpeas in July.

At the last cultivation of the peas, on the 20th of August, rye, hairy vetch, and crimson clover were sown for a winter cover crop and to plow down in the spring, with no extra expense of preparation of ground.

At the last cultivation of the corn, cowpeas were sown broadcast. The corn was cut and shocked, the peavines disked into ground. Rye, vetch, and crimson clover were sown also on the potato ground.

Instead of a field of bushes, briers, and gullies, I now have a field well terraced and covered with green crops to plow into the soil next spring to increase its fertility and the yield of succeeding crops.

Grows Fertility

All available manure is being used to increase the growth. The value of the fertilizer not consumed by the crop is plainly evident by the increased growth of cover crops in potato, pea, and corn rows. Not only am I growing fertility to plow down next spring, but am conserving the fertility by preventing it washing and leaching out of the ground with the winter and spring rains.

I did not expect a large yield, until the ground was put in condition to produce it, but the yield was sufficient to leave a small profit to say nothing of the increased value of

(*Turn to Page 53*)

Lowell Moffitt in front of the seed corn house made by combining an old tool shed and hog-house.

The Rise *of a* Hoosier Corn King

By K. E. Beeson

Soils and Crops Department, Purdue University

ONLY a few years ago Lowell Moffitt was a grain and livestock tenant farmer down in Rush county, Indiana. He was a good farmer, it's true, but was unknown outside his own neighborhood. Today he is Indiana's latest corn king, by virtue of winning the 1928 State Corn Show, and few honors in the Kingdom of Corn exceed that of winning the Hoosier Show where competition is as keen as at the International Hay and Grain Show in Chicago.

Very few "Kings" have had a more phenomenal rise to this glory than Mr. Moffitt. Like most livestock farmers of his territory he was feeding both cattle and hogs a few years back when prices dropped, and consequently faced the problem of making his farming operations profitable by changing his system. Always a lover of corn, though not a specialist like some of his neighbors, he turned seriously to the task of studying this leading Hoosier crop. With a start of well-bred, high-producing corn, the addition of the right fertilizer to his black soil, and the use of sweet clover in rotation he was soon producing yields that made him a constant threat in the State Five-Acre Corn Contest, with official yields ranging from 111 to 125 bushels per acre during the last three years. However, like all lovers of corn, he was not content with yields alone, but took up the finer study of improving his type and developing a seed-corn business. Naturally this called for equipment for properly storing and drying his corn. But here a stumbling block developed in his plans that might have stopped a less determined individual. His landlord's interest in corn, hogs, and cattle did not carry over to the seed-corn business, and no properly constructed seed house was available.

These stumbling blocks sometimes inspire determinaton and such was the case with Moffitt. He took stock of the farm buildings and decided that some of his machinery could be stored in the barn and that less space was needed for his hogs. Combining two buildings that were thus made available, adding a concrete floor and walls, battening the cracks, and making the building rat proof soon made a place that would store 500 bushels of seed corn. The addition of several windows cared for the necessary light and ventilation, and an old stove surrounded by sheet metal provided enough heat to properly dry the corn and prevent freezing. Wire racks suspended from the reinforced cross-beams offered ideal means of storage, for no two ears touched and air circulation was excellent. And so an inexpensive home-made seed house was developed.

More than ordinary care must be exercised in producing a crop of corn that is primarily intended for seed purposes. The sweet clover provided the organic matter and a part of the nitrogen needed by the corn crop, but Mr. Moffitt took no chances of his corn starving for lack of plant food. Liberal fertilization ranging from 200 to 400 pounds per acre of 0-10-10 were broadcast before seeding, and 100 pounds of 2-12-6 were applied in the row at planting time, while adequate cultivation was given during the growing season.

The real burden for the seed-corn producer came with the harvesting of the seed crop. Shouldering a grain bag, Mr. Moffitt spent days in his fields when the corn was properly matured, but before it had been frosted, gathering the proper type of ears from the right kind of stalks.

No seed-corn man spends valuable time during the fall and winter in

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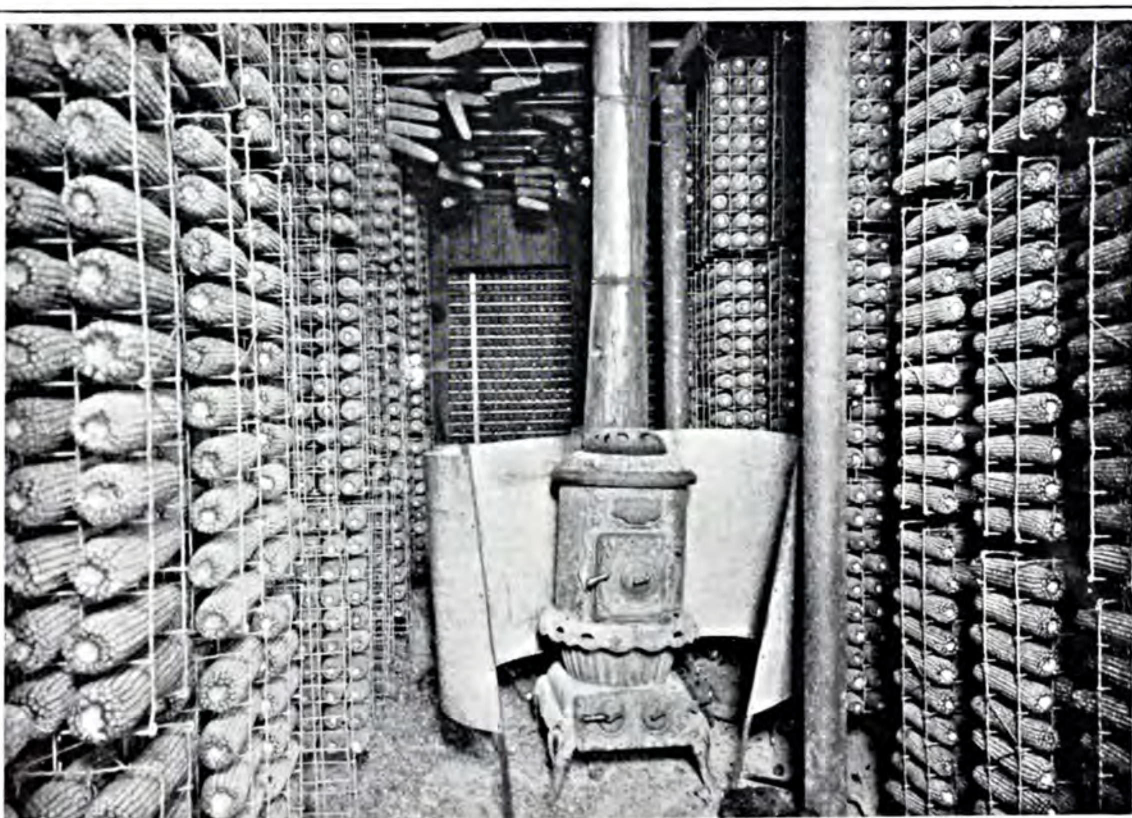


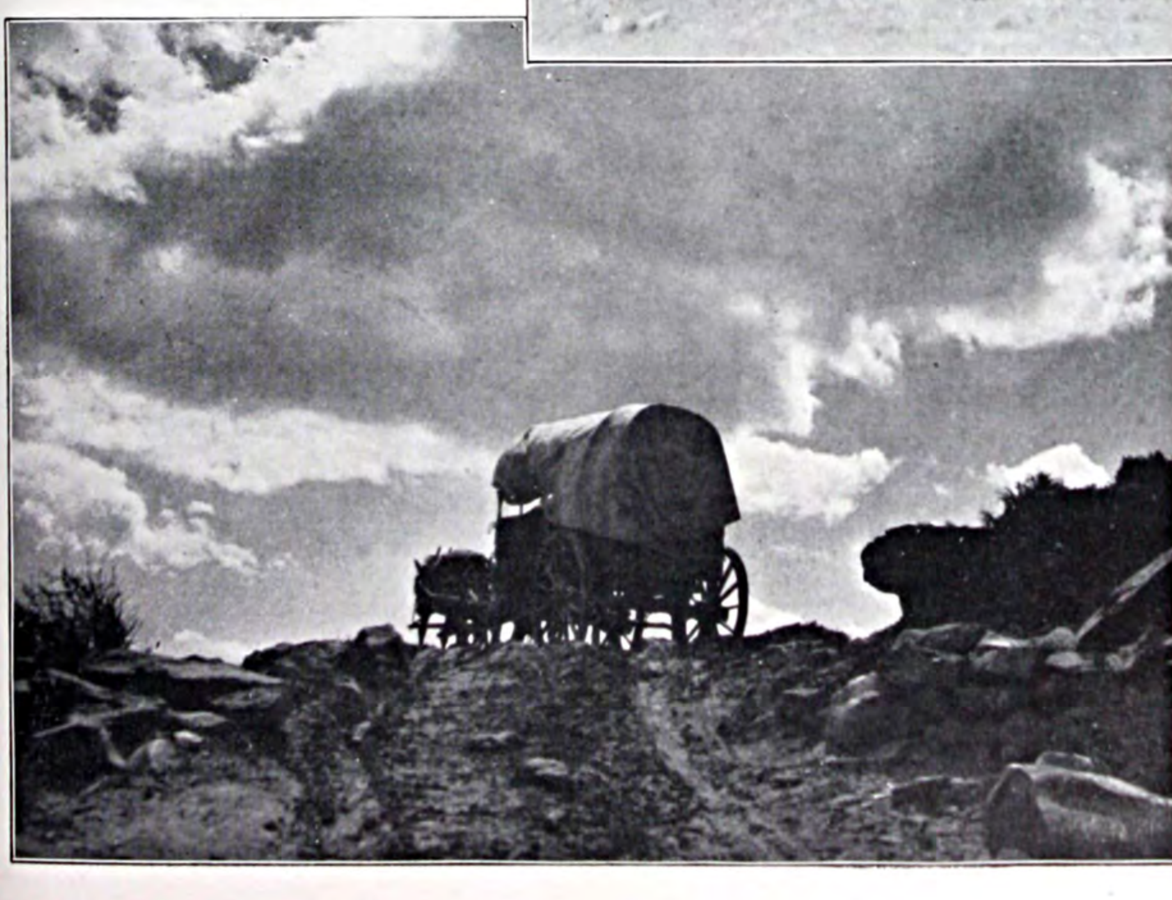
An old stove furnished steady heat. Wire racks made excellent storage facilities to promote drying.

Pictorial

TRANSPORTATION OLD and NEW

Aunt Sammy of the Department of Agriculture Radio Service and the plane in which she flew with Colonel Lindbergh. Aunt Sammy does the radio home economics stories for the Department and is editor of the Radio Cook Book.

The photograph below shows how we travelled before the radio and the aeroplane were ever thought of.



Right: It is the woman who works on the farms of Central Russia. This photograph shows a peasant woman cutting wheat.

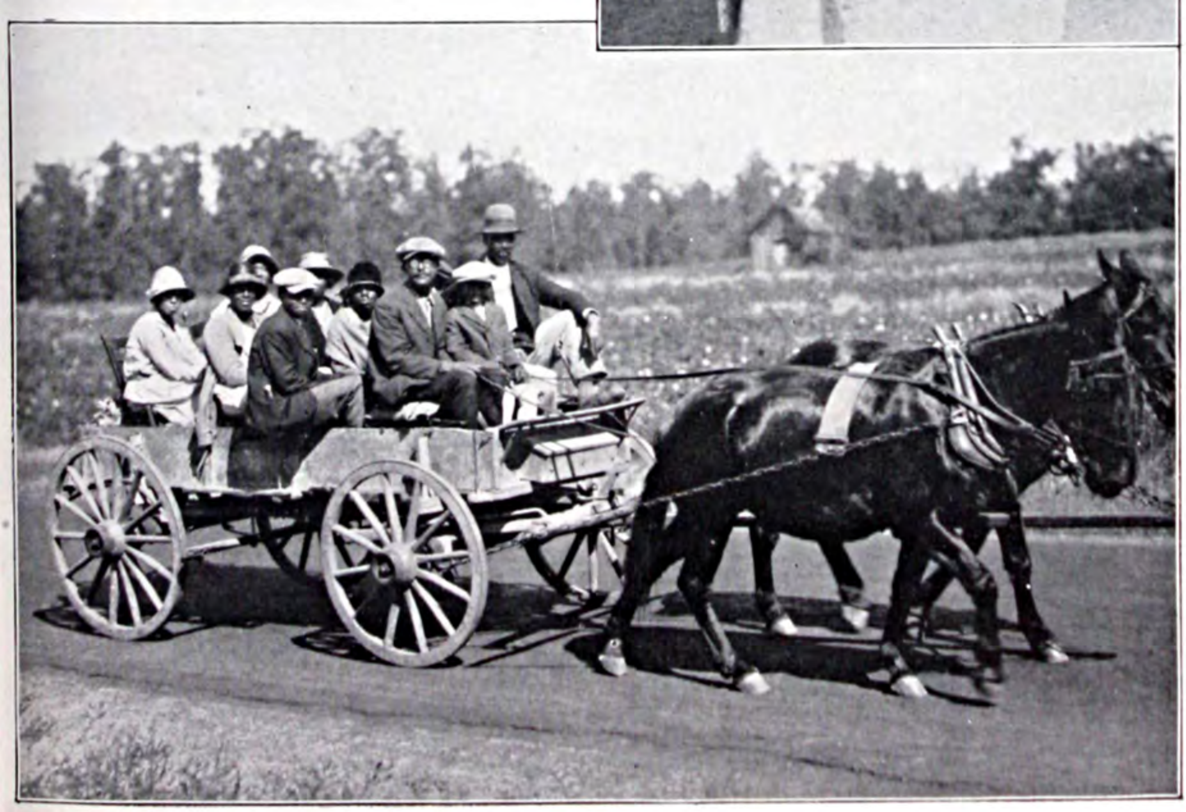
Left: Dr. P. H. Dorsett, one of the plant explorers of the Department of Agriculture, took this picture in China. The Chinese woman is cutting pumpkin into long strips for drying. The pumpkin is mounted on a spindle and turned round and round by means of a stick placed at an angle at the bottom of the pumpkin. The cutting is done with a small tin knife as the pumpkin is rotated.

Mules in tandem on a country road in Spain, pulling a heavily laden cart. Their driver walks beside the load.

Above: Colored boy and old gray mule—a good combination for growing cotton.

Right: An old negro mammy coming home from the village store.

Below: Going in town on the weekly day of rest.



Robert Holt, of Remington, Ind., in his mother's flowers.

Alice Woodling, 4-H Club girl of Warsaw, Ind., giving a demonstration at the Club Round-up at Purdue.

John Knight of Grayson, Ga., with a large citron.

Dorothy Shelby of Lafayette, Ind., feeding goldfish in a lily-pool.

Bob-white and the plowman are mutually friendly. Aside from the fact that this little bird goes well on toast, he is a great aid to the southern farmer in the destruction of insect pests that destroy crops.

Above: A log cabin in the foothills of the Blue Ridge Mountains, typical of thousands of homes in the back country regions of Virginia and West Virginia.

Left: "Meow! Meow! Will there be any left for me?" asks the kitten in the center.

Poor children in New York City enjoy clean cold milk which is distributed free from booths in the tenement districts and parks.

The Editors Talk

"The truly quaint materialism of our view of life disables us from pursuing any transaction to an end. You can make no one understand that his bargain is anything more than a bargain, whereas in point of fact it is a link in the policy of mankind, and either a good or an evil to the world."

—STEVENSON

Prosperity Without Profit

Some of our British business cousins came to America recently to study our business methods. They saw; they went; they said a good many things, mostly challenging things. Among such was the report that few business concerns in America were making any money. One phrase occurs often in their report, "prosperity without profit."

Commenting on this report, Jesse Rainsford Sprague in the June HARPER'S admits that there is a "shade of truth" in this finding. Continuing, the writer points out that a continued struggle for increased sales volume with little regard to the cost is attributed as the chief cause of prosperity without profit. The question is asked, "Why do business men in great numbers set up stiff increases in sales volume each year?"

Too often apparently internal adjustments within the business, to insure maximum profit, are sacrificed to the god, "Increased Sales Volume." That all business all the time has to deal with changes of all sorts and types, seems to be overlooked. Adjustments have to be made to meet these changes. Business men in the agricultural world particularly have to meet violent changes and conditions.

As an example of the short-time change, prices of farm products fluctuated violently. In the Fall of 1926, cotton was 10 cents a pound; in the Fall of 1927, 22 cents.

A striking instance of a long-time change is the agricultural depression that has lasted seven years, a period in which the farmer did not receive his share of the national income. Another example, from 1900 to 1920, farm land values increased; thus farm mortgages were a very safe form of investment. From 1920 to date, the general trend of farm real estate has been downward. Such changes affect all business groups, in the first instance, of course, those who do business directly with the farmer.

Business organizations are forced to make internal as well as external adjustments in order to meet these changes. It is the internal adjustments that are too often sacrificed, but whatever business as a whole is doing, it is very gratifying to note that it is in this field that the fertilizer industry is now doing much of its best work. As an example, in recent years costs of production have been decreased by the installation of labor-saving machinery. In 1919, the average tonnage of fertilizer produced per wage earner in the industry was 261 tons. Four years later, in 1923, it was 357 tons. The volume of output per wage earner had increased 37 per cent, while the total fertilizer tonnage in these two years was approximately the same. This is due largely to an increased use of machinery. In 1919, the horse power per wage earner in fertilizer plants was 4.8. Four years later it was 8.7. This is an increase of 81 per cent. The increase in volume of production per worker was made possible by the greater use of power equipment.

Not only is labor being used more economically, but the code of trade practices, the work in cost accounting to determine the cost of manufacturing fertilizers, the higher analyses of fertilizers sold to save freight, and the better analyses calculated to give the farmer a greater profit, are all striking evidence of the work being done in this field.

In many lines of industry, the cost of selling goods and promoting new sales, such as advertising, etc., are now greater than ever before. It is probably in these fields of distribution and promotion that internal adjustments are yet most needed.

In contrast to much of the business done in America, British and European business is often carried on in a field of fiercer competition. Natural resources are more limited; home markets more limited; the labor supply, in greater abundance, must be absorbed; and sales volume does not, as a rule, readily leap upward. It requires careful planning and hard work. Stark realities have to be met. Internal adjustments, often from the broadest social viewpoint, are essential, if business is to survive.

It is in this field of internal adjustments that American industry has probably something to learn from our visiting business friends. Possibly after all there was a shade of truth in what our British cousins reported to their stockholders about their trip to America. It is clear, however, that in one basic American industry at least, the shadow of truth in their criticism is fast disappearing under the light of a greater vision.

"The requirements of a good farmer are at least four: The ability to make a full and comfortable living from the land; to rear a family comfortably and well; to be of good service to the community; to leave the farm more productive than it was when he found it."—L. H. BAILEY.

Fertilizer Handbooks 1928

Adjustments of external and internal conditions being the prime requisites of any profitable and progressive business, it follows that any worth while adjustment can only be made on the basis of facts. The more complete and comprehensive the facts, the quicker and better adjustments can be made.

We badly need comprehensive facts regarding the fertilizer industry from a great variety of viewpoints. For this reason, the two fertilizer handbooks for 1928 are valuable references.

THE AMERICAN FERTILIZER HANDBOOK for 1928, the twenty-first edition of which was published recently, is a substantial contribution to the needs of the industry. Outstanding among such information in the handbook is the data giving the sales of fertilizer in the United States by states and geographic regions for the years 1920 to 1927. This information is often useful particularly in planning advertising and distribution policies which are profitable fields of further adjustment.

Another important section is on "The Fertilizer Material Markets." It gives the trend of the cost of materials. Data on the production and imports of fertilizer materials are given, also an interesting discussion on the agricultural situation. The data on fertilizer materials is very complete, and is a great help in unification and definition of the terms used in the fertilizer trade, thus helping to avoid confusion. The handbook also contains 17 directories which when needed are badly needed.

A section on the work of the executive officers and the Soil Improvement Committee add a comprehensive viewpoint regarding the work that is being done by the National Fertilizer Association. The state fertilizer laws are always useful.

Many people will read with interest the section on fertilizers in Continental Europe, which covers a discussion of the fertilizer developments in about a dozen important countries.

In the South, the 1928 YEAR BOOK has been prepared by the Commercial Fertilizer, Atlanta, Georgia. While smaller than the AMERICAN FERTILIZER HANDBOOK, it contains an excellent record of all fertilizer activities in 1927, the present outlook, and the record of a busy year for the National Fertilizer Association. The work of the Soil Improvement Committee, Southern Division, is well recorded, also the work of the Northern Division. New fertilizer materials are discussed, especially the newer nitrogen fertilizers. The handbook contains several important directories. It is of particular interest and value to the fertilizer trade in the South.

Both books are well printed and indexed. They should not only be readily available, but the contents should be well known to every executive in the fertilizer trade.

"Cooperation is not a sentiment—it is an economic necessity."

As It Came to Us

You have a dollar. I have a dollar. We exchange dollars. Profit—none!

You have an idea. I have an idea. We exchange ideas. Result—we both have two ideas!

Take for example the extension man and the fertilizer dealer. Why not exchange ideas with the local fertilizer dealer? He is an important man, and in the past has been too much ignored, rightly or wrongly. He is the man who often determines the kind of fertilizer the farmer uses.

In many sections, superphosphate alone is recommended for alfalfa, but it is a fact that alfalfa takes four times as much potash from the soil as phosphoric acid.

It is a fact that from the Atlantic to the Pacific there is an increasing interest in the proper fertilization of alfalfa with phosphates and potash. Why? Because it has been found to pay.

Does the local fertilizer dealer know this? Does he know what potash starvation looks like on alfalfa? Does he ask the farmer he serves if he has seen it? Does he know who is growing alfalfa? Does he know that proper fertilization prolongs the life of alfalfa and saves expensive reseeding?

Now turn around. Do people realize the difficulties of the dealer in finding time to advise the farmer? Do we know how much trouble he has with competition and in collecting his accounts in hard times? Do we know fully his side of the day's work?

In trading it is necessary to exchange dollars.

But it is also profitable to exchange ideas.

We are too prone to find fault; let us look for some of the perfections.—SCHILLER.

The Blues

The blues can apparently be either a dance or a mood. The prime function of the blues as a dance supposedly is to dispel the blues as a mood, but alas, not at Yale!

It seems there is a "Yale Blues" and it seems further that some one has carelessly given the impression that Yale as a university is responsible for the blues as a dance. Was there ever such a lamentable situation? No wonder that many of the learned students of Yale seem to be sad about it.

At any rate, it will be no fault of the "Yale Daily News," a student newspaper, if this grave injustice does not cease, for the editor of the *Yale Daily News* has dutifully and hopefully written a most explicit letter to the editor of the *Times* in London.

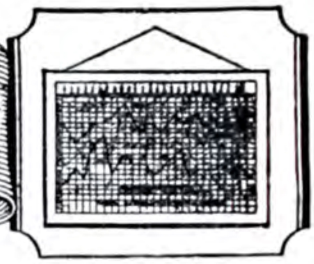
The letter assures that part of the highly respectable and dignified public of Britain that peruses the *Times* after its breakfast that Yale University "assumes no responsibility for the Yale Blues." "Yale," the letter continues, "is a self-respecting, educational institution, such as Oxford or Cambridge, and not a cheap dance hall."

But why pick out the London *Times*? The ecclesiastical and county public that read the *Times* are not the people one usually associates as indulging riotously in the blues, whether of the Yale variety or any other sort. The *Daily Express*, perhaps, would have been a better medium, or why overlook the popular friend of the people, the *Daily Mail*?

At any rate, let us proclaim as plainly as this type can do that Yale should be respected as one of the leading universities, or as the editor says, "as a self-respecting, educational institution," and that Yale does not assume any responsibility for the blues as a dance. They are apparently too busy dispelling the mood.

He who every morning plans the transactions of the day, and follows out that plan, carries a thread that will guide him through the labyrinth of the most busy life. The orderly arrangement of his time is like a ray of light which darts itself through all his occupations. But where no plan is laid, where the disposal of time is surrendered merely to the chance of incidents, all things lie huddled together in one chaos, which admits of neither distribution nor review.—VICTOR HUGO.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

THE SEVEN VEILS OF DAIRYING

There are seven big problems that obscure success in the dairy industry today, in the opinion of K. L. Hatch, of the University of Wisconsin, who spoke recently before the American Dairy Science Association. He says more research should be directed toward the solution of the following problems: Economy of production, herd testing, recognition of quality, establishment of a new set of standards for dairy products, better utilization of dairy products, packaging of cheese, and the use of electricity on dairy farms. These are all interesting to both producer and manufacturer. In research, he says, more attention should be given to labor costs, dry cow expenses, depreciated herd costs, bull costs, and capital charges.

BIG EGGS MEAN BIG CHICKENS

The bigger the egg the bigger the chicken, according to results obtained at the New Hampshire Agricultural Experiment Station. Not only were the chickens bigger when hatched, which was to be expected, but those from the big eggs were bigger at five weeks of age. This leads to the conclusion that it is important to select large eggs for hatching unless you are growing bantams.

The same station has shown that fish meal and codliver meal, as well as codliver oil, are very effective in the prevention of rickets in chickens. Five per cent of fish meal along with the regular rations prevented rickets; two per cent of codliver oil and the same of codliver meal were equally efficient, and the birds grew better than those on the fish meal.

NINE FERTILIZER RATIOS FOR OHIO

All fertilizer needs in Ohio, according to the Ohio State University, have been met by nine standard plant food mixtures, and a leaflet descriptive of them has been issued. The agronomists with the assistance of fertilizer manufacturers have worked out these mixtures to get away from the former confusion and unnecessary expense resulting from the large number of fertilizers of various analyses that were little different from each other. This action on the part of Ohio is one of the results of a conference of agronomists and fertilizer manufacturers held last fall in Chicago.

COCONUT PORK

Farmers on the little island of Guam are feeding hogs on the meat of coconuts. The agricultural experiment station of the island says 100 pounds of gain can be obtained for a feed cost less than $3.50 whether the fresh coconuts are fed or coconut meal. For a time it looked as if coconut scale would stop the production of this crop but it has been controlled by the predatory black ladybird beetle and now the old export crop is doing well and there is a surplus for pork making.

NEW HOG TATTOOING SYSTEM

A more convenient system of tattooing hogs so that the carcasses may be readily identified in packing plants has been devised says K. W. Stouder of Iowa State College. Many counties where tuberculosis eradication has been completed have adopted the new marking system. The new plan is based on the use of five letters. The first indicates the State, the second the county, the third the township, the fourth the section in the township, and the fifth the farm. The second letter is assigned in the order in which counties are accredited as being tuberculosis free and a bar over this letter indicates the second group of counties after the alphabet has been run through and a bar under the State letter indicates the third group of counties and a bar above and below distinguishes the fourth group. Under this plan each section of land is divided into 40-acre areas, each of which has a letter which remains its designation permanently. When a man moves to another farm the designation for his hogs will change.

OLD ALFALFA FIELDS

There are many fields in Windsor county, Vt., says H. W. Soule, county agent, that are from 8 to 12 years old and still going strong. One grower last year cut a big load from a quarter acre that was planted in 1917. How long will alfalfa live in this country and particularly how long will it live and produce good crops? In its native country it is said to live for generations.

"BOOTLEGGING" CULL APPLES

Apple growers should not sell their culls to unscrupulous dealers, says R. S. Marsh, horticultural extension specialist of Illinois. Many buyers of cull apples, he says, distribute them to cities where they sell at prices near those received for good fruit and he contends a carload of culls will do more damage in glutting the market than 50 carloads of good fruit. This year, he says, the "bootlegger" may be worse than ever because there is prospect for an excellent fruit crop. Swat the culls, he says, and get a better price for good fruit.

PHOSPHORUS LACK MAKES BONES BREAK

Clover and alfalfa hay are always thought of as good bone builders as well as feeds rich in vitamins, but, says Dr. C. H. Eckels, of the University of Minnesota, they do not supply enough for livestock pasture on soils deficient in phoshorus such as are found in parts of western Minnesota. He says cows on such lands suffer so badly from this lack, even though receiving as much alfalfa hay as they could eat, that sometimes their bones break. Alfalfa grown on such soils contains less phosphorus and when such hay is fed, the deficiency should be made up by feeding a mixture of equal parts of bone meal, ground limestone, and salt. Dr. Eckels says added calcium does not help in such cases and may really prove to be a disadvantage. Apparently livestock growers must feed mineral mixtures according to the soils on their farms.

TRYING IT ON THE CORN BORER

Illinois is trying to find out what the corn borer will do when it gets there in force. The Experiment Station has planted 40 varieties of Illinois corn near Toledo, Ohio, and will note what the borer does to them. Among the varieties are some representing each section of the State. These variety tests are a continuation of tests started in a small way last year at Monroe, Mich. It is to be hoped someone will soon find a variety that the c.b. can't chew.

Foreign and International Agriculture

Pineapples

By Chas. A. Beatley

Habana, Cuba

SOME years ago, in the minds of many an uninitiated Northerner, pineapples grew on trees. In these days of rapid transportation by sea, land, and air, and consequent intercourse between even distant lands, such an idea is hardly tenable. The pineapple is no stranger today in most parts of the world and is known and relished as an article of diet in many countries far beyond the confines of its native habitat. There is still much of interest in pineapple culture to be told the reader who has never seen the crop.

The pineapple, known scientifically as Ananas Sativa, is indigenous to America. The true fruit is described botanically as a berry. The fruit as known to agriculture and commerce is a compound fruit made up of many individual berries. Instead of being separated in familiar form, these are fleshy and crowded together to form a seemingly single fruit at maturity. In many varieties the black seeds can be readily separated from the flesh of the florets.

Not only is the pineapple frequently classed among the best of tropical fruits, and a well-fertilized and properly matured pine is certainly a delicious morsel, it also possesses certain dietetic and medicinal qualities, to say nothing of culinary virtues that place it almost in a class by itself. The juice of the fruit is recommended by many authorities in the treatment of cases of indigestion and dyspepsia.

The pineapple was originally a native of Central America, but is now grown to more or less extent throughout the tropical world, and is cultivated commercially in Florida, the Hawaiian Islands, India, Australia, and the West Indies. Cuba alone exports annually a million and a quarter crates to the United States.

There are a number of varieties, some of which are not classified to any advantage since the same varieties in different countries are known under different names; however, the generally recognized varieties known commercially are the Red Spanish, the Smooth Cayenne, Pina Blanca (known also in Cuba as Criolla), and the Cabezona.

The Red Spanish is the hardiest, the best shipper, and is best known commercially in the United States.

The Smooth Cayenne is large and of very fine quality. The plant is spineless, therefore, less objectionable in the work of cultivation and the picking of the fruit. It is grown extensively in Hawaii. It gives large discs when sliced and is used principally for canning. The fruit is a poor shipper and will not carry except under refrigeration.

The Cabezona, which in Spanish means a large head, is the largest known variety, weighing as much as 25 lbs.—12 to 15 lbs. is very common. This variety does not succeed well under all conditions. Even in Porto Rico, where it appears to thrive best, it succeeds in a comparatively small area.

The Pina Blanca or Criolla is grown in Cuba to a small extent for home consumption. It is very juicy, but has little flavor and does not carry well.

A curious minded person might ask the question, "Why is this apple called a pine-apple?" As to historical records there is probably no data that would definitely answer the question. The presumption, however, is that it is called a pine due to its shape and outward appearance, resembling that of a pine cone.

The stem is covered with leaves, arranged in whorls, and is supported by the attached roots. The margins of the leaves of most varieties are covered with spines; the Smooth Cayenne is an exception, the margins being smooth. At a certain period in the life of the plant the flower head, on which the fruit develops, appears on a stalk which is a direct elongation of the plant stem.

The pineapple is propagated by rattoons, suckers, and slips from the mother plant. When the fruit is matured and cut, these parts are severed from the main plant stock and set out. Roots soon develop directly in the soil, and if the new plant is good sized and

(*Turn to Page* 47)

Photo shows yield of second picking of pineapples from:
Plat 1 (5-10-10, 250 lbs. per 1,000 plants) Yield: 480 fruits.
Plat 3 (5-10- 0, 250 lbs. per 1,000 plants Yield: 280 fruits.

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 Action of Aluminum, Ferrous and Ferric Iron, and Manganese in Base-Exchange Reactions," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 18, Feb. 1, 1928, O. C. Magistad.

"Effect of Phosphorus in the Form of Acid Phosphate Upon Maturity and Yield of Lettuce," Agr. Exp. Sta., Tucson, Ariz., Bul. 121, July 15, 1927, F. J. Crider.

Soils

Soil erosion as a national menace is ably and intelligently discussed in a new U. S. D. A. Circular, 33, by H. H. Bennett and W. R. Chapline. Estimating that more than twenty-one times the amount of plant food removed from soils by the crops annually is lost by erosion, the authors stress the seriousness of the situation with typical instances of great losses all over the United States. The circular is exceptionally well illustrated and makes a splendid text-book on this problem of soil management.

"Alkali Soil Studies and Methods of Reclamation," Agr. Exp. Sta., Tucson, Ariz., Bul. 123, Jan. 15, 1928, P. S. Burgess.

"Crop Yield from Illinois Soil Experiment Fields in 1927," Agr. Exp. Sta., Urbana, Ill., Bul. 305, Apr., 1928, F. C. Bauer.

"The Soils of Bowie, Denton, Freestone, and Red River Counties," Agr. Exp. Sta., College Station, Tex., Bul. 375, Jan., 1928, G. S. Fraps.

"Irrigation Requirements of the Arid and Semi-Arid lands of the Missouri and Arkansas River Basins," U. S. D. A., Washington, D. C., Tech. Bul. 36, Mch. 8, 1928, Samuel Fortier.

Crops

A tribute to the importance of soybeans in the agriculture of the Midwest is found in an exceptionally well-written bulletin, No. 310, by J. C. Hackleman, O. H. Sears, and W. L. Burlison of the Illinois Agricultural Experiment Station. The discussion of this crop as a profit maker is quite complete, and in addition results of experimental work with different varieties on various soil types in Illinois are included in the bulletin.

America's most valuable and probably oldest farm crop is corn. Any new information on the crop therefore attracts attention. A very attractive special circular on "Corn Growing" has just been issued by the Wisconsin College of Agriculture. While its author, E. D. Holden, in this short circular, relates the crop to Wisconsin conditions, there are many helpful hints for growers in other sections of the country.

"Japanese Honeydrip Sorghum Silage versus June Corn Silage for Milk Production," Agr. Exp. Sta., Tucson, Ariz., Bul. 122, Aug. 1, 1927, W. S. Cunningham and J. R. Reed.

Monthly Bulletin of the Dept. of Agr., Sacramento, Cal., Vol. XVII, No. 5, May, 1928.

"Blueberry Culture in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 194, Feb., 1928, Harold Mowry and A. F. Camp.

"Experiments in Crossing Varieties as a Means of Improving Productiveness in Corn," Agr. Exp. Sta., Urbana, Ill., Bul. 306, May, 1928, L. H. Smith and A. M. Brunson.

"Bush Lima Beans as a Market Garden Crop," Agr. Exp. Sta., Urbana, Ill., Bul. 307, May, 1928, J. W. Lloyd.

"Experiments in the Culture and Forcing of Witloof Chicory," Agr. Exp. Sta., Urbana, Ill., Bul. 309, May, 1928, C. B. Sayre.

"Physiological Studies on the Nitrogen Fixing Bacteria of the Genus Rhizobium," Agr. Exp. Sta., Ames, Iowa, Research Bul. 113, Rudger H. Walker.

"Sweet Corn Seed Studies," Agr. Exp. Sta., Ames, Iowa, Bul. 250, June, 1928, A. T. Erwin and E. S. Haber.

"Sugar Cane Test Field Work," Agr. Exp. Sta., La. Bul. 202, Apr., 1928, C. B. Gouaux.

"Abstracts of Papers Not Included in Bulletins, Finances, Meteorology, Index," Agr. Exp. Sta., Orono, Me., Bul. 342, Dec., 1927.

"Bud and Root Selection in the Apple," Agr. Exp. Sta., Orono, Me., Bul. 344, Apr., 1928, Karl Sax.

Quarterly Bulletin, Agr. Exp. Sta., East Lansing, Mich., Vol. X, No. 4, May, 1928.

"Experiment Station Progress—Report for the Biennium, July 1, 1925 to June 30, 1927," Agr. Exp. Sta., Fargo, N. D., Bul. 217, Mch., 1928, P. F. Trowbridge.

"About Roses," Agr. Ext. Service, Columbus, Ohio, Bul. 71, Alfred C. Hottes.

"Varieties of Cotton for Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Bul. 175, Apr., 1928, L. L. Ligon.

"Comparison of Cane and Kafir Silage for Milk Production," Agr. Exp. Sta., Stillwater, Okla., Bul. 177, June, 1928, R. B. Becker and Willis D. Gallup.

"Abstracts of Bulletins 347-365 and Circulars 43-47," Agr. Exp. Sta., College Station, Tex., Cir. 49, Jan., 1928, A. D. Jackson.

"Seed Production from Sugar Beets Over-Wintered in the Field," U. S. D. A., Washington, D. C., Cir. 20, Jan., 1928, John C. Overpeck.

"Weeds," Agr. Exp. Sta., Logan, Utah, Cir. 71, May, 1928, William Peterson and D. C. Tingey.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 246 and 247, June, 1928.

"Distribution of Wheat Varieties in Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 224, Apr., 1928, E. G. Schafer and E. F. Gaines.

American Potato Journal, The Potato Assn. of America, East Lansing, Mich., Vol. V, No. 6, June, 1928.

Economics

The depression in the cattle business which followed the war has caused violent changes. A study of ranch organization in Eastern Colorado, Bul. 327 by R. T. Burdick of the Colorado Agricultural Experiment Station, reports a study of ranch organization and management. The data is from the records of 22 ranches in eastern Colorado. The average amount of land per ranch was 19,071 acres. Receipts from cattle were the chief source of income. Feed, leases, taxes, and labor were the largest items of expense. On some ranches taxes required one-fourth of the cash income. For the four years, 1922 to 1925, the average return on the investment for the ranches studied was 2.39 per cent. This bulletin gives an interesting insight into ranching as it is carried on in the West today.

In order to find out what changes farmers have made in their farming and marketing practices during the period of relative decline in hay prices since the advent of the automobile, the truck, the tractor, and the electric motor, a study was made in Pennsylvania in the market hay areas by F. P. Weaver, Head of the Department of Economics, Pennsylvania State College, and R. S. Washburn of the U. S. D. A., Bureau of Economics. Their findings, as published in Pennsylvania State College Bul. 223, show that in some sections commercial dairying has become more prominent. Hay sales in this region have decreased because of more intensive feeding of the cows during the winter period. The expansion of the poultry enterprise in some sections affords an outlet for effort, formerly devoted to hay. In some sections more cash crops, such as potatoes, cabbage, and other vegetables are grown.

There has been a rapid increase in farmers' cooperative marketing organizations. In order for these organizations to function to the best advantage, it is necessary for members to understand their responsibility. W. W. Fetrow of the Oklahoma Experiment Station has discussed this responsibility in a very interesting, new Oklahoma bulletin, No. 174.

"An Economic Study of Tomato Production for Canning in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 225, June, 1928, Carlos E. Campbell.

"Rural Social Organization of Clark County," Agr. Exp. Sta., Pullman, Wash., Bul. 225, Apr., 1928, E. A. Taylor and F. R. Yoder.

Diseases

"Cotton Wilt Studies: 1. Relation of Soil Temperature to the Development of Cotton Wilt," Agr. Exp. Sta., Fayetteville, Ark., Bul. 226, V. H. Young.

"Smuts of Colorado Grains," Agr. Exp. Sta., Fort Collins, Colo., Bul. 334, Feb., 1928, L. W. Durrell.

"Grape Disease Control in Delaware," Agr. Exp. Sta., Newark, Del., Bul. 154, Feb., 1928, T. F. Manns.

"Diseases of Lettuce, Romaine, Escarole, and Endive," Agr. Exp. Sta., Gainesville, Fla., Bul. 195, Apr., 1928, G. F. Weber.

"Infection Studies with Watermelon Wilt Caused by Fusarium niveum EFS," Agr. Exp. Sta., Ames, Iowa, Research Bul. 112, D. R. Porter.

Insects

"The Potato Flea Beetle," Agr. Exp. Sta., Fort Collins, Colo., Bul. 337, Mch., 1928, John L. Hoerner and C. P. Gillette.

"Wireworms Affecting Maine Agriculture," Agr. Exp. Sta., Orono, Me., Bul. 343, Feb., 1928, J. H. Hawkins.

"The Chain-Dotted Measuring Worm, A Blueberry Pest," Agr. Exp. Sta., Orono, Me., Bul. 345, May, 1928, C. R. Phipps.

"The Beet Leafhopper in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 205, June, 1928, George F. Knowlton.

"Treehopper Injury in Utah Orchards," Agr. Exp. Sta., Logan, Utah, Bul. 206, June, 1928, Charles J. Sorenson.

"Spray Information for Virginia Fruit Growers," Ext. Div., Va. A. & M. College, Blacksburg, Va., Bul. 102, Jan., 1928, F. A. Motz, F. J. Schneiderhan, and W. S. Hough.

"The Sugar-Cane Moth Borer in the United States," U. S. D. A., Washington, D. C., Tech. Bul. 41, Mch., 1928, T. E. Holloway, W. E. Haley, U. C. Loftin, and Carl Heinrich.

Pineapples

(From Page 44)

vigorous will produce fruit in about 18 months. Slips from the crown of the fruit may also be planted, but being smaller require a longer period to develop fruit.

The fruit of the pineapple may possess any one or more of the variations of taste from delicious and luscious to pungent acid and almost putrid. Various conditions contribute to this variation in taste; however the controlling factors are fertilization of the plant and the proper stage of maturity at which the fruit should be picked.

A recent publication of the Porto Rico Agricultural Experiment Station on Fruit Maturity of the Pineapple, by Henry C. Henricksen, Director of Farm Management, gives very valuable and interesting results of investigations on this subject. Comparisons of fruit picked at the different stages of ripeness show that the standard of maturity is the plant-ripened fruit, that is, the fruit which has been left on the plant until it is fully colored and picked before it has begun to deteriorate. At this stage the fruit is at the height of perfection for immediate consumption, but it is not suitable for long distance shipment because the tissue is too soft to withstand the weight of the surrounding fruit when packed several in a crate and it cannot be kept very long, except at a low temperature.

The problem, therefore, is to pick the fruit at the ripest stage of maturity at which it can be shipped. This condition will be influenced to a great extent by the quality of the fruit. Plants liberally fertilized with properly balanced plant foods make fruits which can be picked at a fairly advanced stage of maturity and yet stand up well in transit, being conserved by the acids developed in the fruit tissues by the action of the added nutrients during growth.

Leaves Make Sugar

Studies and investigations of the ripening processes of pineapples have disclosed the fact that the sugar content of the fruit is derived exclusively from the leaves of the plant, as the fruit approaches maturity, and does not increase after the fruit is removed from the plant. If the fruit is picked green and allowed to ripen, the sugar content at complete maturity is the same as it was when the fruit was picked. Analyses of the fruit show that it contains no substance that can be changed into sugar during transit or in storage; therefore fruit that is picked too green is always lacking in flavor. The sugar content of such fruit is from 2 to 3 per cent, while that of the fruit ripened naturally on the plant ranges from 9 to 15 per cent. The sugar content may increase as much as 5 per cent in two weeks during the process of ripening. The so-called ripening of green fruit after cutting from the plant appears to consist largely of a softening of the tissues.

A microscopic examination of sections cut from the green fruit shows that the tissues are greatly thickened, but become extremely thin on ripening normally. The pungent sensation on the tongue experienced after eating pineapples is due largely to needle-shaped crystals of microscopic size that are imbedded in the pulp. These crystals are present in mature and immature fruit alike but are more noticeable in the latter as the tissue is more difficult to masticate, and the more thorough mastication produces a more intense sensation.

The main points thus brought out are, that the pineapple fruit contains no starch or other sugar-producing material that can be converted into sugar during the ripening process after separation from the plant. It derives its sweetness solely from the stored-up carbohydrate materials in the tissues of the leaves and stock, and when once picked it is finally cut off from its base of supplies.

The weights of the Red Spanish variety, vary from 1lb. 6 oz. to 6 lbs. 3 oz. The crate used for packing is a size universally adapted for the market and holds and takes, according to size of fruit, from 12 to 48 fruits. The 48 size is not shipped to the northern markets, and for the past two years very few if any of the 42's have been shipped. The consumer, armed with the knowledge of the size and weights of the fruits, knows what he may expect for his money when he buys pineapples by the box or the piece. For instance, a pineapple crate will hold 24 fruits weighing 3 lbs. 2 oz. each, a total net weight of 75 lbs., while the same size container will hold 36 fruits weighing 2 lbs. each, or 72 lbs. net, a difference of 3 lbs. in favor of the larger size. Normally the larger fruit should contain a comparatively larger

Fertilizing pineapples—Bainoa, Habana, Cuba.

	Yield crates per acre	Value of fruit per acre	Cost of fertilizer per acre	Net returns	Returns for $1.00 invested in POTASH
(1) no treatment	182	$ 547.50	———	$6	———
(2) 5-10-0	234	$ 725.50	$31.20	$ 694.30	———
(3) 5-10-10	324	$1,104.00	$41.13	$1,062.87	$38.12

per cent of juice and a better flavor.

The pineapple must have a generous supply of air at the roots in order to thrive well; therefore a light soil is best adapted. A very fine sandy soil is not desirable as it packs too closely and excludes the air from the roots. The same objection applies to a heavy clay soil. A clay soil containing a fair portion of sand or humus or both is considered good. Different types of this soil naturally produce different effects on the yield and quality of the pine.

For a number of years pineapples have been grown on some of the red soils of Cuba without fertilizer, but practical and scientific experiments have demonstrated that a properly balanced fertilizer greatly increases the yield and quality of the fruit. It is also safe to say that the fertilized fields, owing to their greater vitality, can be carried two years longer without replanting than those unfertilized.

Various formulas are used, such as 5-9-13, 5-10-10, and 6-10-13. From 1,500 to 4,000 lbs. per acre are applied, according to the class of soil and the number of plants. Depending on the system of planting, an acre may contain from 6,000 to 14,000 plants.

An experiment conducted at Finca "El Desquite," Bainoa, Cuba, of Sr. Andres Arguelles, gave the above listed results per acre of 6,800 plants.

The average price received per crate of pineapples in the check plat was $3.00, for plat 2 (5-10-0) was $3.10, and for plat 3 (5-10-10) was $3.40. The average difference in price per crate was due entirely to the size and quality of the fruit.

The experiment demonstrates the value of fertilizing. Potash, the controlling factor, plays an important role and proves to be a good investment for the grower since an expenditure of $1.00 gave a return of $38.12.

In conclusion, it is the writer's observation that when ripened, the pineapple is not only a delicious fruit, but that with good cultivation, scientific fertilization, care in handling, packing and shipping, the industry is a good business.

Utah Knows Her Onions

(*From Page* 17)

The weeds are kept out until harvest time which starts when the seed pods begin to change color and break. The pods are sun dried in canvas bottomed 4 x 12 crates until the greater part of the moisture is removed, after which they are hung up in white sugar beet sacks until they get dry enough to be threshed. Threshing is done by beating the pods in coarse canvas sacks. The rough stuff is then removed and the threshed, immature kernels are separated from the plump, healthy ones by putting the seeds in water. Those that do not sink within 10 minutes are considered to be unfit for planting.

Winegar said this process does not hurt the seeds as they are immediately spread out to dry in the sun. They are then certified and sent all over the United States at a customary price of $10 a pound. This may seem to be a high price in view of the fact that yields of 400 pounds to the acre are secured, but the cost of producing the crop is high. It takes only about three pounds of onion seed to plant an acre, so the extra cost above common seed at five to eight dollars a pound is not great when one remembers that some of the gardeners who made this saving of a few dollars on seed in 1926 left their onions in the ground as they did not grade high enough to market them. On the other hand, Bountiful onions from home-grown seed have been so good that a special grade called Utah Fancy had to be established on the trade. This grade is anything three inches in diameter or over while U. S. No. 1 Large is from 2¼ to 3 inches in size.

A Hoosier Corn King

(*From Page* 30)

gathering, drying, and selecting his corn without fearing that it may not sell and his time will have been wasted. However, application for seed certification in 1925 resulted in the stamp of approval by the Indiana Corn Growers Association, and Moffitt's name was added to the list of certified seed growers. This step increased the sales of his seed corn, and gave him encouragement in this new undertaking. Since that year Mr. Moffitt has been a regular applicant for seed certification, and his seed house has been entirely emptied annually long before planting season.

Since launching his seed corn business Mr. Moffit has consistently showed corn at the local, state, and International shows. In 1926 his 10-ear sample of Reid's Yellow Dent placed third in its section, and in 1927 his exhibit was among the best. Finally in 1928 came the honor that every Hoosier corn man craves—the distinction of winning the Indiana Corn Show in the warmest kind of competition. And so the name of Moffitt has been added to the growing list of Indiana corn luminaries, and as rapid a rise to fame as has ever occurred in Hoosier Corn-land is here recorded.

Pages From A Field Note Book

A picnic dinner was served cafeteria style—Mathews' Alfalfa Field Day.

Alfalfa Responds to Potash Top-dressing

By I. J. Mathews
Winamac, Indiana

ALFALFA in its growth uses four times as much potash as phosphorus—according to the latest edition of Henry & Morrison's Feeds and Feeding, the bible of the livestock world. Last fall I chanced upon this information and it interested me very much, for as countless other growers have been and are doing, I had always fertilized my alfalfa largely with phosphoric acid. I did slip once and used an 0-20-20, and much to my surprise on this poor old field had the best alfalfa I had ever seen.

Although I was born in Michigan, have worked in Illinois, and now live in Indiana, mentally I am always from Missouri. When I can't be shown by others, I try to show myself. And so, when I found the statement from the authorities mentioned, I set about trying to see what more potash would do for alfalfa.

On the 20th of last October I staked off a portion of an alfalfa field that had never done much except on the first cutting, and sowed by hand 200 pounds of muriate of potash per acre. Certainly that should be enough to demonstrate something—or nothing.

That treated part seemed to make a little better growth last fall, and this spring my attention was called to it again because the last frost in the spring nipped this harder than any

Short growth and signs of potash starvation were found where no potash had been applied.

other part of the field—there was more alfalfa to nip. Two or three days later it was conspicuous because of the whitened tops.

On the 15th of June, when we held our annual field day, the parts of the field that had received no potash were showing a great many plants with signs of potash starvation—light spots on the leaves. The alfalfa which received the 200 pounds of muriate of potash last fall showed none of these spots on the leaves and was about eight inches taller.

It had occurred to me when the potash-starvation symptoms began to appear, to stake off some of the plants which showed the most signs and water them with some water in which potash had been dissolved. We watered the plants on a spot about four feet on the 5th of June, and on the 15th of June that spot looked like an oasis of dark green in a background of mottled yellow and brown. The green had come back into the leaves and many of the white spots had disappeared.

Two hundred pounds of potash per acre made this difference in growth and healthy plants.

What I Did With Waste Land

(*From Page 28*)

and. The corn produced 25 bushels er acre, market here $1.00 per bushel, 25.00; potatoes 85 bushels per acre, resent local price $1.15 per bushel, 97.75; adding the returns or value of the corn produced on one acre to he value of the potatoes from one cre, we have $122.75, an average income per acre of $61.37.

The only cash outlay was $4.80 er acre for fertilizer. Allowing customary wages for work done, clearng, and cultivation, the total cost er acre was $24.80; $61.37 minus 24.80 leaves $36.57 profit.

To thorough cultivation combined with the use of good fertilizer is due he credit.

Why a farmer will think it so necssary to feed himself, family, horses, ows, pigs, and poultry, and provide helter from winter rain and cold, and fail to recognize the necessity of feedng his crops and soil and protecting the latter with a carpet of green to prevent it from washing and leaching, remains a mystery. The prosperity and welfare of himself, family, and livestock depend entirely on the yie'd of his crop and the continued fertility of his soil.

You cannot cash a check without funds in the bank; you cannot get a yield of crops with no plant food in the ground—the conditions are the same. Why produce crops at a loss? Why make your land poorer each year?

Feed your crops liberally with a high grade fertilizer suited to its needs; grow cover crops to make humus. The more humus in your ground, the more fertilizer you can use profitably; the more fertilizer, the larger the yield and the larger your bank account. Reclaim the waste land and make it an asset instead of a liability. It will pay its own expense. Try it and see.

Stacking Beans

(*From Page 27*)

s to form a pad about four feet in dimeter and five inches thick when ettled down.

The beans from the four windrows re collected with a pitchfork and iled around the post. The bottom ormed by the beans should not be ver 3½ feet in diameter. The stack s built straight up for about two feet nd then is drawn in a little until it is apped well above the post.

The beans can remain in the stacks ntil a good day in fall when it is convenient to thresh them. If it seems that the weather will be bad, it is best to pull and stack the beans the same day.

An average person should be able to work three to five acres per day, the number depending on the cleanliness of the fields. The average cost of posts is about $3.70 per acre. Winds have a better chance of drying the beans in stacks. Even in case of a shower a light breeze will be able to dry the beans sufficiently to be threshed.

HIGH POTATO YIELDS

"There is no compromise in potato growing if you want the big yields; you can't get by with inferior seed; there is no substitute for plant food; you can't make any concession to insects and diseases; there is no neutral ground with weeds. There is no compromise—no middle course—if you want the best in potato yields and quality."

In just those words, Dr. E. L. Nixon, extension professor of plant pathology, Pennsylvania State College, gives the secret of success of the 400 bushel potato growers in his state, and, we might add, of the high-yield potato growers of other states as well. This "uncompromising" attitude toward the enemies of good potato crops is largely responsible for the large number of growers who, in 1927, made potato history with yields, of 300, 400, 500, 600, and even 650 bushels on measured acres.—*L. H. Woodward, County Agent, Warsaw, N. Y.*

BUILD LIME HOUSE

There recently has been completed at Maryville, Mo., a lime storage house for the benefit of those farmers who are unable to handle a carload of ground limestone at one time. At the suggestion of Walter B. Remley, Agricultural Agent for the C. B. & Q. R. R. Co., County Agent J. Ross Fleetwood secured the loan of $300 from the local banks with which to erect the building on the railroad property and finance a couple of carloads of lime. The building cost $200. A profit of 10c per ton is made to retire the $300.00 loan.

It is hoped that by making the ground limestone so easily accessible, there will be a decided increase in its use in this community. Farmers who bring a load of produce to town can take back a load of lime thus cutting down their hauling charges. Under the old system when a carload arrived and the weather made the roads bad so as to delay unloading, there were demurrage charges to pay. Many farmers who needed and wanted lime could not handle a carload, so that the use of lime was considerably reduced.

This project is an excellent example of an attitude of helpful cooperation between the railroads and the territory they serve.—*D. A. Caldwell, Maryville, Mo.*

FORECASTS BEAT THE SUGAR BEET HOPPER

Walter Carter of the Federal experiment station at Twin Falls, Idaho, and now doing work for a doctor's degree at the University of Minnesota, has developed a forecasting service for sugar beet growers which in two seasons saved the Twin Falls area millions of dollars. In this region the sugar beet hopper, or white fly, lives through the winter and breeds in the deserts of southern Idaho and when the wild plants dry up it migrates to cultivated crops. By making a study of this desert region and the habits of the insect he found that when severe winter weather had killed off a great proportion of the hopper population he could safely predict the following year would be a good one to grow sugar beets. Conversely, he found he could forecast with considerable accuracy that a favorable season on the desert plants meant disaster to anyone attempting to grow sugar beets in that region that year.

The sugar beet hopper doesn't do the damage itself but carries a disease which causes the plant to turn yellow and curl up. A disease resistant beet is the real hope for beet growers in regions infested by the hopper. But in the Twin Falls section they seem to have found a means of growing beets successfully a part of the time.

The Corncob

(From Page 6)

stances, in laboratory experiments and also commercially, have been transformed into a host of useful things. Pentosans are five-carbon sugars. That is to say, they are sugars lacking the specific quality, namely sweetness, by which the laymen usually recognizes sugar. Sugar like sucrose, dextrose, and levulose are six-carbon products. When you break down a six-carbon sugar you get an acid. When you break down a five-carbon sugar, that is to say a pentosan, you get an "aldehyde"—for example, furfural.

From furfural industrial chemists produce artificial resins used in making printing plates, phonograph records, varnishes, pipe stems, cigarette holders, electrical instrument parts similar to those made with hard rubber, backs for brushes, and many other useful and valuable articles. This is possible because furfural is not unlike formaldehyde. It has been known for about 20 years that formaldehyde mixed with phenol or carbolic acid will produce synthetic resins. Such resins today are familiar to every smoker in the form of bakelite and redmanol in cigarette holders and pipe stems. When the Government chemists discovered that the same thing can be done with furfural, agricultural prospects, with the far-sighted, went up a few points. Furfural is also a possible source of motor fuel, although because of its high boiling point it can not be used with the type of carburetor suited to gasoline.

About eight years ago the Bureau of Chemistry found out how to get furfural out of corncobs at small cost. They were led to this discovery by a belief that furfural obtained from pentosans in farm wastes might be valuable as a dye intermediate. Accordingly they looked around for a handy and abundant supply of pentosans, finally choosing the corncob as the best source because of its convenience in handling and the ease with which it can be assembled in large quantities. They found that pentosans from corncobs decompose into furfural when heated with water and acid, or with water alone under pressure. Furfural can also be obtained in the same way from oat hulls, peanut hulls, and other farm wastes.

Many Uses for Furfural

This was a discovery of capital importance. Previously furfural had been so expensive that it was little more than a chemical curiosity. By the new process, a way was opened for its production cheaply and in large quantities. Worth \$30 a pound before the discovery of the new method, furfural is now commercially produced in a quantity exceeding 500,000 pounds a year and sold at from 10 to 17½ cents a pound. At this price it becomes a competitor for formaldehyde in the production of synthetic resins, and has numerous other industrial possibilities. Several new plants for the commercial elaboration of furfural from farm wastes are under consideration.

As yet the cost restricts the use of furfural resins to the manufacture of electrical, radio, telephone and similar equipment. But this drawback is likely to be only temporary. Improved processes have raised the yield of furfural to about 200 pounds per ton of corncobs, or half the theoretical maximum, and the cost of the operation has been reduced. Furfural from corncobs will eventually be commercially utilized in a thousand ways as yet scarcely imagined.

As for the third main constituent of corncobs — cellulose — laboratory experiments have demonstrated several means of utilizing it. Cellulose from the corncob may be nitrated and made into spools, picture frames, combs, etc. Many other things commonly made of wood, such as wall board and other building materials, can be produced from it. The possibilities of corncob cellulose as a substitute for wood in pulp and paper making are considerable, although cellulose from other sources is cheaper at present.

Incidentally the industrial use of corncob cellulose may yield valuable by-products, a possibility already demonstrated with straw. A commercial plant in Minnesota produces illuminating gas and motor fuel from straw by a process which yields tar and carbon. From the tar and carbon the company makes paint and auto-top dressing, roofing materials, and disinfectants. As yet it has not been found possible to use all the gas produced. Some of it is utilized, after the manufacturing process starts, in heating the retort into which the straw is fed, but the greater part is wasted. Nevertheless, the existence of important possibilities has been established.

Uses of Cottonseed

Anybody with a grain of faith in science, or with the least knowledge of what science has already done in utilizing farm wastes, will not doubt that, before very long, the part of the corn plant out of which we now get practically nothing will be valuable. Consider, for example, what has been done with the by-products of the cotton plant. Cottonseed, for example, contains four primary elements —crude oil, cake, or meal, linters, and hulls. Chemistry has already found immense markets for the first three of these by-products, and has glimpses of a market for the fourth. Cottonseed hulls may not long remain in the category of farm wastes because, as already observed, they resemble corncobs in containing furfural, acetic acid, alcohol, tar, and other hydrocarbons.

Until about 75 years ago cottonseed was wholly wasted. Then a chemist found that cottonseed oil is edible, and within a decade more than a million tons of cottonseed was being diverted annually from the refuse heaps to the oil mills. Improved methods were invented to separate the "meat" of the seed from the hull, so that loss of oil in the crushing process was greatly reduced. Decorticating machines were devised which extracted a very high percentage of the oil, and improved the oil cake by freeing it from adherent fiber and hulls. Oil cake thus prepared came widely into demand, not only as a concentrated feed for cattle, but also, because of its high nitrogen content, as fertilizer. A still better separation of the hulls and the meats was eventually obtained by delinting the seed before crushing it. Crushing seed with the lint still on it causes a considerable amount of the contents to become tangled in the fuzzy hulls. Modern delinting machines which prevent this loss effect huge savings.

This saving is two-fold in character. Delinting machines, besides getting more oil and oil-cake from cottonseed, furnish a by-product, linters, for which the chemist has found a hundred uses. Employed only as batting or mattress filling 20 or 30 years ago, linters today are made into felting, upholstery, padding, rope, fleece lining for underwear, explosives, surgical dressings, artificial leather, sausage casings, roofings and floor coverings, wearing apparel, photographic films, toilet articles, pyroxlin paints, and billiard balls.

Here is evidence enough that searching for buried treasure in the corncob is not a wild-goose chase. Economic as well as chemical problems must be solved before what is in the corncob will be worth actual money. But economic problems usually present fewer difficulties than chemical problems. Uncovering wealth when it has been located is generally easier than locating it—a fact which suggests by the way, that the services of the prospecting chemist are not rewarded as generously as they should be. That, however, is another story. We are simply concerned with the problem of the utilization of farm by-products, the solution of which will free the farmer from much unrequited toil.

If you want to know how long it will be before the farmer can expect to cash in on what the Government chemists are doing for him, the answer of course is that nobody knows. But we might get a line on the prospects by watching the outcome of a recent success in the Bureau of Chemistry. This is the discovery of a new way to obtain gluconic acid. This compound, formerly very rare, is now produced in good yields through the action of certain molds on corn sugar or dextrose. It is expected to result in a materially increased industrial utilization of corn. Watch the outcome, and you will have some kind of a measuring rod by which to judge other phases of the reclamation of farm wastes.

The Quality Era

(*From Page* 24)

tal law of economics necessitates that products must be worth the price asked for them or they cannot survive on a buyers' market.

A veteran agricultural authority in one of our midwestern states thus drew on his experience of half a century with American farmers by summing up the situation about like this: "I've seen a constant improvement in the efficiency and per capita production of our farmers, but their past accomplishments will be insignificant when compared with what the future has in store for them."

Complete fertilizers insure yield and quality.

More and more our farmers are learning that what they get for what they raise depends to a great extent on what they spend to produce it. They are rapidly coming to realize that the value of their dollar in purchasing raw materials and equipment for production is proportionate to the amount of judgment they apply with it. Price today has almost universally ceased to be the only basis of comparison in buying. Both our urban and rural people have learned to appreciate quality.

Oklahoma

(*From Page* 10)

els on the unmanured. Barnyard manure is applied to the manured plot once in four years at the rate of about 10 tons per acre.

A regular series of fertility test plots have been established on the station farm, with rotation tests emphasized. The top-dressing of alfalfa with commercial fertilizer materials and with manure is another series of tests. Other plots have been started at a number of points over the state to furnish comparisons and to give results on the different types of soils under varying climatic conditions.

Most of the outfield experiment station plots are located in the eastern part of the State as the United States Department of Agriculture is working in the western part of the state where conditions are dry. A station is maintained at the Panhandle Agricultural College, Goodwell, Oklahoma, under the direction of H. H. Finnell.

This Panhandle Station has 700 acres of land at its disposal. Eighty acres are used for plot and field experiments; four acres for orchard; 160 acres for livestock farm rotation; 30 acres for farm lots and buildings; and 426 acres for native pasture. Moisture problems are receiving a great deal of attention at this station. The effect of terracing on dry land farming is part of this study and is giving some significant results indicating that terraces to insure that no rainfall is lost by run-off may be a very profitable practice. Another promising line of work is in breeding sorghum strains to meet the semi-arid conditions with increased yield and easier handling.

Record Potato Yields

(*From Page* 19)

comeback. What are the reasons for the recovery—why are larger yields now being obtained on land that has been farmed many years, than were gotten on the virgin soils when they were first reclaimed?

That such yields were gotten in three years out of four shows that they were not the result of any freak of climate, season, or other element of chance. It was not a question of the variety used, for it was the Burbank which made the first record, Wisconsin Pride the second, and British Queen the third. Furthermore, these yields were not secured from "pet" acres, grown especially for high yield regardless of cost, for they were in each case selected from large fields grown as a commercial crop.

No doubt one of the important factors has been the use of plenty of commercial fertilizers. As much as a ton per acre of an 0-21-24 fertilizer has been used, and this is equal to 4,000 pounds of 0-12-12, which formula is a favorite on peat and muck in many sections of the country. Of course little is really known about the fertilizer requirements of these "soils" beyond the fact that they do respond to ample applications of potash and phosphoric acid. But some growers in the California Delta are progressive and are continually making experiments in an effort to ascertain the facts that will lead to still higher and more economical production. Thus, in 1924 Mr. Rindge had more than 100 fertilizer test plots, and as Herbert Zuckerman says, when we really get at the fundamentals involved, much greater things will be possible.

Another consideration is the amount of seed used. Planting is in rows 28 inches apart—just wide enough for horse-cultivation, with the seed dropped 9 to 12 inches apart in the row. Using seed pieces about 1¼ ounces in weight means that about 22 sacks or 44 bushels of seed are required for each acre. This is very heavy seeding, but it has proven profitable when growth conditions are favorable. There are no fungous diseases to combat except Rhizoctonia; the water is supplied by sub-irrigation in liberal amount through the growing season; the light, loose muck is cool and well aerated, providing good environment for the tubers to develop; and the growing season is long. With all these factors so well taken care of, liberal fertilization and heavy seeding leads to heavy yields. The chief factor that has not yet received the attention it deserves is seed selection. Use of vigorous disease-free seed stock will lead to even better results in the future.

Tomorrow's Farmer

(*From Page* 18)

At the present time, however, only a few agricultural corporations have been able to operate at a profit. There are a great many large farms or "estates" scattered in different parts of the nation which are owned by men who have made their money in other fields and are now gentlemen farmers. Mostly these establishments are a hobby in which profits are subordinated to considerations other than utility.

It is very seldom that a manager may be found who can make such farms pay. There are others, however, which are operated by corporations and where the proposition of "putting on a front" does not enter. The number of such establishments is increasing and more of them are making some money for their stockholders.

It is possible also that a cooperative system, in which individuals or corporations share the work and the proceeds with the tenants, may soon be more extensively developed. One of the best examples of this is the Sinissippi Farms, owned and operated by Ex-governor Lowden, of Illinois, leader of the militant agricultural political forces of the country. One or two large projects are also operated on a similar system in my own neighborhood. The landlord or owner supplies the land and sometimes the livestock and machinery. There are many different types of leases of this kind, but all of them require that the tenant furnish the labor and an agreed-upon percentage of operating costs. In such cases the landlords are in a position to be of great help to the tenants by being able to supply seed and merchandise at wholesale prices.

I am inclined to think that this system headed by both wealthy individuals and stock corporations holds great promise in the future and will probably develop to as great an extent if not greater, than that of large corporations operating farms by hiring all their own labor.

In spite of the development of these agricultural enterprises I am not very much concerned over the fear that small owner-operated farms of this country will be done away with.

American farmers are extremely independent and most of them would rather farm and "be their own boss" than to be on the payroll of large corporations.

The type of man who will fit best into the super-farming operations is probably the man from the city who wants to get away from the hurly-burly of Metropolitan life to a quieter, and if you please, saner existence in our rapidly disappearing "wide open spaces."

At the rate which our cities are growing and our industries developing, it stands to reason that they will continue to overlap the country at an increasing pace.

This will make it hard to determine just where the country ends and the city begins. It means that in the immediate neighborhood of large towns there will be a great increase of small farms devoted mostly to market gardening.

Some industrial leaders believe it possible to develop a system whereby factories concentrate on production in the winter months and release at least part of their labor in the summer to the farms. The owner of a small farm can develop a nice home and make a little money off his land and at the same time increase his income by working in the factories. Just to what extent such development actually will occur is hard to say. It is quite probable that there will be at least a partial development of this system in some industries and in certain localities.

The farmer of the past has been highly individualistic and even today he has not lost all of his clannishness. In fact, at the present time the farmer is a more powerful political unit than at any time in the past. It stands to reason that if there is no radical change in the farming methods or improvement in the financial condition of the rank and file of the farmers that this political cohesion will be intensified in the future. When all the farmers are making money, they are not going to be worried about who is going to be the next president or whether or not congress will pass relief measures.

Irrespective of what happens to agriculture along mechanical and organization lines, the social condition of the future farmer will be vitally different from that of the past. With radios having almost complete possession of the farm, with nearly every farm family having one or more cars which connect their home with the nearest city by means of quick and easy journeys over improved roads, the farmer cannot help but come to think and act in terms of the city.

Little Church to Go

It is very probable that in a great many rural localities the little church in the vale will disappear entirely and religious services will center exclusively in the villages and cities. The red school house on the hill has already disappeared almost entirely, and consolidation is becoming more and more an assured fact. It will be a matter of only a few years before there will be no such thing as a "country school" in many sections of the nation. Busses will pick up the children and take them to centralized schools in the villages and nearby towns. The high schools of most large cities have already been compelled to charge tuition fees for nonresident pupils in order that the country children will not crowd out those children entitled to first privileges of the school.

There is no question but that along religious, educational, social, mechanical, and organization lines that the farming of the future, and of the very near future, will be vitally different from that of even the past 10 years. The country boy and girl will be going to a different kind of school and will have a vastly broader outlook. This nation will be a melting pot not only of race but of rural and urban life.

Protect Your Wheat

(From Page 14)

the Ohio agricultural experiment station. In a five-year rotation, the average yield of wheat for 28 years with a complete fertilizer was 26.75 bushels per acre; without fertilizer, 10.15 bushels per acre. No fertilizer was applied to the clover. It was all applied on the crops preceding. The yield of clover hay was increased 1,814 pounds per acre. This emphasizes the possibility of the proper use of fertilizers in this territory.

Large areas of winter wheat land in the Midwest are lacking in available phosphorus. This is often the first fertilizer needed. Many farmers are using superphosphate with good profit.

But is superphosphate enough? The increased crop of wheat grown by adding superphosphate removes from the soil greater quantities of nitrogen and potash. Thus, with the continued use of fertilizers high in phosphoric acid, the supply of available nitrogen and potash tends to become exhausted. Under average conditions, when the yields are increased by using superphosphate, not enough manure is returned to the soil to keep up the supply of either nitrogen or potash.

Taking out increasing quantities of the three elements, nitrogen, phosphoric acid, and potash, and returning only one, will eventually lead to loss. The superphosphate will become less and less effective. Lower yields and diseases of many crops will be the result. This is the general history of continued fertilization with one element only.

On many farms potash should be added to the superphosphate when used for growing wheat and clover hay, particularly if manure is available only in small quantities. That this is practical advice is proved by the fact that on most of the county experiment farms of Ohio, conducted by the agricultural experiment station, the profit from the rotation on corn, oats, wheat, and clover hay was increased when muriate of potash was used in addition to the superphosphate.

These results apply particularly to experiments on soils derived from limestone. This means that roughly, three-quarters of the farm land in Ohio and very large acreages in other states should receive a fertilizer containing phosphoric acid and potash, for the most profitable results on wheat and clover.

If clover or wheat yields are not satisfactory and a farmer is using only superphosphate or mixed fertilizers low in potash, he should look for signs of potash starvation on the clover leaves. They are as follows: On the leaves yellow to brown spots will be found which develop around the border of the leaf and usually form a more or less definite pattern. Later on, spots develop towards the center and the border becomes yellow, curls down, and dries up. The portion around the middle rib is the last to be affected. The spots always appear on the older leaves. Spots caused by insects should not be confused with these spots.

That clover does not grow as it used to is well known. Clover demands lime and inoculation, but it is also a "potash-hungry" crop. It removes a large quantity of potash from the soil. A good crop of mixed hay removes about 75 pounds of actual potash per acre, equal to 150 pounds of muriate of potash. The soil supplies some of this potash, the manure more, but on very few farms is there enough available potash used to produce the most profitable crop of clover hay.

And so with the spotlight turned on the farmer's wheat losses, and careful attention given to control them, the next step in large and quality production is proper fertilization.

Gardening

(*From Page 4*)

of yellow I have since attained is wild mustard, while I find I can best imitate the blue border with chicory.

When I have money enough to employ this gardener and subsidize a greenhouse I shall have this Dominion delight for my own backyard. Till then, *ad referendum*.

I cannot recommend absentee gardening, however, for it is like absentee landlordism—hard on the soil and tough on the soul. To envy your friend's onions is a greater sin than to grow them and have your own halitosis. The proper thing to do in that case is to be original and grow garlic. Imitation gardening is only a hindrance to pioneer spirits moving in a wilderness of weeds toward the hopeful harvest of a hill of beans.

Conventional gardens to my notion are no more comfortable than conventional clothes. Formal dress has its honest uses, however, and carries the advantage that one can change it at will for something easier. But a formal garden is torturing nature into harsh lines and angles, whereas we know that plain geometry and plant genetics have nothing in common. I have a friendly enemy who owns a small plot where he has trimmed the cedars in the shape of tables, pillars and pots. I shall suggest retrimming two of them this season to resemble a donkey and an elephant, and then get ready to cut one of them down after the November election.

As a rule when the large formal gardens on large estates are in their highest degree of starchiness and primness there is nobody left around the premises but the underlings. Do the owners of such places take their vacations to escape the graveyard feeling that such gardens give?

Our own middle class gardens appease the palate, appeal to the perceptions, promote physical culture, and protect the purse. My garden has done all this for me and kept me from falling a victim to the golf craze besides. I have never perfected a "stance." I prefer to do my sod chopping where it will be of some normal use. My leathery coat of tan and my wife's fresco of freckles have been acquired on our own fairways of bucolic content.

How many of us consider how much gardens are a part of human life and the fundamental development of race culture? The first man and woman lived in the Garden of Eden, and the greatest human sorrow was in the Garden of Gethsemane. Archaeologists who dig into the bowels of the earth's crust on the sites of ancient çities discover traces of garden ornaments, and the Indian historians of America show us plenty of evidence that the red brother cultivated the corn plant long before he was captivated by corn whiskey. I am quite sure that some of the Colonial patriots were prouder of having grown a prize pumpkin than having their sputtering signatures on the Declaration of Independence. Sage, pennyroyal, rosemary and mint, brave little roses and tendrils of English ivy—these were the compensations which our New England mothers enjoyed for having severed home ties to begin life anew in a savage-haunted realm across the sea.

They feed tomato juice and spinach to infants, dill pickles to debutantes, and extract of sauerkraut to vitalize our declining years. They bring flowers to the mothers of new-born babies, and the florist enjoys his reward with the undertaker. No human habitation assumes its right proportions or hides its visible defects without herbage and flora. The first thought in planning a better city is to put in parks, after they have the parking space! The first cost of any public building is not the only cost. There must be land for a lawn and a janitor for the tulip beds. I am just a little perturbed right now over providing suitable gardens for the sky-high air ship depots and the mid-ocean landing places. However, give me time and I will Burbank it all right.

YET I have observed that horticulturists are among the most timid and reticent of mortals, despite their vantage places of universal envy and esteem. To mix up the metaphor a little, it is the desire of all good householders to have their own vine and fig tree blossom like a rose. Some of them are not too proud to seek advice. They want the earliest tomatoes and the climbingest roses, the most headstrong cabbage and the kinkiest kale that nature and their own skill can produce. They are anxious to have angleworms for bait but they don't want grub worms in their sod. They write to the horticulturist to learn what to concoct that will deal sudden and permanent extinction to those "hump-backed bugs that cause warts on cucumbers." The more adventurous of them seek a way to graft a tomato bud on a potato root stalk so as to get Chili sauce above and French fries below. 'Tis true that horticulturists are entitled to a meed of praise for patience in being the father confessors to so many vegetable homicides; but I repeat that their fault is professional modesty. No, I am not forgetting the nursery catalogs, but they pass through the hands of journalists 'ere they reach us with their militant optimism.

American college horticulturists are particularly prone to be that way. Those in Canada seem to have more gumption. In America the livestock feeders and the students of field crops have pushed the horticulturists off the map, with a few exceptions. Our horticulturists have plenty of stamp money to use when they answer those nosey letters from amateurs like myself. But they don't seem to have got past the stamp act in their legislative appropriations. Figuratively, the fences are down at our experiment stations and the cows and chickens are wandering at will over land that ought to be in horticultural research. As a consequence, we have more pork than apple sauce and more corned beef than cabbage. But knowing these gentle horticulturists as I do, I would never insist that they abandon orchard grafting for the other kind.

But after all, I presume that gardening is a lot like life. Nobody can tell you what to do or when to do it under the peculiar environment in which the garden or your life moves on its way. You have to grope around and operate your own experiment station, with the help of information in general that certain things retard and other things promote normalcy and growth.

NORTHERN gardening on old soils amid the breeding grounds of all the insects known to the state entomologist is a great thing to promote stamina as well as sunburn. Despite lice on my turnips and slugs on my tomatoes, despite our long winters and short asparagus, I tell you I would not trade my honest hours with the hoe for all the largesse of the tropics.

The closest I have been to the tropics myself is when I found a spider in a bunch of bananas, but the facts I present are those of another equally capable observer who is no more afraid of the truth than I am.

He told me of the flowers in Java, mostly Cannas, Gardenias and members of the family of Convolvulaceae. He said they were bold and flashy like some overdressed dowager, but highly unsatisfactory from the aesthetic point of view; there is nothing personal or affectionate about them. They are fat and luscious, and either smell too much or not at all. He saw an enormous Rafflesia in Sumatra, a purple cup like a gigantic crocus, rising from the decaying trunk of a tree. At a distance it was wierdly beautiful like some Arabian Night drapery, but on examination he found the petals were fleshy and smelled like old fish, being riddled with squashy maggots! These overfed, easy-living tropical flowers are gross and bestial. The fight for life that plants in the north are accustomed to make, regardless of what the seedsmen tell you, is the very thing that makes them charming and desirable.

Beauty in gardens is like the legendary blue bird of Happiness. One need not chase far afield in a vain hunt for its hiding place. Your own will and favorable weather soon brings it to pass beside your door.

So when I get home from the marts of trade I revel with four friends in my arboreal plot. These chance acquaintances of mine who likewise love this form of outdoor sport are the chipmunk, the toad, the rabbit, and the garter snake. Perhaps their right to be the fauna to my flora is undisputed. Perhaps I am the interloper. The rabbit seems to think so, for he lives up to the Uncle Wiggley stories by nibbling voraciously at my beans that do not wax. The toad and the snake are my allies, for they kill more insects than I do. The darting chipmunk is my constant reminder to step lively in good American fashion, to keep ahead of Jack Frost and the tax collector.

The mystery of growth and fruitfulness, a changing aspect from morning until night, the secret of chemistry of plant and soil, the tranquil moment in the amber twilight, the cleaning of the hoe at nightfall preparatory to a fond farewell as the curtain ends another day; when Mother calls the children in for bed, and I sit down and spoil it all by reading about the political campaign—that's my American home life beside my ambitious garden.

No matter how humble a space we have to till, the planting lust is in us as a rule. Every city tenement has its garden when ash heaps can be shoved aside. Stone apartment houses boast their flower boxes. America has largely sprung from an original race of open country folk. Foxes confined in concrete dens dig furtively at the floor. So, too, the close-hemmed masses of our modern crushing life desire to dig their knuckles into the earth and revive their latent instincts to produce.

It's a great game if you don't weaken! He who gets close to the soil may imbibe some of the alchemy of its age-old power and promise, even if what he can't is far greater than anything he cans therefrom.

Hyphenated legislation and surplus control bills do not haunt the home gardener. The only surplus I have to fret me are bromides and Greek roots. With confidence in my native ability to eat more than I can coax from the land, I am always sure of a task to tinker at. That alone is worth the price of admission and all the fungicide to boot.

Just one last word of caution—keep an eye on the melon patch! Your neighbor's boy is no better than you were, and he's a half brother to the rabbits anyhow.

CAN'T BEAT A LAWYER

A lawyer's dog one day stole a piece of meat from a butcher's counter. The butcher, knowing to whom the dog belonged, went to the owner that evening and put the following question to him:

"Sir, suppose a dog steals a piece of meat from my shop, have I a right to make the owner pay for it?"

"Certainly," replied the lawyer.

"Very well," said the butcher, "I'm sorry to tell you that it was your dog who stole my meat. It weighed three pounds. You therefore owe me a dollar and a half."

Without saying a word the lawyer took out a dollar bill and a fifty cent piece and gave them to the butcher. The next day the butcher received the following statement from the lawyer:

"Due, from A. B., the butcher, to Y. Z., the lawyer, $10.00 for legal advice."

THIS BORES US

"What! Jones in the hospital again?"

"Yeh. His leg."

"I thought he had that amputated long ago."

"He did, and got a wooden one in place of it."

"Well?"

"Corn borers." — *Northwestern Purple Parrot.*

Of all the sad sights in ocean travel the saddest of all is to see a whale blubber.—*Utah Humbug.*

AS YOU LIKE THEM

Recently the proprietor of a country hotel served a fine plate of strawberries to a patron.

Patron: "What beautiful berries! Where did you get them?"

Proprietor: "I raised them."

Patron: "Do you put fertilizer on them?"

Proprietor: "You can put anything you want to on them, but we generally put cream and sugar on."

HARDLY WORTH IT

Little Mary, who had fallen ill, begged for a kitten.

It was found that an operation was necessary for the child's cure and that she must go to the hospital. Her mother promised that if she were very brave she should have the very finest kitten to be found.

As Mary was recovering from the influence of the anesthetic, the nurse heard her muttering:

"It's a rotten way to get a kitten."

The colored preacher was standing church trial for hugging one of the dusky maidens of his congregation. He pleaded that as shepherd of the flock it was his duty to take the lambs into his arms.

This caused considerable embarrassment to the jury who finally brought in a verdict clearing him of the charge but with this suggestion, "Howsumevah we suggests dat next time brudder Jones feels called upon to take de lambs into his arms dat he take de ram lambs."

SAFEGUARD *your* WHEAT

POTASH gives wheat the extra vigor it needs when planted after the fly-free date. Potash produces plump, sound grain, thereby increasing the test weight per bushel. When potash is lacking, the grains ripen too early and lack quality; the stems and leaves die while the grain is still immature; and the wheat suffers from winter-killing.

The best way to insure a good wheat crop and control winter-killing is to plant after the fly-free date and use liberal applications of a fertilizer containing plenty of potash. The right seed, a good cropping system, and the proper fertilizer will safeguard your crop and stabilize quality and yields.

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Try at least 6% to 8% of potash in your wheat fertilizer this fall. It will benefit not only your wheat crop but the succeeding crops in your rotation as well, and is especially helpful in getting a good stand of clover hay following the wheat.

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VOLUME XI NUMBER THREE

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N. V. POTASH EXPORT MY.
of Amsterdam, Holland
Directors: J. N. HARPER G. J. CALLISTER

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Fair-time

Better Crops with PLANT FOOD

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Do you mean it when you say, "Sincerely Yours"?

Sincerity

By Jeff McDermid

IN this age of night clubs, time payments, and sliding gear transmission, sincerity is as much to be desired as personal liberty and the gold standard. While I may dissect it, I also defend it, as the surgeon said about the vermiform appendix.

Where does sincerity get its meaning in the limbo of forgotten languages? Sincerity comes from two Greek words, "sine" and "cere," meaning "without wax." Old Grecian pottery makers coined the trade term to guarantee their vases as solid originals instead of broken ones mended with wax. From this early use of a trade guarantee slogan by the Etruscans comes the word selected for the text. Used first as a testimonial of *vase* values, it has remained among the best indicators of *face* values.

"Sincerely yours" has replaced the stiff politeness of Victorian usage when letters were ended with the apostrophe: "I beg to remain, sir, your most humble and obedient servant." Humility and obedience have been cut from correspondence as well as from the wedding rituals. I am not certain, however, that sincerity has always truly replaced those hackneyed phrases in either. In this age of trial marriage and "trying" stenographers, the substitution of "conditionally yours" or "yours with reservations" might be more sincere after all.

Sincerity is a hard word, an elusive word, a word that is difficult to live up to in my experience. This is perhaps because a scribbler must always have some latitude and license. If writers were obliged to be sincere in all minor details, the jails would be full of journalists. I am not urging more penal accommodations, however.

WE can't always be sincere, it seems, surrounded as we are by others who find it equally irksome and vastly impractical. By this I mean *petty* sincerity as distinguished from broad native honesty. These two degrees of sincerity are as wide apart in practical life as Tex Rickard and the Bishop of York.

Let me illustrate by using my fervid friend, the Senator, whose toga (like the plume of William of Orange) is the "oriflamme of war" and the insignia of reform. In this campaign he is busy with the broadax felling rotten timber, making the chips fly on the stump, and building hog-tight fences with the rails. I have helped him rip off a few shingles myself in former times, and the sawdust is used to dam everything. All honor to his forestry platform, but here is where the saw pinches.

The Senator cannot use more petty sincerity with the voters than I can with Old Bill Jones, my neighbor. Old Bill holds a mortgage on my property, a sort of lien on my lean-to, as it were. If he is looking poorly, I must congratulate him on his health and youthful vigor; if he dresses in outlandish garb, I must overlook it; if his kids trample my lawn, I must expose the "other cheek" in fortitude instead of calling them cheeky.

Oh, how I'd love to be sincere with Old Bill for once! My conversation with him must be the scriptural "yea" and "nay" when he yeas and neighs. Diplomacy and the rule of "confound" interest prescribe my conduct in relation to Old Bill Jones just as the exactitude of practical politics puts limitations on the petty sincerity of the belligerent Senator.

The Senator dares not be utterly and frivolously sincere with the proletariat, for if he were to follow such a course unerringly it would put him at a disadvantage and lose him a befuddled following. As I said in a former erudite essay, the politician may use the franking privilege but he cannot always be frank himself and be safe.

But I am not through with the Senator, whose name I shall endorse with a stubby pencil in November. After the dress rehearsal is over and all the cord wood and shavings are collected, my good Senator will return to his desk and roll up his sleeves for some real constructive work. Here is where he may, temporarily, forget petty sincerity and gross insincerity and turn to broad native honesty. He then becomes *our* Senator for six years more of the full dinner pail. He can thereafter forget himself and remember the Maine! But *I* must disregard petty sincerity until we burn the mortgage. Yet I intend to cling to my broad native honesty and inborn nobility each evening after I get the cat kicked out and the doors bolted.

PUT this fact down while we have it wriggling. In personalities as in politics we can stand for petty sincerity of partial truth better than downright insincerity. A man who dare not be foolhardy is wiser than one who "stoops to conquer." I want to tell you why.

To be foolhardy with facts in these complex days is very dangerous. There never was a time when truth itself was more elusive and intangible for the masses. This is because American life is specialized, and there is an awful

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Common barberry growing along the bank of a river n Wisconsin.

The Barberry Battle

By John L. Richardson

U. S. Department of Agriculture

FOR more than 10 years farmers, millers, bankers, and business men, cooperating with the United States Department of Agriculture and other agencies, have been waging an aggressive and extensive battle against common barberry, the shrub which harbors and spreads the destructive stem rust to wheat, oats, barley, rye, and other grains. During this period, more than 16,000,000 barberry bushes have been found and eradicated in the 13 principal grain-growing states of the Northwest—commonly known as the breadbasket of our nation.

A great deal has been said about this campaign, and there are not many people engaged in agricultural work who do not realize that a barberry eradication project is in progress. We find, however, that very few understand the seriousness of the problem and really appreciate the significance of this campaign as it affects the agriculture of this country.

Stem rust is the worst disease of the cereal crops, causing the loss of many million bushels of grain every year. It is a fungous disease which attacks the stems of growing grain, extracting plant food and causing a shriveling of the kernels. This results in a greatly reduced yield and poorer quality of grain. Everyone is familiar with the acute consternation which strikes the hearts of the grain producers when they hear that a serious black stem rust epidemic is expected.

It was 12 years ago when the activities of the common barberry and stem rust first began to alarm the citizens of America. The World War had been in progress two years—it was 1916. The hungry peoples of Europe were looking to America for enormous supplies of food. Everything indicated that a bountiful crop would be harvested, and the extra millions of bushels of grain needed to feed the hungry world seemed assured. But just before harvest got under way, this arch enemy of the farmer—black stem rust—swooped down on the grain fields of our country and Canada and inflicted tremendous damage.

Nearly 200,000,000 bushels of wheat were lost in the 13 north central states and more than 100,000,000 bushels in Canada, due to that devastating stem rust epidemic of 1916. How severe this blow was to American farmers is indicated by the average loss in South Dakota, which was approximately $800 per farm. Instead of producing an excess of grain to supply the needs of starving Europe, the United States entered the war in April, 1917, with a shortage of flour for the needs of our army.

How was black stem rust, the most dreaded disease in the Northwest—the black scourge of the wheat grower—to be controlled? Farmers were quick to offer a solution. They recommended that the common barberry bush be eradicated in the grain-growing area. It had long been known that rust was worse on grain growing near common barberry bushes, and although the farmers could not explain exactly how the barberry spread the rust, they were convinced that this shrub was responsible for it.

Spring Host to Rust

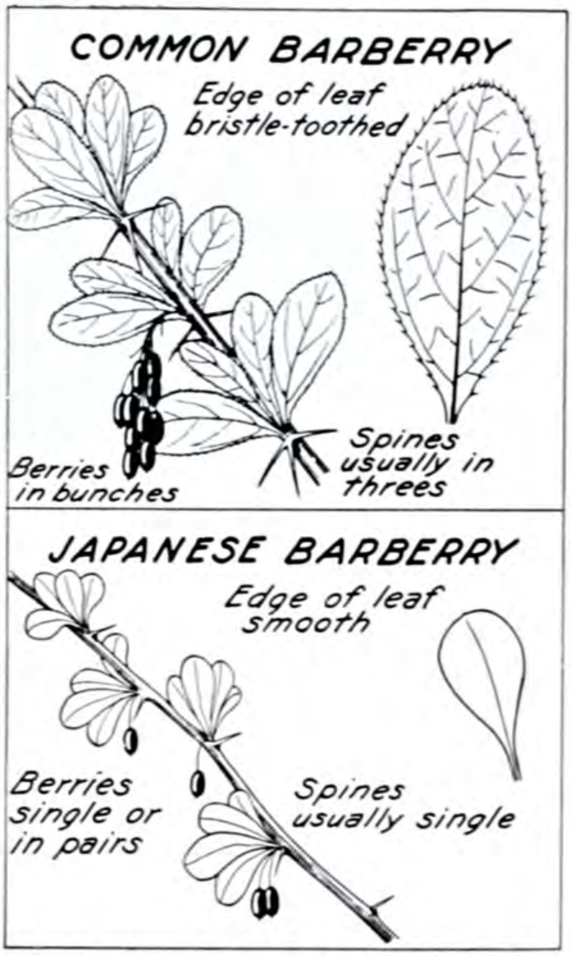
But how could an innocent-looking barberry bush spread the rust to grains? Scientists proceeded to answer this important question. Black stem rust, as they explained, has three stages in its life cycle, much like the butterfly. It is a fungus, or a tiny plant which lives as a parasite on other plants. One part of its life, the summer stage, is spent on the stems of the grain where it saps the life from the plants and causes the kernels to shrivel; the winter stage is spent on dead grasses and grains; and the spring stage is spent on the leaves of the common barberry plant. Without the barberry bush, the destructive stem rust cannot complete its life cycle in the north central states and the life cycle of the rust is broken, just like breaking a link in a chain. The rust cannot live to complete its development and to attack the grain crops without the barberry.

Applying salt to a large common barberry bush found in an Illinois pasture.

Grain growers and scientists carried their demands for barberry eradication to Congress and other governing bodies. With the sad picture of ruined crops in 1916 still fresh in its memory, Congress rallied to the support of a comprehensive campaign for fighting the stem rust pest with an appropriation for barberry eradication. In accordance with this Act, forces were mobilized under the direction of the Bureau of Plant Industry within the United States Department of Agriculture and in April, 1918, the great war against common barberry was started. Millers, bankers, and business men also formed an organization known as the Rust Prevention Association, to aid in the fight. This organization has spent $250,000 in assisting the eradication campaign.

Equipped with picks and shovels for use in fighting it, the advance guard of the eradication forces moved forward in 1918 to meet and subdue the destructive barberry. The general opinion was that there would not be much to it—just a skirmish and barberry would be quickly routed. But the recruits found they were battling a foe that had become well intrenched in the prairies and timberlands of the north central and mountain states of the eradication area.

Barberry eradication has moved slowly forward, but it has not been all joy. When the campaign began, it was thought that the bushes were mostly planted for ornament in cities and towns, with but a few hedges on farms. The earliest survey on farms proved that that idea was all wrong. Less than 3,000,000 million bushes have been found in cities and towns, while more than 12,000,000 million bushes, old and young, have been located in rural districts. The discovery of so many barberries on farms and rural properties was the first outstanding surprise. It was quite obvious that every farm would have to be thoroughly scouted if all the pernicious barberry bushes were to be found.



ABOVE: How to tell the difference between common barberry, which spreads rust, and the harmless Japanese barberry.

LEFT: Sprouting bushes, springing up from old barberry roots.

From where did all these bushes come? Those in cities, towns and villages were planted for ornament. Some of those in the country had been planted for decorative purposes or for hedge fences, but most of them were escaped—running wild.

Barberry bushes produce thousands of berries. Many kinds of birds eat these berries greedily, especially in winter when other food is scarce and the bright red berries are easily seen. Wherever the birds roost, in groves, orchards, thickets, or woodlands, the seeds have been dropped and seedling bushes have appeared. This has been going on for more than a 100 years in the older states of the barberry eradication area. Millions of seedlings have grown into fruiting bushes which in their turn have started new crops of new bushes. The worst areas of wild or "escaped" bushes, as the eradicators call them, have been found in the rolling and timbered portions of Ohio, Michigan, Illinois, Wisconsin, and certain sections of Iowa and Minnesota. Nearly half a million plants of all ages have been destroyed in one small area of rocky and wooded bluffs along the Mississippi river in Wisconsin. In Lake county, Illinois, which borders Lake Michigan, hundreds of thousands of bushes, large and small, have been removed from exclusive lake front estates in Lake Forest, Waukegan and other cities. On one 60-acre abandoned woodland pasture in Geauga county, Ohio, more than 835,000 barberry bushes of all sizes were found and eradicated during the summer of 1927.

After awakening to the fact that barberry bushes were "running wild," the barberry chasers met with another huge surprise. They were amazed at the long distance rust could apparently spread from one barberry bush and at the tremendous damage for which one bush might be responsible. It has been accurately determined that 92,736,000,000 spores, or rust seeds, may be produced on one average sized bush in one season. If the wind should distribute these spores in a way that one might fall on each square inch of land surface, the spores from this single barberry bush would cover 14,784 acres, or an area of 23 square miles. Anyone familiar with the winds of our prairie states can easily imagine how far the dust-like spores, which are so small that they can be seen only under the microscope, might spread on a windy day.

The spring stage of stem rust, as it appears on the leaves of the common barberry.

Rust Spreads Quickly

It is clearly pointed out that the barberry gives the rust an early start in the spring. Each bush may produce millions of spores, each of which after leaving the barberry and coming in contact with growing grain may produce rust pustules containing from 200,000 to 500,000 new spores every six to ten days throughout the growing season if weather conditions are favorable. Because of the rapid rate of reproductions of the initial infection, a small amount of rust which started directly from one barberry may have increased to tremendous proportions by harvest time.

In 1927, a hedge of heavily rusted barberries was found in Barnes county, North Dakota, from which stem rust infection could easily be traced to fields of durum wheat as far as 10 miles away. Two barberry fieldmen working in Stevens county, Minnesota, noticed that stem rust on oats became heavier as they worked eastward to-

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Cotton variety test at the Stoneville Branch Experiment Station, Stoneville, Miss.

MISSISSIPPI

Experiment Station

By Ben F. Hilbun

Agricultural Editor

BACK in 1883, four years before passage of the Hatch Act by Congress and acceptance of its provisions by the Mississippi Legislature, experimental work was begun at the Mississippi A. & M. College by F. A. Gulley, Professor of Agriculture and Superintendent of the College Farm.

Professor Gulley in a written report dated December 1, 1883, made it clear that the Farm Department was not an "experimental station," but continued his report with:

"We have, however, begun a series of experiments to determine the feeding value of cotton seed and its products, the cheapest and most permanent plan for renewing the fertility of our worn-out lands, the most desirable forage crops for our climate, the grasses best suited to our soils, and the best method of securing stands of same."

The concluding paragraph of this report is doubtless the first and shortest report on experimental work ever made in this state. The conclusions reached were: "We have made ordinary steers gain considerably in live weight on daily rations of cotton seed cooked and hay straw. Several (50) head of dry cows, and calves nearly one year old, have been kept in good condition on an average daily ration of six pounds of seed and six pounds of hay through the winter months, milch cows consuming about 25 per cent more."

Beef cattle on feeding test at Mississippi Central Experiment Station.

Professor Gulley said, "We are nearly ready to commence experiments in the dairy line," and closed his remarks by saying that to carry on experimental work satisfactorily, "special funds, outside the regular college appropriation, are needed."

The needed financial assistance to carry on experiment station work was made possible in 1888 when the Mississippi Legislature accepted provisions of the Hatch Act passed by Congress in 1887.

The work of an experimental nature that had been done for more than four years before the Experiment Station became a reality enabled the first officials to get into a definite program without delay. No funds were available until March 1888, and consequently the work that year was but little more than a continuation of elementary experimentation begun by the Farm Department.

Mississippi being a state of multiform soil types, it became evident that experimental work, if successful, must be carried out in sections of different soil types. The central station, carrying on some investigations that applied to the state as a whole, could not render the needed services along agronomic and soil lines, and the urgent need of branch stations was then recognized.

The first of these branch stations was located at McNeil in 1900, and the initial investigations were with fruits and vegetables. It is generally conceded that this work is responsible for the expansion of trucking and fruit growing now being done on an extensive scale by farmers of that semi-tropical region along the Gulf Coast.

Other Branch Stations

In 1918 the state legislature voted to move the station to Poplarville where better advantages obtained. The old McNeil Station now known as the Coastal Plains Experiment Station was then taken over jointly by the central station and the Bureau of Animal Industry, United States Department of Agriculture, for the purpose of

This photograph of a cotton plot at Poplarville, Mississippi, shows the difference in growth between highly fertilized and unfertilized plants.

conducting investigations along livestock lines, such as feeding steers, utilizing native grown feeds, grading up the native cows of that section by the use of purebred bulls, and making permanent pastures.

The new station established at Poplarville is interested chiefly in horticulture with a great deal of attention being devoted to corn, cotton, and other field crops. Results of experiments with fruits revealed the possibilities for the fruit-growing industry which has grown with such remarkable rapidity in that section.

J. R. Ricks, Director

Holly Springs Branch Station in the hilly section of northeastern Mississippi and the Stoneville Branch Station located in the alluvial lands of the Yazoo-Mississippi Delta were established by legislature enactment in 1904. Raymond Branch Station, located in the southwestern part of the state, was established in 1920, being the youngest of the auxiliary experiment stations.

The Legislature of 1928 made liberal appropriations for the expansion of the central and branch stations with a large fund for the extension of the Delta Branch Station at Stoneville. Another unit to the system has been organized in Adams county, the work to be done there to be wholly with pecans.

Delfos Cotton Developed

Several projects in agronomy are under way at the present time. Some of them are: the effects of certain crops on soil fertility, forage crops, permanent and temporary pastures, cultural methods of cotton and corn, various forms and combinations of nitrogen, phosphorus, and potash for cotton and corn, different crops for silage, cotton wilt test, corn and cotton variety tests, and plant breeding work with cotton and corn.

Plant breeding work includes the production of improved varieties of cotton and corn. Tests are run comparing the merits of the many commercial varieties currently available. Fifty to seventy-five varieties of cotton and fifteen to twenty varieties of corn are compared annually.

Probably the greatest single achieve-

Soybean experiments are carried on at all of the Mississippi stations.

The agricultural building at the Mssissippi A. and M. College.

ment of the Mississippi Experiment Stations was the development of Delfos cotton, a long staple variety particularly adaptable to the fertile delta lands.

Production in that section had been badly impaired because of the ravages of the boll-weevil, and it was decided that to alleviate the conditions of the delta planters it would be necessary to breed up an early variety of long staple cotton. Dr. H. H. Brown attached to the central station, was assigned this task, and the Delfos cotton was produced.

According to planters who have been using Delfos cotton since it was first introduced, it redeemed the cotton industry in the delta. It is estimated that the increased yields of this variety over others in the delta means an increase in returns of more than $1,000,000 annually. Being early maturing, the crop is pretty well made before the boll-weevil infestation becomes extremely hazardous, and the length of the staple insures top prices.

At the present time 95 per cent of the cotton planted in the Mississippi Delta is Delfos. It is also being used more extensively each year in other parts of the delta. Notwithstanding its adaptability to alluvial lands, it is grown more extensively each year in the hill section of the state, where it is proving satisfactory.

Plant breeding work is also being done with short staple varieties of cotton. Improvements are constantly being made in the popular varieties being grown in the state.

Other projects include breeding and variety tests with oats and soybeans, soybean oil studies, winter cover crops, and soybeans for feeding and soil building.

The central station has conducted a number of fertilizer experiments in the Northeast Mississippi Prairie belt, Hills and Flat Woods of East Central Mississippi, and in Choctaw county where the soil is of a sandy clay type commonly found in the Short-leaf Pine area of the state. Fifteen trials, three-year average, were made in Choctaw county tests, 68 in the Hill and Flat Woods tests which ran over a period of three years, and 16 trials in the Prairie over a two-year period.

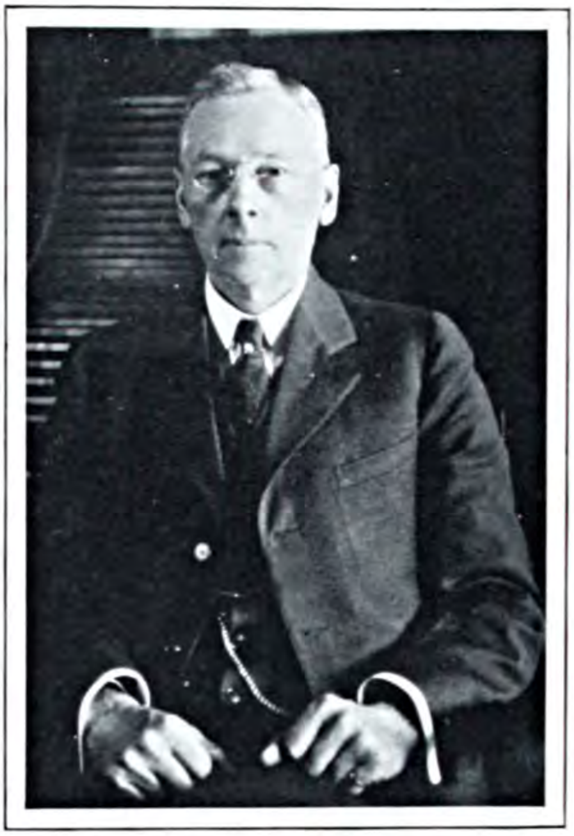
Fertilizer Tests

Results of varying amounts of phosphoric acid, nitrogen, and potash used in the Choctaw county tests showed that an 8-6-4 was the best fertilizer mixture to use, a net profit of $48.31 being realized on an acre from the use of 600 pounds of this combination. In the Hills and Flat Woods this mixture again showed the highest net profit per acre, the amount being $29.50. More nitrogen gave better results in the Prairie section, an 8-8-4 leading with a net profit of $22.82, followed by a net profit of $18.92 obtained from the use of 600 pounds of an 8-6-4 fertilizer.

To determine the most profitable amount of fertilizer to use, varying amounts were tried in each of the 84 tests completed. An 8-4-4 combination was used in each instance. In Choctaw county 600 pounds gave a net profit of $32.52; 1,200 pounds, a profit of $49.95; 1,800 pounds, a profit of $57.74; and 2,400 pounds, a net profit of $55.73.

All Hill and Flat Wood tests gave the following results: 600 pounds, $24.14 net profit; 1,200 pounds, $33.64; 1,800 pounds, $33.87; and 2,400 pounds, $29.71 net profit. Profitable results were obtained by increasing amounts in the Prairie section as 600 pounds netted $11.49; 1,200 pounds, $19.89; 1,800 pounds, $20.61; and 2,400 pounds, $19.64.

The most profitable amount in each case, as indicated, is 1,200 to 1,800 pounds per acre. On an average, 2,400 pounds was more profitable than 600 pounds, as the former amount failed to produce a net profit in only a few cases. The above amounts, as stated, were based on the use of an 8-4-4 fertilizer, but results indicate that a smaller amount of an 8-6-4 would have given as good returns.



B. M. Walker, Ph.D., President, Mississippi A. and M. College.

For years, wilt and rust, prevalent cotton diseases, exacted heavy tolls from the cotton crop in Mississippi, materially reducing production and incidentally affecting the quality of cotton produced. Mr. E. B. Ferris, director of the Poplarville Branch Station, believing that a lack of some form of plant food in the soil caused these diseases, started investigations in 1919 to determine the source of wilt and rust infection and find effective control measures.

Plot in foreground without potash for eight years was 90 per cent wilted. Plot in background with potash had practically no wilt.

This work was inaugurated with one acre of land divided into 12 plots and fertilized in 8 different ways, using four plots as checks. The land was planted two years to sweet potatoes, one to corn, and since 1922 has been planted to cotton continuously. Each plot has received the same plant food every year, 1928 being the tenth successive year this has been done. No very marked differences were shown at first between the plots with and without potash in the mixtures, but as the experiment was continued the plots without potash began to develop wilt which has become so bad in recent years as to practically destroy stands before the end of the growing season. On the other hand, all plots with potash have remained free from wilt at least until very recently and then it appears progressively as the minimum of potash has been used.

In 1919 Mr. Ferris set aside 56 plots of land for general work with fertilizers for cotton. At first the plots without potash showed no marked difference from those receiving phosphorus and nitrogen alone, but as the experiments were continued on the same plots, rust became so bad on those where potash was absent that by midsummer of each year all leaves were shed on the no-potash plots while those with potash remained green until frost. As far back as 1922, after the experiments were begun, the addition of potash to phosphorus and nitrogen gave splendid increases in yields. A combination of 240 lbs. superphosphate and 240 lbs. cottonseed meal yielded 810 lbs. seed cotton while the supplement of 240 lbs. kainit to this mixture gave a yield of 1,332 lbs. seed cotton per acre. "To the eye the difference was even greater than the above figures would indicate," said Mr. Ferris.

Enlarge on Work

The 56 plots in general fertilizer tests were taken out of cotton in 1925 and planted to corn for two years. No potash was used in the fertilizer combination for corn. Dr. D. C. Neal, plant pathologist, A. and M. College, cooperating with Mr. Ferris in rust and wilt control measures, assisted in planning a series of experiments with those 56 plots in 1927 which were again planted to cotton. The plots were fertilized in different ways, using 600 pounds per acre of an 8-6-0 on checks and 600 pounds per acre of an 8-6-8 from four sources on the plots receiving potash. The average increase in yield of seed cotton per acre from the four sources was 382 pounds over and above the average of the plots that did not receive any potash. Since there were four replications with each source, or 16 replications in all, the results were significant in showing the effect of potash in the control of rust. Mr. Ferris states that one could have told the difference in the plots with and without potash in the fertilizer mixture if he had flown over the field in an aeroplane, so great was the contrast.

Results of experiments dealing with rust and wilt control were so important that this year (1928) finds the station force enlarging upon the work begun some 10 years ago. An increased number of experimental plots are being used on land leased for the purpose of expanding fertilizer investigations. Experiments now being run looking to better control of rust and wilt in cotton are:

The use of animal manures in connection with commercial fertilizers containing varying amounts of potash from several sources;

The turning under of a number of winter cover crops now being followed by cotton fertilized in several different ways and grown on limed and unlimed land;

The use of fertilizers with varying amounts of potash, ranging from an 8-6-0 in 2 per cent increases to an 8-6-14, all applied before planting;

Similar work to the above using 800 pounds of an 8-6-4 mixture uni-

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LEFT: The field is in perfect condition for planting after one time through with the "pulverator plow."

RIGHT: The revolving blades seen at the right of each plow share pulverize the soil as it is turned up.

The Plow *that* Pulverizes

By William D. Bowie

Ames, Iowa

THE "pulverator plow," an implement which does the operations of plowing, disking, and harrowing all at one time, recently has been perfected by J. B. Davidson and E. V. Collins of the agricultural engineering department, Iowa State College.

The invention consists of 10-inch blades set along a rapidly revolving vertical shaft beside each plow share. The blades catch the soil as it is thrown up from the share and pulverize it, distributing it evenly in the furrow. The blades are turned by a power take-off shaft from the engine of the tractor pulling the plow.

The new implement takes only 10 to 15 per cent more power than a regular plow, according to Mr. Davidson. This is because the new plow makes more efficient use of the power developed by the motor of the tractor.

The blades, which turn at the rate of 525 revolutions per minute, break up all clods and fill the furrows, leaving a level surface appearing like freshly-harrowed ground. Cornstalks and stubble are broken up and well covered. No air spaces are left below the surface of the ground, as with the old-type plow, to hinder the downward growth of roots, Mr. Davidson asserts.

Experiments with plows of this kind have been carried on in different parts of the country. Mr. Davidson, with the assistance of E. V. Collins, has been working for three years to perfect the new implement. Sixteen experimental plows were constructed before the final plans were worked out for the implement which is now being manufactured.

The Quebec Convention *of the* Canadian Agriculturists

The Chateau Frontenac in Quebec where the convention was held.

By
H. E. Lefevre
Montreal

Courtesy C. P. R

ON June 11 there opened in Quebec a convention that is to live in the memories of all present as a very delightful event and a masterpiece of organization. A pleasant affair, well planned and well managed, the convention proved interesting in so many respects that none left Quebec without regret that it was over.

The Canadian Society of Technical Agriculturists, more commonly known throughout the Dominion by its initials, "C. S. T. A.," was organized at Ottawa in June 1920, for the purpose of bringing together men engaged in all phases of agricultural work

Courtesy C. P. R.

A street market in Quebec.

throughout the Dominion. Judging by its last convention, the Society certainly succeeded in developing among them the best spirit of understanding and cooperation.

The C. S. T. A., which is affiliated with the American Association for the Advancement of Science, the Royal Society of Canada, the British Association for the Advancement of Science, the World Agricultural Society, etc., publishes a monthly review printed in English and in French: "Scientific Agriculture (La Revue Agronomique Canadienne)." Years of effort on the part of its editors have put this review up to the standard of the best scientific publications.

The Society is divided into 17 local sections, one section at least being in existence in every province. Each section has its own organization and meetings.

The Society holds a general meeting every year, alternately in Eastern and Western Canada. Previous meetings had been held at Winnipeg, Manitoba; MacDonald College, Quebec; the University of Saskatchewan; the Ontario Agricultural College; the University of Alberta; Ottawa, Ontario; Vancouver and Victoria, B. C. For the first time the convention this year was held in the heart of French-speaking Canada.

On this subject of languages, the convention almost offered a slightly humorous spectacle. To an unprejudiced and somewhat simple mind, a few lectures and toasts would have made it quite plain that Canadians belonged to either one of two main groups: (a) Those who were making speeches in French, known in handbooks on geographical and ethnological subjects as English-speaking Canadians, and (b) Those who were making speeches in English. They were the very men whom the same handbooks classify as French Can-

Courtesy C. P. R.

An interesting old street, Quebec.

Mr. E. S. Archibald,
President-elect.

adians. (It would not be fair for the writer to steal Major Strange's remarks about those speaking "Parisian French.")

Leaving all jokes aside, the feelings of understanding and friendship that during the convention were so obvious between the representatives of the two races that built Canada, are a very good omen for the future of the Dominion.

Quebec had more than one claim to be the seat of the convention. It is the oldest city on the American Continent, having been founded by Champlain in 1608. Louis Hebert, a colonist who came from France, who was the first Canadian farmer, had his farm inside the limits of the present city of Quebec. There is a monument to Louis Hebert in Quebec, probably the only monument ever erected to a "mere" farmer. Laval University, founded in 1852, was the first Canadian university and always one of the most eager to promote agricultural education. The affiliated school of agriculture at Sainte-Anne-de-la-Pocatiere was the first agricultural school in Canada.

Mr. J. P. Sackville,
Vice President.

Mr. L. H. Newman,
Honorary Secretary.

Quebec today is a delightful city, combining the efficient organization of an up-to-date city, provided with all modern facilities, with the charm of old streets that still remember the glory of the old French flag, white with "fleurs de lys" of gold, forgotten even in France today. The Chauteau Frontenac, one of the best Canadian Pacific Railway hotels, used as headquarters by the convention, commands a magnificent view over the valleys of the Saint Lawrence and Saint Charles Rivers. Last, but not least, the delightful hospitality of the population of Quebec made it an ideal place to come and meet old friends and acquaintances and chat merrily of everything under the sun.

Dr. A. T. Charron,
Vice President.

The convention was attended by more than 300 members of the Society. It opened on June 11 with a statement of the results of the election of the Society's new bureau. The new president is Mr. E. S. Archibald, Director of the Dominion Experimental Farms; the new vice-presidents: Mr. J. E. Sackville, Professor of Animal Husbandry at the University of Alberta and Dr. A. T. Charron, Assistant Deputy Minister of Agriculture of the Dominion; the honorary secretary, Mr. L. H. Newman, Dominion Cerealist. The general secretary is Mr. Fred H. Grindley who has been general secretary since 1920.

Mr. Fred H. Grindley,
General Secretary.

At the luncheon the delegates were welcomed to Quebec by Dr. P. H. Bedard speaking in the name of His Hon. Mayor Auger. Before and after the luncheon, lectures were delivered in

Hon. J. Ed. Caron, Minister of Agriculture. His Honor Narcisse Perodeau, Lieutenant-Governor. Hon. L. A. Taschereau, Prime Minister. Mr. J. A. Grenier, Dep. Minister of Agriculture.

English or in French (sometimes in both languages at the same time), in the Promotion Hall of Laval University, by Dr. A. Volkhart, Director of the Oerlikon, Switzerland, Experimental Station; Mr. H. M. Nagant, Professor at the Institut Agricole d'Oka; Dr. Lattimer, Professor at MacDonald College; and Dr. J. D. Black, Professor at Harvard University.

Mgr. A. E. Gosselin, Rector of Laval University. took the occasion of the convention to confer the honorary degree of D. Sc. A. upon three ex-presidents of the Society; Dean E. A. Howes of the University of Alberta, Dean H. Barton of MacDonald College, and Mr. L. P. Roy of the Quebec Department of Agriculture. This proved to be one of the most stirring moments of the whole convention. All three new doctors were enthusiastically applauded and warmly congratulated by their friends, which is to say, by every member of the Society.

Renewed appreciation of the honor conferred on him was given Dr. Roy that same evening at the business banquet during which, being the last president in charge, he delivered an address. Dr. Roy appeared to be and certainly deserves to be the most popular member of the Society. Other reports were presented by Mr. F. H. Grindley, general secretary, who, although he received no honorary degree, was also warmly cheered by the members of the Society and deserved it; by Mr. L. H. Newman; and Mr. G. E. McRostie.

L. Ph. Roy, Ex-President.

Rev. A. E. Gosselin, Rector, Laval University.

On Tuesday, June 12, a trip was made from Quebec to the School of Agriculture at Ste-Anne-de-la-Pocatiere. Four hundred and ten visitors were received by M. l'abbe Noel Pelletier, Director of the School of Agriculture. A visit was then paid to the experimental farm where Mr. J. A. Ste-Marie, Manager, explained to the visitors the work done by the station.

In the evening a banquet was served in the Classical College at Ste-Anne-de-la-Pocatiere. Mgr. A. Boulet welcomed the visitors and at the end of the banquet Mgr. Wilfred Lebon, principal of the College, thanked them for the visit paid to the College. Addresses were delivered by M. l'abbe Jean, Professor at

Mr. H. Barton,
Dean of Macdonald College, P. Q.

Ste-Anne and President of the local section of the C. S. T. A.; by Mr. Archibald; and Dr. John Black.

This trip to Ste-Anne-de-la-Pocatiere was one of the most pleasant features of the convention. The cars passed through, in an interesting section of the Province of Quebec, some of the oldest settlements on the American Continent. The beautiful weather gave their fullest picturesque effect to the mighty St. Lawrence River and distant Laurentian Mountains. Special mention must be made of the remarkable organization of the trip. Eighty-eight cars carried the visitors from Quebec to Ste-Anne and back, a round trip of more than 150 miles. Motorcycles opened the way; a car with mechanics equipped to take care of any necessary repairs followed the motorists. Everyone was transported safely and on time. Even the few inevitable "flats" did not succeed in dampening the good humor of the party. Mr. N. Savoie, of the Quebec Department of Agriculture, who was in charge of the trip, certainly ought to be congratulated.

The writer feels that something ought to be said also about the dinner at which simply and deliciously prepared food was served a-plenty; he still thinks the Ste-Anne strawberry jam is not to be equalled anywhere.

Abbe Noel Pelletier,
Director, Ste. Anne
de la Pocatiere.

On Wednesday, June 13, a trip was made to the Experimental Station at Cap Rouge where the party was in charge of Dr. Gus. Langelier, Manager of the station. Lunch was served on the lawns of the station where the good weather and pleasant company put everybody in the best of moods. In fact the lawns were so comfortable that the writer must humbly confess that he will have to go back to Cap Rouge to know something of the work carried out by the station.

Professor H. M. Nagant,
Oka Agricultural
Institute.

On the way back to Quebec the party stopped at the Quebec bridge, a gigantic structure boldly thrown over the St. Lawrence river. An elderly lady came walking by (she, of course, did not belong to the convention) and was heard to inquire sweetly of her escort, "It's a *genuine* steel bridge all the way through, isn't it?"

At the morning session of the Society H. M. Nagant, Professor of Geology and Chemistry at the Oka Agriculture College, University of Montreal, had been chosen as the most outstanding and valuable member of the C. S. T. A., and unanimously awarded the Fellowship prize. No better choice could have been made than that of Prof. Nagant, who is not only a distinguished scientist, but the kindest of men.

In the evening a banquet, offered by the Quebec Department of Agriculture at the Chateau Frontenac, was presided over by the Hon. J. A. Caron, Minister of Agriculture of the Province. Fol-

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Mr. E. A. Howes,
Dean,
University of Alberta.

Here's Our Old Friend Again—

Supply and Demand

By Arthur P. Chew

U. S. Department of Agriculture

"DO you still believe in supply and demand?" said a western newspaper editor to me not long ago, when I suggested to him that blaming grain exchanges for low prices was like blaming the barometer for bad weather. "In this part of the country we've dropped that superstition. Supply and demand may have worked in the old days of really free competition. It doesn't work now that all the channels of money and trade are in the hands of monopolists who can fix prices to suit themselves. When the grain markets drop five cents a bushel, it is not because the supply and demand ratio has changed, but because a few operators have decided the farmers are due for a trimming. It is the same with cattle and hogs and with cotton. These commodities are all under the control of groups that have repealed the law of supply and demand, and have substituted for it their own arbitrary will."

That sort of an opinion can only be refuted with facts, and at the time I did not have the right facts at my command. The other day, however, I had the pleasure of mailing to my editor friend a copy of a study just completed by the United States Department of Agriculture on cotton prices, which shows that the cotton market in the last 30 years has been governed, not by speculation or by monopolies or by misleading reports, but by our old friend supply and demand. This study is based on statistical data indicating how the various supply and demand factors fluctuated during the test period. It demonstrates, by the conclusive test of experience, that prices never stay very long either above or below the natural supply and demand level. If he respects the logic of facts, my editor will be forced to admit that he was wrong.

How Price is Determined

But the belief that the law of supply and demand does not work any more is exceedingly widespread. That is shown by the recent uproar regarding the issuance of market forecasts by the United States Department of Agriculture. No such uproar could have arisen had the opinion not prevailed that market prices are influenced by opinions rather than by the basic facts of supply and demand. When the Senate recently passed a bill fixing a penalty of $15,000 fine or five years imprisonment for Government officials who publish or authorize the publication of forecasts as to the price of cotton, it testified to a conviction that other forces more powerful than the law of supply and demand can and do enter the commodity markets. It may therefore be worth while to glance at the evidence on which the Department of Agriculture bases its assertion that the

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"Nothing But No. 1's"

—*the* PECANWAY *Aim*

By Sid Noble

"WE have been successful in the pecan business because we try to produce nothing but No. 1 nuts," said M. O. Dantzler to the writer on the occasion of a recent visit to Pecanway Place, at Orangeburg, South Carolina, generally recognized as one of the most successful pecan farms in the South. "We treat our trees well and they are good to us.

"In 1926 our 45-acre orchard produced 42,000 pounds of pecans, 38,000 pounds of which sold as No. 1 nuts," he continued. "We graded 12,000 pounds of these as Pecanway No. 1 nuts and sold them through the mail at more than $1.00 per pound. We sold 24,000 pounds through the Carolina Co-ops 21,000 pounds of which graded United States Standard No. 1, and the remainder was sold in bulk to buyers in Cleveland, Ohio, at No. 1 prices."

The Pecanway No. 1 pecans that Mr. Dantzler speaks of are very high-grade nuts, and are sold with the aid of national advertising to buyers throughout the country. They are

Ten-year-old pecan trees and a second-year growth of crimson clover.

carefully picked and graded, and made up into packages. A three-pound package sells for $3.50 east of the Mississippi, and $4.00 west of the Mississippi. A five-pound package sells for $5.50 and $6.00.

"We try to grow pecans that are better than the best that the other growers produce," Mr. Dantzler said. "Our success in this respect is proven by the fact that our Pecanway No. 1 grade is much higher than the generally accepted No. 1 grade. As a result, our packages are much in demand, and each year we have to send back many orders which we cannot fill. One year we were forced to return $8,000 in checks because we did not have enough Pecanway No. 1 nuts to supply the orders."

Cradled in Courage

Pecanway Place was begun 28 years ago by Mr. Dantzler's father. Convinced that the generally accepted idea of an "every-other-year-crop" of pecans could be overcome by proper fertilization, he purchased 100 acres of very sandy soil, and set out to make a successful pecan farm. He suffered set-back after set-back in the early years of his venture. However, he was never discouraged, and the fine grove at Pecanway today is silent proof of the fact that he had the courage of his convictions.

His first discouragement came when he purchased his first trees. After building up his soil by planting the first velvet beans in South Carolina, he set out 30 acres in pecans at the rate of 20 trees per acre. He afterwards

ABOVE: Drying racks in the grading and packing shed.

LEFT: The cover crop is important.

found that the trees which he had bought for budded trees were seedlings, and they all had to be dug up. Through a lawsuit he succeeded in getting his money back, and replanted this orchard with budded trees, in the meantime keeping the remainder of his farm in corn and velvet beans.

These trees brought him a second discouragement by scabbing severely as soon as they came into bearing in 1908. He called on the government for help, and specialists were sent to his farm in 1909 to experiment in the control of the scab. By 1911 they had found it impossible to control this scab in the trees which were of the Texas Prolific and Sansaba varieties.

That same year, the trees were cut back and top-worked to 14 varieties in an effort to find the best pecan trees for his particular conditions. When the trees came into bearing in 1914, the Schley was chosen as the best nut of the lot. At about this time he added another 15 acres to his grove, and it has never been increased beyond this size.

Mr. Dantzler is convinced that it is useless to plant pecan trees unless they can be well taken care of. He deems it inadvisable for any farmer to plant pecan trees unless he is in a position to give them the best possible attention and treatment.

Better Than the Best

All of this time, the trees were being given a complete fertilizer high in nitrogen and potash at the rate of 30 pounds per tree. In 1915 a system of clean cultivation in the summer and a winter cover crop was started.

The grove yielded the first crop "that amounted to anything" in 1917. That year, Mr. Dantzler, Sr., started to try by better methods of fertilization to produce a better nut than that produced by other growers, and conceived the idea of selling in small packages at a premium through national advertising. This idea met with almost immediate success, and today from 6,000 to 12,000 pounds of Pecanway No. 1 nuts are sold each year in small packages. The amount depends upon the crop. All of the nuts that can be produced which will come within the high standard of the Pecanway No. 1 grade are easily sold in this fashion.

The business grew year by year with 1926 as the banner year:

1919	16,000	pounds
1920	8,000	"
1921	19,000	"
1922	12,000	"
1923	16,000	"
1924	22,000	pounds
1925	1,800	"
1926	42,000	"
1927	13,000	"

(In 1925 a beautiful crop was set but dry weather completely ruined it.)

By comparing the yields with the fertilizer applied, it can be seen how the yields came up as the fertilizer came up, and the yield remained fairly steady year after year, thus insuring a good crop and doing away with the "every-other-year-crop" idea.

In 1923, 1924, and 1925, 400 pounds of sulphate of ammonia were broadcast in August, and 40 pounds per tree of 10-5-8 fertilizer were applied in April. In 1926, 40 pounds per tree of 13-3-20 were applied in April. In January, 1927, 500 pounds of superphosphate and one ton of lime were broadcast, followed by an application of 40 pounds per tree of a 2-8-16 in April. In April, 1928, a 7-9-10 fertilizer was broadcast at the rate of 1,200 pounds per acre.

Filling the Shell

"When we decided to put out package nuts, we needed both size and quality to make this idea a success," Mr. Dantzler said. "Therefore, we were careful to use a complete fertilizer high in potash to produce quality. We found by experiment that potash produced a better flavored nut higher in oil content and richness. It was then we adopted the slogan, 'Our nuts burn like a candle.' In order to maintain this high standard, we must completely fill the shell. I have found nuts popping open on trees that received extra high applications of potash, the potash so completely filling the shell that the shell was not large enough for the kernel.

"We now have 570 trees on 45 acres. My father turned the orchard over to me in 1924, two years before he died, and I have continually endeavored to maintain the high standard of production that was his aim."

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Making wheat hybrids to produce smut-proof wheats.

Wheat Breeding

By E. N. Bressman

Oregon Agricultural College

A RECENT survey by J. A. Clark of the United States Department of Agriculture shows that up to the present time we are indebted to the grower or farmer for a majority of the varieties that we are now growing. There is a change coming about, however, and most of our new varieties are being originated by professional plant breeders connected with the various state agricultural experiment stations and the United States Department of Agriculture.

The professional plant breeder has an enormous advantage over the grain grower in developing new material. He has more time, more funds, and without a doubt a better scientific background for carrying on the work. In at least half of the states of the Union and in every state where wheat is an important crop, there is being carried on some type of a program to develop new and better varieties. In fact, there is so much work being done that it requires constant effort to keep up with the varieties being developed.

There are many improvements that are being worked upon. In every case, the increased yield per acre is an important item. However, it is not the only factor as many characteristics of the plant such as disease resistance, winter hardiness, non-lodging, and improved quality are receiving recognition. More than likely resistance to disease is receiving more attention than any other factor. The two most important diseases of wheat are rust and smut.

Plant breeders are using three general methods of attacking the problem of developing improved varieties. These three methods are known as the introduction, selection, and hybrid method of improvement. Many are of the opinion that wheat breeding means the making of hybrids between various plants. This, however, is only one method of attack although it is an important one and is receiving more and more consideration. It may be well worth while to discuss these three methods and tell not only how they are carried out, but give some of the interesting developments made along each line.

Introductions of wheat varieties are made not only into this country from foreign ones, but also from state to state. It is no small task to test out all of the known wheat varieties and decide upon their ability under any particular environmental condition. This is the first thing that should be done, however, in a wheat-breeding program, so that the worker may know where to begin. Also, because of the many originations made each year, it is necessary to carry on this work constantly and test the new material being developed. The common method of growing a large number of introduced varieties is to put them in rows a rod long in what is known as the breeding nursery. Usually three of these rod rows, one foot apart, are grown as a plot, and three plots are usually included to get a fairly accurate idea of their ability.

Many of our standard varieties of wheat are introductions from foreign countries. The most notable, without a doubt, are Turkey, the famous hard red winter wheat; Marquis, the well-known hard red spring wheat; and Federation, the new white spring wheat from Australia which is doing so well in the Western states. The introductions of valuable wheat varieties from one state to the other are almost without number, and nearly every state is growing a variety of some value that has been originated in another state.

The oldest and perhaps the best known method of improvement in both plants and animals is selection. Everyone is familiar with the plan of selecting the best individuals to propagate. This method has long been used with wheat and is extremely valuable. It is still being used in many places and the results are outstanding. The most valuable wheat selection probably is Kanred, the hard red winter wheat selected from the old variety Turkey at the Kansas Experiment Station. This variety is resistant to many forms of rust and is being grown as a leading variety in several of the larger wheat producing states. Many other selections such as Red Rock in Michigan and Regal and Oro in Oregon are adding to the profits of the wheat grower.

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Rows and small plots of grain, Experimental Farm, Ottawa, Canada.

Quality Production PAYS

By Robert Stewart

Dean, Nevada College of Agriculture

MASS production in industry, whereby the output of the individual worker has been markedly increased, has led to the realization of the entirely new principle that human wants and desires are not limited but that the consuming public wants more of the better things of life. The demand for commodities which have quality and style is always unsatisfied. This principle is now the lodestone of industry.

While the capacity of the human stomach for food is limited, the demand for quality foods is unlimited, and the new guiding principle of industry is equally adapted to agricultural production. The old practice of blind production in agriculture must give way to quality production. The farmer must produce these commodities which the consuming public wants and for which it is willing to pay. Many farmers are aware of this principle and are making good profits, while others are producing blindly in the hope that they may have a lucky break.

The application of this principle to agricultural production is well illustrated by the results obtained from the olive orchard owned by the writer. This orchard is part of a tract operated by the Berkeley Olive association consisting of 442.68 acres of the Mission variety of olives near Oroville, California. This association consists of 24 individual members, each of whom owns and controls a definite area of land. The individual tracts vary in size from nine acres to forty-nine acres. The irrigation, pruning, and cultivation are uniform over the whole area and are done as though the grove was all in one orchard. The individual tracts are fertilized, however, in accordance with the varying conceptions of the several owners. Consequently, some tracts do not receive any fertilization at all, some receive sheep manure, while others receive commercial fertilizer of various kinds.

The Mission variety of olives is of value for pickles and oil production. The price paid for the pickles is based upon the size of the olives. The olives accordingly are graded into five sizes, mammoth, extra large, large, medium, and oil olives. The mammoth size is worth \$230 per ton, the extra large \$175 per ton, the large size \$135 per ton, the medium size \$75 per ton, while the oil olives are worth only \$50 per ton. The profits in olive production, therefore, are determined by the relative proportion of the larger size of olives.

Use Fertilizers

The writer's tract of nine acres has received commercial fertilizer for the past four years. The effect of this treatment has been most pronounced, not only in the increased yield obtained but also in the quality of the fruit obtained and the price received for it.

The yield of olives from the entire 442.68 acres of olives in 1927 was 579 tons or 1.3 tons per acre. There were 361.25 tons of pickles and 175.-75 tons of oil olives, i. e. 62 per cent of the olives were pickles. This was a good record and was better than that of most growers of olives in the Oroville district and fully as good as that of the best 10 growers of the entire district.

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Inventors Who Work *for the* Grain Farmer

By C. B. Sherman

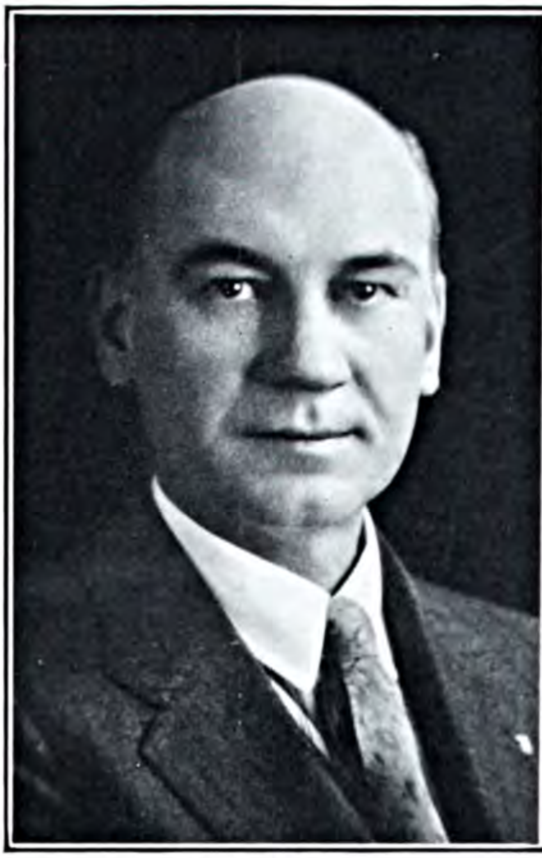
U. S. Department of Agriculture

THE inventions evolved during the past few years by one small group of men in the Department of Agriculture are estimated to have already saved to the people of the United States literally millions of dollars in the marketing of our great grain crop. In each case the invention has been placed under a public service patent which allows its use by the people without the payment of any royalty.

This small group, chosen as an example, are all to be found in the Grain Division of the Bureau of Agricultural Economics. Their inventions have practically revolutionized the cleaning, inspection, and grading of the grain crop of the nation, and results are evident not only in this country but abroad, wherever our grain surplus is exported. Generally speaking they have made it possible so to grade grain as to secure confidence on the part of the farmers as to the accuracy of the grade of the grain which they ship to the terminal markets, confidence on the part of the

The Grain Inspection Office, U. S. Department of Agriculture. The men in the center are using the Boerner sampler.

bankers who finance the industry, and confidence on the part of both the domestic and foreign buyers in the kind of grain that is going to be shipped to them when they buy grain by grade. This confidence did not prevail before these devices and methods were available for accurate grading, and this confidence on the part of the buyer, especially the foreign buyer, has made him willing to pay a higher price for the grain than he otherwise would.



E. G. Boerner
Ass't. Chief Marketing Specialist, U. S. D. A.

Beginning with grain on the farm, a public service patent was recently granted for an aspirator, developed by E. N. Bates, for cleaning grain at the threshing machine. Based on reliable figures, it has been conservatively estimated that if the wheat crop of the West were properly cleaned it would save the wheat region more than $10,000,000 a year—and the wheat region has no millions to spare. The aspirator is designed especially to remove foreign material and smut spores from the grain on the farm and smut is wheat's greatest enemy all over the United States. Aspirators have now passed the experimental stage and are now working in the wheat and rice fields in increasing numbers.

Another patented appliance, invented by J. H. Cox, removes from grain and rice certain weed seeds which are not readily removed by the ordinary cleaning devices.

Reaching the markets we find that E. G. Boerner has devised a grain sampler for accurately splitting samples of grain for analysis. This accuracy is essential to correct grading, for the old method of looking at a sample and assigning the grade merely on the basis of the "look" is a thing of the past. The Federal standards for grain specify for each grade the maximum limits for all of the factors which show undesirable qualities. In practical inspection and grading, the various tests are of necessity made on separate portions of the sample, and to split the original large-sized sample into small portions for analyzing and testing purposes is hardly possible without the use of the Boerner sampler, as this device is known in the trade.

An additional grading apparatus and method involves a weight-per-bushel tester also invented by Mr. Boerner. The "test weight" of grain is one of the governing factors in assigning grades to grain and, in the case of wheat, it is the principal grading factor. The test was formerly made by the use of various devices and no two would give uniform results. This haphazard testing was of little use and led to many disputes. Bv the use of the weight-per-bushel tester, grain inspectors can now make their tests in an accurate and uniform manner.

The ship sampler is another invention by this group of workers. Under the old system of ship sampling it was the custom to seize handfuls of grain from the stream of grain as it went into the hold, or to lower a bucket into the cargo hold and catch some of the grain. These methods did not give representative samples, and grading was often very unsatisfactory. The new device takes complete cross sections from the falling grain as it leaves the delivery spout, so that the various samples, when combined, accurately represent the shipment. E. G. Boerner and E. H. Ropes are the men who contributed this improvement to our great export trade in grains.

When protein content of wheat came to be such an important market factor, it became evident that methods for determining the protein content in lots of wheat, as used in different protein-testing laboratories over the country, were not uniform and were not obtaining uniform results. As substantial premiums are now being paid for high protein wheats, and as practically every lot of hard red spring and hard red winter wheat arriving at terminal markets is now tested for its protein content at one or another of these laboratories, there was increasing necessity for getting uniform results from the tests. To aid in this result, the Grain Division, through Dr. D. A. Coleman, has developed a standard method for making protein tests, the value of which is now widely recognized.

Develop Moisture Test

Two scientists in other Bureaus of the Department helped on the work by collaborating to produce a quick method for the determination of moisture content in grain and other substances. This method is developed around an improved apparatus designed by Dr. J. W. T. Duvel and E. Brown and has completely changed the handling and grading of grain in all important grain markets. Its great advantage is that moisture determinations are made on the whole grain, so that there is no loss of water from the grinding of samples, and much time is saved. Without this device, which is commercially known as the Brown-Duvel moisture tester, the grading of grain on a moisture percentage basis as now provided for in the United States standards would be practically impossible.

Coming back to the Grain Division, we find that as the value of flaxseed for crushing depends largely upon its oil content, and the method heretofore used for determining the oil content required about 24 hours, Dr. D. A. Coleman and H. C. Fellows have recently provided an innovation by developing such a simple method for determining the oil content of flaxseed that the test can be made in approximately 10 or 12 minutes. Now they are working out modifications of the technique, in the Grain Division laboratories, to cover many other oil-bearing materials. The test as applied to flaxseed is now in general commercial use at the principal terminal markets of the central Northwest.

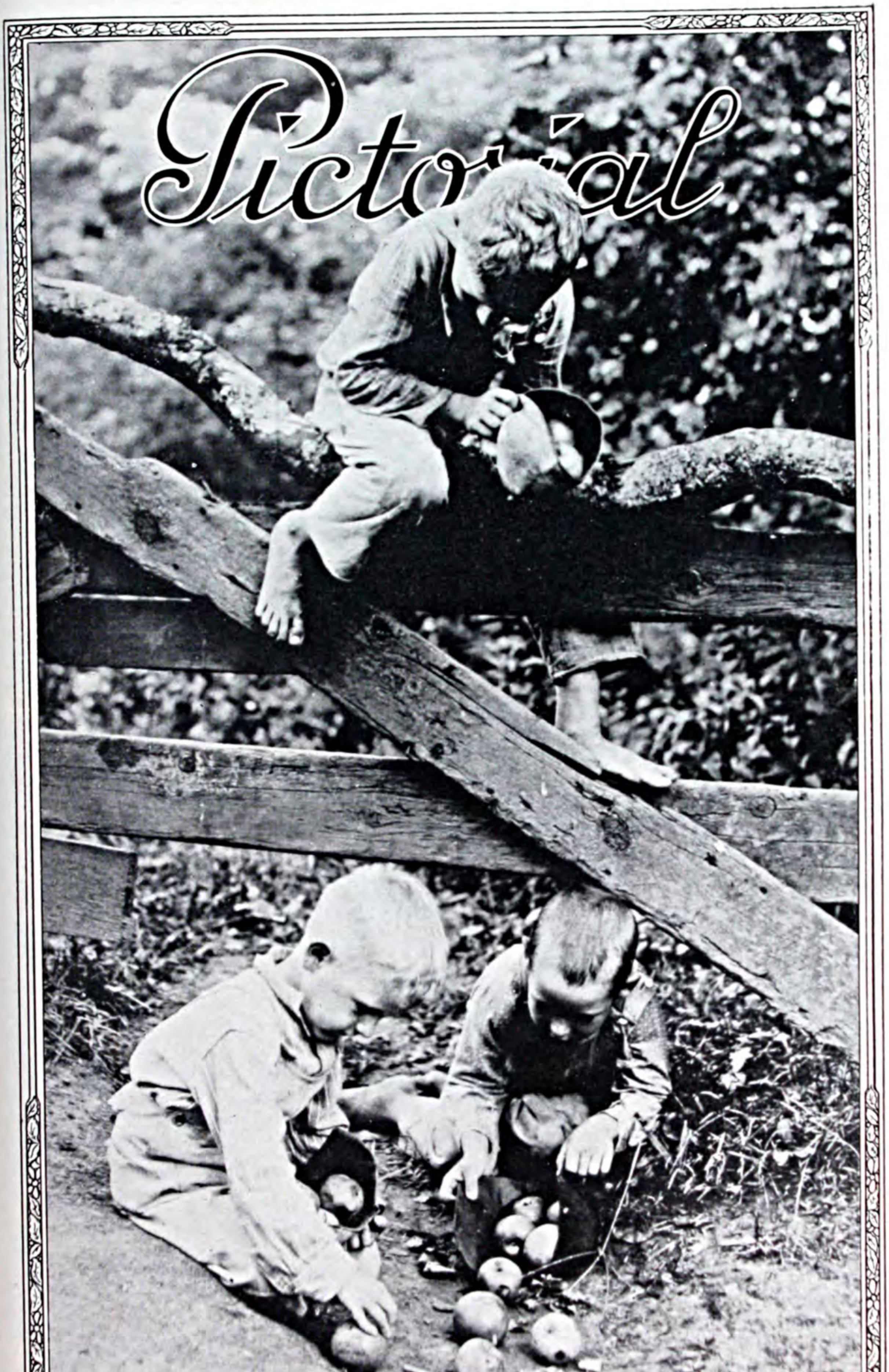
Rice Hulling Machine

Hulls can now be removed mechanically from samples of rough rice by means of a shelling device, invented by W. D. Smith. To ascertain satisfactorily the value of rough rice, it is necessary to remove the hulls, so that certain defects can be detected and the milling quality or hardness of the rice can be determined. It had been the custom for buyers and graders to "rub out" samples by hand before buying or placing a valuation on the rice, but since this estimate is so important to price, and the hand method of rubbing samples results in such wide variations in duplicate "rubbings," the need for an accurate mechanical test had become pressing.

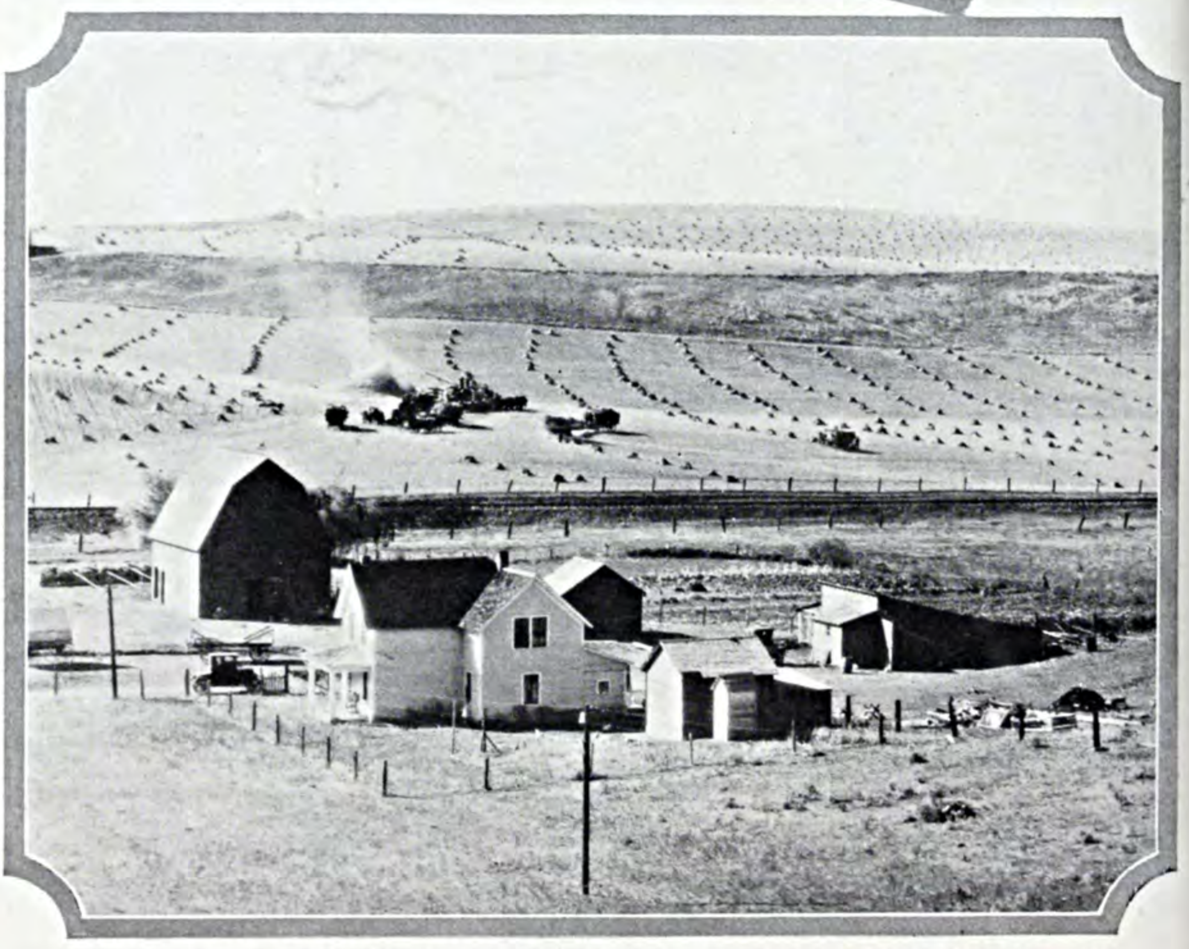
The savings effected by these devices and methods are so extensive and occur in so many parts of the world that they cannot be calculated, yet

(*Turn to Page* 54)

Pictorial

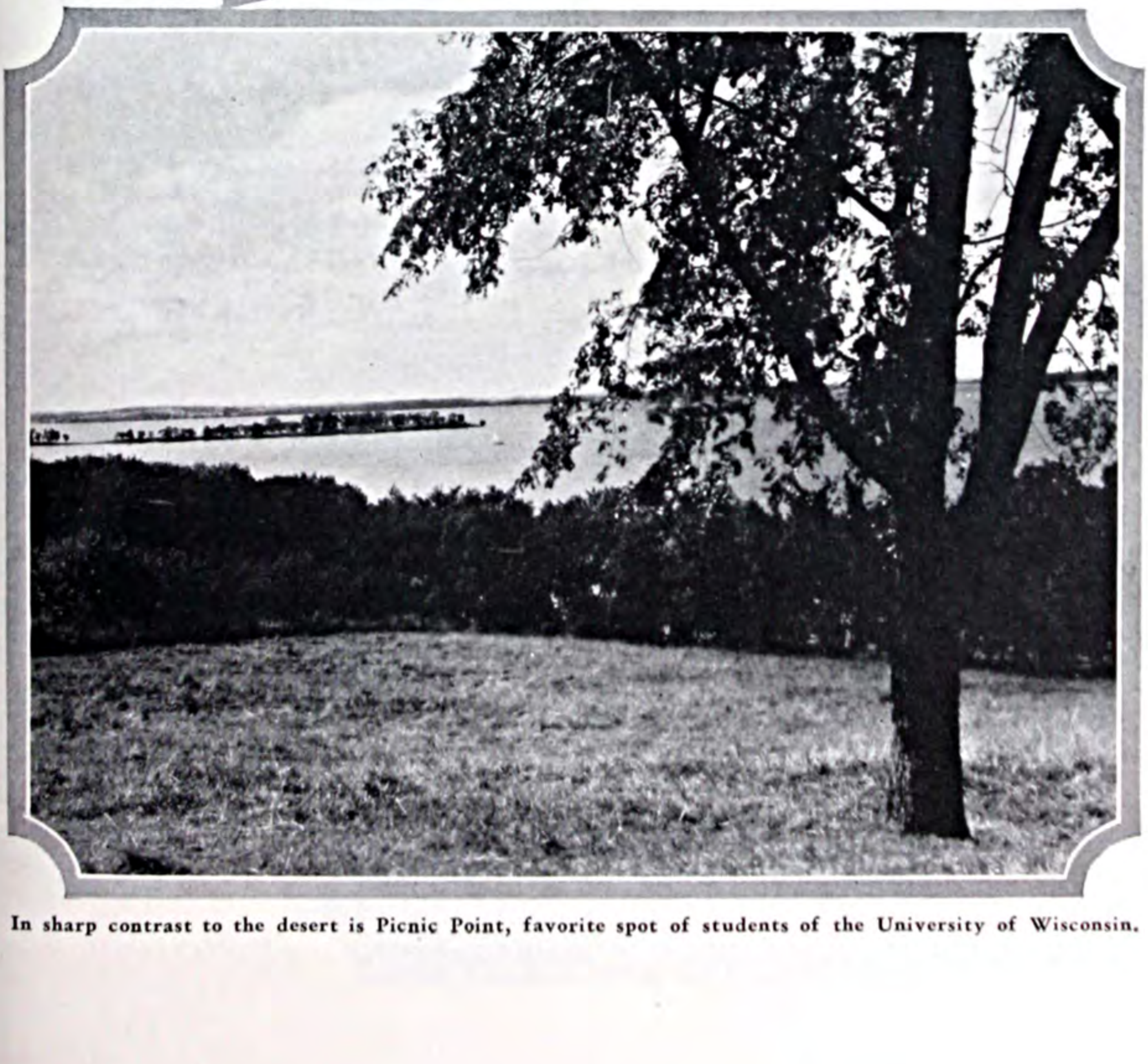


Live oaks make this
majestic approach to an old
Southern plantation in Louisiana.



Trees are scarce around these buildings on a big ranch in the Gallatin Valley, Montana.

Death Valley in California is one of the world's hottest and driest places.



In sharp contrast to the desert is Picnic Point, favorite spot of students of the University of Wisconsin.

LEFT: Not many youngsters have the opportunity these two had recently when they talked over the radio to the whole U. S. A. They are Montie Rippy of Arkansas, and Mildred Bennett of Minnesota, 4-H club members who attended the National encampment at Washington in June.

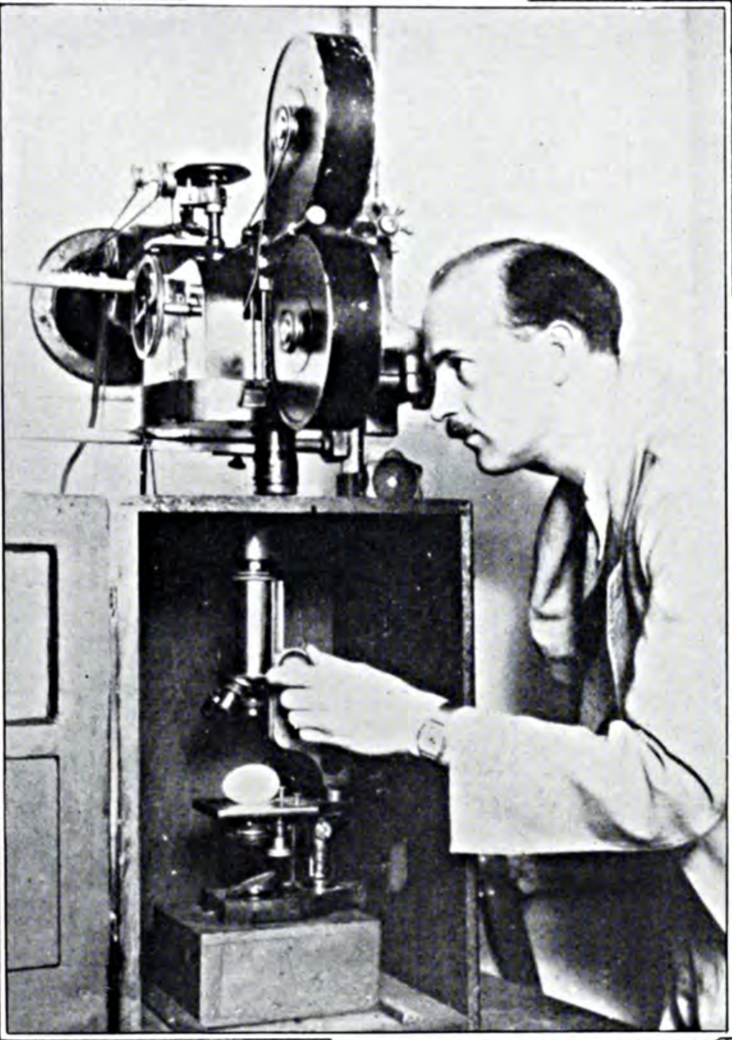
RIGHT: County Agent J. W. Hendricks of Catawba county, North Carolina, with a basket of fine Black Ben apples on the farm of H. D. Frye, Hickory, North Carolina.

LEFT: Lloyd Hahn, America's greatest miler, who represented the United States in the recent Olympic games, on his farm near Omaha, Nebraska. Hahn plans to settle permanently on this farm inherited from his mother's estate two years ago.

BELOW: J. Clyde Marquis of the Bureau of Agricultural Economics, U. S. Department of Agriculture, is now in Germany assisting in a 3-months' study of agricultural marketing conditions being made by a group of German and American marketing experts and economists. The American commission is headed by Doctor G. F. Warren of Cornell.

ABOVE: Nils A. Olsen, who was recently appointed chief of the Bureau of Agricultural Economics, U. S. Department of Agriculture. Mr. Olsen, who has been with the department since 1919, was brought up on an Illinois farm and has had much farm experience in addition to thorough training in history and economics.

RIGHT: Dr. James J. Durrett was recently selected to take charge of drug control work in the Food, Drug, and Insecticide Administration in the U. S. Department of Agriculture. Dr. Durrett succeeds Dr. G. W. Hoover, who was with the Department for many years and who has resigned to go into private work.



LEFT: The operation o
an extraordinary machin
which automatically film
without human aid the lif
of a chicken within an egg
records the beating of
turtle's heart, reveals th
home life of germs, an
the growth of flowers ha
been perfected. The ma
chine, a combination eight
day electric clock, motio
picture camera, and pow
erful microscope is show
here with its youthful in
ventor, Carl Dame Clarke
medical illustrator at th
University of Maryland.

BELOW: John Rober
Knight and Geo. B. Knight
Jr., sons of Mrs. Mami
Knight, Grayson, Ga.
picking cotton. These boy
with one mule do all th
work on a 40-acre farm
and support their widowe
mother. They had out 1
acres of cotton and 15 acre
of corn this past season
They aim to feed the sur
plus corn to hogs and sel
the cotton as a cash crop

The Editors Talk

Per Acre Plus Per Man

Europe excels in agricultural production per acre. America excels in agricultural production per man.

But emphasis on either one alone is not enough. Either achievement alone is only a partial fulfilment of agricultural possibilities. For the best development of any national agriculture, both are necessary—high production per man plus high production per acre.

To combine these two is America's unique opportunity. Few other countries are so well fitted for the development of both factors, namely, high production per man plus the most profitable production per acre.

America possesses the natural land resources in suitable areas. Farm units are on the average large, or at least adequate in size for economical operation with machinery. In fact, it is this physical basis of the farm unit that has been one of the most important factors in present high production per man, whereas many foreign countries have not this much needed physical basis. Farms are often in smaller units. There are, of course, large and well laid out farms in nearly every country, but broadly speaking smaller units and less machinery are the outstanding characteristics of farms in many foreign countries. Their production per man is therefore limited by this factor and also by denser populations, many of whom must of necessity often work on the land.

In America the picture is different. Production per man is higher. To this it is possible to add the best that Europe has to teach us in the most profitable production per acre. It is well known that the average production in the United States is comparatively low. However, before production per acre will be materially improved there must first be cleared away several mental obstructions that hold us down, chief of which is a too prevalent fear of over-production. This fear cuts right across our proper appreciation of profitable production per acre. We stand too fast by the idea that we must always farm on the extensive basis of high production per man satisfied with only moderate yields; otherwise, we shall all be ruined. We are too afraid of over-production.

Regarding this fear, Warren and Pearson, well-known agricultural economists of Cornell University, have shown that over-production as a cause of depression has been over-rated. Other factors are more important.

Let us face the facts. Farm surveys made of actual farms in different parts of the country show that the lowest cost per unit of crop is obtained by the farmer growing higher than average yields; in other words, better than average yields bring better than average profits. As an inevitable result of producing higher yields at the lowest cost per unit, marginal lands which cannot afford to produce a given crop will be forced to grow what is better suited for such land. Thousands and hundreds of thousands of acres which are now trying to produce corn, cotton, tobacco, wheat, and other major crops at a high cost would have to revert to uses to which they are better fitted.

If America is to attain her possibilities in agriculture, we need now the greatest emphasis on all factors that will produce the most profitable yields per acre. Soil management, plant breeding, good varieties, good seed, and soil in a high state of fertility should all be strongly emphasized. Particularly in the next decade should the proper use of fertilizers be investigated and the results demonstrated in the most practical fashion to every farmer in every area where climatic conditions permit their profitable use.

Western Europe uses vastly greater amounts of fertilizers which are used for one chief reason—because their use makes crop production more profitable.

All questions relating to the most profitable yields per acre need constant and watchful attention. High production per acre, plus high production per man is America's opportunity. Few other countries have the opportunity to an equal degree. But it will need more courage and determination and a bolder and more self-reliant outlook if our agricultural possibilities are to be fully realized.

An American Victory

So longingly have we looked to the Olympic Games for American victories that we have possibly overlooked the Eisteddfod recently held at Treorchy, Wales, in which a choir from Cleveland successfully competed.

An Eisteddfod is a musical festival in which choirs, orchestras, soloists, and practically all types of musical expression compete. An Eisteddfod is a notable occasion in the life of the Welsh people long to be remembered and talked about, much as we might talk about a ball game. Interest in the humblest homes is keen; training and preparation are strenuous.

It is, therefore, particularly gratifying to learn that the choir from Cleveland was successful. The following is rather an intimate and interesting account from a correspondent at Treorchy, published in Great Britain.

"I was outside the pavilion last week when the adjudication in the male voice competition was being given. A dense crowd awaited the final decision. Suddenly a big American charged down with a yell that realized all one's boyhood dreams of what a Red Indian war cry should be. His yell was answered by a chorus of shouts, and all at once a group of big Americans was executing a frantic dance of triumph, locked in each other's arms and shouting like mad. Professor Dawe, who brought the Cleveland Choir over to Mold and Swansea, was hoisted on heaving shoulders, his hat knocked over his eyes, his tie flying loose, and his voice ringing across the field. The lady who had accompanied for the choir was next lifted to what must have been a precarious eminence in that wildly excited throng, and Professor Bassett, the conductor, was treated in the same way. Staid American ladies kissed other staid ladies and members of the choir, and finally the whole mass broke into 'My Country, 'Tis of Thee,' followed by a rendering of 'Hen wlad fy nhadau' that made the hills resound. Handkerchiefs and hats were waving, and the last scene of all was a photographer climbing on the roof of a neighboring shed with a camera and the triumphant choir trying to subdue its excitement sufficiently to be properly grouped. It was a good ending to a good day."

Why not the greater development of singing in American life? The choir from Cleveland has not only won glory for itself, but set an example.

Fertilizer Economics

In a review of the fertilizer industry in the United States from its beginning to the present time much information is readily available on imports, consumption, and wholesale prices. However, very meager data can be obtained on the prices paid by farmers at their local purchasing points. The records kept by the Pennsylvania Department of Agriculture, Bureau of Foods and Chemistry, are, therefore, greatly appreciated by anyone seeking this information.

Wholesale prices have been available in trade journals, but as far as we know, with the exception of New York State over a short period of time, Pennsylvania is the only state which has kept any record of retail prices. Since about 1905, the Pennsylvania Bureau has recorded the actual price per ton that John Doe paid for fertilizer in his home town.

While wholesale prices of fertilizer materials are slightly above prewar prices, the price of labor is very nearly double the prewar price. This price of labor has a very important effect on the retail prices of fertilizer, since the distributing costs on fertilizers are primarily wages for labor.

Before the war, the consumption of fertilizers increased at the rate of five per cent per year, from 1900 to 1914. Since the beginning of the war, the rate of increase has only been about one per cent per year, and in some years there has been a marked decline in tonnage. One of the probable factors that has operated to keep fertilizer consumption relatively low has been the increased cost of distribution.

The Pennsylvania data not only makes it possible to determine the change in the retail prices of fertilizers from year to year, but it also makes it possible to determine the average change in the retail price caused by changes in guaranteed analyses.

Organized Science

There are approximately 700 technical and scientific organizations and societies in the United States. This is exclusive of organizations directly controlled by universities which must be added to the 700—surely enough scientific organizations to meet the requirements of progress and the needs of everybody.

A ready guide to these societies has been prepared by the National Research Council of the National Academy of Sciences under the direction of the Information Service of the Council. The work was done by Clarence J. West, Director of the Service, and Callie Hull, assistant to the director.

In which society or organization are you most interested? To start on safe and universal ground, there are independent societies devoted to individual flowers. The list includes dahlias, gladioli, iris, peonies, roses, and orchids. Moss lovers have formed an organization of their own, as have people whose interest centers in ferns. Other than the horticultural and quite technical societies, this list seems to cover the organizations devoted to flowers.

Do you stand up right? If not, there is a posture league whose object is to do scientific and educational work in the standardization and improvement of conditions affecting the posture of the human body.

What might be called the most distant society is the Association of Variable

Star Observers. Another society spreads the truth and knowledge about reptiles. The Horological Institute dignifies time and the people who keep the correct time for us.

Medicine, agriculture, and engineering, of course, occupy prominent places in the scientific societies and organizations of the United States. But the list is very varied and to the layman perhaps a little exclusive and mysterious. For instance, there is the Orthopsychiatric Association, the Otological Society, the Pediatric Society, the Phytopathological Society, the Psychiatric Association, the Society of Parasilologists, also the Society of Ichthyologists and Herpetologists. All of these societies are national in scope, American preceding each of the above titles. The list is perhaps significant as showing the development of scientific thought.

We have made progress. Scientific associations and societies are essential. They do excellent work, but we now hardly know the name by which a fellow scientist should be called. He talks a separate and distinct language. There is apparently no escape, for no one man can understand everything.

But is there not a danger of over-emphasizing scientific detail and calling it knowledge? Are we not underestimating somewhat the philosophy, the real meaning of science? We need facts; we need detail, but beyond that there is a need, unless science is to fall of its own weight in unrelated facts, a great and urgent need for men who can see through scientific subject matter to the related and simple truths that lie beyond; truths as they affect the vital tide of human life.

For this reason, the National Academy of Science, The Smithsonian Institute, whose object is to increase the diffusion of knowledge among men, the American Association for the Advancement of Science, and other organizations, in emphasizing science as a whole and bringing together its different branches, are doing a much needed and excellent work. The guide to these societies and organizations is extremely useful and a much needed publication.

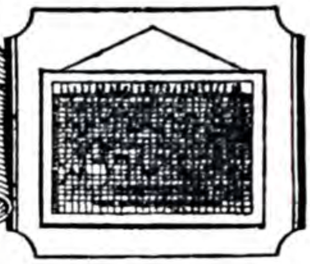
Diagrams Work

The Ohio Agricultural Experiment Station is to be congratulated on a recent published report of their field work. The bulletin is appropriately named "Field Work Guide." On the centre page is a map of the different experimental farms from which a total stranger could locate any particular experimental plot in which he was interested without the aid of a member of the experimental staff. The location of prominent experiments is indicated by number on the map; the same numbers follow the headings of the tables of results given in the bulletin, making it possible to determine the location of any prominent experiment for which data are presented. These data include results of tests of crop varieties and cultural methods, and experiments with fertilizers, lime, manure, and crop rotations.

The cover of the publication has a very attractive scene on an experimental farm.

This is the first guide of experimental work that we have seen. The idea is a capital one and makes readily available the most important work which the experiment station is doing. It, therefore, will prove a time-saver in presenting interesting work to visitors at the station.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

BETTER RUST-RESISTANT WHEATS

Strains of wheat still more resistant to rust than Marquillo, a variety developed not long ago in Minnesota, are being tested by plant breeders of the University of Minnesota in cooperation with the U. S. Department of Agriculture. An indication of the progress of this wheat improvement work is found in the fact that the promise of these new strains is being brought out even before Marquillo has been multiplied enough to provide seed for distribution. Marquillo in the bad rust year of 1927 averaged 31 bushels to the acre while the old reliable Marquis produced only 19 bushels. Marquis had 95 per cent of rust while Marquillo had only 6 per cent. During that same year of rust prevalence some of the new strains yielded at a rate 35 per cent greater than the very good Marquillo. It looks as if the plant breeders are going to give wheat rust a "ride."

THE SWEETENING FLOOD WATERS

The Vermont floods of last year have been found, as a result of tests by Professor Van Alstine of the Vermont Extension Service and H. H. Bennett of the U. S. Department of Agriculture, to have added much lime in the deposits strewn over the lowlands. Since much of the farm land in this region was so acid as to require frequent applications of lime, what is the explanation of this sweetening action of the swirling waters? These soil scientists say the answer lies only a little way beneath the surface. Formerly all the surface soil in this region was plentifully supplied with lime, but it was gradually leached out, even out of the surface of rocks that lay on the fields. But the subsoil and the centers of the rocks still held their stores of lime. The flood, not stopping after tearing away the surface soil, dug into the subsoil, mixed it with surface soil, and spread the mixture with its lime over meadows, pastures, and fields. Much of this land with a veneer of sand and gravel presents a discouraging aspect, but it is a more favorable home for legumes than the old sour soil. Nobody wants floods, but if we must have them let's hope they'll be sweet ones.

A NEW FEATHER FOR THE JERSEY

If the Jersey cow were addicted to millinery she would now be adding another feather to her hat, for dairy specialists at the New York State Agricultural Experiment Station have taken issue with the old notion that rich milk does not make high-quality cheese. Recent tests, which corroborate some old ones made at the same station, show that excellent cheese can be made from milk testing more than 5 per cent butterfat, and that the yield of cheese is greater per hundred pounds of milk than from milk containing less fat. The conclusion is that cheese made from milk with more than 5 per cent fat is fully equal in quality to that made from milk containing from 3 to 4 per cent fat, and awards at recent State fairs and at the National Dairy Show have substantiated the statements of the New York specialists. Since milk is usually sold to the cheese factories on the basis of fat content, this conclusion is of great importance. The test showed that the high-test milk—above 5 per cent—produced 13 pounds of cheese per 100 pounds, while 4 per cent milk yielded 10.5 pounds of cheese, and 3 per cent milk produced 8.2 pounds from 100 pounds. The loss of fat in the whey was no greater from the high-test milk than from the low-test.

HUMAN HUSKER STILL SUPREME

By a mere twist of the wrist the husky Iowa corn-huskers have shown that they are equal to the contraptions produced by the machine age. Economists of Iowa State College, as a result of comparisons of results on farms where mechanical corn-huskers were used and on farms where the wrist method is favored, announce that the machine method is no cheaper if as cheap as the hand. On none of the farms where records were kept was the difference between the two methods great, the largest difference being a half cent per bushel in favor of hand husking.

SWEET CLOVER RESCUES BLUEGRASS

When bluegrass pastures become practically useless in midsummer because of heavy spring grazing, dry weather, and starvation, there is an easy way out of the problem of feed production, says L. F. Graber of the Wisconsin College of Agriculture. The Wisconsin plan to improve the bluegrass is to seed sweet clover right on the sod, a plan that has worked well for four years. The land must have plenty of lime and phosphate in it or the sweet clover will fail. Seeding must be heavy, about 30 pounds to the acre, and previous to this any accumulation of old bluegrass must be burned off. The Wisconsin tests showed that the combined yield of sweet clover and bluegrass is frequently twice and even three times that of the bluegrass alone. No grazing is allowed the year of seeding, but the second year the sweet clover makes excellent grazing during the dry period. By the third year the bluegrass has often been so stimulated by the nitrogen collected by the sweet clover that its heavy growth prevents the reseeding of the clover.

MILKERS CAN'T BEAT MACHINE

Unlike the Iowa corn-huskers who successfully met machine competition, the boys who milk the cows haven't been able to make the grade alongside the mechanical milker. As a result of careful experiments at Iowa State College, it is concluded than on a herd of from 20 to 25 cows the machine will save about half the time required in milking by hand and reduce the cost about one-fourth. The investigators say the yield of milk is the same by hand or machine; that machines are commonly left on the cows too long—4 to 6 minutes long enough; and stripping after the machine should always be practiced.

JUST A WORD

The day is probably not far off when a farmer's letter to his county agent will look something like a doctor's little note to the druggist. According to Agronomist L. H. Smith of the University of Illinois, the next term the farmer will take to his bosom is "soil colloids." Not many years ago "bacteria," "protein," "humus," and "legume" were only rarely met with outside the laboratory and would have withered the grass had a farmer used them, but time has changed methods and, along with them, vocabularies.

Foreign and International Agriculture

Notes from South Africa

By W. Jerwitz, Ph.D.

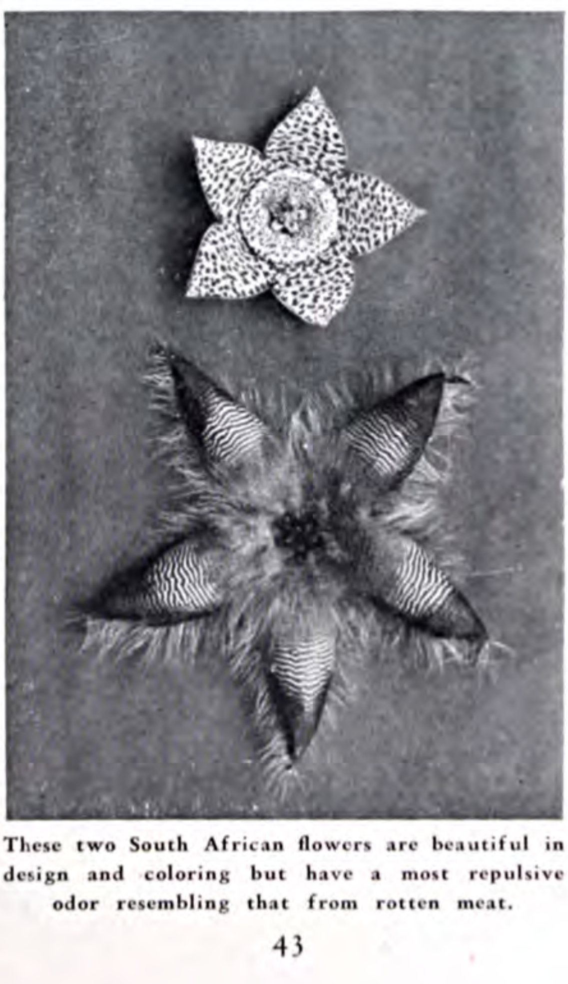
Cape Town, South Africa

EDITOR'S NOTE—*The following notes, together with some very interesting photographs, one of which we reproduce herewith, were received from Dr. W. Jerwitz. We believe they will be very interesting to our agriculturists who have never had the opportunity of visiting this far-away country which is so rapidly developing its agricultural possibilities.*

SOUTH AFRICA is a country of contrasts in many respects, and this is true also of its climatic conditions—summer rains on the east coast, winter rains on the west coast, and an interior where there are districts with summer rain and large areas of a prairie or even desert character.

Sharp contrasts are found often between districts adjoining each other. Thus, Worcester has a rainfall of about 10 inches, while the adjoining Ceres separated from Worcester only by a narrow mountain range may have a rainfall of 60 inches or more.

In accordance herewith we find also a pronounced variation in regard to the indigenous flora of South Africa. Of particular interest is undoubtedly the flora of the very arid grotesque forms as nature has chosen to adapt the plants to the droughty conditions prevailing here either during parts of the year or all the year round. Plants can be found with flowers which are very ornamental showing peculiarly delicate designs with a mixture of colors ranging from yellow to red brown. One is reminded of artificial hat flowers. As pretty as these flowers are, so far as appear-



These two South African flowers are beautiful in design and coloring but have a most repulsive odor resembling that from rotten meat.

ance goes, their smell is disagreeable, reminding one of rotting meat. By these means flies are attracted, and in this way the plants achieve pollination.

The use of fertilizers in the profitable production of commercial crops is growing as evidenced by the following instance:

In 1927 I inspected the citrus groves of Messrs. Van Zyl Bros., of "Middelpos" Citrusdal. They were particularly worried by one of their groves consisting of 400 Navels and 300 Valentia late. The soil consisted of a deep rather sterile sand and the trees looked miserable. They were then about 10 years old and had never given a decent crop.

From the 400 Navels they obtained in that particular year about 100 boxes all in all. It was evident that the trouble was due to starvation and a good dressing of fertilizer was applied, per hundred trees 300 lbs. blood meal, 200 lbs. sulphate of ammonia, 500 lbs. superphosphate, 100 lbs. Egyptian rock phosphate, and 300 lbs. sulphate of potash, introducing into the soil 70 lbs. of nitrogen, 120 lbs. of phosphoric oxide, and 150 lbs. sulphate of potash.

In 1928, these trees were inspected again about a month before harvesting time and the results were astonishing. The growth had been wonderfully improved in spite of the fact that the trees bore a very good crop. Messrs. Van Zyl expect to harvest from their 400 Navels at least 1,000 boxes this year. This means an increase of 900 boxes. The increase therefore will bring a net return of approximately $1,125. If the fertilizer is put down at $125 which includes a long distant transport to the farm and expenses of sowing the fertilizer, a net profit of almost $1,000 is to be obtained from an expenditure of $125.

It need scarcely be pointed out that this result is a great encouragement to the surrounding farms to use fertilizers in this district in which fertilizers have been practically unknown until last year.

Quality Production Pays

(*From Page* 27)

The writer's individual tract consisting of nine acres fertilized in a definite way gave a total yield of 31,611 pounds of olives or a yield 1.42 tons per acre. This tract not only outyielded the average of the entire grove but also yielded better than any of the individual tracts. There were 25,614 pounds or 12.8 tons of pickles and 5,997 pounds of oil olives. This tract gave a yield of pickling olives of 81 per cent. The 12.8 tons of pickles were of high quality. The crop consisted of the following sizes: 4,580 pounds of mammoth; 10,290 pounds of extra large; 7,921 pounds of large size, and only 2,823 pounds of the medium size. The value of this quality crop based upon the prices indicated above was as follows:

4,580 pounds mammoth size at $230 per ton....	$ 526.70
10,290 pounds extra large size at $175 per ton....	901.37
7,921 pounds large size at $135 per ton........	533.67
2,823 pounds medium size at $75 per ton.........	103.86
5,997 pounds oil olives at $50 per ton...........	150.00
Total.............	$2,215.60

The cost of cultivation and care of this tract for the year 1927 was $324. The cost of the picking of the crop was $308.16, while the cost of

(*Turn to Page* 48)

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

A bulletin recently published by the Agricultural Experiment Station, College Park, Maryland, has a very significant title. It is called, "Fertilizer Ratios for Prince George County," Bulletin No. 294, by A. G. McCall.

The word "ratios" emphasizes, of course, the idea that the ratio rather than the analysis is important. We are very glad to see this title used. In the bulletin will be found several pages of the triangular diagram representing the fertilizer ratios employed in the fertilizer studies. The sooner we learn to study such work from the ratio viewpoint the quicker we shall be able to correlate results obtained in different parts of the country.

Several soils were included in the experiment cited, namely, Leonardtown silt loam, Leonardtown loam, Collington sandy loam, Norfolk sand, and Sassafras loam. The basic materials used for the fertilizer mixtures were commercial grades of nitrate of soda, acid phosphate, and muriate of potash.

The experiments were conducted on wheat in tile plots of glazed sewer pipe 18 inches in diameter and 22 inches long set into the ground to a depth of 20 inches. The fertilizer was transferred from the field to the plots, but was thoroughly mixed and sifted and the top soil and subsoil were placed in the same position as they were found in the field. Several tables are included in the bulletin, giving the results in detail.

An excellent bulletin has been published by the Agricultural Experiment Station, Raleigh, North Carolina, on the "Influence of Crop Rotation and Soil Treatments upon the Yield of Crops on Cecil Clay Loam Soil," Bulletin No. 256, by C. B. Williams, S. K. Jackson, and F. T. Meacham. Five rotations were used in the experiments.

"Published Quarterly Report of Individual Samples of Commercial Fertilizers, Season 1927," Serial No. 107, Department of Agriculture, Atlanta, Ga.

"Commercial Fertilizers for 1928," Control Series, Jan. issue 1928, No. 125, State Fertilizer Inspection Service, U. of Md., College Park, Md., N. E. Gordon and L. E. Bopst.

"Fertilizers for Early Cabbage, Tomatoes, Cucumbers, and Sweet Corn," Agr. Exp. Sta., Wooster, Ohio, Bul. 420, May, 1928, Donald Comin and John Bushnell.

Soils

"Reclamation of the Fresno Type of Black-Alkali Soil," Agr. Exp. Sta., Berkeley, Cal., Bul. 455, June 1928, W. P. Kelley and E. E. Thomas.

"Soil Temperature Studies with Cotton," Agr. Exp. Sta., Gainesville, Fla., Bul. 197, May 1928, M. N. Walker.

"The Effect of Sulphur on Soils and on Crop Yields," Agr. Exp. Sta., College Park, Md., Bul. 296, Jan. 1928, R. R. McKibbin.

Crops

An interesting folder dealing with the Eastern farmer's problem of producing at home feed for his dairy cows, is found in Extension Circular 81, "Alfalfa on New Hampshire Farms," by Ford S. Prince and G. L. Waugh. The illustration shows a cow standing in Vermont and New Hampshire with her neck stretched to reach a grain bag in Iowa. The caption is

"Wouldn't it be more profitable to feed her at home?"

In the discussion of how alfalfa may be made a profitable crop in New Hampshire, the authors point out that New England soils must be made fertile. "The need for chemical fertilizers has not been so clearly recognized by New Hampshire growers," according to the circular. "Minerals, especially acid phosphates, are essential for highest yields of alfalfa. Potash also increases yields and helps to prevent winter injury."

The little folder is a concise reference on points which must be considered in introducing this important legume crop on New England dairy farms.

New Jersey has published the results of its study of permanent dairy pastures in Cir. 141. H. B. Sprague and H. W. Reuszer give an exhaustive report on work which has been done with drainage and cultural treatment of lands which are intended for permanent dairy pastures. The circular is of particular interest, because of the importance which is now being given to pasture management in the United States.

"The Effect of Interplanted Legumes on the Yields of Corn," Agr. Exp. Sta., Fayetteville, Ark., Bul. 229, July, 1928, C. K. McClelland.

"Cooperative Extension Work in Agriculture and Home Economics," Agr. Ext. Div., U. of Fla., Gainesville, Fla., Wilmon Newell.

"The Fortieth Annual Report of the University of Maryland," Agr. Exp. Sta., College Park, Md., Vol. 40, 1926-1927.

"Strawberry Culture," Ext. Serv., Durham, N. H., Ext. Cir. 82, May, 1928, L. P. Latimer and H. A. Rollins.

"Fiftieth Annual Report of the North Carolina Agricultural Experiment Station," Raleigh, N. C.

The Bimonthly Bulletin, Agr. Exp. Sta., Wooster, Ohio, Vol. XIII, No. 4, Whole No. 133, July-August, 1928.

"Mixtures of Spring Cereals and Flax in Ohio," Agr. Exp. Sta., Wooster, Ohio, Bul. 421, July, 1928, L. E. Thatcher.

Department of Agriculture and Immigration of Virginia, Richmond, Va., Bul. 248, Aug. 1928.

Economics

"Agricultural Statistics of Florida, 1927," (Quarterly Bulletin Department of Agriculture, July, 1928) Tallahassee, Fla., Vol. 38, No. 3 presents very workable data on the crops, livestock, and miscellaneous farm sales by counties in the state of Florida, for the year 1927.

"A Study in the Ratios of Assessed Values to Sales Values of Real Property in Oregon," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 233, June, 1928, W. H. Dreesen.

Illinois Crop Reporter, U. S. Dept. of Agric., Washington, D. C., Cir. 380, July 1, 1928.

Insects

Much research on the removal of spray residue from apples and pears has been done in the State of Washington. Results are published in three bulletins, as follow:

"The Removal of Spray Residue From Apples and Pears in Washington State," Agr. Exp. Sta., Pullman, Wash., Pop. Bul. 142, July, 1928, J. R. Magness, F. L. Overley, F. D. Heald, J. R. Neller, D. F. Fisher, H. C. Diehl.

"Arsenical Spray Residue and Its Removal from Apples and Pears," Agr. Exp. Sta., Pullman, Wash., Bul. 226, May, 1928, F. D. Heald, J. R. Neller, F. L. Overley.

"The Removal of Spray Residue from Apples and Pears," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 234, June, 1928, Henry Hartman, R. H. Robinson, and S. M. Zeller.

Diseases

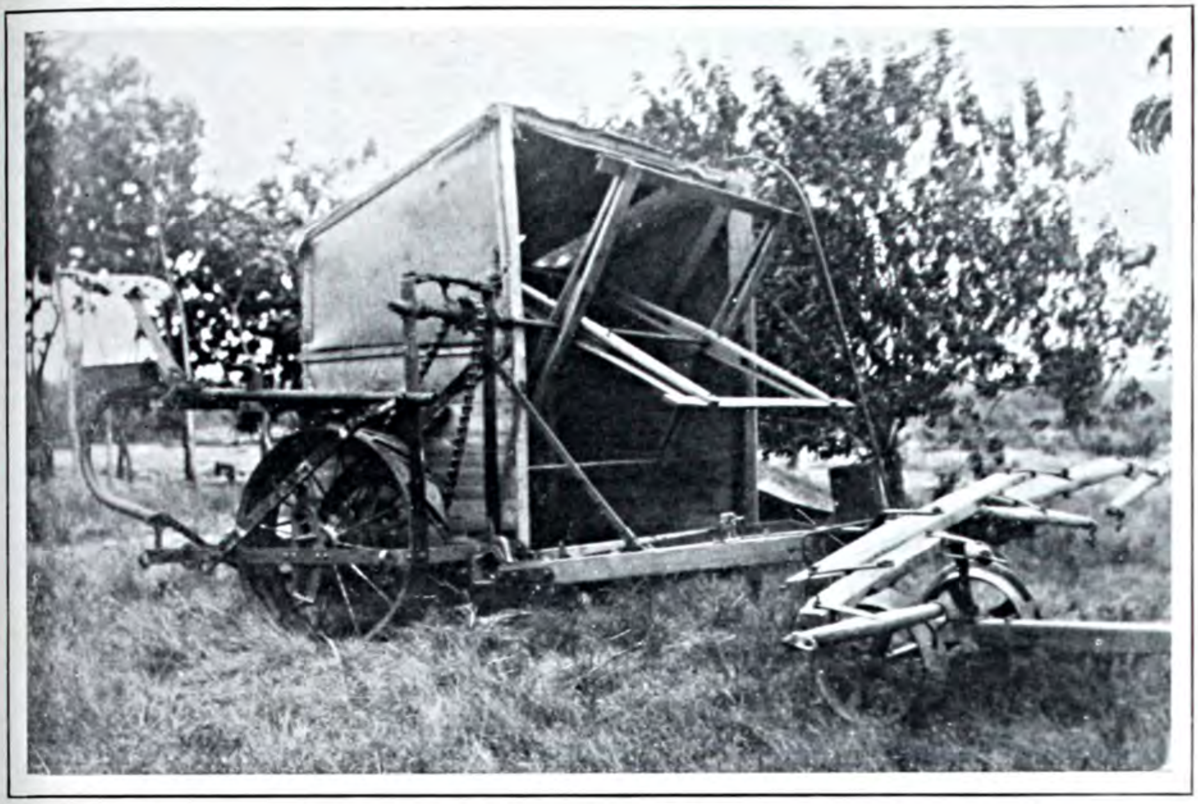
"Pear Blight Control in California," Agr. Ext. Serv., Berkeley, Cal., Cir. 20, June, 1928, Leonard H. Day.

"Tomato Wilt Disease," Agr. Exp. Sta., Manhattan, Kans., Cir. 140, June, 1928, R. P. White.

A SAFETY ADVOCATE

Safety First Teacher: "Norman, give me a sentence using the word 'diadem'."

Pupil: "People who drive onto the railroad crossing 'diadem' sight quicker than those who Stop, Look, and Listen."—*Studebaker Wheel.*



A home-made sweet clover seed harvester which is giving satisfactory results.

A Sweet Clover Harvester

By Robert V. Peterson

Oklahoma A. & M. College

A SWEET clover seed harvester that has for its foundation the wheels, frame, and platform of an old grain binder is being used successfully on a number of farms in Oklahoma. Easily constructed with but little expense and absolutely dependable, the machine promises to find wide use wherever sweet clover is raised.

The blade and table of a binder are removed and replaced with a big hopper or seed catching box. The lower half of the hopper can be sided with wood, using canvas or wire screen for the upper half. The entire lower half of the back panel can be made as a shutter, or a door can be built in to facilitate the removal of the seed.

The drive is direct from the bull wheel sprocket to the small sprocket on the beater shaft. The sprocket on the reel shaft embodies a jaw clutch for throwing the reel in and out of gear.

One successful harvester has three five-foot posts of 2x½ inch iron supporting the reel which is five feet in diameter. The blades are of 1x4 hardwood material. The shaft is 1⅛ inches in diameter.

Paul Stritke of Oolagah, Oklahoma, who has had one of these home-made machines for some time, estimates that its efficiency is from 70 to 80 per cent. He points out that the seed can be harvested any time after the seed is perfectly ripe, as heavy shattering is desired. He believes that with this machine the large, plump, fully ripened seeds are saved, the principal losses occurring in the immature and less desirable seed. With the ordinary binder the results are exactly the opposite.

Another advantage of this machine is that the seed is harvested when perfectly dry and in condition to be stored at once without any danger of heating—an important point in handling sweet clover.

Mr. Stritke estimates that the draft is about equal to that of a binder, varying with the heaviness of the crop. With his six-foot machine he harvests from eight to ten acres a day, the capacity being reduced by the necessity of stopping to shovel the seed into a wagon.

The machines have been used successfully on soybeans and may have a place in harvesting alfalfa seed.

Quality Production Pays

(*From Page* 44)

delivering the crop to the packing plant was $94.20. The taxes on the land were $24.73. Thinning the fruit cost $20. Fertilizer cost $137.50. Interest at five per cent on a valuation of $850 per acre was $375, making a total of $1,283.59. This tract paid all expenses of production including five per cent interest on an investment of $7,500 and left a clear profit of $932.01 or $103.44 per acre.

If the interest item is not figured at five per cent, the total cost of production is $908.59. The total income is $2,215.60, the net profit is $1,307.01 or $145.22 per acre or 17.4 per cent return on an investment of $850 per acre.

These results indicate quite clearly that quality production in agriculture pays. Also that quality products in agriculture may be obtained by proper methods of production. And, as in industry, the quality product finds a ready market at a good price.

This is not a special case or an isolated instance of the application of this principle of production. Numerous farmers throughout the land are making good money through a knowledge of the workings of this business principle. The government irrigation projects have been a bone of contention in Congress and the public press during the past few years. Most of the projects have been financial failures and the farmers on many of them have sought and obtained government relief.

Yet, Area Wimsett, who taught school in Iowa for a good many years, came to the Newlands Reclamation project in Fallon, Nevada, in 1922. He had exactly $2,400 with which he contracted for 120 acres of government land on this project. He commenced to produce quality products for the market, principally turkeys and dairy products. Five years later, in 1927, he had a farm worth $15,000 on which he actually made six per cent interest and had $3,200 left over as payment for his labor and management. During the worst period of farm distress in the United States this school teacher increased his capital from $2,400 to $15,000 all within five years and made during 1927, $4,700 for his year's labor and interest. There are few lines of human endeavor where this could be duplicated. His formula is a very simple one; he keeps records and knows exactly what he is doing. He quickly detects the leaks in the business and stops them. He buys in quantity lots and sells quality products.

There is probably no better opportunity in any line of work right now than in agriculture for the young man who is farm-minded and possesses the necessary business ability.

Solving a Buggy Problem with Bugs

By W. L. Wilkinson

County Agent, Kingsville, Texas

THE accidental introduction of the Cottony Cushion Scale from Australia into California has added one more insect pest to the long list that now affect the fruit growing sections of the United States, especially those sections where citrus fruits are grown.

With the egg sack of the adult female sometimes containing as many as 1,000 eggs, this scale reproduces very rapidly and will attack all citrus trees, and many other trees, so intensely that they are weakened and consequently killed unless control measures are applied. It also attacks rose bushes and other shrubbery. This scale, therefore, had not been in this country very long before its rapid spread and fatal injury made it evident that the citrus industry was being threatened.

The surface of this scale being a whitish, ribbed, cottony mass of eggs and to a great degree waterproof, it was found that the usual sprays recommended for controlling other scale insects were useless. Therefore, it was necessary to go to Australia, the native habitat of this scale, and find its natural enemy as a means of control. This investigation resulted in the importation of the Vedalia Lady Beetle (Novious cardinalis) that has proven without fail to be the only real effective means of control.

The Vedalia Lady Beetle, unlike most insects, can not stand very much cold weather, and the Cottony Cushion Scale is its only food. Unfortunately this beetle can not survive after it has practically cleaned up an outbreak of the Cottony Cushion Scale, and so at times it is necessary to restock them.

As an instance of how effectively the little beetles work the following is cited: In the latter part of December, 1924, a cold wave swept over the Southern States freezing all the Vedalia Beetles in California, Texas, Mississippi, and Florida. This gave the Cottony Cushion Scale an unmolested opportunity to spread. June 26th, 1925, the county agent of Kleberg county, Texas, found a serious outbreak of the Cottony Cushion Scale at Kingsville, the county seat. He at once wrote to Mr. Cel Curto, Chief of Division of Plant Pathology and Seeds, Austin, Texas, for Vedalia Beetles, but found that he was unable to secure even a colony of them from any of the citrus growing states. However a continuous search was made for the beetles. All this time the scale was spreading from tree to tree and from grove to grove killing trees and shrubbery. Scarcely a day passed that the county agent did not get an office or phone call notifying him of a new outbreak of this scale on citrus trees.

Like all other sucking insects, this scale emits a sweet sticky substance called honeydew. Garden ants, desiring to harvest a good crop of this honeydew, were busy caring for the eggs of the scale and carrying them from place to place thus causing the scale to spread more rapidly than it naturally would have. Song birds caused this scale to spread from grove to grove by carrying the eggs on their feet. Citrus trees, the trunks of which were six and eight inches in diameter, were killed and many others were dying because of this scale.

November 1, 1925, the good news came that Mr. E. W. Halstead had finally succeeded in getting a colony of about 12 of the Vedalia Lady Beetles. Mr. Halstead was with the Division of Plant Pathology, Department of Agriculture, State of Texas, and located at Mission, Texas. In order for Mr. Halstead to get enough beetles from this small number to send out to attack the scale, it was necessary for him to start a "Bug Hatchery."

This hatchery was made of a wooden box with a glass top for furnishing light, and cheese cloth sides to let in air. As there was no Cottony Cushion Scale in the Rio Grande Valley, Mr. Halstead sent to Kingsville for food to feed his beetles. The county agent sent him a three-pound coffee can full of the scale each week, that the beetles might not get hungry.

By December Mr. Halstead had enough beetles in his hatchery to send a colony of 12 beetles to Kingsville. These were introduced onto a citrus tree by taking a flour sack and slipping it over a limb heavily infested with Cottony Cushion Scale. After emptying the beetles in the sack the open end was tied around the limb so that the beetles could not get out. Ten days later the sack was removed, for by that time the beetles had become well established and the young or larvae could be seen feeding on the scale.

The Vedalia Lady Beetles are very small but quite active and can be seen running all over the branches of the trees from which they are cleaning the scale. They can fly a short distance and thereby extend their good work from tree to tree and from grove to grove.

In order to get the destructive work of the Cottony Cushion Scale stopped as quickly as possible, the county agent took colonies of the beetles from trees where they were the thickest and introduced them on all the groves that were infested with the scale. By doing this the beetles had the scale under control by the first of June 1926. As soon as these hard-working, valuable little beetles had freed the trees of the scale they had no food left and therefore starved. The trees, that were not killed by the scale before we could get the Vedalia Beetles, began convalescing and putting out new leaves and branches. These little beetles saved the citrus growers of Kleberg county thousands of dollars, and trees that would take 10 or more years to replace.

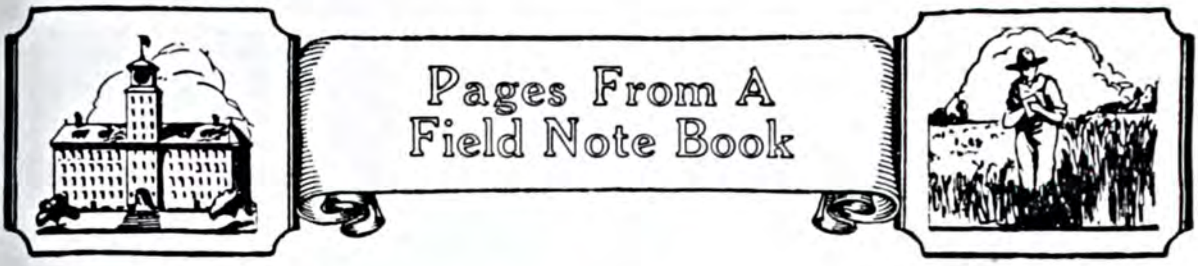
MAKE FERTILIZERS MOST EFFECTIVE

In using fertilizers that cost $30 to $40 a ton, it is important that general soil conditions should be as favorable as possible, points out Professor A. W. Blair, soil chemist at the New Jersey Agricultural Experiment Station.

"A soil that is strongly acid may limit the growth of certain crops to such an extent that the fertilizer can have little effect," says Professor Blair. "It is a waste of money to use fertilizer on such land. When the acidity of the soil is eliminated by the use of lime, good results may be expected from the fertilizer.

"Sometimes the land is so wet that crops can make only very poor growth, fertilizer or no fertilizer," he states. "Until satisfactory drainage is provided, it is a waste of money to use high-priced fertilizer on this kind of land.

"On land that is very sandy and poorly supplied with organic material, growth of crops is often limited by the water supply. Heavy applications of fertilizer cannot produce good crops under these difficulties. First of all, organic material must be added to the soil; then the fertilizer application may be profitably increased."—*L. H. Woodward, County Agent, Warsaw, N. Y.*



Soybeans Show Potash Hunger

By I. J. Mathews

Winamac, Indiana

ONE of the most interesting object lessons shown to one of the three field-meeting sections of the National Soybean Association which held its annual meeting in Indiana on August 15, 16, and 17 was a potash demonstration on the farm of Chester Joyce in Carroll county, Indiana.

For years it has been known that many low spots, locally termed "bogus," are deficient in either potash or lime or both. It has been common knowledge for years that when planted to corn, these spots need an abundant application of potash salts. But the soybean is very sensitive to fertilizer concentrations in contact with the seed. It apparently had never occurred to anyone that the crop might demand even more potash than corn for satisfactory growth on such soil or any other.

But Chester Joyce, the soybean grower visited, made such a test. In one of these "bogus" spots, after the beans were planted, he top-dressed several rows with 200 pounds per acre of muriate of potash. This was cultivated into the soil.

At the time this plot was seen on August 15, the soybeans that had not received potash were about 12 or 14 inches high, were light green in color, with the under leaves appearing brown, ranging to yellow a little higher up and with the rims of the leaves still higher showing yellowish splotches.

The soybeans that had received the potash treatment were from 24 to 30 inches tall and a very dark, uniform green. A conservative estimate is that the beans which received potash would make at least two and possibly three times more tonnage of hay per acre than those not treated.

A Rough Pasture Makes Good

By R. A. Payne

Northampton, Massachusetts

ABOUT eight years ago Robert Clark of Woodbury, Connecticut, had a typical brush-cover pasture which partially fed 10 cows during the summer. Starting early in July, green feed or hay had to be fed as well as a regular winter ration of grain. Today this pasture, supplemented only with a limited amount of low protein grain, furnishes more than enough feed for 25 high producing Holstein cows.

This change in the productive capacity of the pasture did not come free nor was it a matter of luck. Mr. Clark is one of the dairy farmers who was not satisfied that going out of the dairy business was the right answer to the pasture problem. At the suggestion of a former County Agent, Mr. Davis, he tried lime, superphosphate and muriate of potash—not alone but in combination—as a top-dressing on two plots on his originally unproductive pasture. One of these plots was near the pasture gate and was practically free from brush. The other was on the far side of the pasture and had nearly a perfect stand of moss. The area between these plots was thick with brush.

Today these two plots as well as the pasture between are free from brush and moss and would cut a better hay crop than the average mowing. The Kentucky bluegrass the middle of June was knee high and the white Dutch clover stood up like alsike. The cows fill up in about an hour on this pasture and then retire to the shade of the nearest trees to chew their cuds and to make milk. When approached they do not act the same as the hired man when caught asleep on the job. They get up politely and in a few minutes lie down as they have their foraging work done.

Mr. Clark while going over the pasture said, "You would not believe that only eight years ago that this was just a rabbit pasture, worth about $10 an acre. On these 30 acres we cut about 25 cords of wood. The brush was so thick that on some acres three of us working all of our spare time could not clear over an acre in two months.

"That must have cost a lot," we ventured.

"Yes," replied Mr. Clark, "but we were not very busy with other work just then. Besides, did you ever really get something for nothing? I figured it this way—our grandfathers made their money in dairying from the pastures. When you stop to think that with nothing going back on the pastures there was no reason why they should not get poorer. If these pastures were once good, it should be possible to bring them back by supplying the things which had been removed by the cattle. Lime and phosphorus are being sold from the farm in milk and in stock. The potash in the manure is lost to the pasture because it is put on the crop land. I have worked it out so that the manure is spread every day from crop planting time till well into December—not on the crop land but on the pasture."

"I started this in a queer way. My hired man wanted to beat the County Agent so he put some manure next to the plot which had the lime and fertilizer. The results from the manure alone were poor. That fall lime was put on part of the manured plot and the next year there was great improvement. To check the value of lime further, one plot was put on with just superphosphate and potash and the results were similar to those obtained with manure alone. Now I use one ton of hydrated lime, 500 pounds superphosphate and 200 pounds muriate of potash per acre as a starter. During the summer I manure this land. The cows will not eat the grass the year the land is manured. This is an advantage as it gives the bluegrass and white clover a good start. The second year it is so good that the cows do not get it eaten close to the ground.

"By taking as much acreage as I can handle in spare time each year I now have improved 30 acres of pasture. This improved pasture, on the basis of purchased feed which it replaces, is now worth $125 per acre. It has cost time and money to do this, but I am getting it back in reduced feed bills every year. I have felt that it was more profitable for me to improve what pasture I had rather than to buy or hire more 'rabbit' pasture and make the cows work every minute to get their feed. The only good thing about the original pasture was that it had good moisture conditions.

I notice that I do not get as good results on the dry parts of the pasture. I do not know how long the treatment will last but the first plot, started about seven years ago is still producing good feed. It has only had one treatment. Every morning the cows head right for this plot. They keep it mowed like a putting-green on a golf course."

Mr. Clark has 30 milking cows, 20 heifers, and 3 horses. He produces the winter roughage for these on 35 acres of crop land. He does this by growing corn for silage and by having a mixture of alfalfa and timothy for hay. Corn starts the rotation. The land is manured, limed as needed, and 500 pounds acid phosphate and 400 pounds muriate of potash per acre are used for fertilizer. The alfalfa-timothy mixture is seeded early in the corn, the corn being planted in hills spaced 3½ feet each way. This seeding mixture is used because a hay crop must be insured and this combination has never failed. Every acre of mowing is top-dressed with manure every year and produces a real hay crop.

Mr. Clark by top-dressing a rough pasture has reduced his summer feed costs to a minimum. By producing maximum crops of fine quality roughage on his crop land his milk check is not needed entirely to pay the grain bill. In fact an almost unbelievably small proportion of the milk check does this. His work is an example of what can be done on most northern dairy farms where a man has faith in good farming and the courage to back this up with action.

The Quebec Convention

(*From Page 20*)

lowing his opening speech, the Minister of Agriculture bestowed the Order of the Merite Agricole, the highest recognition that can be given to agricultural merit by the Province of Quebec, on four prominent members of the C. S. T. A.: the Hon. W. R. Motherwell, Minister of Agriculture of the Dominion, Dr. A. T. Charron, Dr. L. S. Klinck, and Dr. J. W. Robertson.

Toasts were drunk to "the King, our guests, the Province of Quebec, and Laval University." Speeches were made by the Hon. Mr. Motherwell; Mr. Archibald; Major H. G. L. Strange, President of the Canadian Seed Growers' Association; Dean Howes; Mr. Hector La Ferte, Speaker of the Provincial Legislative Assembly; Dr. Klinck; and Mgr. Camille Roy, Vice-Rector of Laval University and President of the Royal Society.

The Hon. L. A. Taschereau, Premier of the Province of Quebec, and many prominent personalities of the Province and the Dominion were in attendance at the banquet.

On Thursday, June 14, meetings of the various committees were followed by an evening boat trip on the St. Lawrence river. There was plenty of moonlight, singing, and dancing. The powerful voice and gesture of Mr. Georges Maheux inspired everybody and animated everything. Then, slowly, the boat came back to the harbor. The convention was ended.

During the convention Mr. Alphonse Desilets and Mr. Norris Hodgins undertook to publish a daily paper. "R U S," the result of their efforts, certainly was an enjoyable achievement.

The ladies and gentlemen of the various organizations, reception, entertainment, etc. committees, deserve the congratulations of all who attended the convention. But they did leave a hard task to those who will be in charge of the convention next year.

Inventors Who Work

(*From Page* 30)

not in a single case has the man who developed the invention claimed for himself one cent of profits, and in some instances his name is not even asociated with his device in the minds of the people it serves.

These are only a few of the many public service inventions that have been developed by Government workers, but probably in no other one small group, working on one set of problems, have there been so many inventions in so short a space of time. Other public service inventions relate to all kinds of crops and to all kinds of work. He who digs into these cases finds many striking evidences that the zeal for real public service constitutes in itself a genuine stimulus to invention. Most of these patents are the direct result of the recognition on the part of these scientific workers of certain definite needs in the industry. Their determination to meet these needs is so great that, when the means cannot be found, these men set out forthwith to create them. And they usually seem to succeed.

Supply and Demand

(*From Page* 21)

price of cotton is determined by the actual supply and demand relationship, rather than by what anybody says about that relationship.

Since 1910 the cotton market has experienced four serious price depressions. These occurred in 1911, 1914, 1921, and 1926. They were due in every case to large crops resulting from overplanting. In 1914 a record crop was harvested followed by a large crop. At the same time the demand for cotton was temporarily reduced by the outbreak of the war. Again in 1921 a combination of large production with restricted demand occurred. Thereafter prices rose. Acreage increased also, however, with the result that in 1926 a crop 5,000,000 bales greater than that of 1924 sold for $428,000,000 less.

There in broad outline you have the main facts of the way prices reacted to supply and demand conditions during the period in question. Statistical investigations made in the department trace the interaction of supply and price in minute detail. On the supply side monthly figures for the current actual supply of cotton and official estimates as to the prospective crop show the seller's position. Data giving cotton exported from and cotton consumed in the United States indicate the demand side of the equation. These data are coupled with information as to current and prospective changes in the business situation, with allowance made for the increasing growth of population and for the expanding use of cotton. With these data at their disposal statisticians figure out how the various factors influence cotton prices.

It is not necessary for our present purpose to go into the matter in any such detail. It will be sufficient to glance at some of the big things that have influenced prices in the last 10 or 15 years. Thus in 1911 recollections of good prices received the previous year caused farmers to increase their cotton acreage 11 per cent. This increase, with good yields, produced

4,000,000 bales in excess of the previous year's production. But though the crop was 4,000,000 bales larger, it was worth $130,000,000 less.

Let us look next at what happened after the war. In 1925 producers added 5,000,000 acres to their cotton acreage. They had a favorable season, and as a result the average farm price of cotton dropped from 22.9 to 19.6 cents a pound. This setback, however, was not sufficient warning. The following year, another million acres were added to the area in cotton with disastrous consequences. In the fall of 1926 cotton sold for around 12 cents a pound.

In 1927 the area in cotton was reduced 14.6 per cent. That was about half the reduction suggested as desirable by the Department of Agriculture. Its effect on prices was supplemented by the destruction of cotton in the Mississippi floods, and the market advanced materially. Nevertheless, still greater reduction in acreage would have been beneficial. It would have reduced the farmers' expenses of production and increased their net income.

It has been said, however, that cotton prices obey other influences than those of supply and demand for short, if not for long periods. This assertion is very plausible. Speculative buying and selling undoubtedly produces market fluctuations. But the evidence shows that speculative buying and selling reflect true supply and demand conditions more speedily than many suppose. When prices rise out of line with fundamental supply and demand conditions, they quickly fall. In like manner prices ruling lower than the natural supply and demand level are restored to that level as soon as the true facts become known. This is not a mere theoretical deduction from the law of supply and demand. It is a statistically proved fact. Price fluctuations above and below the supply and demand line are invariably of brief duration.

How uniformly the cotton market behaves under similar conditions is shown by its behavior in the three seasons beginning 1918, 1921, and 1927. Cotton prices rose and fell in these three seasons in a strikingly similar manner. This is particularly noteworthy because in the last season the Department of Agriculture, on September 15, 1927, issued a market forecast which has been held responsible for the subsequent course of prices. As no such forecast was issued in either of the two preceding seasons, the logical inference is that its effect in the 1927-28 season was negligible rather than important. In other words, the market acted in about the same way, in the year when the Department of Agriculture expressed an opinion in regard to price prospects, as it did in two similar years when no such opinion was expressed.

Law Unchanged

Each of these three seasons began with a large carryover of cotton from the preceding season. Each of them experienced the decline of about five per cent in general business activity. Each of them witnessed great speculative activity in the cotton market in August. And in each, prices later fell about as far and about as fast. In each year the break in prices followed *reduction* in the official crop estimate. Even the fluctuations which took place in these three seasons were similar.

It is evident that under like conditions the cotton movement behaves in a like manner. It is dominated not by anybody's view as to what it is going to do, but by the basic factors of supply and demand. These factors can be known in advance sufficiently to make possible very reliable general forecasts as to the course of prices. When the statistician knows the size of the American crop, the world carryover of American cotton, the general commodity or business situation, and the actual growth of the demand for cotton due to increasing population and to increasing use of cotton, he can tell pretty confidently what the market will do.

In the last three or four years the Department of Agriculture has attempted this service for the farmer. It has achieved a high average of accuracy in its forecasts. Hereafter predictions as to cotton prices are to be banned. On other commodities the forecasting service is not to be changed. Accordingly farmers will still have an opportunity to see by actual test how far price analysis can claim status as an exact science. They will have an opportunity to use expert interpretations of economic data as a guide in planning their production. They will also have a practical continuing demonstration that the Department of Agriculture does not believe the law of supply and demand has been effectively repealed.

"Nothing But No. 1's"

(*From Page* 24)

The soil at Pecanway Place is Orangeburg sandy loam. Mr. Dantzler thinks that the best pecan soil is pebbly sandy soil, 8 to 10 inches deep with a white clay subsoil over red clay. He recommends clean cultivation to conserve moisture during droughts and keep down all growth so that the trees get all possible ventilation, which is a great factor in controlling scab. Continuous harrowing also helps the land to dry out thoroughly during wet weather.

Various cover crops have been tried at Pecanway, and the Austrian winter pea is now being used. The legume is planted in late September or early October, and turned under with fertilizers with a disc plow about six or eight inches deep in April when buds commence bursting. The soil is kept thoroughly cultivated throughout the summer with a disc harrow. This requires harrowing twice a month until the latter part of August. The cover crop is turned under in order to get the fertilizer and humus down to the roots of the trees so that during the summer the disc harrow will not disturb the roots when they come up to feed.

Mr. Dantzler's recommendations for fertilizing pecan trees are: From the third to the sixth year of growth, apply 10 pounds per tree of 7-6-5 fertilizer, increasing this 5 pounds per year until 25 pounds per tree is reached. After the sixth year start increasing the potash and phosphoric acid by putting down 30 pounds per tree of 12-8-10 fertilizer, increasing this each year by 5 or 10 pounds per tree until a maximum of 75 pounds per tree is reached. In the Pecanway orchard, the potash is increased after the twelfth year, using 70 pounds per tree of 12-10-15.

This fertilizer should be applied in a circle beginning 8 feet from the tree trunk and going 5 feet outside of the ends of the limbs. After the thirteenth year the fertilizer can be broadcast.

"In addition to our nut business, we sell a number of budded trees each year to people who are planning to start orchards," Mr. Dantzler said. "I always try to impress upon these buyers, the importance of giving their trees the proper care and treatment. There is a mistaken idea in some sections that pecan trees can be set out and forgotten and later discovered as a wonderful orchard. The important rule in pecan growing is *treat your trees well and they will be good to you!*"

Mississippi

(*From Page* 14)

formly over the field with side applications of potash varying from 50 up to 250 pounds of muriate of potash per acre;

Additional experiments to the ones named using various sources of potash in uniform amounts both on land where cotton has been grown continuously for three years and where it is being grown for the first time;

Varying the percentage of nitrogen in otherwise uniform mixtures, going from an 8-0-4 in 2 per cent increases to an 8-10-4.

Where experiments are being run primarily to test methods of wilt control at least a part of the land has been inoculated with wilt germs to insure the presence of this disease from the beginning of the experiment. None of this work is done in less than three replications, much of it in four, while check plots are placed at the beginning and end of each test and every fourth plot between.

In all, there are 359 plots on the Poplarville Branch Station utilized primarily in testing the effect of various soil treatments in the control of rust and wilt in cotton. Many of these have been under way for several years, many more were begun in 1928, and with favorable seasons some outstanding results this year or in the very near future should be obtained.

Vary the Analyses

At the Holly Springs Branch Station, C. T. Ames, director, has for a number of years run fertilizer tests on both valley and hill land common to that section of the state. He recommends the use of an 8-4-4 fertilizer on average soils, an 8-6-4 on soils deficient in vegetable matter, and an 8-4-6 or even an 8-4-8 on lands where rust affects cotton. Four hundred to one thousand pounds per acre are thought to be most profitable.

Mr. Ames is now conducting experiments with varying amounts of potash and phosphate. Some of the experiments have been run for three years while others have only been conducted for two years.

Graphs were issued at the end of 1927 showing the findings over three and two years. The average three-year tests on valley land at the Holly Springs Station with applications of an 8-4-8 gave a net profit $24.50; an 8-6-4, a net profit of $17.35; an 8-4-4, a net profit of $20.12; an 8-4-2, a net profit of $11.47; and an 8-4-0, a net profit of $5.20.

A three-year average on hill land at the same station, with nitrogen and phosphorus constant and potash used in varying amounts, shows the following results: An 8-4-8 gave a net profit of $34.15; an 8-4-6, $37.55; an 8-4-4, $36.94; an 8-4-2, $23.00; and an 8-4-0, $19.90.

On the cooperative experimental plots at New Albany that have been under way for two years an 8-4-8 netted $26.09; an 8-4-6, $21.87; an 8-4-4, $20.77; an 8-4-2, $15.63; and an 8-4-0, $14.98.

Averages over a three-year period on valley land with phosphate varying and nitrogen and potash remaining constant showed a profit of $20.12 for an 8-4-4; $16.27 for a 6-4-4; and $13.55 for a 4-4-4.

The same time average on hill land with the same fertilizer mixtures obtaining gave a net profit of $36.94 from an 8-4-4; $22.06, from an 6-4-4; and $18.56 from an 8-4-4. A two-year average at New Albany showed a profit of $20.77 from an 8-4-4; $15.20, from a 6-4-4; and $17.31, from the use of a 4-4-4 mixture.

Similar tests with nitrogen had not been completed at the station in 1927.

Valuable contributions to cotton production have been made by the station through its experiments in the spacing of cotton. It has been found to be practical and profitable to space cotton thickly. This is true, in most instances, regardless of variety or the different soil types found in the state. Farmers of the state have largely abandoned the old system of thin spacing after finding that yields are much larger where reasonably thick spacing is practiced.

Results on spacing tests at Holly Springs by Director Ames last year were very significant. On valley land, 5.03 plants per foot gave an acre yield of 1,588.7 pounds of seed cotton; 2.44 plants per foot gave a yield of 1,781.3 pounds of seed cotton per acre; 1.70 plants per foot gave an acre yield of 1,686.8 pounds seed cotton; .89 plants per foot gave an acre yield of 1,676.5 pounds seed cotton; .66 plants per foot gave a yield of 1,548.8 pounds seed cotton per acre; and .57 plants per foot gave a yield of 1,648.5 pounds per acre.

Thick spacing showed to a better advantage on hill land: 4.02 plants per foot gave a yield of 1,029.6 pounds seed cotton per acre; 2.43 plants per foot gave a yield of 1,020.6 pounds seed cotton per acre; 1.75 plants per foot gave a yield of 915.5 pounds per acre; 1.21 plants per foot yielded 904.7 pounds per acre; .71 plants per foot gave a yield of 823.5 pounds seed cotton per acre; and .63 plants per foot gave a yield of 764 pounds seed cotton per acre.

The Directors

The station also makes investigations in animal husbandry, plant pathology, horticulture, poultry, farm management, and farm machinery.

In addition to the work being done on the stations proper, something like 50 acres of experimental plots scattered over the state are under the direct supervision of station employees. This work is primarily with fertilizers and is designed to ascertain the plant food needs of the multiform soil types commonly found in the state.

Since the station was organized in 1888 five men have served as director. S. M. Tracy was the first director serving from 1888-1897. Other directors and their tenure of office were. W. L. Hutchinson, 1897-1910; J. W. Fox, 1910-1911; E. R. Lloyd, 1911-1919; and J. R. Ricks, present director, who succeeded to the directorship of all Mississippi stations in 1919.

The Poplarville (Old McNeill Station) Branch Station has only had one director, E. B. Ferris, serving in that capacity since its establishment in 1900. C. T. Ames has directed the work of the Holly Springs Station since it was established in 1904. There have been three directors of the Delta Branch Station at Stoneville: J. W. Fox, 1906-10; G. B. Walker, 1910-22; and W. E. Ayres, present director, who took charge in 1922.

Coordinate Work

Director J. R. Ricks, J. N. Lipscomb, Dean of the Agricultural School, and Director R. S. Wilson of the Extension Department, coordinate the experimental and instructional work in all phases of agriculture practised in the South and particularly in Mississippi, so that agricultural students upon completion of the regular four-year course will have a practical and scientific knowledge of agriculture.

The Extension Department with executive offices at the College unites with the College in disseminating the information obtained by the Experiment Station. Its organization of specialists and county agents, both men and women, effectively infuse the better methods of agriculture into the rural sections of the state.

The work of the station and the school of agriculture is correlated so that agricultural students get the benefit of all information obtained by the central and branch stations, even before it is issued in bulletin form. This is possible because most of the central station employees are members of the instructional division of the College. The station farm is a part of the 2,270 acres comprising the college proper and is accessible to students and visitors desiring to observe the experiments from beginning until completion.

The Barberry Battle

(From Page 8)

ward the Swift county line. They continued their search into Swift county and found that the rust came from common barberry bushes seven miles away.

Not only can stem rust spread great distances from a barberry bush, but rust from a single barberry may cause excessive loss. W. E. Leer, Purdue University, told of a large 60-year old barberry bush which was found near Alert, in Decatur county, Indiana, back in 1922. It had already spread stem rust to grain fields of the community. More than 50 acres of wheat in the immediate vicinity of the bush were not even cut, and the grain from more than 200 acres in more distant fields was so badly shriveled that it was not saleable after being threshed. A prospective yield of 22 bushels per acre over an area of about 50 square miles was reduced to 8.8 bushels per acre. The total crop loss traceable to this single barberry bush amounted to at least $50,000 in that one season. This bush was destroyed in 1922. Observations made every year have revealed practically no stem rust losses in the community since the offending common barberry was killed.

Still another surprise awaited those in charge of the crusade against barberry. This came when efforts were made to kill the bushes. It was easy enough to kill them, but making them stay dead was a different thing. This really proved to be a big problem. When the work was first started bushes were dug with spade and mattock, or pulled out by the roots with horses and tractors. But the pesky rascals would not "stay put." Every little piece of root or root-stock left in the soil sprouted right away. Dozens of sprouts came up where one bush had stood before.

Then the eradicators turned to more modern methods of warfare—chemical. After a long hunt for chemicals which would kill bushes so completely that sprouts would not appear later, just two, common rock salt and kerosene, were found to do the business cheaply, surely, and safely. Now they have adopted the slogan "Kill It With Chemicals."

One gallon of kerosene poured around the roots is an average dosage. Ten to twenty pounds of crushed rock salt placed around the root crown, will kill an average size barberry bush. However, the action of kerosene is very slow. Barberry bushes growing close to valuable plants or trees are dug or pulled, as the application of chemicals may damage the other plants. Seedlings and small bushes sometimes are pulled, as it often is more economical to do this than to treat them chemically."

These are but a few of the surprises and problems which have come to light, but the campaign has continued with increasing vigor, the heat of battle ever growing fiercer. We still have stem rust, although not nearly so much. By delaying the early infection, barberry eradication has greatly reduced losses just as the scientists claimed it would do. The encounter against barberry and stem rust is far from won at the present time, but more attention is being centered on the project than ever before.

During the past 12 years conservative estimates place the average yearly loss to all grains due to black stem rust at $54,000,000. The estimated loss of wheat alone in the six years, 1915 to 1920, inclusive, was about 50,000,000 bushels per year. This was before and during the early years of barberry eradication. During the six years from 1921 to 1926, when more and more barberries were being destroyed, the average loss dropped to about 16,000,000 bushels per year.

The Second Survey

There are 976 counties in the eradication area. With the exception of a very few, all of these counties have been covered on the first survey, which means a survey from house to house in towns and cities and from farmstead to farmstead in rural districts. This was conducted rapidly to get the largest number of bushes for the smallest amount of money and time expended and to eliminate as quickly as possible the greatest source of rust losses.

A second and more intensive survey is now in progress. The purpose of it is to scout every square yard of territory where there is a possibility of finding a barberry. In this way all straggling bushes missed on the first survey and all seedlings and sprouts which have sprung up recently will be found. Many years will be needed to complete this survey.

The common barberry is not a weed growing in the grain fields. It is a woody bush and may be found on lawns, in and around orchards, in pastures and woodlots, along fence rows, near streams, and in fact wherever bushes grow. Before eradication laws were passed, this shrub was commonly set out in hedges and in ornamental plantings around farm and city homes. It is an erect growing shrub which ranges in height from three to twelve feet. Extremely old bushes may grow to a height of almost 20 feet. When found in cultivated plantings, it resembles Spirea in general appearance. When growing wild in woodlands and pastures, it resembles wild gooseberry, common buckrush, prickly ash and other bushes, but a close inspection reveals characteristics which easily distinguish it from these and other bushes.

Foremost among its distinguishing characteristics are the leaves which are produced in clusters like apple leaves. The leaves may be either green or purple and have small spines on the edges, making them resemble a fine-toothed saw. Just below each cluster of leaves is a set of spines or thorns, usually three or five appearing from the same base.

Early in the spring, small yellow blossoms are produced but they are noticeable for only a very short time. In the fall, many small, red berries, oval in shape and hanging in clusters like currants, are noticed. The berries are numerous and hang on the bushes throughout the winter. When snow falls on the barberry bush in winter, the red berries make a beautiful sight. The outer bark of this bush is

Abandoned.

dark gray in color, while the inner bark and wood are bright yellow.

Common barberry should not be confused with Japanese barberry, which is used so extensively for shrubbery at the present time. Japanese barberry is a smaller, low-spreading bush which seldom reaches a height of more than four or five feet. It does not spread rust and should not be destroyed. It is easily distinguished by its small, smooth-edged leaves, single thorns, and berries hanging singly or in two's.

Some people think that, since the eradication campaign has been in progress for more than 10 years, all of the common barberry bushes have been found and destroyed. This is not the case, however, for thousands of bushes are being found at the present time.

Previous to this year, more than 4,000,000 bushes had been destroyed in the state of Wisconsin, yet within 10 days after field agents started work this spring they found 2,654 common barberries in Dane county, not far from Madison. Hundreds of bushes are being found in Hennepin county, Minnesota, along the shores of Lake Minnetonka. More than 1,100 bushes were discovered in Lake county, Indiana, during the month of June, and an entire carload of crushed rock salt was used to destroy the barberries found in the vicinity of Traverse City, Michigan, within two weeks after the work started in that state this spring.

Barberry eradication is progressing as rapidly as possible under existing conditions. It is a long and difficult task, but those who are in closest contact with the work are confident that it is possible to entirely eliminate destructive barberries from the 13 great grain growing states of our country.

Wheat Breeding

(From Page 26)

The selection method is based on the fact that many of our old standard varieties are not pure from a breeding standpoint, but are made up of various separate strains which differ greatly, not only in yielding ability, but also in many characteristics such as winter hardiness, disease resistance, and quality. The selection method consists of isolating these superior strains and increasing them from the original single head selected. This is not a very difficult matter but requires careful work over a long period of years, and the testing out of hundreds of selections.

The third and most fascinating method of wheat improvement is known as hybridization. In this method, hybrids or crosses between valuable varieties are made artificially and the resulting progeny are selected until they breed true and the most valuable ones are determined. Enormous possibilities are offered by this method because valuable characteristics of the various varieties can be combined into a new variety. For instance, we have many valuable wheats that are susceptible to disease, and, on the other hand, we have many wheats that are very resistant to the common diseases, but are inferior from the commercial standpoint. Combinations of these types of wheat have given us valuable commercial varieties that are, for instance, resistant to disease, or desirable in other characteristics that have been combined.

Without a doubt, the most notable wheat developed in this way is Marquis, the hard red spring wheat developed by Dr. Saunders in Canada. Dr. Gaines of the Washington Experiment Station has recently distributed to farmers two new wheats that were developed in this way. These wheats are known as Ridit and Albit. Both of them are good yielding wheats and resistant to the smut disease.

Concentrated efforts in many states by experimentalists on these three methods of developing superior wheats will surely give new and better varieties. If the progress made in the last decade continues, it is surely difficult to predict the performance of wheat varieties in 1950.

Sincerity

(*From Page* 4)

lot of truth to assimilate. We burrow in our own ant hills and depend upon the testimony of experts, who usually disagree at a critical time.

Grandma's "old time religion" is torn asunder by modernists and fundamentalists, by free-thinkers and neo-this-or-that. Grandpa's squirrel whisky has gone from a home remedy to a household liability, and there is as much "con" as "pro" about the inhibition business. The unswerving patriotism of my boyhood schooling has given way to Internationalism and pink colored cults. The red schoolhouse rule of three is on a side-track while the teacher gives the chart class lessons in expression eugenics, and social control. Web perfecting presses by thousands, radio sets, and non-stop lecture tours dull our once keen minds by the friction of fiction and fact. Our job now is to find which is which and what for. No age has had so many facts to digest and so many directions to face at the same time.

Therefore, we are prone to be doubtful of many things. When one is in doubt and the mind is not made up, how can one find it easy to be sincere? Sincerity of opinion requires conviction.

I have made so many mental reservations that my brain must look like a wild-life refuge. I've had to pigeonhole my data on Bernard Shaw, Mexico, Tunney's abdication, and Al Smith's temperance platform, and I have still neglected to file and catalogue my gist of references on oceanic flights, the public utility conspiracy, the European war debt, and the conclusions of the soil improvement committee. Have patience! I shall in due time get ready to form an opinion on something, and perhaps I can be sincere about it until the next load of mail arrives. Only a tireless student or a victim of insomnia can hope to be sincere in an opinion worth fighting for these days. The average man can't stay awake long enough.

Now I come to another interesting phase of sincerity. Many people are sincere in opinions and beliefs that are *not* based on facts. The sincerity of a child waiting for Santa Claus is matched by the sincerity of some farmers in the relation of plant growth to the moon's changes or belief in permanent relief through legislation.

This kind of sincerity may be called naive. In children who talk of the Sandman and St. Nicholas we see nothing but winsome delight. In the old-fashioned farmer who sticks to the opinions of past generations we see nothing but stubborn resistance. It's all in the point of view.

Wordsworth says that all the world lies close about us in our infancy. Who is there who has not tried to prolong the period of a child's innocence to dwell in those charming days of fairy tales and Christmas reindeer? Who has not regretted the exchange of childhood's disinterested sincerity for the sophistication of adolescence and the trying teens?

I am aware that this is the wrong

dope. The child psychologists would be vexed at this, terribly. They do not believe nowadays in playing hocus-pocus with the babies. The whole truth and nothing else but!

For my own part in this I trust to infantile impressions gained when I was abundantly sincere and believed that all men were likewise. I recall that I ardently loved and revered an old music master of our village who used to stop and watch me at play. After I had reached the age when I could be trusted with the truth, I learned he was called one of the meanest old codgers in our bailiwick. Maybe if he had sensed how highly I regarded him, he might have turned a new leaf in his book of life. Even yet his face haunts me as benign as the pictures of John Burroughs, and I wonder sometimes if they ever gave him a chance to be as sincere as I thought him to be.

EMERSON says that to believe in yourself and what you hold to be true is genius. Matthew Arnold links culture with sincerity of knowledge and refinement. I am aware that culture and genius taken hold of in those terms are as hard to find as a dry prohibition officer. Yet I am sincere in hoping to cultivate a share of it, and so are you.

Every man worth consideration is trying to be cultured and thinks he is a genius. He nurses his ego in all sincerity, but when he gets to exhibiting too many blue-prints of his own model of a perfect self-made man, watch out for trouble!

Men who hold to that kind of lonely, self-absorbed sincerity are so bothered with the details of their own perfection that they miss the real brand of sincerity. This I hold above all others to be *sincerity* of *service*.

But don't quit on me yet! I am not taking you from this point directly into a salesmen's pep convention or to a Rotary luncheon. By using the term "sincerity of service" I am only taking you from the passive to the active form of sincerity. Before this I have mentioned sincerity of opinions, beliefs, and moral attitudes. Now I am drawing toward the grand finale, which consists in taking sincerity completely out of the dusty dictionary and putting it out at hard day-labor.

When sincerity is used in the industrial or professional world, it pays big dividends. The old vikings of the commercial seas were often piratical and sailed under false colors until they gained a tricky victory, whereupon the skull and cross-bones were flung to the breeze.

TRUTH-IN-ADVERTISING, ethical training, and progressive business associations may have had the first opportunity to point the way, but sincerity sold itself to anyone who gave it a fair trial.

Codes of ethics have been almost as generally adopted as trade-marks. Cynics may sneer as they will at what they call hypocrisy in business, but I have found in dealing with large corporations that they hardly dare to do otherwise than live up to their contract with the public. The high standard of living has made a more discriminating public, while the dissemination of technical information has made it harder for the charlatan to make a profit out of deceit.

Of course, insincerity will continue to be bootlegged as long as humanity is in its present imperfect state, but the genuine article forever gets all the repeat orders. The investment banker is vigorous in closing the market to the hawker of false securities, because every empty oil well is a drag on legitimate gushers. The bar associations frown on the shyster and sooner or later knock down his greasy shingle. The medical faculty is zealous to ban the quack. The ministry unfrocks the preacher who hides hideous sins under a cloak of apparent sincerity. The advertising profession is a dynamic advocate of fair dealing and honest service.

It all finds a common root in confidence. Where man reposes confidence, he banks his greatest treasures, and the failure of an institution to be worthy of confidence is the greatest calamity that can befall it.

SINCERITY is no longer a crutch for weak sissies to lean upon and for strong men to disregard. Sincerity is a powerful weapon in the arsenal of competition. Industry and profession bid against others in their lines for a larger share of public confidence and patronage. Community vies with community and city with city, each looking for a larger chance to earn the wages of sincerity.

Mergers which have recently taken place in such large numbers were the result of the necessity for minimizing ruinous and insincere competition.

An old-time business often plumed itself over the dishonesty of a competitor and reckoned on getting the increased trade resulting from the doctrine of "caveat emptor,"—let the buyer beware.

It's different now. Manufacturers and sales agencies unite to advertise their common product and to teach the weaker ones how to establish a universal confidence in all goods and services they sell.

"Say it with flowers"—"save the surface and you save all"—"wood; use it; nature renews it," these are not mere empty catch words to make readable copy for the advertising field. These and similar national campaigns have sent a far-reaching force down the line of their endeavor to make such slogans stand for sincerity.

Mankind in the mass may not be as pious as of old. There are not so many camp-meetings. But I can well remember folks who snuffled on the mourners' bench and then laid awake nights figuring a way to cheat someone out of the nickel they put in the plate. When Big Business got "converted," it crowded all those sniveling hypocrites off the mourners' bench and then proceeded to make ethics work. Business sincerity has managed to spread a little more of the Sunday spirit through the rest of the six days.

I am confident that as time goes on our stock of every-day sincerity is going to become more automatic and we shall be less self-conscious about living the truth. The machinery creaks a little nowadays in bearing the load of responsibility and sincerity forced upon us by the higher standard of ethics that *almost* keeps pace with the higher standard of living.

It would be as easy, no doubt, to be sincerely cynical as to be sincerely hopeful and confident about the future. But if I am going to be sincere about anything, which requires a vast amount of energy, I shall be so for the sake of *ideals* rather than unworthy *suspicions*.

AND finally, you must concede that sincerity, to be genuine in its work, must not be too conspicuous or bear a label.

It must be quietly and unobtrusively on the job, like mother in the kitchen.

The rough and jocular sincerity of two laborers in the ditch or two dough-boys in the trenches, the honesty of purpose which responds alike to the pipes of Pan or the factory whistle—that's the brand I intend to emulate and acquire a share of if I may.

There is a prouder pen than Jeff's to clinch this argument for once and all. I leave you to ponder the lines of Henry David Thoreau:

"Between whom there is *hearty truth* there is love; and in proportion to our truthfulness and confidence in one another our lives are divine and miraculous, and answer to our ideal."

A Few Whinnies

IF IN DOUBT

Judge—"And why didn't you stop beating the plaintiff here when he had yelled 'enough' three or four times?"

Defendant—"Well, you-all don't know how dat man can lie. You can't nevah believe him."

An American was prowling around a Scottish churchyard. His eyes caught the epitaph "Lord, she was thin."

"Say, sexton, what d'ye make of that?" he asked.

"That's all right, sir; the sculptor went over near the edge of the stone and didna leave room for the 'e'."

Seth's pap sent him to the mill one day to try to sell the season's wheat crop.

Seth got hold of the miller and submitted a handful of wheat to him. The miller examined the wheat very carefully. Then he said:

"How much more has your pap got like this?"

"He ain't got no more like it," young Seth answered. "It took him all morning to pick that out."

"Pa, what does it mean here by 'diplomatic phraseology'?"

"My son, if you tell a girl that time stands still while you gaze into her eyes, that's diplomacy. But if you tell her that her face would stop a clock, you're in for it."—*Union Pacific Magazine.*

A SATISFACTORY ANSWER

At a baseball game a young woman asked her escort: "Why does that man behind the hitter wear such a big bib?" He explained to her that it was to keep the catcher's shirt from getting all mussed up when the ball knocked his teeth out.

"Why did you break your engagement with that school teacher?"

"I didn't show up one night, and she wanted me to bring a written excuse signed by my mother."—C. C., *N. Y. Mercury.*

ELECTION UNANIMOUS

Asked at the marriage license bureau where his bride-elect" was, a negro replied sharply: "What yo' all mean, bride-elect? Dey weren't no election; de lady appoint herself to de office at mah own pussonel request."

Hubby: "Why are you angry with the doctor?"

Wifey: "Just think! When I told him I was awfully tired he asked to look at my tongue! Think of it, my tongue!"

POPULATION CONTROL

Owing to the lack of space and the rush of editing this issue, several births and deaths will be postponed until next week.—*Announcement in an Iowa paper.*

Better Crops with PLANT FOOD

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Better Crops with PLANT FOOD

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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
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Look into the autumn hazes with Jeff

Indian Summer

By Jeff McDermid

INDIAN summer to many of us pessimists means a periodic interval of grace between hay fever sneezing and bronchial coughing; between sun scald and chilblains; or an interlude between the ice man's sloppy tracks and the coal man's grime.

To the optimist who never heeds the admonition of the grasshopper and the bee in old McGuffey's readers, but who dreams and dallies in real un-American fashion, as a free thinker should, Indian summer is an idyl. To thoroughly enjoy an idyl one must be idle, albeit the standardized vacation weeks by this time are torn off the calendar.

The recurrence of spring fever laziness and Indian summer somnolence enhances my conviction that Darwin made a serious error. Our species were once accustomed to "hole up" or "den down" for the dormant season instead of hanging by the hocks to vegetation like Anthropoid apes. That is, we were ground hogs originally, and up to the time of the air ship age some of us had not entirely escaped being fraternally recognized as such.

The first awakening stretch and yawn of our hibernating ancestors are carried over now in the lassitude of spring fever—although I disclaim knowledge of what causes the poetic complex. Likewise, the comfortable settling down in a snug bed of dried leaves which our forbears enjoyed in the autumn is left to us in a rudimentary way by Indian summer languor and reveries.

Even my friend the curator of the state museum cannot tell me why they call the nice autumn days after the vanishing red brothers. Maybe the color of the leaves reminds one of the war paint which the squaws got ready when the first League of Nations was suggested by the Iroquois, who were then the Tammany leaders of New York.

YET somehow the haze over the landscape in October and November suggests the smoke of many aboriginal campfires, and each year at this time a great Chicago newspaper reprints upon request the cartoon by Hoosier McCutcheon, showing the small boy's vision of a cornfield where each shock becomes an Indian tepee by the magic of a story teller's imagery. From this, and from the lines of Hoosier Riley depicting the twinkle of the frost on the rubicund shapes of the pumpkins, while the sharp tang of the breeze hastens the husking, I am firmly convinced that Indian summer is a precious fantasy belonging to us of the Middle West.

They don't recognize it in California; it is nothing in the lives of Floridans; and the sea mists of the Atlantic are different than the indefinable diffused aura that now spreads over our inland empire.

'Tis a kind of doxology after the delights of summer, a sharp taking in of the breath before the plunge into the zero waters of winter. It stands true to the warning of wiseacres anent fine days being "weather breeders." It is the time to ramble in shaggy byways for wild grapes, bitter sweet, and hickory nuts, and to return with stone bruises, torn shirts, and burdock burrs in your pants.

The youth of the present age get their nuts from the chain stores. We used to risk our hides and re-blister our reputations every autumn by a jaunt into the blue hills for purposes of pillage.

We knew that trespass was unlawful, but the gang was in league with the squirrels and the world was ours. We had nimble legs and were used to being called so-and-so. The only unfavorable reaction to this sport was when some farmer slyly watched us from a secret place while we pelted his trees, and then invited us in to supper because his boys were all gone and he was lonesome. He was the man who first made me understand that Indian summer had sadness in it somehow, and I went home without taking any butternuts from *his* place. Thus a little poetry can become a protection against pilfering, whereas your decisive "no hunting" signs are always full of BB shot!

Coming home one night lately I chanced quite unexpectedly upon a scene that was characteristic of the nineties, when the fall days on the farm meant the laying in of a score of liniments, hair tonics, ague bitters, and fever pills. It was the sight of a flamboyant medicine show parked in the dusky fringes of a grove, with the usual eager crowd of urchins pressing to the front for favors. They had collected a crowd from the countryside of Pumpkin Hollow to revel in the peripatetic wonders of a cross-eyed juggler beneath flickering oil lamps.

SINCE treasury agents, inspectors and bureaucratic control have paternalized us into a standardized citizenry, we have lost much of the joy that comes from being genuinely and thoroughly humbugged — completely hornswoggled out of cash that at this season was dedicated to mittens and leggings. Old Simon Surpress has taken a lot of real fun out of following the gipsies and gaping at the medicine fakirs.

But rest assured, as soon as I saw

(*Turn to Page 62*)

hese seedings were the same—a mixture of timothy and clover. The plot which received 400 lbs. f superphosphate and 100 lbs. muriate of potash produced 6,432 lbs. of hay per acre (all clover); the other plot, 1,440 lbs. (half timothy).

Farm Demonstrations

By G. E. Langdon

Wisconsin College of Agriculture

TAKING the demonstration to the farmer instead of the farmer to he demonstration is a successful way f studying soil fertility problems, ac- ording to Wisconsin county agents.

In Monroe county this past year a ampaign was started with 10 one- ay institutes at which soils problems vere discussed. About 150 farmers ent in soil samples and information lanks before the cropping season. The samples were tested for acidity nd available plant food and sugges- ions offered as to suitable crops. While he spring field work was in progress, ither the county agent or a repre- entative from the College of Agri- ulture visited each of the farms, an- wered questions, and helped plan eld work.

"The increased use of commercial ertilizers was one of the measures of success in this campaign," according to O. R. Zeasman, Soils Specialist of the College, one of the men in charge of this kind of extension work. "In 1926 only 80 tons were used in Monroe county but in 1927 more than 280 tons were used."

Potash Needed

"The work done on the silt loam soils of Monroe county uniformly shows the need for lime and phosphates. On the sand and marsh soils the problem is more complex. The sands are low in lime and all the plant foods. The solution is to use lime and the necessary mineral fertilizers for growing legume hay crops of greater feeding value and for building up the organic matter and nitrogen in the soil.

"The demonstrations disclose that

on about three-fourths of the farms potash is the limiting factor while on the other one-fourth phosphates alone give the greater response. In nearly all cases a combination of the two mineral fertilizers give the best results. No blanket recommendation can be given as the solution, but if fertilizer is to be used on an untested farm the only safe procedure is to use both potash and phosphate. For most economic use the proportions will vary."

Farm demonstrations, in Zeasman's belief, are doubly beneficial in that they show not only the benefits of fertilizers but also are a means of securing data on fertilizer needs of the soils in different localities. He feels that mere talk will not sell the fertilizer idea to the farmer unless at least some of the actual results are shown on local farms.

"One of the conspicuous things we noticed in our farm demonstrations," explained Zeasman, "is the variableness in the results which come from differences in management. One farm would show a greater response to phosphate fertilizers and the next to potash fertilizers; that is, differences in management have resulted in erratic differences in the fertility of the soils. We do not make any blanket recommendation for phosphate alone or potash alone. Except where the land has been heavily manured recently, the combination of the two fertilizers has shown a good profit, and any general recommendations, if made at this stage should be for using both fertilizers."

In Adams county, in the sand marsh region of central Wisconsin, intensive fertilizer demonstrations also are being carried on, and the results studied by local farmers as brought to their attention by specialists and county agents in tours and field meetings.

Some of the following interesting results have been attained in special work in field demonstrations in Wisconsin according to Zeasman.

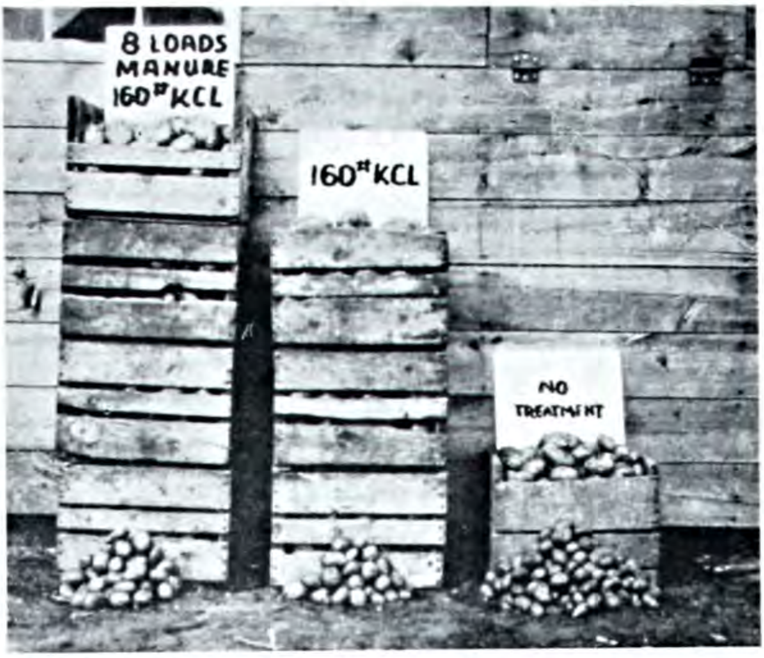
Cucumbers Respond

Plots of cucumbers were fertilized with a mixture of about 50 pounds of ammonium sulphate, 75 pounds of treble superphosphate, and 75 pounds of muriate of potash per acre which was spread around the hills. The harvest was made by the owner and the fertilizer bags tagged. The first half dozen pickings alone paid for the fertilizer used. Other plots fertilized with a mixture of 40 pounds ammonium sulfate, 60 pounds treble superphosphate and 40 pounds of muriate of potash, showed net profits of over $55 an acre.

On this farm the average yield of oats on peat where fertilizer was used is more than 51 bushels for five years.

On one plot grubs destroyed the cucumber plants on the unfertilized portion but left a 75 per cent stand on the fertilized part of the field.

Potash has been proved effective for pastures. An extensive set of fertilizer plots



166¾ bushels. 128 bushels. 45½ bushels.

as laid out in Adams ›unty in 1925 on unning sand which is ı extensive marsh bor-›r soil, the Wisconsin ›ecialists report. This ea was laid out in two ›lds; one was left in ıe native state and the her plowed. The seed ›d was prepared and eded to a mixture of ısture grasses. One-ılf of each field was ned and strips of pot-h, phosphate, combi-ıtion (mixture of pot-h and phosphate), ıd manure were ap-ied alike on the limed ıd unlimed portions of ıe fields. On the plowed and seeded ›ld, much better and more grass ›ew on the manured plots and those ıving potash treatment than on the anks and the plots having phosphate one. Lime alone was no improve-ent, but with potash and with ma-ıre there seemed to be some improve-ent over these fertilizers alone. The ›mbination of lime, potash and phos-ıate appeared to be the best plot. he lime and potash combination was cond best. Potash alone showed the ggest improvement of a single ele-ent. The stock showed a decided ›eference for the grass growing on l plots on which potash was used by ›azing them down more closely than ıe others.

Grains on Peat

"Peat soils are not well adapted to ›owing grains because of the tend-ıcy to lodge," explains Zeasman. Proper fertilization reduces this tend-ıcy and increases the yields. On ıe Juneau county poor farm, oats ere grown on a fertilizer plot on hich potatoes were grown in 1925. he yields of potatoes showed a very ccellent profit over the cost of ferti-zers. The increase when 200 pounds uriate of potash and 125 pounds treble superphosphate were used was .22 tons per acre weight of straw and 49.6 bushels weight of grain per acre.

"Buckwheat was grown on a fertilizer plot on peat on the farm of C. P. Des Bouillons a short distance from Wisconsin Rapids with the following results: 200 pounds muriate of potash alone showed 375 pounds increase per acre over the non-treated plot; 150 pounds of treble superphosphate showed a 125 pounds per acre increase; and 200 pounds muriate of potash and 150 pounds of treble superphosphate showed 500 pounds increase per acre.

"On this farm the average yield of oats on peat where fertilizer was used is more than 51 bushels for five years. On the Juneau county poor farm the two-year average is nearly 60 bushels. These yields are much better than the average for surrounding sands.

Rye is a good grain crop for peat soils, according to Zeasman, and is valuable for subduing raw peat marshes. However, it pays to fertilize even when rye is grown on virgin peat. One fertilizer plot was put in and harvested in the Leola district of Adams county with the following results:

Fertilizer treatment	Yield of Straw pounds	Yield of Grain bushels
Check	2,300	11.6
150 pounds treble superphosphate	3,500	16.6
200 pounds muriate of potash	3,700	21.6
150 pounds treble superphosphate & 200 pounds muriate of potash	4,000	23.3

Potatoes on Peat Marshes

Peat is a soil physically well adapted to growing potatoes but to secure profitable yields fertilizer treatment is necessary. To demonstrate this fact, Wisconsin extension workers laid out seven plots, varying in detail, in drained marshes in Juneau and Portage counties. The results are given in the following statement.

yields on the blank plots were so lo that it proved extremely unprofitab to attempt to raise potatoes on th soil without fertilization.

Potatoes on Sand

Potatoes have always been a favor ite cash crop in the sand section o Wisconsin, and are one of the crop responsible for the depletion of ferti ity in this section. Usually manu only has been used by farmers fo fertilizing them; but in these exper ments it has been found that commer cial fertilizers properly used increa the yields and replace some of th plant food sold in the crops.

Eleven fertilizer plots on potato were harvested. The fertilizers use were 4-8-8 and home-made mixtur of ammonium sulphate, treble supe phosphate, and muriate of potash use in about the same proportion. Th

Treatment	No. Cases	Bushels Av. Yield Market	Small	Cost Ferti-lizer	Value of increase over cost of fertilizer. Potatoes $1.25 a bu.
Blank	7	35.3	17.7		
100-220 pounds KCl	7	94.8	15.4	$ 4.32	$ 70.05
Blank	2	49.3	11.6		
6-12 loads manure	2	123.3	10.0	22.50	70.00
Blank	1	42.6	9.3		
100 pounds KCl and manure	1	155.8	7.9	20.75	120.75
Blank	1	0.0	32.0		
275 pounds 0-12-12	1	72.0	29.3	5.50	84.50
Blank	1	74.5			
125 pounds treble superphosphate	1	104.0		3.44	33.43
Blank	2	37.2	32.0		
200 pounds KCl-75 pounds 125 pounds treble superphosphate	2*	98.6	34.6	7.75	69.00

(*Each plot had 200 pounds KCl and in addition one had 75 pounds treble superphosphate and the other had 125 pounds treble superphosphate. One of the plots had poor drainage.)

The primary need is potash; and there is less response to phosphate. Manure alone does well, but manure reinforced with potash salts gives the best results. During this particular season of high-priced potatoes, the use of fertilizer was very profitable. The

amounts ranged from the equivale of 225 to 700 pounds of 4-8-8 fert lizer, the average being about 50 pounds. The average yield on 1 check plots was 104.4 bushels and th average yield on 11 plots using a

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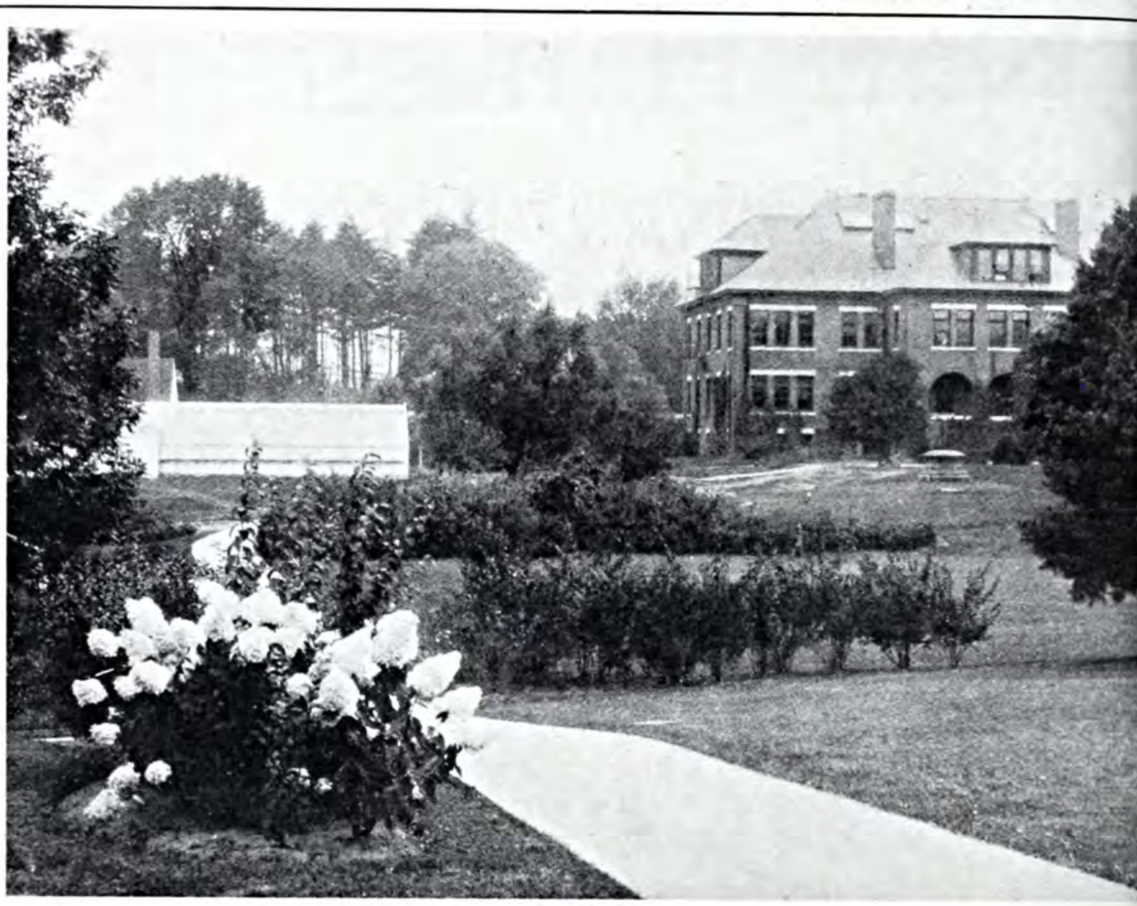
New Hampshire
Experiment Station

By Henry Bailey Stevens
New Hampshire Agricultural Experiment Station

IT is now nearly 300 years since white men started to develop agriculture in New Hampshire. As early as 1634 a letter to Capt. John Mason of England from Mr. Ambrose Gibbons, manager of his plantation at Newitchawanock near the present city of Portsmouth, said: "you have here at the great house 9 Cowes, 1 Bull, 4 calves of the last year and 9 of this yeare, they prove very well, farre better than ever was expected. They are as good as your ordinary Cattle in England and they goates prove some of them very well, both for milke and breed. If you did send a shippe for the Western Ilands of 6 scoore tunne or thereabouts for cowes & goates it would be profitable for you. A good husband with his wife to tend the Cattle & to make butter and cheese will be profitable, for maides they are soone goune in this countrie."

Even since then, except in the industrial centers, farming has been a major industry in New Hampshire. Although the Agricultural Experiment Station was not established until August 4, 1887, it is interesting to note that long before this time Benjamin Thompson, the Durham farmer who was responsible for its foundation at the present site, had a vision of the possibilities of agricultural education and research. Even before the passage of the Morrill Act by Congress, Mr. Thompson had drawn up his will leaving to the agricultural college his entire estate. Upon his death in 1890 this bequest led to the removal of the institution from Han-

Thompson Hall, the administration building at the University of New Hampshire.



Morrill Hall, agricultural building and headquarters of the New Hampshire Experiment Station.

over where it had been established as a part of Dartmouth College to its present location in Durham.

It was only natural that the first experimental work of this station should have been concerned with problems affecting dairy production. The progeny of Capt. Mason's cattle, "very Large Beasts of a yellowish colour," are said to have been scattered through northern New England, and since that time cows have played a considerable part in the state's farming operations. Kept at first to supply local demands for milk, cheese, and butter, they began to furnish milk for the industrial centers at an early date. The first milk was sent to Boston on steam cars in 1845; and while the numbers of sheep, swine, and beef cattle have steadily decreased since that date, the population of dairy cattle has held its own.

The first director of the New Hampshire Station, George H. Whitcher, dealt in his early reports with work on ensilage, feeding experiments, winter cut corn ensilage, science and practice of stock breeding, fertilizer and fertilizer material, tests of dairy apparatus, effect of food upon milk, etc.

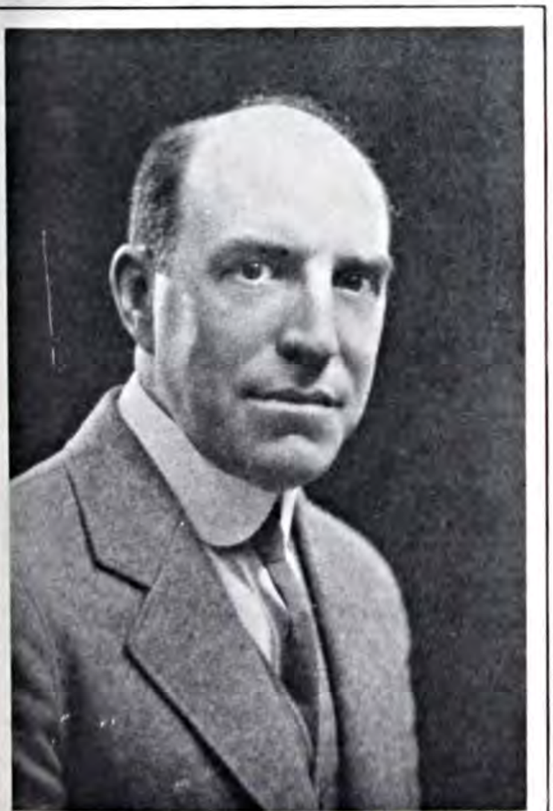
As far as agronomic experiments were concerned, the removal of the Station to Durham in 1893 was perhaps unfortunate since the heavy soil there has not been representative of conditions in general throughout the state. Life history studies of many insect pests, investigations of plant diseases, tests of varieties of horticultural plants and analyses of fertilizers, feedstuffs, and soils played an important part in the work of the Station in the years around the turn of the century.

From 1894 until 1901 Charles S. Murkland, president of the college was acting director of the Station. In 1902 W. D. Gibbs was made director becoming president as well the following year. In 1908 the investigational work was placed in charge of the entomologist, E. Dwight Sanderson.

Jpon his resignation in 1910 the resent director, John C. Kendall, who s also in charge of the University Extension Service, was appointed.

Among the major projects in recent ears have been the studies in sheep reeding, basal metabolism of steers, ruit bud formation, effect of insecticides and fungicides upon plants, life istory studies of codling moth, European corn borer, gipsy moth, brown ail moth and many other pests. With he passage of the Purnell Fund it as been possible to start a comprehensive series of soil fertility experiments in the different parts of the tate. Investigations in agricultural conomics, home economics, and poultry diseases are also now under way for he first time.

The station is cooperating with the nutrition laboratory of the Carnegie Institution of Washington in nutrition studies with steers and dairy cows. One of the features of this work has been the use of a new type of respiration chamber, the first inexpensive type of respiration chamber for large domestic animals in the world. Work in this field has now been conducted for 10 years in Durham.



John C. Kendall, director of the experiment station and extension service.

During the past three years the New Hampshire Station has been conducting studies in the relation of electricity to agriculture for the New England area in cooperation with the state and national committees on this subject.

Horticultural Experiments

One of the major projects of the Station has been that of fruit bud formation. For 18 years the Station has been securing records from the Woodman orchard on trees growing under various cultural conditions: trees in sod with no fertilizer, unfertilized trees cultivated in alternate years, trees cultivated but not fertilized, trees cultivated which receive in addition 2 pounds nitrate of soda, 4 pounds sulphate of potash, and 8½ pounds superphosphate or its equivalent in basic slag per tree, and trees which receive in addition to the cultivation and complete fertilizer listed an additional amount of superphosphate in the one case, nitrate of soda in another, and sulphate of potash in the third.

During the first 10 years of the experiment some increased growth on the plots receiving fertilizer was indicated but no significant increase in the average annual yield. During the last eight years, however, the yield of the trees has been very materially influenced by the fertilizer treatments. There are apparently four general classes in order of yield as follows beginning with the lowest: (1) trees growing in sod without fertilizer; (2) trees cultivated without fertilizer; (3) trees cultivated and receiving either the complete fertilizer alone or with extra phosphorus and potash; (4) trees cultivated with complete fertilizer and 4 pounds of extra nitrate of soda per tree.

The trees in the plot receiving cultivation and cover crop together with the application of six pounds nitrate of soda and other chemical fertilizers have become the most vigorous in the orchard. Instead of declining in yield they show an increase on the average for 1919-1925 of nearly 75 per cent over their production for the preceding 10 years, 1909-1918 inclusive. These trees are resisting winter injury and the inroads of canker more successfully than the others in the orchard.

For nine years a series of top-dressing experiments was conducted on hay plots. Sixteen plots without fertilizer gave an average yield of 1½ tons of hay, while the application of 200 pounds of nitrate of soda increased this figure by ½ ton, and 400 pounds of nitrate gave a ton increase. Other fertilizer treatments gave similar increases.

Analyses of the heavy clay soil at Durham have shown that large amounts of potassium oxide are present, and studies of hay on this type of soil have indicated that sufficient potash was available from this source. Studies with potatoes on this soil have also shown that where stable manure was used at the rate of 20 spreader loads per acre the strength of potash in the supplementary fertilizer need not be greater than 4 per cent. On the other hand in the soil fertility plots established in Greenland since 1925 the only significant increase in alfalfa yields has been in the potash plots. It is too early as yet to draw very general conclusions for the state as a whole, but the series of soil fertility plots in the different parts of the state which are now established should give important information during the next few years.

Garden Plots

Permanent garden soil fertility plots have now been established for ten years receiving the following treatments each year:

Plot 1—32 tons of manure per acre.

Plot 2—24 tons of manure per acre and the following commercial fertilizers per acre: 150 pounds Tankage, 100 pounds Nitrate of Soda, 600 pounds Superphosphate, 150 pounds Muriate of Potash.

Plot 3—Green manure plus the following commercial fertilizers per acre: 160 pounds Nitrate of Soda, 250 pounds Tankage, 800 pounds Superphosphate, 300 pounds Muriate of Potash.

Plot 4—16 tons of manure and the same fertilizer treatment as Plot 3.

Plot 5—Check plot.

Plot 6—8 tons of manure and the same fertilizer treatment as Plot 3.

Plot 7—Green manure plot.

In general the response from manure has been most noticeable with the different crops. This was true with red kidney beans, sweet corn, snap beans, and strawberries. Blue Hubbard squash responded remarkably to applications of readily available plant food either in the form of stable manure or stable manure with supplementary commercial fertilizers. Plot 6 yielded approximately as Plot 1. Yields of spinach indicated that commercial fertilizer could be substituted for stable manure to a considerable extent. One half of each plot is limed each second year with 2,000 pounds of ground limestone. The investigations showed that lime effected a 75 per cent increase in spinach.

Where the tomato season is cut short by early frost as in New Hampshire the use of superphosphate in addition to manure has been found to increase very greatly the total crop of ripe fruit obtained. Studies for several years on the effect of phosphorus on the tomato showed that the maturity of the tomato crop was hastened by the use of this fertilizer, by promoting the rapid early growth of the plant.

Recent economic studies have disclosed facts which may have an important bearing upon the future agricultural development of the state. The state wide survey of the economic balance between the production and consumption of food stuffs grown in the

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A large combine at work in Umatilla county, Oregon.

Dry Land Farming

By F. L. Ballard

County Agent Leader, Oregon Agricultural College

WHEAT production under dry farm practices is one of the im-ortant agricultural enterprises out in ie Northwestern country. West of ie Great Plains regions and north of ie line drawn through Utah and cross-ıg Nevada at about Reno and on ırough California, the practices of ry land farming are generally similar nd differ from practices of the Great lains regions. In this western region ie precipitation is practically all re-eived in fall and winter, and moisture onserving practices are so organized as o make this winter moisture carry on o the utmost possible degree through he growing months of spring and arly summer. Very satisfactory dry ind farming in these regions is con-ucted on 10 to 12 inches of rainfall nd some of the most famous wheat land of the country is farmed under an average precipitation of 18 to 22 inches.

Big scale operations are the practice in farming under these dry land conditions. Extensive areas are farmed in the single farm unit. A section of land is a rather small wheat farm. Two sections are approaching a real unit, while many of them run into the thousands of acres. All other things being equal, the larger holdings are the most practicable, owing to a certain standardization in practices which can be so handled as to reduce overhead. There is in active operation a well developed trend toward enlargements of units. A Government survey of income and expenses from 79 such farms in Oregon bears out the soundness of this trend. On the farms of 1,000 acres or more, the gross income was larger; likewise, the net income. Based on trends in interest on capitalization, the farms of 1,000 acres or more return more than twice the return of those of 500 and 600 acres. Bigness prevails in all the different farming operations. Hitches of 32 horses or mules on the combine which cuts and threshes the grain and hitches of 8 to 20 horses or mules on harrows or weeders are common, while the wheat hauling is done with 8 and 10 animal hitches.

In the after-war developments, however, this movement stopped and probably receded somewhat as throughout most of this region a generally heavy stocking of horses and mules is necessary for some of the operations. It generally was found most economical to use horses and mules, raising some increase on the ranch. Now with different conditions and later improvements in machinery, there is again quickened interest in motorized outfits. Careful consideration is being given to the conditions under which such machinery is an aid to economical operation.

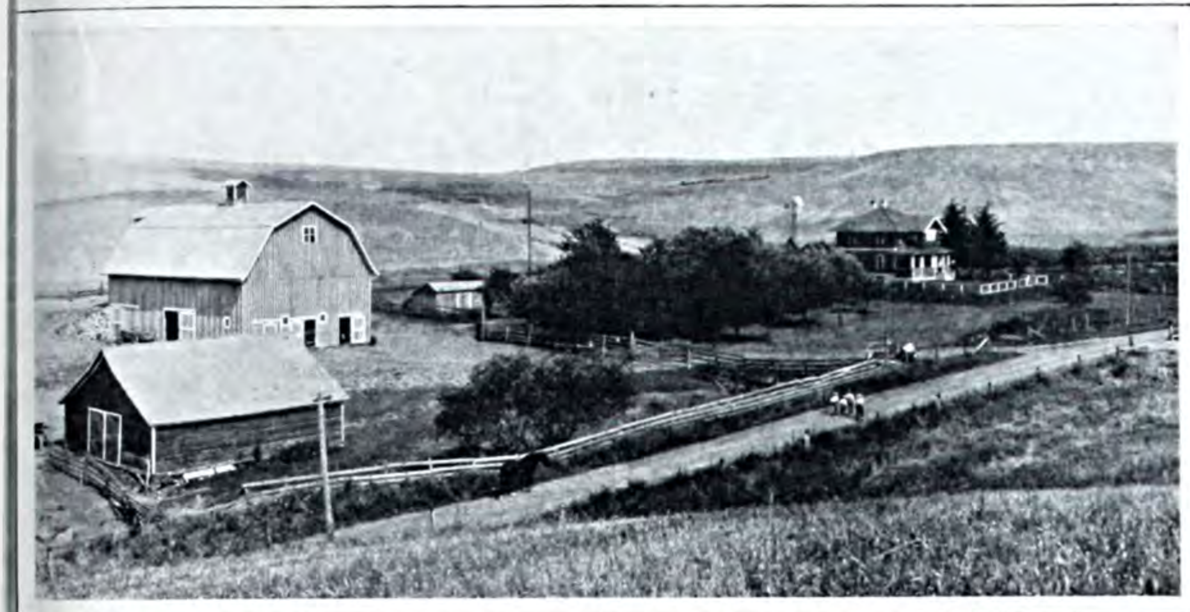
Many of the changes directly point toward cost reduction. An important change in this connection has been the abandonment of many of the large 32-horse combines in favor of the smaller combines pulled by 10 or 12 horses a operated by two men. Adoption of t small combine lengthened the harv season on the individual ranch, but r duced the labor requirements so mat rially that the economy is becomi very rapidly established. Larger hitch for harrowing and weeding we adopted.

Summer Fallowing

Trends in the dry land regions a of course, toward increased yield p acre, but it has also been found economic importance to increase t acreage farmed per man by use of the improved mechanical devices. In t connection there is a growing tenden to increase the plowing hitch, for i stance, from an 8 to 10-horse tea pulling a 14-inch three bottom ga plow to a 16 to 20-horse team pulli two such plows, but, of course, wi only one driver; in fact, the 16-mu team is generally popular as this hit will handle 12-foot duckfoot cultiv tors or two 12-foot revolving-r weeders.

The basis of dry land tillage pra tices in this Northwestern region summer fallow under which the la lies fallow every other year, or eve second year. This practice was esta lished as a moisture conserving fact two years' moisture being availab

Wheat stacked up awaiting shipment at a warehouse in eastern Oregon.



A Palouse homestead where wheat has been the only crop for 40 years.

therefore, for a single crop. Recent investigational work in dry land farming shows, however, that where rainfall exceeds a certain volume, the summer fallow in reality has no effect on moisture conservation, but does have a vital effect upon the accumulation of nitrates in the soil. Where the rainfall is very light, the summer fallow practice does have beneficial effect upon holding moisture.

Incidentally, out on these big wheat farms the continuous cropping of the thousands of acres of semi-arid land has for some years now foretold a pressing problem. What will happen when the soil becomes depleted, has been the question. One answer has been, why worry? The crops are greater now than 15 and 20 years ago. This is true, but this condition has resulted from improved varieties and improved knowledge of the handling of dry land soils is the reply.

The more far-sighted farmers point to the increasing erosion on the hills of the Palouse country in eastern Washington and northern Idaho, and to other signs of diminished fertility and impaired physical condition of the soil. The question of soil depletion on these thousands of acres is, in fact, already a serious one. In the Palouse country, with its relatively higher rainfall, a legume crop has been successfully established in the grain rotation with results that will be elaborated upon later in this article. On other soils in eastern Washington, in Utah, and in the Columbia Basin in Oregon in particular, where the rainfall is around 10 to 12 inches, the problem is more difficult because here it now appears that wheat is the only possible crop of commercial importance after all efforts to include a legume on a practicable basis have met with poor success.

Some unusually competent research work in dry land practices has been carried on by experiment stations in the Northwest, and it is interesting that at widely separated points in this region similar tillage practices have produced comparable results. As an example, at Moro, Oregon, Lind, Washington, and Nephi, Utah, the latter an elevation of 5,000 feet, it has been found that the fall disking of stubble land to be plowed early in the spring decreased yields. This was formerly an advocated practice that was extensively followed. Now it is generally being abandoned. Highest yields of winter wheat in all three districts were harvested from land that had been plowed for fallow in early spring. Results covering a 15-year period in Oregon indicate a loss of a bushel per acre per week for each week land is left unplowed after the middle of April.

Another common practice in the wheat country a few years ago was the

Discing with eight-horse or mule teams.

spring harrowing of winter wheat, a rather expensive operation when the large acreages in the dry land wheat ranches are considered. Several years' results at Moro and Lind indicate slightly reduced yields where this practice is followed, and at Nephi no increased yield resulted. In all three districts highest yields were obtained from early fall seeding of wheat providing the ground had been moistened by fall rains.

In the regions of heaviest rainfall in the Northwest dry farm country, the practice of burning stubble is generally followed. Results on the farms so far indicate that this practice, commonly thought to be wasteful of soil organic matter, is the practicable one, inasmuch as heavy volumes of stubble do not decay rapidly in dry farm soils and cause excessive drying out and consequent reduction in yield.

In the Palouse country of eastern Washington and northern Idaho, soil analyses show that 40 years of summer fallow tillage have resulted in a loss of one-third the organic matter of the soil. Here soil erosion is becoming pronounced. In this region the annual precipitation is about 20 inches per year, and under these conditions it is becoming evident that summer fallowing is not a necessity for moisture conservation, i. e., to store two years' moisture for one crop. A normal annual rainfall brings the first seven feet of soil up to its full moisture-holding capacity, which is enough moisture for a 50 bushel wheat crop, a heavier yield than is usually produced even under the best methods. It is under such conditions as this that the benefits of summer fallowing lie in the accumulation of nitrates. The question immediately arises, cannot these nitrates be applied artificially, or, better yet, by use of leguminous crops? Both methods are being followed, but the growing of leguminous crops has made the most rapid advance under practical farm conditions. Sweet clover is making rapid advance in this region as a pasture crop making possible the carrying of livestock in considerable numbers on farms heretofore exclusively devoted to wheat production.

Rotation

In general, however, in deciding upon other crops to be grown in a rotation in the wheat country, the influence of these crops on the yield of wheat is the most important factor as wheat still is, and will continue to be, perhaps for all time, the most important crop. In this connection, sweet clover, alfalfa, and red clover, all have a pronounced beneficial effect upon the succeeding yield of wheat. Sweet clover and red clover show best results on the wheat crop the first year after their elimination, while the effects from alfalfa are best on the second wheat crop and the

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Stealing Northern Honors

Allen J. Ellender is the Louisiana "Potato King"

By R. B. Fairbanks

SOUTHERN Louisiana is noted for her early Triumph Irish potato rop. About 10 years ago this indus-ry in Louisiana was practically an-ihilated by diseases. The yields were o small and the tubers that were pro-uced were so inferior because of dis-ase, that the cost of production was ar more than the price received. In act, the industry had literally re-eived a knockout blow. About this ime George L. Tiebout, Horticultur-st of the Louisiana Extension Service, tarted some tests with certified Tri-mph seed from the West. It very uickly was proven from the use of hese certified seed that sufficiently ood quality po-tatoes and high ields could be ecured to make he business prof-table again. Since hat time the arly Triumph rish potato in-lustry in Louisi-na has been on he up-grade and s now bigger han it ever has een in the past.

Many of the arishes in the outhern part of he state grow he early Irish otato very ex-ensively. Prob-bly none of these roduce better potatoes or produce them more profit-ably than the Terrebonne parish. The soil is rich, has enough fall so that reasonably good drainage can be pro-vided and is of a texture that makes it especially adapted to the successful growth of this crop.

One of the leading growers of Terrebonne parish is Allen J. Ellender. This year he was crowned "Potato King" in a contest put on in the State by the Extension Service and others. He has secured as high as 341 bushels per acre and this year (1928) his average for his entire crop was 242.42 bushels per acre of graded potatoes. This quantity was produced after 15 to 20 bushels per acre were elimi-nated because of scab and other reasons.

Allen J. Ellender.

But let Mr. El-lender tell his story in his own words. How he produced this crop is intensely interesting, and he tells it in the following para-graphs in a most practical and helpful manner. Here is what he says:

"I am very much gratified with the showing made with my spring potato crop, especially because I was again able to improve my yield over previous years. My yield the first year, per acre, was about on a parity with the average yield for the State, say 60 to 75 bushels. In the space of five years, I have gradually increased that yield to as high as 341 bushels per acre, with an average for my entire crop this year (1928) of 242.42 bushels per acre, of graded potatoes. I had an unusual amount of cut, scab, and deformed potatoes this year, which decreased my yield at least 15 to 20 bushels per acre.

Intensive Methods

"Three of my tenants entered a three-acre contest conducted by the Agricultural Department and Extension Division. The average yield for the nine acres was a little over 270 bushels per acre of graded potatoes. It does seem as if we are going to win three of the four prizes offered.

"My motto is 'intensive,' instead of 'extensive' farming. Each of my tenants is allotted from 9 to 15 acres of ground, 4 to 8 acres of which are planted each year to potatoes, and the rest soybeans, corn, string beans, and other vegetable crops. Following my potato crop the land is planted to soybeans, sweet potatoes, and corn. By permitting my tenants to cultivate a small acreage, the land can be better prepared, the soil can be better cultivated, and they are able to cope with the weeds and grass to advantage.

"I consider drainage one of the most important steps in potato culture. A seedbed cannot be thoroughly prepared unless the land is properly drained. Soggy, sour, wet lands will not do when preparing the seedbed, and a lack of drainage will cause such a condition. Many feel that mere surface drainage is sufficient. That is a mistake. Lateral ditches, 18 to 30 inches deep should be made, paralleling the potato rows, every 150 to 200 feet apart, depending on the distance the water must be carried to the main drainage canal. Such ditches, by small drains leading into them, will not only take care of surface drainage, but also seepage drainage. A farmer who takes care of his seepage has a decided advantage in that he can cultivate and work his land much sooner after a rain.

"The next step is to add humus to the soil and that may be accomplished by plowing under a heavy crop of soy or velvet beans. I always follow my potato, bean, or other vegetable crops with a crop of soy or velvet beans. About the latter part of September or early October, I plow the soy or velvet beans under, taking precautions that they are well covered. Later on, say about four or five weeks thereafter, I pass a disk harrow or disk cultivator over each row so as to kill all grass or weeds that may come up during the fall. In the latter part of December or the early part of January, I plow my land for a second time. By so plowing, the decayed soy and velvet beans become thoroughly mixed with the soil and an excellent seedbed for my potato planting is the result.

"I used a commercial fertilizer analyzing 10-4-7 (P.N.K.). It was applied at the rate of 600 to 650 pounds per acre at planting, care being taken that the fertilizer did not come in contact with the seed pieces. When the potatoes were out of the ground to a height of three to four inches, I applied a side-dressing of nitrate of soda, at the rate of from 150 to 200 pounds to the acre. I believe that better results could have been obtained had I applied the commercial fertilizer about 15 to 20 days before planting.

"After the land is thoroughly prepared and fertilized, then comes the important step, that is, planting. Good seed selection is as important a cog in the process of potato culture as is any other step. I have used Nebraska Certified Triumphs for the past five years with most excellent results. I

(*Turn to Page 59*)

Seeding *by* Airplane

By William L. Teutsch

Oregon Agricultural College

THE airplane is proving to be of new usefulness in the field of agriculture. In numerous instances airplane dusting of vegetable and fruit crops for the control of insect pests has proved successful. Now comes Harold R. Adams and his partner, N. W. Perkins, commercial fliers at Myrtle Point, Coos county, Oregon, who used their travel-air biplane to broadcast grass seed on a 1,000-acre tract of range land to be used for grazing sheep.

As a result of this successful feat, it is believed a world's record has been set in speed of seeding grass lands. The entire 1,000 acres were seeded in slightly more than 10 hours; thus, the seeding was done at the rate of 100 acres per hour. That the experiment was successful is proved by the fact that on this 1,000-acre tract an excellent stand of grass is now evident.

The idea was conceived by Dr. Earl G. Lowe, a practising physician in Coquille, Oregon, and one of the stockholders in the Coquille Valley Sheep and Wool Company, owners of 800 ewes.

The interesting part about the experiment was that the cost of seeding by airplane was less than the cost of hand seeding. The seed was broadcast from the airplane at a cost of 50c per acre, while the usual contract price for hand seeding is $1.50 per acre. Experts who examined the plot also expressed the opinion that the airplane distribution of seed was more uniform than was possible from the hand broadcast.

These Oregon aviators by means of a specially constructed hopper to hold the seed in the front cockpit, the valve opening of which was controlled by the pilot in the rear cockpit, were able to do an excellent job of seeding. The opening through which the seed passed was calibrated before the plane left the ground by timing the amount of seed that poured through

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Cornstalk Shows

THE corn, growing on a black sandy loam in the plot at the right in the first picture, was fertilized with 100 lbs. of 20-20 in the row at planting time. The plants at the left received in addition a side-dressing of muriate of potash at the rate of 400 lbs. per acre. A marked difference in growth is noticeable.

The picture in the oval is of two representative stalks taken from these plots to be used for the stalk test for malnutrition, developed by Dr. G. N. Hoffer, Purdue University Agricultural Experiment Station, Lafayette, Ind.

Even before the test is made, potash deficiency symptoms can be recognized readily in the field. The leaves show a marginal firing and yellow streaking, as indicated in the third picture. Plants are three to four feet tall when these symptoms develop in soils deficient in potash.

The first step in making the test is to carefully pull the stalks and examine the roots for root rot, commonly found in potash deficient soils. The stalks are then

Starvation Signs

split open clear through the crown, keeping all dirt from the split surfaces. (Fourth picture).

A few drops of the chemicals, more fully described in Purdue Bul. 298, are then applied to the joint tissues to see whether or not there is an accumulation of iron. (Fifth picture). An accumulation of iron shows up under application of the chemicals as a reddish discoloration in the joint tissues and indicates that the plant is not receiving enough potash.

The stalk to the right in the last picture received 20 lbs. of K_2O per acre in the row at planting time. The stalk to left received 20 lbs. of K_2O per acre at planting time and a side-dressing of 400 lbs. of K_2O per acre three weeks after planting. Note the heavy iron accumulations in the smaller stalk, whereas the content of iron in the larger stalk is normal. These test results show that an application of 100 lbs. of 20-20 does not supply adequate potash in this soil.

With the stalk test, deficiencies of nitrogen and phosphorus can also be determined.

Spiking the old theory that college men are not good farmers

A Grad Makes Good

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College

AT times harsh criticisms are made of agricultural college graduates due to the fact that some people believe the majority of such graduates are influenced away from actual farming and at times even those that are inclined towards farming do not obtain as big a success as their education would seem to warrant. It is a big question whether such criticism is warranted. Much difference in opinion prevails. Those that are in close touch with graduates of agricultural colleges feel that a large percentage of such graduates make good at farming. This is the belief of the writer. In order to back up this belief a story of a graduate of an agricultural college is used as an illustration. This example can be used for other men in similar circumstances.

In the little town of Buckland situated just north of Manchester, Conn., in the year of 1896 on the farm of his father was born Frank V. Williams, a rather serious minded chap who has the faculty of looking into things and grasping details. He grew up as all boys do in that location—attended the grammar school and high school and at the age of 18 decided to take a two-year short course in agriculture at the Connecticut Agricultural College, Storrs, Conn. The two-year course caused this young man to decide that if he wished to be the best type of farmer and to be above the average of farmers in whatever neighborhood he decided to live, it would be to his advantage to obtain a full college course of four years. Just as this decision was being made Frank was drafted to serve in the war.

At the end of the war he was discharged with thousands of other young men and did not immediately return to farm work. In less than two years thereafter he thought there was no future in the type of work that he was doing and in February, 1921, he decided to again enter the Connecticut Agricultural College in order to obtain the B. S. degree. He graduated with the class of 1922, being very prominent in many of the affairs which make up a successful college body.

During the period of attending the college and one summer, he had the good fortune to earn some money by working for the Experiment Station and it was while working under the direction of the Experiment Station that he became interested in potato growing. Having learned what he could from the experimental and practical side of the growing of potatoes as conducted by the Experiment Station, he decided on April 1, 1923, to rent 10 acres of land from his father at Buckland, Conn. The entire acreage was to be planted with potatoes entirely looked after by Frank, and any spare time was to be given over to assist his father in various farm work.

The methods used in 1923 were, of course, those that he had learned from the previously mentioned source. He used a home-mixed fertilizer of a

-8-4 formula approximately 1,500 ounds being applied per acre. The ariety of potatoes planted were Green Iountain, the seed being certified and btained from a good source in Maine. he plowing work was carried on ith a three-horse hitch. It required 8 hours of work to plow the 10 cres. Being familiar with machinery e used a two-man planter with a rtilizer attachent and thus the otatoes were lanted quickly nd more uniormly.

One of the big ems in successul potato raisng is that of praying, and rank sprayed his rop six times usng a four-row 2-nozzle sprayer f the traction ype. He had arned that he ould save money y making his wn Bordeaux nixture of 5 ounds copper sulphate, 6 ounds of lime, nd 50 gallons of vater. When roperly mixed e found this forula made one f the best sprays or the control of light. At harest time the poatoes were dug vith a modern igger and the crop all sold in he field at an verage price of 1.70 per bushel. The yield per acre veraged 225 bushels of number ones. This gave him a return for the 10 acres of $3,825.

What 500 bushels per acre look like.

This yield was satisfactory enough to influence Frank to hire 12 acres in 1924 and as before assist his father with other farm work when not busy with the potatoes. The fertilizer used in 1924 was similar to that used in 1923 and the amount per acre was the same. The seed variety again was Green Mountain and was obtained from a good source in Maine. Of course it was certified. The planting, plowing, and cultivating were similar to that used in 1923 and so was the spraying with the homemixed Bordeaux. One great change in this year was the fact that a new digger had arrived with an engine attachment which brought the crop out of the ground in much better shape.

The yield this year was a little higher than the year previous averaging 275 bushels per acre of number ones. These were sold at digging time for 90 cents to $1.00 per bushel.

This again encouraged Frank so much that on April 1, 1925, he obtained a fiveyear rental and option to buy his father's farm.

This year he decided to raise 15 acres of potatoes and in addition three acres of sweet corn for seed, the balance of the land being in hay and a few miscellaneous vegetables. There was a change in his methods during this year. He continued to home-mix his fertilizer, but instead of using a 4-8-4 formula he used a 5-8-7 formula, approximately 1,800 pounds per acre. It was thus seen that he not only used a higher grade fertilizer but more of it. This change was probably brought about due to the fact that the change was common in his neighborhood and throughout the State.

Capitalizes on Experience

The variety of seed potatoes used was again Green Mountain but instead of planting all certified seed from Maine, some of the certified seed was obtained from Vermont, so that he was in a better position to judge the merits of stock from both places. The plowing was the same as in previous years, but instead of harrowing with horses a tractor was obtained and a double-action disk used. This rendered the land in finer and deeper condition. In previous years the seed pieces were cut by hand but during this year the bulk of the seed was cut with a machine cutter. By hand from two to three bushels are generally cut in an hour and with a machine fiv or six bushels were cut.

A slight increase in the number o times the crop was sprayed was mad this year, the same type of spraye being used and the material bein home-mixed Bordeaux. The cultivat ing and digging of the crop were th same as in previous years. The yiel this year was more than any othe year amounting to 290 to 300 bushel per acre of number ones. Practicall all the crop was sold in the fall a $1.75 per bushel. Frank regretted no holding the potatoes that year becaus a little later they sold for $3.00 bushel and he said he could have mad considerably more money by storing but unfortunately his facilities fo storing were not large and the amoun of crop obtained, almost 5,000 bushel of all kinds, was more than he coul accommodate.

In 1926 the same acreage of th crops was raised as in 1925, that is 15 acres of potatoes, three acres o sweet corn, corn for grain, and a fev miscellaneous vegetables. The grea changes during this year were foun in a 200-pound increase per acr of fertilizer used; the same form ula, 5-8-7 as used in 1925 was agai used this year. The variety of potat seed was Green Mountain but all cam from certified seed from Maine. Th other great change was an increase o one spraying whic probably due t weather condition was necessary. Th average yield this yea was 300 bushels o number ones. At dig ging time in the fal two-thirds of the cro were sold. The bal ance was sold in th winter at a loss of 2 to 30 cents per bush el over the price re ceived in the fal Nevertheless he ob tained a satisfactor

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Interested farmers watch the digging.

Business Interpretation *of* Fertilizer Experiments

By John P. Bell

University of Arkansas

THE usual method for reckoning commonly styled increased profits through the use of fertilizers may be misleading, states Dr. J. A. Dickey, Professor of Rural Economics and Sociology, College of Agriculture, University of Arkansas. This is true because of the failure to take into account the added expenses involved in harvesting the increased yield, such as horse labor, man labor, marketing, insurance, and interest.

The use of fertilizers has increased enormously. As crops rise in price, their use is certain to continue to increase. "Many farmers would make more money if they used more fertilizers, but a farmer needs to be careful about applying the results he reads about. The facts recorded as to yields may be accepted, but the conclusions as to profits are sometimes misleading, because the difference between the cost of fertilizer and the value of the increased crop is often called profit," Dickey says. He points out that all the other costs, such as interest, crop insurance, hauling and applying fertilizer, harvesting, storing, and marketing the increased crop are ignored. The primary object of such trials or tests is to determine the effect of any particular treatment. This part is usually well done and is of great value to farmers. The business interpretation of results is often poorly done.

The same point applies in the interpretation of results of any other intensive methods. Dickey goes on to say, "The statement that it costs no more to handle a large crop than a small one is almost universally accepted by persons who have never kept any accounts of such work. It has been assumed that it costs no more to grow, harvest, store, and sell 75 bushels of corn per acre than it does to raise 31 bushels. Any conclusions based on such an assumption are worse than useless. We must know the extra cost of growing and handling the larger crops before we can tell how large a crop it pays to grow. There is a limit both ways in profitable crop production.

"This method of figuring profits has come about as a result of the failure to assign any value to the farmer's time. The farmer's time is worth at least farm wages. If not, he had best hire out to a neighbor who will pay him wages. He owes no thanks to anyone who persuades him to adopt methods that do not pay farm wages.

"The almost universal method of interpreting fertilizer tests is shown by the following example taken from a very excellent publication.

"The last column 'Value of Increased Crops above Cost of Fertilizer' is called profit in this publication. The conclusion is, therefore, reached that the complete fertilizer used on plot 11 pays best. But the $19.64 is not profit. Of all the costs involved, only the cash cost of fertilizer has been subtracted from the increased value of the crop.

Results of a Fertilizer Trial

Treatment	Cost of Fertilizer	Value of Increased Crops Above Cost of Fertilizer
Plot 2, phosphorus	$2.40	$13.99
Plot 6, nitrogen and phosphorus	14.40	19.29
Plot 8, phosphorus and potassium	8.90	14.34
Plot 11, nitrogen, phosphorus, and potassium	20.90	19.64

"The fertilizer on plot 2 cost only $2.40 while that on plot 11 cost $20.90, a difference of $18.50. The increased crop on the latter plot pays this and leaves $5.65 to pay for the other extra costs. This must pay interest on $18.50, crop insurance, pay for hauling and applying the extra fertilizer, and for harvesting, storing, and marketing the increased crops of 10 bushels of corn, 15 bushels of oats, 9 bushels of wheat, and 1,785 pounds of hay. The farmer is not likely to find anyone who is willing to undertake this contract for $5.65.

Mr. Dickey gives, in the following table, an example of proper cost accounts in the use of fertilizers on a New York state farm:

"The table below gives the results from a set of cost accounts in growing 60 acres of timothy hay on a New York farm. The increased crop, due to fertilizing, was about 60 tons. The table gives a close approximation to the cost of producing this increased crop.

"It will be seen that the real cost of the fertilizer on this farm is $634, not $272. In this case, a so-called profit of over 100 per cent by the usual method of figuring would really be a loss, because the fertilizer is less than half the total cost," Dickey states.

The labor costs are charged at the average cost on this farm for the year

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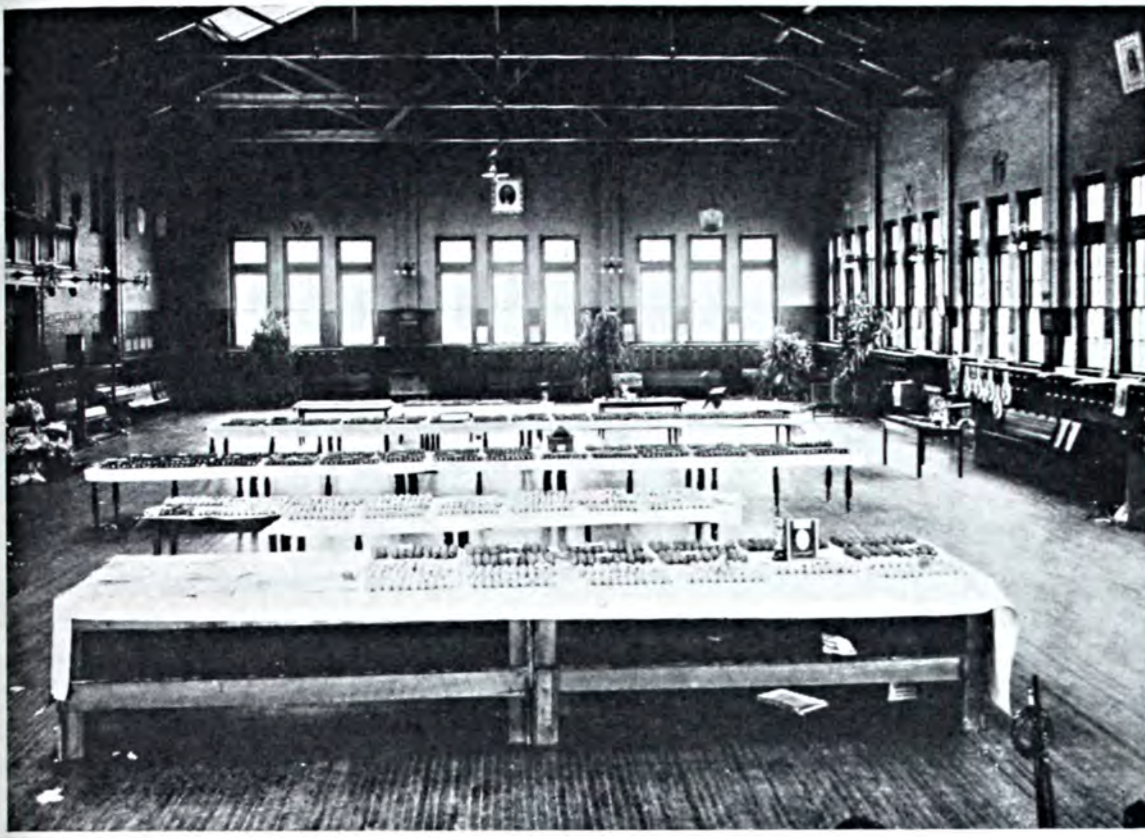
Real Cost of the Increased Crop Due to Fertilizing 60 Acres of Timothy

Cost of Fertilizer		
8,000 pounds nitrate of soda	$185.00	
2,080 pounds muriate of potash	39.77	
10,354 pounds of superphosphate	47.37	$272.14
Other Costs		
Freight on fertilizer	26.66	
39½ man hours hauling fertilizer at 21.6c	8.53	
58 horse hours hauling fertilizer at 13.2c	7.66	
29 man hours mixing fertilizer	6.26	
84½ man hours sowing fertilizer	18.25	
101½ horse hours sowing fertilizer	13.40	
200 man hours hauling in and storing 60 tons hay	43.20	
160 horse hours hauling in 60 tons hay	21.12	
108 man hours pitching hay to baler	23.33	
Meals for hay pressers	14.40	
Meals for hay pressers' horses	7.30	
118 man hours hauling 60 tons to railroad	25.49	
208 horse hours hauling 60 tons to railroad	27.46	
Use of barn (proportionate share)	95.00	
Fire insurance (proportionate share)	3.00	
Interest on above costs for 7 mos. 6%	21.46	$362.52
		$634.66



Plenty of light and space at the corn show aid judges in studying the corn.

The Annual Corn Show

By G. L. Schuster

Secretary, Delaware Corn Growers' Association

THE winter corn show has become one of the traditional institutions in many communities. Corn shows have played an unique and important role in the development of corn throughout the country. The Annual State Corn Show is the climax of all such community activity, friendly rivalry, etc.

Have corn shows outlived their usefulness? The corn show directs attention toward the requirements of good corn. There is an exchange of ideas on corn culture, adaptability of varieties, disease resistance, yield, fertilizers, etc., all of which are valuable for the production of better corn and more corn. Many corn growers are producing from 50 to 75 bushels per acre more than the average corn production for their state. A dissemination of the knowledge as to "how they do it" is valuable, and in this the corn show is valuable.

The life of the state show depends upon the local shows. These may be held by a community organization, grange, school, chamber of commerce, or what not. A few general rules should be adhered to in planning a show. All corn exhibits should be classified as white, yellow, or mixed classes unless they are classes for varieties. An exhibitor should enter one exhibit only to a class. Exhibits should consist of 10 ears, except for single ear classes. Every exhibit should be produced on the exhibitor's farm during the season just past.

The premium list should receive careful consideration. The premiums may be cash, merchandise, ribbons of merit, or a combination of any of the above. It is better to have a large number of premiums of moderate value rather than a few expensive ones. A corn show should not only award the best producers, but should also reach out and encourage the less able ones. A first, second, third, fourth, and fifth premium in every class of entries will reach more people and attract more entries than just three awards to a class.

Have the show in a hall that is readily accessible. The hall should be well lighted and roomy. Light is very essential for the study of corn characteristics by the judge as well as the growers. Roominess makes it more inviting to the visitors.

Experience is a great factor in the selection of corn. One learns corn and its important characters by working with it. I once knew a young farmer lad that moved 500 bushels of corn in picking out a 10-ear sample. It is needless to say that he won. The International Grain and Hay Show has set up a desirable type for white and yellow corn with variations as to size and indentation that will be permitted. This should be followed in communities where corn of this kind is grown. In selecting a 10-ear sample, select one typical ear that is sound and free from disease and then select nine others like it.

Some varieties will not conform to the International Grain and Hay standards. In this case the vertical standards should be followed. Much experimental evidence has been gathered in recent years that leads to the general conclusion that reasonable variations of visible characters within

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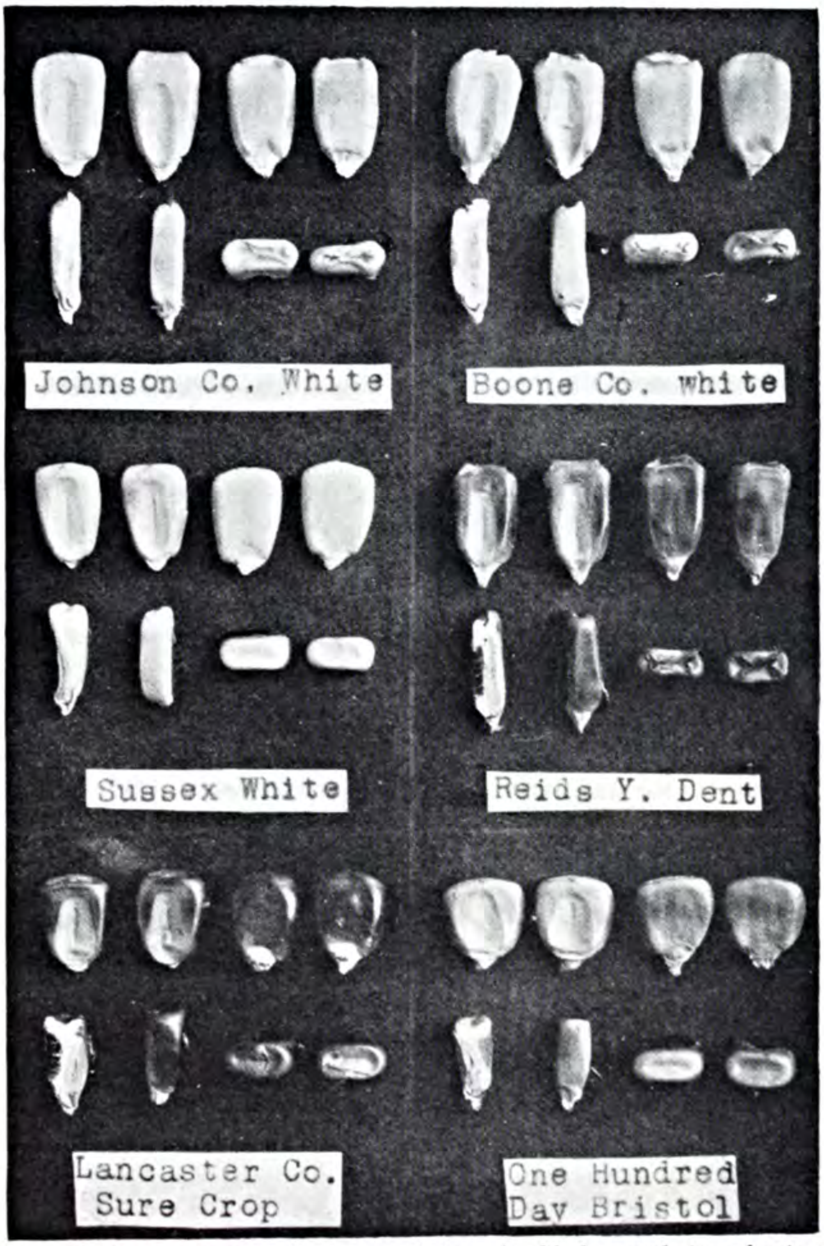
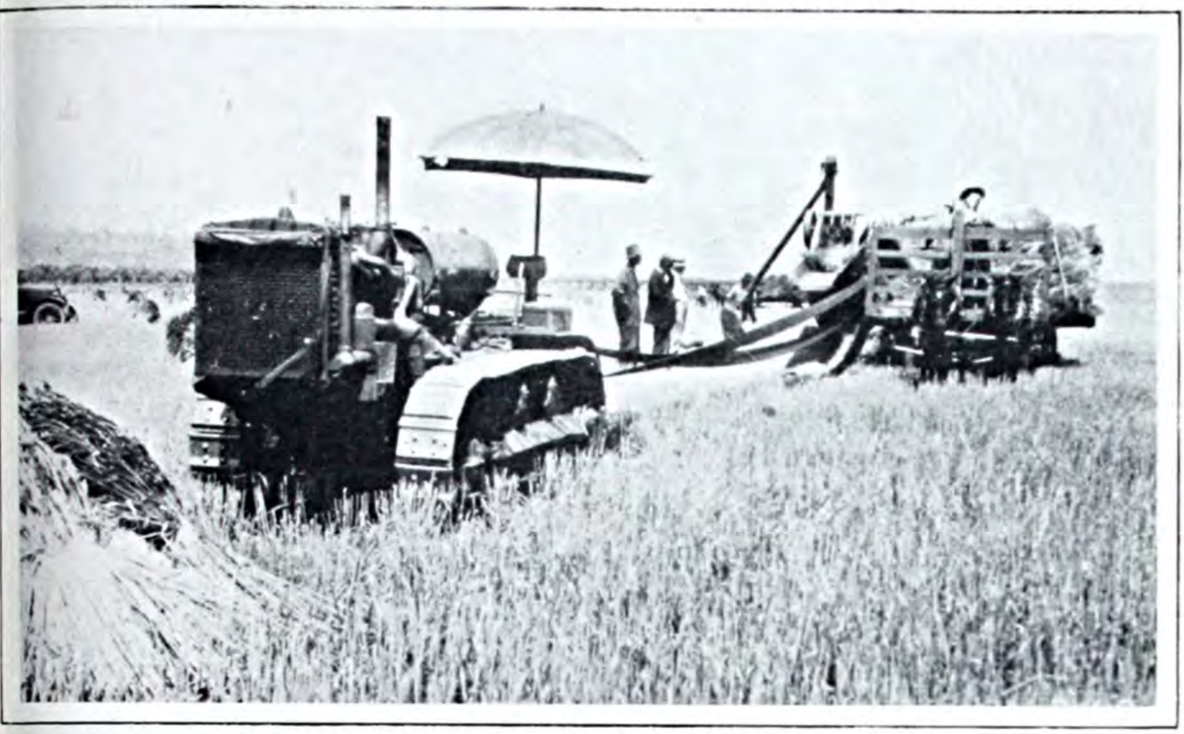


Kernel characteristics of corn varieties should be used in selecting and judging exhibits.



Machines like this save many expensive harvest hands.

Machines Aid Harvest

By U. V. Wilcox

Washington, D. C.

TWO nationally known authorities have computed the saving that the farmers have passed on to the consumer by their saving in the greater use of machines in the harvesting of their crops.

C. D. Kinsman, formerly of the U. S. Department of Agriculture and a member of the American Society of Agricultural Engineers has estimated after an extensive survey that the American farmer has saved the cost of hiring some 130,000 men, making an economy of $30,000,000 in the harvesting of the crop for 1927.

Professor Walter G. Ward of the Extension Department of the Kansas State Agricultural College estimates that Kansas farmers alone used 30,000 less harvest hands than previously, due to the greater use of machine methods.

These estimates, admitted as accurate, are in line with the recommendations made a year ago by Secretary of Agriculture Jardine that the farmer give more study to the use and application of machinery to his cost of harvesting the crops that he grows.

Mr. Kinsman finds that the farmer has not worried so much regarding labor shortage and the competition of city jobs and easier living for the floating help. Using the figures gathered from all classes of equipment manufacturers, it is evident that the labor-saving harvest machine is filling the gap.

Combine machines have been particularly popular in the harvesting of crops this year, according to Mr. Kinsman and Prof. Ward. There are 43,-000 to 45,000 more combines in the western sections of the United States and Canada. Each machine it is believed has eliminated at least three high-priced itinerant farm workers, making a total of 130,000 men. However, in many instances more than the labor of three men has been saved.

"These men," says Mr. Kinsman, "not only drew high wages, but requested and insisted upon having quantities of high-priced food, much of which had to be specially purchased. There was also the cost of extra bedding, loss by breakage, fires, and thievery.

"Due to the greater use of modern machinery the harvest period is being shortened to two weeks instead of two months. Thus allow $5 a day for each of the 130,000 men dispensed with for eight weeks and there is a total saving of close to $30,000,000."

Harvest Help Expensive

The picturesque harvest-tide of other years is doomed to become one of the lost institutions of rural America. From the highways and byways, mountains and seas, men came to work in the harvest fields—white-collar men seeking a breath of outdoors, adventurers desiring to add to their experiences, farmers of other crops who took advantage of the high prices paid for labor, collegians on a lark or hoping to get money for their education, tramps willing to work for a week.

Once hired, they lived on the fat of the land. Chicken and cream gravy, noodles, corn, eggs, milk, home-cured ham and bacon, home-churned butter, and all the other delicacies of the farm were theirs in abundance. However frugal the farmer might be, he never stinted when it came to feeding the appetites of his harvest crew.

Many harvest hands followed the wheat reaping through from Texas, Oklahoma, Kansas, Nebraska, the Dakotas, and up into Canada, enjoying lucrative employment throughout the summer. But these harvesters are by way of becoming a memory, like the cowpunchers.

The change that is so rapidly maturing and which the figures this year make so graphic is nothing basically new. The greater use of machinery is the result of better machinery and the American farmer's instinctive mechanical ability to use this machinery effectively. Then too, each year finds young men, fresh from an intensive study of agriculture, taking up their places upon the farms and ranches, and they are anxious to use the best methods possible.

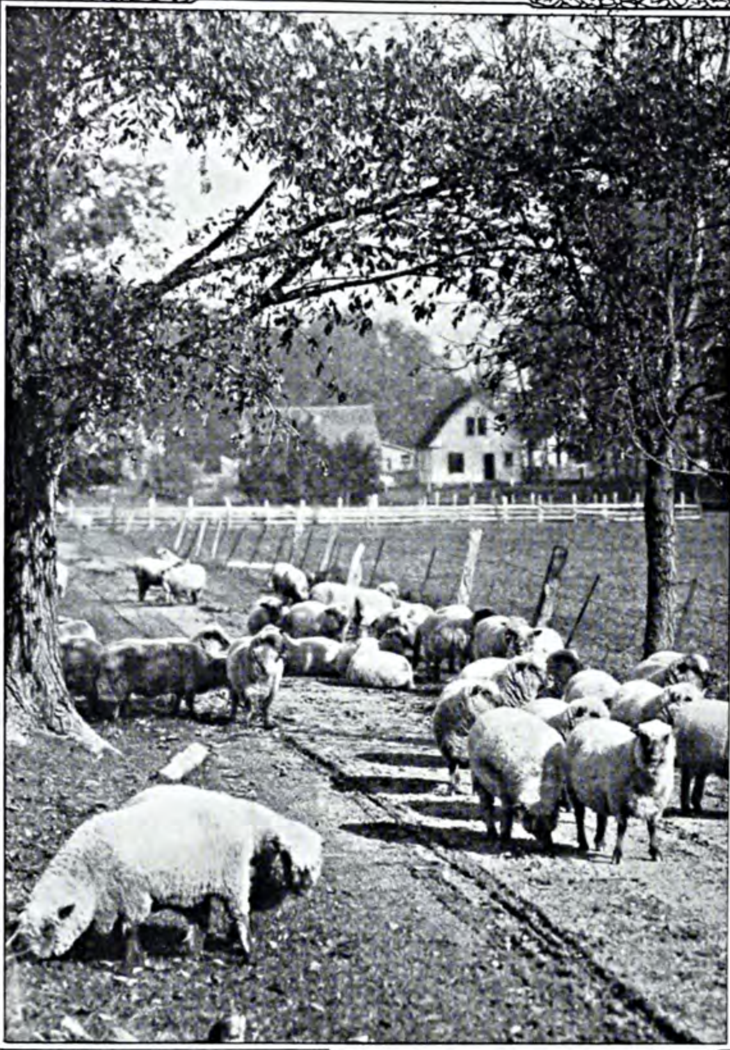
The Pacific slope has been the pioneer in the use of machines for harvesting, this and other surveys make evident. The late Benjamin Holt and Daniel Best built combine harvesting machines to meet the conditions prevailing upon the great wheat farms, like the Miller and the Lux and Lucky Baldwin ranches. These men developed the caterpillar tractor for use in territory where hills or swamps and various obstructions made traction difficult. The caterpillar was given world-wide recognition at the time of the world war and its incorporation as a part of the army tanks.

It has only been during the last year, however, that the figures show that the American farmer generally has turned to the use of the new harvesting equipment. The native American agriculturist is an ingenious individual and after accepting the idea of greater use of machines for harvesting he has turned to adapt it for a wide variety of uses. He has been responsible for the "pick-up" system that has this year been used so widely. This permits the handling of such crops as clover, alfalfa, timothy, milo maze, and kaffir maize.

The future will see still greater labor cost reductions, which for the country as a whole, run about $1,250,000,000 a year in wages and an additional $1,000,000,000 for board, lodging, and other expenses.

Pictorial

Old Peter Vinegar comin' home.



Left: On Fall evenings th
flock comes home by itself
There is a feeling of homines
and a sense of security abou
feed-filled farm buildings whe
the frost comes that even th
animals seem to enjoy.

Below: Two pals just enjoy-
ing Indian Summer together.

ght: Drink, dern ye, drink! hat farm boy's patience has t been tried to the limit in aching a "dumb" calf to ink out of a pail? A good attering of milk has increased many a boy's vocabulary.

elow: A picturesque moun-in roadway between Austria and Italy.

Above: Marceline Day, movie actress, recently visited a large hog ranch at Fontana, California. Dressed like a young farm lad, she had a good time giving these pigs a cold shower.

Left: This picture and its companion on the next page were taken "Down where the cotton and the sweet potatoes grow."

Long Island duckling in the making! These are just a few of the thousands of ducks being fattened on Long Island, New York, farms for the holiday trade.

Above: Carefully gathering grapefruit in Florida. The popularity of this fruit is relatively recent. The first shipment from Florida to New York and Philadelphia was made some time between 1880-1885 and netted the shippers about 50 cents a barrel.

Right: The chief worry of this colored man is not the price of cotton, but the picking of it.

Why farm boys stay on the farm! Every one of these girls sings and dances, is a farm girl, and a member of the Gold Medal 4-H Club at Worthing, South Dakota.

Right: Looking for red ears! The Misses Lucille and Nava Beaver of Statesville, North Carolina, believe they will find some in this pile of snapped corn.

Left: Another sign of Fall. Along with the winter's supply of vegetables and canned fruit there must be plenty of savory ham.

Right: Farm relief! Who'd ask for any more? This is I. A. Riise of Turlock, California, with his nine sons. Besides these fine boys, Mr. Riise has three daughters who couldn't be crowded into the picture.

The Editors Talk

New Purchasing Index Numbers

The U. S. Department of Agriculture is to be commended for a change made in the method of measuring purchasing power of agricultural products. From now on, this index number will be based upon the retail prices which farmers pay for what they buy instead of the wholesale prices of those products.

The measurement of farm commodity purchasing power on the basis of retail instead of wholesale comparison will tell a slightly different story from that told by the index numbers previously in use. That the new index numbers will prove more accurate as a measure of the exchange value of farm commodities is recognized by the fact that farmers obtain most of their supplies at retail rather than at wholesale.

The change was illustrated for the first time in the price index number comparisons for June of this year. For that month, according to the new method of reckoning, the purchasing power of farm products was 93 per cent of the level prevailing in the five-year period, August, 1909, to July, 1914.

The Department points out, however, that the new index numbers do not measure the purchasing power of farmers but merely that of a fixed quantity of farm products. They show the power of a given amount of agricultural commodities to purchase certain kinds of other goods as compared with pre-war exchange ratios.

The improvement is not a complete measure of the agricultural price situation. Although the prices of commodities purchased by farmers are now nearly on the level with the prices of products sold by farmers, taxes and farm wages remain relatively high. In June, 1928, farm taxes were 250 per cent of the pre-war level, and farm wages 170 per cent of that level. The prices of commodities purchased by farmers for use in production were lower than the prices of commodities entering into family living. The index of the prices of commodities used in production averaged about 148 per cent of the pre-war level, whereas prices of commodities used for family living averaged 162 per cent of the pre-war level.

Contributing to the high cost of living on the farm in June, were furniture and furnishings at 208 per cent of the pre-war; clothing at 179 per cent of the pre-war; and building materials for the home at 171 per cent of the pre-war level. Food prices were on about the same level as commodity prices generally. Some production items were relatively low, notably feed and fertilizer prices. The price of farm machinery was close to the general price level.

This constant study of the purchasing power of farm products serves to give a clearer picture of the agricultural situation and to be of assistance in attempts to adjust the difficulties which farmers have experienced since the World War.

Commerce and Science

Agricultural Experiment Stations and Colleges, as well as other authorities, often make reports on the progress of scientific research work. For instance, regarding the effect, on crops, of many of the lesser known chemical elements found in the soil, sometimes called the minor nutrients, as distinct from nitrogen, phosphoric acid, and potash, reports are made. Of course, progress reports also often are made on phases of research in connection with these better known plant nutrients.

There is, however, one rather important problem in connection with the publication of such reports. They represent progress only and not final results. The result may eventually turn out as indicated in the early stages of the research work. Then again, the final results may not confirm the initial work. Yet if the scientific world and the world of commerce and the farmer are to know what is going on these reports are essential.

There is a grave danger that these valuable progress reports will become less and less in number and content if science does not feel assured that such progress data will not be represented as final in commercial advertising uses.

On the part of commerce there is a natural and legitimate desire to take the results of scientific research and give them a popular and wide publicity.

On the part of many scientific workers there is apparently a fear that business will give to progress data a finality and assurance that were not intended or warranted by the initial publication of such data.

If unfortunately any such cases of premature, wide, and final publicity have been given to progress data, it is probably due to a misunderstanding of the status of the data rather than to any other cause.

Agricultural business knows full well that it would only hurt its own business and prestige to present to the farmer as final, and as a basis for his expenditures, information and data that afterwards may be proved to be wrong.

The farmer does not forget—Business knows this.

Yet because the possibility of too wide publicity exists, through not fully understanding the status of published results, it is a question that organized agricultural business might well take up and discuss with research workers with the object of creating that confidence between the two groups that is so essential if full progress reports are to be made available. Certainly their curtailment would be a serious detriment to the practical solution of many urgent problems.

Dry Land Farming

Fifty years are a short time in which to develop a new agricultural country, yet it can be said that this span of years in general will cover the development of dry land farming in the West.

It has taken 25 years for farmers of Idaho, Washington, and Oregon to learn how to produce wheat with their present success. An eastern farmer who decided "to go West" has had to unlearn practically all he knew about farming. Recognition of the untiring industry and progressiveness of these men is accorded by increasing realization of the importance of dry land farming to American agriculture.

Receiving only one-sixth to one-half of the amount of rain and snow which falls in other parts of the United States, farmers in the arid region rightly deserve credit for their ability to wrest from these fertile soils profitable crops without the rainfall usually considered necessary for successful production.

In this issue of BETTER CROPS WITH PLANT FOOD, we are publishing a story on the dry land farming in the Columbia basin. This region is known as the second great soil district of dry farming territory in the United States, the first being the Great Plain district which includes parts of North and South Dakota, Nebraska, Kansas, and Oklahoma, and parts of Montana, Wyoming, Colorado, New Mexico, Texas, and Minnesota. The third region of importance is the Great Basin, which includes nearly all of Nevada, half of Utah, and small portions of Idaho, Oregon, and Southern California.

The Columbia River basin includes the State of Washington, most of Oregon, the northern and central parts of Idaho, western Montana, and extends into British Columbia. The soils are generally of volcanic origin. The chief dry farming crop of this region is wheat. Western Washington, known as the "Palouse country," is famous for its wheat. Satisfactory production has been obtained in sections where the rainfall has been only 10 inches.

Quite naturally, the first concern of these farmers has been the conservation of moisture which has been accomplished by summer fallowing. Little, if any, attention has been given to maintaining soil fertility, with the result that under repeated cropping many of these lands are beginning to hint at a depletion of plant food. In regions of a little greater rainfall, where summer fallowing is not so necessary for conservation of moisture, and the system has resulted in a loss of organic matter in the soil, progressive farmers are already looking to the use of commercial nitrates to bring up soil fertility. That it will only be a question of time before other plant nutrients will be necessary to get profitable yields is recognized.

Cotton Market Reports

Cotton reporting has always been a debatable subject to people in the cotton belt. Government reports have been severely criticised. Therefore, the Department of Agriculture should receive the appreciation and cooperation of every one for its recent step in making its cotton market service bulletins more comprehensive and authoritative.

The Cotton Quotation Service bulletins which have been issued weekly at certain field offices of the Division of Cotton Marketing of the Bureau of Agricultural Economics have been discontinued. In their place a new service has been inaugurated with first releases on September 1. The new project differs from the former one principally in that it views cotton markets of the world as interrelated and undertakes to review market conditions more comprehensively. The old project concerned itself rather with reporting local conditions in markets and sections of the cotton belt and adjacent to the points where the bulletins were issued.

Under the new plan telegraphic reports as of each Friday are received Saturday morning from the Division's own representatives at Charlotte, N. C., Atlanta, Ga., Memphis, Tenn., New Orleans, La., and Houston, Texas, and from special correspondents at Boston and New Bedford, Mass., and Green-wood, Miss. These telegrams contain up-to-the-hour information on the state of the demand for various grades and staples of cotton, qualities in supply and qualities sought, basic prices, grade conditions and staple premiums, fixations, and other factors of importance. Similar prompt information is received at the same time from the principal European markets by cable. The data thus assembled in Washington are carefully reviewed, when the more vital features are consolidated in a weekly review which is telegraphed to the field officers on Saturday morning. At the field offices it is mimeographed and mailed so that it may reach almost every corner of the cotton belt early Monday morning.

To the grower who is ready to dispose of a crop, this is a valuable service. Knowing the size of the world crop and the world carryover, the general commodity or business situation, and the actual growth of the demand for cotton, due to the increased population and to increasing the use of cotton, he can tell with some degree of confidence what the market will do and govern his operations accordingly.

Yet There Is Hope

Writers of books can be divided into two broad classes, writers of gloom and writers of hope. The prophets of gloom probably make more money from their books than the prophets of hope. The gloom takes all sorts of forms—political, biological, cultural, and particularly economic. It is refreshing to occasionally find something to stack up against the prevalent flood of gloomy thought.

One such instance was a very significant event in Wales. South Wales is suffering perilously from unemployment. The coal industry, on which it depends, is in a deplorable state. Some men have not had work for years. Yet, in spite of these grim conditions, large numbers of the humble folk of South Wales spent a week in singing. Reports show that South Wales can now claim its pre-war position as a center of brilliant choral singing. Most of the contestants were amateurs.

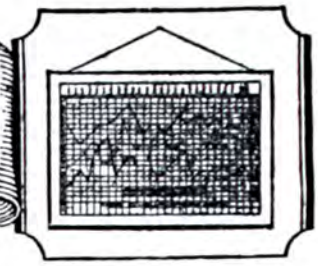
The area of Wales is small, yet in one choral contest alone it was able to recruit ten choirs of over a hundred male voices in each choir to sing Shubert's "Song of the Spirits." A group of over a thousand men in a festival of song amidst the worst economic conditions is surely a tribute to courage and the finer things of life, showing that the real character of a people is rooted deep in its soil and its history, quite independent of economic conditions, bad as they may be.

The report continues to state that there was an enormous house to hear the ten choirs and very often the prolonged expressions of enthusiasm were as much a source of embarrassment as a pleasure to the competitors.

About the same time an initial group of ten thousand unemployed miners was shipped overseas to help in the harvests as the only possible way of giving them work.

This is just a significant note for the world's writers of gloom who are so anxious to tell us of the terrible things that are going to happen to our present civilization, unless we sign on their particular dotted line.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

RAISING CHICKS OFF THE GROUND

A farmer of Richland county, Illinois, has had noticeable success in raising chicks on a wire floor entirely off the ground. This farmer raised 1,040 chicks and lost only 194 during the season, a mortality rate 10 per cent below that of other flocks in the same class, according to the extension poultryman of the University. This farmer, W. D. Householder, who is one of several hundred flock owners cooperating with the University in a poultry sanitation project, devised the pens himself. Each of Mr. Householder's brooder houses is equipped with a "porch" 10 by 12 feet floored with heavy wire screen.

COUNTY CLEAN ON FIRST TEST

Carlton county, Minnesota, has an enviable record in tuberculosis eradication. One test was sufficient to put this county on the accredited list. When the 16 veterinarians after two weeks' work finished the testing job, it was found that only ½ of 1 per cent of the animals had reacted. Nine townships had no reactors, several had only 1 or 2 each, and only 58 farms in the whole county had reactors, only a single farm being heavily infected.

PHALARIS ON PEAT

Farmers having peat land in Minnesota are being introduced by the experiment station to phalaris, a coarse, tall grass grown in England in 1824 and in Germany in 1850. Agronomists of the station predict it will become a valuable forage crop on such lands, and it is already being used by a few farmers in Blue Earth, Waseca, and Le Sueur counties. One farmer who has a five-year-old stand says he gets two or three crops a season and cuts about 10 loads to the acre. Although the hay is coarse, it has the great advantage in being very palatable.

LEARNING FROM BRITISH DAIRYMEN

The English dairyman's efficient handling of pasture lands is the most valuable observation made by the representatives of the American dairy industry who attended the International Dairy Congress at London recently, says A. M. Loomis, secretary of the National Dairy Union who acted as secretary of the American delegation at the Congress. Loomis says the good English farmer will carry a mature dairy cow for six months of the year on from one-half to one acre and maintain a heavy milk flow all the time. "The keys to the English system," he says, "are alternate grazing of small fields and fertilization which, with a fairly even distribution of rainfall and relatively low evaporation, combine to make conditions so favorable to pasture grasses that a given amount of land will carry from 2 to 5 times as many animals as under the ordinary method of pasturing followed in this country. . . . Under this plan the pastures are diveded into 6 or 8 fields and the animals are allowed to pasture for only a few days in each field and then moved to another, thus providing new tender grass at all times. Fertilization consists in several applications of commercial fertilizer—artificial manure, as it is called in England—made at intervals from late winter to fall."

GRASS AT ROTHAMSTED

Mr. Loomis also made a study of pasture management at the famous Rothamsted experiment station in England. "The grass plots at the Rothamsted Experiment Station," he said, "were extremely interesting. Here for 72 years they have fertilized grass land in various ways without any seeding or cultivation. The surprising thing was the large amount of clover on the unlimed soil wherever phosphate and potash fertilizer had been applied. I had heard that cattle graze by preference on phosphated grass land but I had never seen proof of it until my visit to Rothamsted where the claim was well substantiated."

ANEMIC PIGS

In spite of his liver, which helps humans similarly afflicted, the pig suffers from anemia. This disease of pigs, says L. P. Doyle of Purdue, is relatively new and is serious. Modernism has been the pigs' undoing in this case —centralized hog houses where large numbers are raised under one roof. Get out and get under the moon—and under the sun, too—is the recommendation to the anemic pig. Cod liver oil, yeast, orange juice and iron do not prevent the disease or cure it.

GIANT SUGAR CANE FOUND

The plant exploration party, headed by Dr. E. W. Brandes of the U. S. Department of Agriculture, which left for New Guinea several months ago, is now returning after having collected 167 varieties of sugar cane gathered in the native home of the plant. There is in the collection one new species, a hard, straight cane, growing to a height of nearly 33 feet. The new kinds of cane will be used in tests and for interbreeding in efforts to create varieties resistant to mosaic and other diseases. During the trip the party traveled 10,000 miles by airplane, 700 miles by canoe, and 400 miles on foot.

FEED HAY LANDS FERTILIZER IN FALL

Fall fertilizing of hay lands pays, says C. J. Chapman of the Wisconsin College of Agriculture, who points out that an application some time between harvest and frost has two important advantages—it stimulates fall growth and also becomes thoroughly incorporated with the surface soil before growth starts in the spring. He recommends 45-per-cent superphosphate as being cheaper in the end than that containing less and suggests using from 100 to 125 pounds to the acre—300 pounds if 20-per-cent superphosphate is used. For sandy loams and lighter soils, he says, phosphate should be supplemented with potash. For sandy loams 0-16-8 or 0-12-6 mixtures are recommended in amounts up to 350 pounds to the acre. The same amounts of 0-12-12 or 0-14-14 are recommended for light sandy soils.

$1 AN HOUR FOR TRACTOR

Records kept by a group of Iowa county, Iowa, farmers in cooperation with Iowa State College are indicative that the cost for the State as a whole is about a dollar an hour. The figure for 1927 was $1.02 which was practically the same as for 1926. Average cost of fuel was about 30 cents an hour, depreciation 29 cents for hour of use, interest on the investment averaged 11 cents, repairs 12 cents, labor in repairing and overhauling 7 cents, oil and grease 10 cents, and miscellaneous expenses amounted to 3 cents for hour of use.

Foreign and International Agriculture

Effects *of* Potash *on* Grass

Editor's Note: *As land values and taxation increase, the profitable use of commercial fertilizers on pastures, meadows, and hay fields becomes an increasingly important question. Many practical men are enquiring what fertilizers to use and when and how to use them.*

The top-dressing of such lands with fertilizers is, therefore, of timely interest to a great number of American farmers. They want to know how they can grow at home more feed in order to save the money they are now paying out for bought feeds.

To make a profit, however, the conditions affecting the use of fertilizers on pastures, meadows, and hay lands must be carefully studied on each individual farm. We need all the data and information that can be obtained. Many experiment stations are doing work along this line.

With a desire to aid as much as possible, BETTER CROPS WITH PLANT FOOD *hopes to publish short articles from time to time on the work being done by agricultural experiment stations and the results obtained by farmers. It is also interesting to know what is being done in other countries where under present conditions the most has to be made out of every acre in order to make the land pay. Following this policy we are quoting a report, made in June, of the potash effects on grass lands in Great Britain.*

CERTAIN grass land trials which were laid down even as recently as the middle of March are already showing marked potash effects. In Berkshire demonstration plots were laid down on a gravel soil at Wargrave and at Theale. At Wargrave, both basic slag and superphosphate alone were used to compare basic slag plus kainit and superphosphate plus kainit, and in June, although the fertilizers were only applied in January, there was a very striking improvement obvious, both from the superphosphate and kainit and the basic slag and kainit dressings. It was interesting to note that the phosphates alone were showing practically no effect at all while the two plots where kainit was applied in addition stood out prominently by reason of the vigorous growth of clover and other leguminous plants which gradually spread over the plots.

In the Theale experiments, also on a gravel soil, a very marked improvement of poor pasture was effected by a dressing of potassic mineral phosphate containing 40 per cent phosphate and 10 per cent potash, the phosphates being so fine as to pass through a sieve with 120 meshes to a lineal inch. In point of fact, although the fertilizers in this case were only applied in January, the improvement from basic mineral phosphate was quite as marked to the eye as the improvement effected by a mixture of superphosphate, steamed bone flour, and kainit applied at the same time on an adjoining plot. The rapidity of the action of potassic mineral phosphate where the phosphates and potash were ground so finely together and the uniformity of the effect of the treatment were certainly a revelation.

In Hertfordshire, another experiment was laid down on the gravel at Kings Langley, and the fertilizers in this case were applied in the middle of March. In this case a comparison was to be made between superphosphate and ground mineral phosphate, and also the same fertilizers along with potash. One of the features of this experiment was the striking effect of potash, there being no difficulty whatever in picking out the potash-treated plots. The superphosphate and potash plot was superior to the ground mineral phosphate and potash plot although there was distinct evidence of improvement in the latter plot. Where ground mineral phosphate and potash separately applied on the same plot had been compared with potassic mineral phosphate, which is a mixture already made up of the same ingredients, the latter showed up more quickly than the former. The uniformity of the improvement effected by the ready-made mixture was certainly a feature of this plot.

Other striking effects from potash on grass land were obtained on the silt loams on the lower wealden strata at Goudhurst. The improvement effected by basic slag and potash was so marked that one farmer did over 100 acres with basic slag and kainit. The improvement of poor pasture by this treatment on this large scale was very striking and it is not too much to say that the land in consequence has at least been doubled in value from the grazing point of view. Slag alone on the fine silty loams was of very little good but when supplemented with potash it produced very effective results indeed.

A Grad Makes Good

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price for his crop during this year. All of the number ones sold at $1.65 per bushel. This would have been slightly higher if he had not held about one-third of his crop.

In 1927 he raised about three acres of Irish Cobblers and about 13 acres of Green Mountains on his own farm, and on shares with a neighbor, 4½ acres of Green Mountains. This year he raised less hay and no corn for grain at all. This additional free acreage was turned into sweet corn for seed purposes. Thirteen acres were devoted to seed and seven acres of sweet corn were to be sold green, that is fresh, on a nearby market.

This year a change in the fertilizer was made, the concentrated form known as 10-16-14 fertilizer was used, approximately 1,200 pounds per acre being applied. The 10-16-14 fertilizer is a double 5-8-7 and it shows an increase of almost 600 pounds per acre in the amount of regular fertilizer applied. Another decided change in the crop system this year was the use of Vermont certified seed only. A new spray rig was purchased this year, one of the power type spraying four rows of potatoes with three nozzles per row; instead of spraying only eight times he averaged eleven times for this year. The Irish Cobblers gave a yield of 150 bushels per acre and the Green Mountains varied from 175 to 450 bushels per acre, due partly to a tremendous infestation of aphis. The total average for the Green Mountains

(*Turn to Page* 56)

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

"Studies Preliminary to the Establishment of a Series of Fertilizer Trials in a Bearing Citrus Grove," Agr. Exp. Sta., Berkeley, Cal., Bul. 451, *Apr.*, 1928, *L. D. Batchelor, E. R. Parker, and Robert McBride.*

Annual Report of the State Chemist of Florida, for the Year Ending Dec. 31, 1927, *Vol.* 37, *No.* 1, *Dept. of Agr., Tallahassee, Fla., R. E. Rose.*

"Lime for Michigan Soils," Ext. Div., Mich. State College, East Lansing, Mich., Ext. Bul. 57, *Jan.*, 1928, *John Sims.*

"Analyses of Commercial Feeding Stuffs and Registrations for 1928," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 471, *June*, 1928, *Charles S. Cathcart.*

"Toxicity to Cotton Seedlings of High Concentrations of Soluble Nitrogenous Fertilizers," Agr. Exp. Sta., Raleigh, N. C., Tech. Bul. 30, *May*, 1928, *L. G. Willis and E. A. Davis.*

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Clemson College, S. C., Bul. 250, *Aug.*, 1928, *R. N. Brackett and D. H. Henry.*

Soils

The fertilizer requirements and some cropping systems for two important soils in Pennsylvania are clearly and fully explained by Professors J. W. White and F. D. Gardner in their recent bulletin "Soil Fertility Experiments on Volusia and Westmoreland Soils," Pennsylvania Experiment Station, Bulletin 229. The Volusia soils occur mainly in Northern Pennsylvania and Southern New York, while the Westmoreland soils occur mainly in Southwestern Pennsylvania.

The two soils differ somewhat in their needs. The Volusia soils are very acid, and generous applications of lime are needed before anything else. On these soils the order of importance of the fertilizer elements is potash, phosphoric acid, and nitrogen, the authors concluding that a mixed fertilizer, relatively high in potash, should be used. Nitrogen was of little value on these soils except in the case of Kentucky bluegrass pasture. When corn is grown for grain, a generous application of fertilizer is necessary to secure a satisfactory yield and maturity. Of the rotations used, that of oats, hay, ensilage corn, and buckwheat proved to be most profitable for the dairy industry, important on this soil.

The Westmoreland soils require moderate amounts of lime and the order of the fertilizer elements required for these soils is phosphoric acid, potash, and nitrogen. Potash was beneficial for the hay crop and Kentucky bluegrass pasture, while nitrogen benefited the grain crop and the pasture.

On both soils reinforced manure was satisfactory, being about equal to complete fertilizers, while six tons of manure were more profitable than larger amounts. The quality of the pasture was considerably improved by the use of lime, and complete fertilizers or reinforced manure.

Those interested in fertilizers and cropping systems, in sections where these soils occur, will find this bulletin contains much valuable information.

Crops

An attractive 8-page bulletin on "Producing Sugar Beets" was received this month from Michigan State College. It is written by C. R. Oviatt, and is listed as Michigan Extension Bulletin 67. Because of the importance of sugar beets to the farmer who practices diversification, this handy treatise of the problems to be met in a successful growing of the crop should receive wide interest. In few words, soil types, drainage, general recommendations for fertilization, planting, and harvesting are covered.

In the "Fortieth Annual Report of the Director of the Agricultural Experiment Station," Kingston, R. I., some very interesting results of experiments on the efficiency of fertilizers and manures are given. For instance, potatoes from four differently fertilized experimental plats were boiled, mashed, and baked, and judged on their mealiness or lack of it. The results showed that the potatoes provied with a liberal potash supply were found preferable. The potatoes from the plat which had been given no potash for 17 years were placed last.

Other crop bulletins received this month include:

"Thirty-seventh Annual Report," Agr. Exp. Sta., Auburn, Ala., M. J. Funchess.

"Lessons from Southwestern Indian Agriculture," Agr. Exp. Sta., Tucson, Ariz., Bul. 125, May 15, 1928, S. P. Clark.

"Experiments with Small Grains in Southern Arizona," Agr. Exp. Sta., Tucson, Ariz., Bul. 126, June 1, 1928, Ian A. Briggs and R. S. Hawkins.

"Timely Hints for Farmers," Agr. Exp. Sta., Tucson, Ariz., No. 159, May 1, 1928, S. P. Clark.

"Colorado Wheat Varieties," Agr. Exp. Sta., Fort Collins, Colo., Bul. 329, Jan., 1928, Alvin Kezer, D. W. Robertson, F. A. Coffman, Dwight Koonce, and G. W. Deming.

"Effect of Acid Wash on the Keeping Qualities of Apples," Agr. Exp. Sta., Fort Collins, Colo., Bul. 343, Aug., 1928, Ferris M. Green.

"Report of the Director for Year Ending June 30, 1927," Agr. Exp. Sta., Storrs, Conn., Bul. 149, March, 1928.

"Vegetable Garden Planting Table," Col. of Agr., Athens, Ga., Vol. XVII, Bul. 352, Aug., 1928, R. L. Keener.

"Report of Moses Fell Annex Farm," (Bedford, Ind.) Agr. Exp. Sta., Lafayette, Ind., Cir. 152, June, 1928, H. J. Reed, H. G. Hall.

"Report of the Director," (Agricultural Extension Work in Indiana), Dept. of Agr. Ext., Lafayette, Ind., G. I. Christie and T. A. Coleman.

"Report of the Director," Agr. Exp. Sta., Lafayette, Ind., G. I. Christie and H. T. Reed.

"Soybean Inoculation Studies," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 114, June, 1928, Lewis W. Erdman and F. Scott Wilkins.

"Top-Working Apple Trees," Ext. Serv., Agr. Exp. Sta., Orono, Me., Bul. 177, Feb., 1928, A. K. Gardner.

"Growing the Black Raspberry in Michigan," Ext. Div., Mich. State College. East Lansing, Mich., Ext. Bul. 62, March, 1928, A. H. Teske and V. R. Gardner.

"Cherry Production in Michigan," Ext. Div., Mich. State College, East Lansing, Mich., Ext. Bul. 64, March, 1928, A. J. Rogers.

"Investigations on Winter Wheats in Michigan," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 88, Apr., 1928, E. E. Down, H. M. Brown, A. J. Patten, O. B. Winter, and G. H. Coons.

"Ultimate Effect of Hardening Tomato Plants," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 89, Apr., 1928, John W. Crist.

The Quarterly Bulletin, Agr. Exp. Sta., East Lansing, Mich., Vol. XI, No. 1, Aug., 1928.

"Report of Northwest Experiment Station, Crookston 1927," Dept. of Agr., University Farm, St. Paul, Minn., A. A. Dowell.

"Report of Three-Acre Better Corn and Cotton Production Contest," Ext. Dept., Miss. A. & M. College, Miss., Bul. 47, Feb., 1928, R. S. Wilson.

"Inferiority of Foreign Red Clover Seed," Agr. Exp. Sta., Columbia, Mo., Cir. 166, Feb., 1928, B. M. King.

"Vegetable Growing in Missouri," Agr. Exp. Sta., Columbia, Mo., Cir. 167, Mch., 1928, J. T. Quinn and T. J. Talbert.

"The New England Seven," Ext. Serv., Agr. Exp. Sta., Durham, N. H., H. A. Rollins.

"Silage Crops in New York," Agr. Exp. Sta., Ithca, N. Y., Bul. 160, Dec., 1927, L. A. Dalton.

"County Agent Work in North Dakota," Agr. Ext. Div., Fargo, N. D., Cir. 83, Aug., 1928.

"Williston Substation Report for Apr. 1, 1927, to Mch. 31, 1928," Agr. Exp. Sta., Fargo, N. D., Bul. 219, May, 1928, E. G. Schollander.

"Cherry Pollination Studies," Agr. Exp. Sta., Wooster, Ohio, Bul. 422, July, 1928, J. S. Shoemaker.

"Training and Pruning Apple Trees," Agr. Exp. Sta., State College, Pa., Bul. 224, Apr., 1928, F. N. Fagan and R. D. Anthony.

"Experiments in Tomato Production," Agr. Exp. Sta., State College, Pa., Bul. 227, June, 1928, W. B. Mack.

"Better Oats for South Dakota," Agr. Exp. Sta., Brookings, S. D., Bul. 230, Apr., 1928, E. W. Hardies.

"Twentieth Annual Report of the Commissioner of Agriculture," Austin, Tex., Geo. B. Terrell.

American Potato Journal, The Potato Assn. of America, East Lansing, Mich., Vol. V, No. 7, July, 1928, and No. 8, Aug., 1928.

"High Grade Alfalfa," Bu. of Agr. Econ., Div. of Hay, Feed, and Seed, U. S. Dept. of Agric., Washington, D. C., May, 1928.

"Systems of Livestock Farming," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1546, Nov., 1927, M. A. Crosby and R. D. Jennings.

"Cucumber Growing," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1563, June, 1928, W. R. Beattie.

"Terracing Farm Lands," U. S. Dept. of Agr., Washington, D. C., Farmers' Bul. 1386, June, 1928, C. E. Ramser.

Economics

A new U. S. Department of Agriculture Circular 30, "Farm Management Extension, 1914-1924," written by H. M. Dixon, gives an interesting account of the development of farm management extension work during this 10-year period. It discloses the important steps which have been made to most effectively bring to the farmers of this country improved methods in agriculture.

Bulletin 7 of the Pennsylvania Department of Agriculture, as written by D. M. James of the Bureau of Markets, gives a statistical summary of carlots and loads of fruits and vegetables in 15 important cities in Pennsylvania. The data is given by months and shipments and are classified as to the state of origin.

"The McIntosh Apple on the New York Market," Agr. Exp. Sta., Amherst, Mass., Bul. 243, May, 1928, Lorian P. Jefferson.

"Potatoes in Massachusetts Farm Economy," Agr. Exp. Sta., Amherst, Mass., Ext. Leaflet 119, Mch., 1928, H. W. Yount, F. H. Branch, R. L. Mighell, and H. B. Rowe.

"Type-of-Farming Areas in Massachusetts," Agr. Exp. Sta., Amherst, Mass., Bul. 244, June, 1928, Ronald L. Mighell and Marian Brown.

"Social Organizations and Agencies in North Dakota," Agr. Exp. Sta., Fargo, N. D., Bul. 221, Aug., 1928, E. A. Willson.

Diseases

"Wilt and Blossom-End Rot of the Tomato," Agr. Exp. Sta., A. & M. College, Miss., Bul. 247, Dec., 1927, H. H. Wedgworth, D. C. Neal, and J. M. Wallace.

"Corn Root Rot Studies," Agr. Exp. Sta., Columbia, Mo., Research Bul. 113, Nov., 1927, B. B. Branstetter.

"The Black Rootrot Disease of Apple," Agr. Exp. Sta., Blackburg, Va., Tech. Bul. 34, Mch., 1928, F. D. Fromme.

"Citrus Chlorosis as Affected by Irrigation and Fertilizer Treatments," Agr. Exp. Sta., Tucson, Ariz., Bul. 124, May 1, 1928, P. S. Burgess and G. G. Pohlman.

Seeding By Airplane

(*From Page* 19)

the opening during a given time. Flying at a velocity of 70 miles per hour at an elevation of 500 feet, the plane spread the seed uniformly on a 90-feet strip.

The corners of the tract were marked with white flags and white strips of paper were used as ground marks at 90-feet intervals across the tract to guide the pilot.

The land seeded was the typical rough, logged-off land of the Pacific Coast country which had been burned over. The development of this new and economic method of grass seeding, it is thought, will greatly stimulate the use of these lands for sheep and cattle grazing purposes. Such utilization of them will decrease the fire hazards on timber lands, it is thought, during the period of reforestation because such practices will keep down underbrush.

This is believed to be the biggest airplane seeding contract ever undertaken in the world, and the outcome is being watched by stockmen throughout the Pacific Coast area.

From Steam Engineer *to* Best Farmer

By G. R. Cobb

Salisbury, Maryland

SIXTEEN years ago John T. Reynolds, now living on a farm near Georgetown, Delaware, was "fooling with steam engines" and knew nothing else but this trade or profession. Today he is known as one of the best, if not the best, farmer in his district. It did not take John all of these 16 years to show his neighbors that he was to become the "best farmer" as he soon demonstrated that brain work was as important as brawn, even on a farm.

Handicapped by soil that had been farmed or rather "mined" for years, poor buildings, no knowledge of farming, and lack of equipment, Mr. Reynolds displayed a fine courage by starting this new venture. He was so ignorant of the farming game that to use his own words, "I couldn't even run a row," and the farmer who cannot run a row is held very lightly by his fellow craftsmen.

He Feeds Crops

On being pressed for a reason for his success, Mr. Reynolds made this answer, "I feed every crop." He might have added, "and I also feed my livestock," because his poultry, swine, mules, and other livestock show the effects of proper feeding and care. The County Agent vouches for the fact that the strain of Barred Plymouth Rocks developed by Mr. Reynolds are perhaps superior to any in his section of the country. And the Poland China hogs raised by Mr. Reynolds are known far and wide for their type, vigor, and size.

In writing a story of this kind, or rather in getting the facts, one is handicapped unless he has good eyes and reasoning power, because the successful farmer, like many other succesful men, has very little to say about his success. Thus it is necessary to talk with the County Agent, the neighbors, and others in order to get a fairly complete story. Mr. Reynolds does not feel that he has done anything remarkable.

We visited Mr. Reynolds just at corn harvesting time and was struck with the strong looking stalks and the yield of well-developed ears. On being asked why his corn was better than that of his neighbor's, he answered with one word, "potash." In addition to green manures, stable manure (when he can get it), and the regular application of commercial fertilizer, Mr. Reynolds uses 167 pounds of muriate of potash per acre on his corn crop, this extra application being the result of demonstrations carried on by him with the cooperation of his County Agent.

That this extra application of potash pays is well illustrated by the fact that the yield per acre is larger, the ears win first prize at corn shows and have a better keeping quality, and there is less shrinkage in storage.

Due to the fact that Mr. Reynolds is not a specialist, in that he stresses no one crop, one must know his method of farming and his type of rotations in order to fully appreciate his title of efficiency.

To illustrate—let us take a 14-acre field as an example and follow the rotation through one round. Starting with a crop of wheat in the ground during the fall and winter, we come to the harvesting of the wheat the following July, when 350 bushels were secured from the 14 acres—a truly remarkable yield when one considers that Delaware is not known as a wheat-producing state.

After the wheat was harvested, the ground was prepared for clover and buckwheat. The buckwheat paid for the clover seed, fertilizer and labor, leaving the clover crop, either as seed or hay, clear profit. Following the clover crop was a crop of soybeans with a yield of 280 bushels on the 14 acres, for which Mr. Reynolds received \$2.25 per bushel. Every third year a crop of corn is raised.

The yields obtained in 1926 and 1927 from these 14 acres were corn 1,490 bushels, wheat 350 bushels, buckwheat 300 bushels, soybeans 280 bushels, clover hay 33 tons, and according to Mr. Reynolds, the 14-acre "cut" netted him over \$1,000 during the year, with a crop of wheat in the ground, extra.

As stated in the first part of this article, Mr. Reynolds "feeds every crop" and knows that potash is needed on his soil, and with his method of farming. Thus he uses stable manure reinforced by 400 pounds of superphosphate, plus about 200 pounds of muriate of potash per acre for his grain and hay crops. This amount is increased on potatoes and other so-called "truck crops." And following the best practice, Mr. Reynolds fertilizes his clover crop, which precedes the corn crop, with manure and phosphorus, using about 10 tons of manure and 400 pounds of superphosphate per acre. In addition to this the corn crop gets 200 pounds of potash in the form of muriate.

For soybeans, wheat, and buckwheat, Mr. Reynolds uses 500 pounds of a 2-8-5 commercial fertilizer supplemented by stable manure spread broadcast.

It would not be ethical nor fair to compare the ordinary farmer's methods and yields with those of Mr. Reynolds for obvious reasons, but to say that Mr. Reynolds is "far ahead of the rest of us" is simply repeating a remark made by one of his neighbors. And according to Mr. Reynolds, his success is due to the fact that he "feeds every crop."

More Fertilizer — More Cotton

By P. O. Davis

Alabama Agricultural Experiment Station, Auburn, Alabama

ALABAMA is making rapid progress in the efficient use of commercial fertilizers. It is a huge state demonstration in which the manufacturers of fertilizer as well as farmers are vitally concerned, and each group should profit by the application of the Alabama demonstration because it is based upon facts, accurately obtained by scientific research.

By the application of these facts, cotton production in Alabama is being revolutionized. A quarter of a century ago—and even 10 years ago—the production of a bale of cotton to the acre in Alabama was a rare event. Usually such yields attracted much comment among the people and afforded stories for the newspapers. People went to see and to study how it was done.

But such production in recent years has become an ordinary event. Throughout the state farmers and 4-H club boys in almost every community have produced a bale to the acre, and some of them are exceeding this yield by 25 per cent, 50 per cent, and occasionally more. They are doing it not only on one acre but on fields of cotton.

However, not every farmer is making these high yields as shown by the fact that the average for the state for the last three years was under 200 pounds of lint cotton per acre. But the majority of those farmers and 4-H club boys who are using commercial fertilizer properly are producing around a bale of cotton to the acre, despite the presence of boll-weevils. Those who are failing to use it properly are pulling down the average. County agents do not hesitate to tell a farmer that if he will fertilize his cotton properly, plant good variety of seed, and then cultivate thoroughly, he may expect approximately a bale to the acre.

It is a significant fact that for the first time in more than 10 years Alabama was third among the states in cotton production in 1927. Only Texas and Mississippi exceeded Alabama.

And it was not an accident. The question arises: How did this happen? What forces are bringing about this change which is resulting in a new and more profitable production in one of the leading cotton producing states?

The Answer

The answer began 15 years ago when the Alabama Experiment Station, Auburn, began a systematic study of cotton fertilizers to get conclusive results. Experiments were not limited to one type of soil on the Experiment Station at Auburn, but the help of farmers was enlisted to make hundreds of tests throughout the State, thereby getting the facts about the effects of different fertilizers in each of the soil divisions.

To state it in other words: The Alabama Experiment Station went to cotton plants on the different soil divisions and asked them about thei fertilizer needs. This included infor mation about different ingredients an the ratio in which to combine then for best results.

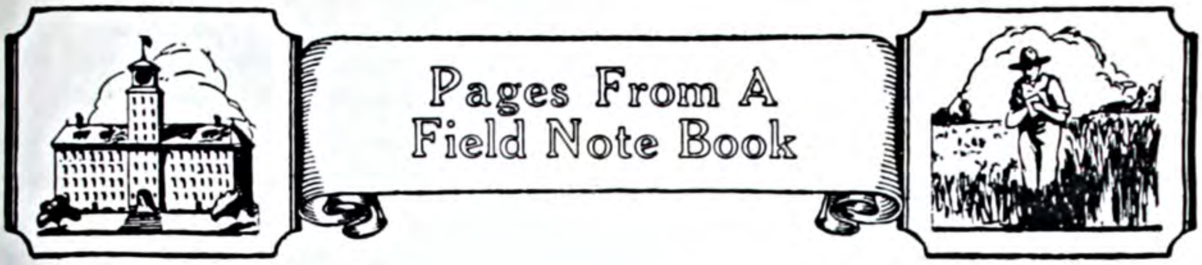
Year after year that work has con tinued. It is still in progress. It i now more comprehensive than at an time in the past because new fertil izers have been placed on the market and, as an unbiased-public-service in stitution, the Alabama Experimen Station is studying these in order t learn what cotton plants think abou them.

Several years ago enough informa tion had been gathered to enable th Experiment Station to make definit recommendations about fertilizers fo cotton on each of the soil divisions o the state. These recommendation were based upon facts obtained b these experiments. The answers give by cotton plants were compiled an analyzed. Later research has strength ened these recommendations and fur nished additional information for im proving and enlarging. The funda mentals are the same.

About that time the extension ser vice of the Alabama Polytechnic In stitute began asserting itself as a pow erful force in behalf of more profit able farming. An extension agrono mist was employed who, in coopera tion with county agents, launched a state-wide campaign for better fertil ization of cotton. He went fron county to county and from commun ity to community within the countie using charts and figures and explain ing to farmers their fertilizer need as shown by answers given by cotto plants themselves. He insisted that i such matters the cotton plant was th final judge.

The specialist who did this wa Frank E. Boyd. For several years Mr Boyd conducted this crusade whic was very convincing. County agent

(*Turn to Page* 61)



Club Boy Challenges Farmers

By Charles Kilpatrick

Fort Smith, Arkansas

WILLIAM SKORKOWSKY, Tishomingo, Oklahoma, Southeast district 4-H president, is not only a leader among his fellows, but he is a leader in "better farm and home practices." Cooperating closely with Curtis Floyd, County Agent, he lined up a number of demonstrations with fertilizers for Irish potatoes early last spring and he is challenging the state with the following results:

Plot	Size	Analysis	No. 1's	No. 2's	Yield per acre
1	¼ acre	Check Plot	292 bu.	23 bu.	315 bu.
2	¼ acre	300 lbs. 8-4-4	326 bu.	26 bu.	352 bu.
3	¼ acre	300 lbs. 8-4-6	353 bu.	25 bu.	378 bu.

The increased yield of marketable potatoes in plot three over check plot where no fertilizer was applied was 61 bushels. The fertilizer cost $8.10.

Young Skorkowsky follows out a crop rotation by plowing up alfalfa every five years. Realizing that his ground was rich, he planted 13 bushels of Nebraska certified seed in 30-inch rows per acre. He plowed and hoed his potatoes twice and was always

Left to right: William Skorkowsky, Jr., William Skorkowsky, Sr., and Charles Kilpatrick. The 61-bushel increase was obtained with $8.10 worth of fertilizer.

ready with poison for the bugs.

Besides the above demonstration, he conducted other tests with Irish potatoes for the County Agent, and he is conducting fertilizing demonstrations with corn.

William is working for a bankers' scholarship that is given to the outstanding boy in each district. He has an enviable record during his seven years of club work by serving as County 4-H president three years, winning a trip to American Royal at Kansas City for the best potato report. He won $23 in prizes on his potatoes at the recent Oklahoma State Potato Show. He has 22 hogs on hand at the present time, and from this demonstration he has cleared $1,000 during the past four years. He has financed his own way through high school besides helping his sister.

In all of his club work at home, it has been a fifty-fifty proposition between him and his father. This is his last year in club work, and for the past year he has been training other boys and girls to "carry on."

Pasture Improvement

(From the Report of the Director, Storrs Agricultural Experiment Station, Storrs, Connecticut, Bulletin 149)

THE nine four-acre plots were grazed by yearling steers in 1926 as in preceding years. Based on both the maintenance and the gains of the steers, the following increases in production have been obtained from the fertilizer treatments of 1924:

Plot Number	*Treatment	Increased production, above check plot, expressed in percentage 1924	1925	1926	Average
1	L P	33	150	184	122
2	P	39	69	83	64
3	L K	—5	28	27	17
4	K	0	14	—15	0
5ck	Nothing	..	..	..	..
6	L	—7	18	6	6
7	P K	45	123	135	101
8	L P K	28	184	198	137
9	N P K	99	125	113	112

*L—Ground limestone at 2,000 pounds per acre.
P—Acid phosphate at 500 pounds per acre.
K—Muriate of potash at 100 pounds per acre.
N—Nitrate of soda at 150 pounds per acre.

These results show that without phosphorus, no gains from other treatments may be expected. In 1926, acid phosphate alone nearly doubled the production; acid phosphate plus limestone or limestone and potash nearly trebled the pasturage; while neither potash nor lime alone or together, affected the yields appreciably. Thus it appears that phosphoric acid and lime are of prime importance in improving worn-out pasture land. White clover (T. repens) spreads rapidly over land treated with those plant nutrients.

Due to the fertilizer treatments on the experimental pasture plots, the production has been increased until as many steers can be kept on two acres as were kept on four acres before treatment. For this reason and also because some treatments have been proven ineffective, certain changes were made in the spring of 1927. It was felt that these changes might answer some pertinent questions in pasture management without increasing greatly the cost of conducting the experiment. Therefore, four of the plots, namely, 1, 6, 8, and 9, were divided into equal halves and are being grazed separately to determine any difference in production between the halves. It is also planned to divide plot 4 and possibly plot 2 in 1928. If, after a few years of separate grazing, it appears feasible to use each half of these plots for different treatments, they may be used to answer such additional questions as how much lime, phosphoric acid, and nitrogen are profitable on pastures and also as to the rate of grazing and time of applying nitrogen carriers for best results.

Alfalfa Experiments

(From the Report of the Director, Storrs Agricultural Experiment Station, Storrs, Connecticut, Bulletin 149)

AFTER nine years, without any application of phosphorus carrying fertilizers, plots receiving potash alone yielded as much alfalfa in 1927 as those which had received 2,625 pounds of acid phosphate during this period. On manured plots potash has not increased the yields, but acid phosphate has produced a slightly larger crop. Nitrogenous fertilizers have not been profitable with alfalfa and tend to increase the amount of weeds and grasses in the stand.

On acid soil (pH 4.9) which had not been limed for at least fourteen years, ground limestone applied in April produced better stands of alfalfa than when applied in June, the alfalfa being seeded shortly after the June application of limestone.

Part of the land used in the "date and rate of liming experiment" had received liberal applications of a 4-8-10 fertilizer during the period 1915-1922, while the remainder had received the same amounts of a 4-8-0 mixture. No fertilizer has been applied since 1922. The limed plots extend across both of the above fertilizer treatments. Ground limestone at one ton per acre on the land treated with 4-8-10, produced a better stand of alfalfa than four tons of limestone on the land treated with 4-8-0. This indicates the necessity of using a complete mineral (LPK) treatment for alfalfa, rather than excessive amounts of one plant nutrient.

On land which had not received any potash or sulphur carrying materials for at least fourteen years, alfalfa did not respond to applications of sulphur in any of the following materials: Flowers of sulphur, gypsum, and acid phosphate. On the contrary, the four plots receiving potash produced the largest amounts of alfalfa.

ALFALFA ROUTS CANADA THISTLES

Alfalfa is the best cure for the Canada thistle, says A. L. Stone, Wisconsin weed commissioner. He says the thistles must be partly subdued before the alfalfa seed is sown and the soil and other conditions favorable.

Farm Demonstrations

(*From Page* 8)

fertilizers was 133.3 bushels.

Potatoes are a crop well adapted to peat and sandy peat and good yields and excellent quality can be obtained with proper fertilizers. Four plots harvested on sandy peat gave the following results: Average yield of four check plots, 59.3 bushels; Yield of one potash plot, 70.2 bushels; and average yield of four potash and phosphate plots, 121.6 bushels.

Alfalfa Builds Fertility

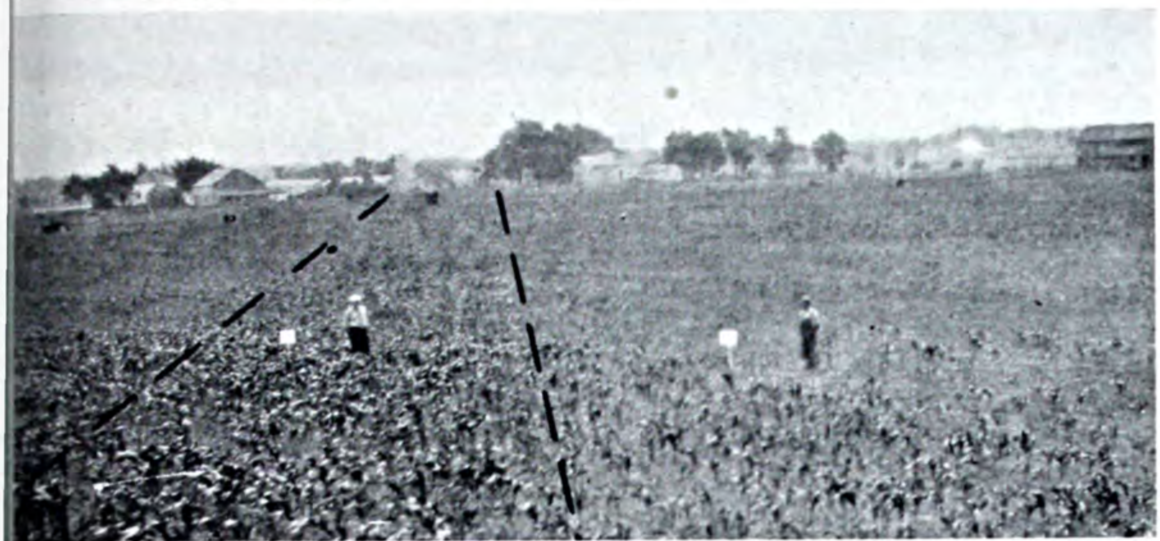
"The fertility of all of our sandy farms is lower than that indicated on the virgin soil and many farms are at or approach the worn-out condition," explains Zeasman. "The logical method of development is to add the mineral fertilizers and lime and grow legume hays to build up the nitrogen and organic matter. The logical method of attack is through alfalfa, which is rapidly gaining in popularity.

"The short-sighted policy in the alfalfa campaign in the sand region was advocating manure for alfalfa. It is true that good stands and yields can be obtained with manure, but non-legume crops need the manure on the sand farms so badly that it is an uneconomic use of the nitrogen of the limited manure supply to use it on alfalfa.

"The use of potash and phosphates as commercial fertilizers, in addition to the lime is the most economic practice on these farms, and most of the extension effort in the sand territory is given to this problem.

"In a summary of 35 cuttings made on alfalfa plots in 1927 about three-fourths of the plots show a bigger increase from potash alone than from phosphate alone. An occasional plot shows better response to phosphate. Nearly always the combination of both shows the largest increase. A single cutting pays for the fertilizer. When it is considered that a similar increase carries through four to six cuttings, a profit of from 300 to 500 per cent can be realized on the money invested in fertilizers. Similar results are possible with clover on sand.

The row of cabbage in the foreground on this dark, fine sandy loam received no fertilizer. All the other plants were fertilized with from 200-300 lbs. per acre of 0-12-12.



n the potash strip the corn is over knee high. The balance of the field is only half as tall, and th stand is poor.

"We feel that commercial fertilizers n sand for corn are a makeshift to e used only when corn must be rown on poor land or land robbed y a heavy feeding crop," Zeasman oints out, "but the practice is not early as profitable in permanent agriulture as fertilizing the legume hay rop and using manure for corn. Since he agricultural committee in Adams ounty had arranged with farmers for ertilizer demonstrations on corn, we ecided to start the plots with the idea f getting yields on the legumes the following year. We feel that in the sandy soil region the emphasis ought to be placed on potash and phosphate for the alfalfa and clover and manure for corn.

"One very striking result was obtained on corn on fine sandy loam to loam soil. This field is on a small farm on which comparatively intensive methods are used. The field had been in alfalfa two years. It was surface-dressed with manure on the nurse crop stubble and again the next fall. The alfalfa sod was plowed in the fall

The potash strip tasseled a week earlier than the balance of the field.

of 1926. The average farmer would have said that here was a field fertile enough to grow a first class crop of corn.

"The owner, however, was at one of the soil improvement meetings and decided to use 250 pounds of superphosphate on the entire field. He also put on a strip of potash in addition to the phosphate. He used about 150 pounds muriate of potash per acre. (The strip is shown between the black lines on the two accompanying pictures.)

"The potash strip was far ahead o the balance of the field and attracte much attention all season. The yiel of corn was 66.3 bushels per acre o the potash and phosphate combinatio and only 31.7 bushels per acre on th portion not receiving the potash. Afte the corn harvest the owner remarked 'I have learned a valuable lesson an I am ordering 2,600 pounds of potas and a ton of phosphate for nex year.'"

A Grad Makes Good

(*From Page* 44)

was well over 300 bushels per acre, however. Nine-tenths of the crop were sold in the fall at digging time at an average price of $1.40 per bushel.

In 1928 the average again was 300 bushels per acre and the average price was about $1.00 per bushel. The sweet corn brought in additional revenue as it was an excellent year with high prices for this crop.

Some of Frank's operations are of decided importance and show why he has been successful. The plowing has always been from 8 to 9 inches deep and if possible the land has been harrowed previous to plowing. Following the harrowing the land has been smoothed or leveled with a plank drag. A modern two-man potato planter has been used in which all the fertilizer has been distributed in the drill with the seed piece.

After planting the fields have been leveled with a drag or spike tooth harrow and this has been followed with a weeder in order to stop the growth of small weeds at a time when they are most easily killed. As soon as the rows of potatoes were seen, a riding cultivator was used, the potatoes being gone over twice. Then hilling started, not the high hills used by Maine po tato growers, but a broad, low, fla top hill was drawn up when necessar to cover and kill weeds. On the firs appearance of the Colorado potat beetle the plants were sprayed wit calcium arsenate and thus the pest were destroyed before great damage re sulted. Spraying with Bordeaux mix ture started each year between July and 5 and continued until Septembe 10, in some of the years once in ever 10 days. During the years when lic were common one quart of nicotin sulphate was used with 100 gallons o Bordeaux in order to check this pest.

When the vines were all dead, th potatoes were dug; they were grade with the best type of grader; and gen erally marketed direct from the field although in late years a tendency t store has been indicated.

Frank expected certain work fron his team, from the men employed an from himself. He expected a three horse team to plow an acre in fiv hours or two acres a day. A Fordso tractor should harrow thoroughly tw acres in an hour. He expected three-horse team drawing a 12-foo drag to harrow two acres per hour

He expected a two-man planter to plant at least 3½ acres in nine hours. He expected a twelve-foot weeder drawn by two horses to cover three acres per hour. He expected a riding cultivator to cultivate an acre in 1½ to 1¾ hours. He expected his best sprayer to spray an acre in 1¾ hours, this to include filling as well as applying the mixture.

He feels that a good picking gang, that is, the group that pick up the potatoes after digging, should average from 90 to 100 bushels per day per man. This includes those that are digging and grading as well as those that are picking up. He feels that four men with a Boggs hand grader should grade 700 bushels in a day. He feels that a truck should be able to deliver 300 bushels in a nine-hour day on a seven-mile haul each way, taking 65 bushels per load. He feels that fertilizer can be home-mixed at a labor cost not to exceed $1.50 per ton. He feels that the average cost per acre for producing including all costs involved has never been much under $200 per acre.

He has found that he never has any trouble getting all the help that he needs, even those that pick up potatoes. In his words—"A few kind words and lots of soft drinks, pumpkin pie, and a cash bonus for staying faithfully through the season accomplishes wonders, lots more than any amount of nagging and howling." He further feels that—"I owe much of my success to parental cooperation and advice. I advise every young man who has a father who has been an active, successful farmer to profit from the advice and experience of his parent. At the same time I feel I must know when to follow new methods or new conditions."

Not only has Frank Williams had time to carry on these wonderful farm operations, but he has been able to give much of his time to community life—to the church, clubs, and community betterment in various ways. In his words—"Farming pays fair returns if well planned, if you work hard, and deal on the square."

Business Interpretation

(*From Page 26*)

1926; not the cost paid the men but the real cost of labor, which included wood, milk, use of house, etc. Horse labor is charged at cost, 13.2 cents per horse hour.

Dickey points out that the time required for baling and hauling hay, barn storage room, and fire insurance are directly in proportion to the crop grown. These are charged at the average cost per ton for 1926. The charge for hay storage is low. The use of fertilizers on this farm has made it necessary to build more barns. The extra time of cutting, tending, and raking the larger crop and additional use of machinery has not been counted. The time to load and haul to the barn is estimated from the time for the total crop, but is very close to correct. The farm is three miles from the railroad and has some bad hills but over 2 tons of baled hay is hauled per load. No hay loader is used, but otherwise work is economized. The charge for baling of $1.25 per ton is not counted, as this is deducted from the price when selling.

In most years, the increase of 60 tons of hay from this farm will sell for $900. This would allow a profit of $265 from fertilizing, not a profit of $628 that would be indicated by usual methods of figuring.

Fixed costs should include fertilizer,

freight on fertilizer, mixing and applying fertilizer, and interest on these, in this case, $365.25.

"Costs, directly proportional to crop are hauling in, storage, fire insurance, baling, hauling to market, interest on these—$269.41 or $4.49 per ton.

"It can then be determined, approximately, what increases and prices are necessary for profit on this farm. If the increase is half a ton per acre from the treatment, the fixed costs are $365 and the variable costs $135. The 30 tons of hay, on this basis, would have to bring $16.66 per ton to pay the cost. This would not be a very attractive investment with hay at less than $18 to $20.

"In some extra good years, this treatment on this farm may give an increase of 1½ tons per acre. The fixed costs would then be $365 and the variable cost $404. The cost of the 90 tons of hay would be $8.55 per ton.

"It is found that the increased crop costs approximately $16.83 per ton if the increase is one-half ton, $10.58 per ton if the increase is one ton, and $8.55 if the increase is one and one-half tons. The average cost of growing hay in this region is $6 per ton. These results may suggest why farmers are slow to take up the fertilizing of hay," Dickey concludes.

He states that these results are, of course, given to show a method of business interpretation of the use of fertilizer and not to give a discussion of fertilizing hay.

New Hampshire

(*From Page* 12)

State has shown that nearly one half of the potatoes marketed in New Hampshire are shipped in during the competing season when local grown potatoes are sold. The survey is being followed up by studies of the cost of production of potatoes and great variations in labor costs have already been found. Growers handling over 11 acres, for example, were found producing the crop up to market time at a labor cost of 71.6 hours per acre, whereas producers with less than three acres in the same section required 131 hours. A large part of the potato crop of the state has been produced on small areas with a noticeable lack of adequate machinery for planting and digging.

Some of the accomplishments which the New Hampshire station can fairly claim during recent years are as follows:

Development of a definite orchard program, which it is estimated would mean an annual increase of $350,000 in the apple crop if applied to a fourth of the bearing trees of the state;

Proof of the possibilities of alfalfa, soybeans, and other legumes, and initiation of the campaign for their use in the dairy ration to cut down the farm grain bill;

Variety tests with field corn, oats, field beans, soybeans, wheat, root crops, forage crops, apples, peaches, plums, cherries, strawberries, raspberries, peas, and tomatoes to determine the kinds best suited to New Hampshire conditions;

Creation of special strains such as "New Hampshire 500" ensilage corn, which on certain types of soil has outclassed other varieties; the Granite State cucumber; and improved timothy;

Original tests of certified seed potatoes, which have meant an annual average increase of 65 bushels per acre over common stock in countless field demonstrations;

lfalfa on the soil fertility plots established at Greenland, N. H., by the New Hampshire Agricultural Experiment Station.

Perfection of control measures for uch devastating pests and diseases as ate blight on potatoes, apple scab, odling moth, apple maggot, brown-ail moth, etc., three of which it is stimated do an annual damage of 215,000 in the state;

Institution of the campaign against vhite diarrhea of chickens which is ctually eradicating a disease that a ew years ago was destroying 50 per cent of the chickens hatched within our borders;

Development of New Hampshire grown certified seed potatoes; and

Maintenance of the analysis service which tests feeding stuffs, fertilizers and seeds, thus making it possible for the State Department of Agriculture to prevent the sale of materials which are fraudulently misrepresented or which have no value.

Stealing Northern Honors

(*From Page* 18)

am very careful in cutting my seed pieces, to make them thick and block-shaped, and weighing from 1½ to 2 ounces each. They are put in the row at a distance of from 11 to 14 inches apart. A 44-inch row is the ideal row in my opinion, for our section. Care should be exercised in not planting potatoes too deep. Five inches of loose dirt over the potato piece is ample.

"Another important step in potato culture is cultivation. It is folly to assert that potatoes should not be cultivated. I try to cultivate at least twice. When they are five to seven inches high I cultivate rather deep, at a distance of from three to six inches from the stalk. The soil is thoroughly loosened with a spring or rigid tooth harrow and then brought back with a turn plow or a disk cultivator. The second cultivation is done in the same manner, except that it is done at a greater distance from the stalk and not quite as deep as the first. I find it advisable to run a double mould board plow or middle breaker between each row a few weeks before harvesting, as it tends to kill and destroy much weeds and grass.

"I manage to harvest, grade, pack, and load on cars in quick succession. The potato digger is followed by a crew of boys and girls, who gather the potatoes in bushel boxes. The boxes are then carried in carts to the grader, which is usually located near the potato patch, and from the grader the potatoes are put into sacks. The sacks are then weighed and sewed and in mediately loaded on a truck, whic conveys them to freight cars for shi ment. In some cases, less than 2 minutes elapses from the time tl potatoes are dug and placed in ca for shipment. It will be noted th the potatoes are handled very little.

"My potato crop was delayed abou two weeks this year, due to a col snap which actually cut down abou 60 per cent of the stalks of the plant In some instances the stalks were cu to the ground. Owing to the delay, did not get very high prices. M average was $1.66 per 100 pounds."

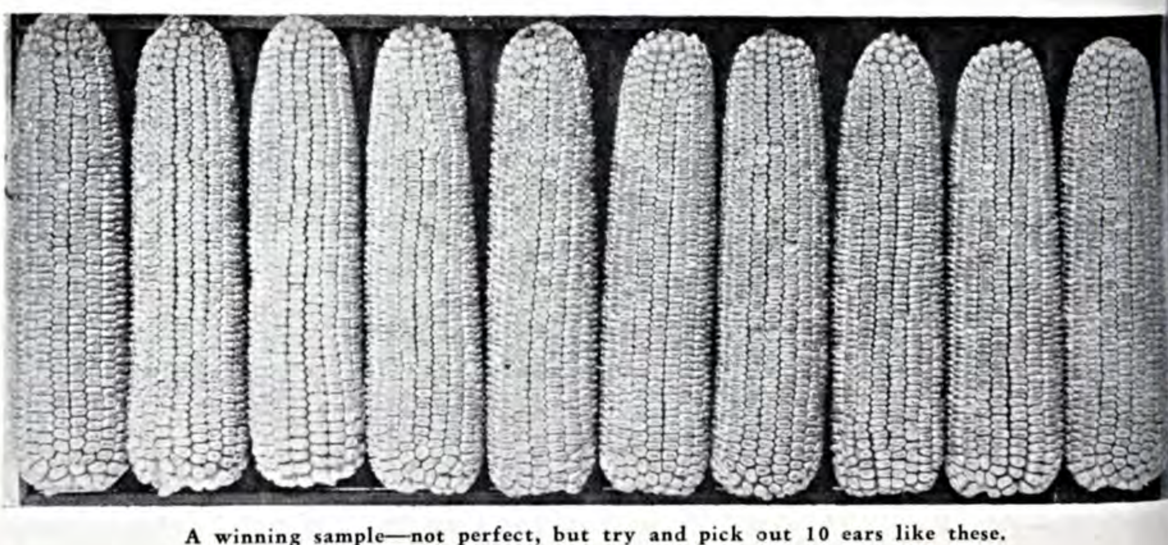
The Annual Crop Show

(*From Page* 28)

a variety has no influence upon the yield of the progeny. That is to say that the score card for corn is no criterion for the measurement of the productivity of corn. It does evaluate some of the characters pertaining to maturity and market condition of corn which are valuable; but it does not evaluate any of the hereditable characters as to yield.

Richey, of the United States Department of Agriculture, says, "winning in a corn show should be taken for what it is, namely, evidence o ability to grow corn and patience t select a good sample." The scor card of performance should becom a full partner with the score card o appearance. Under performance th following questions should be answere satisfactorily:

1. Is it a pure variety?
2. Is it free from disease?
3. Is it adapted to your soils an climate?
4. Will it yield?



A winning sample—not perfect, but try and pick out 10 ears like these.

More Fertilizer—More Cotton

(*From Page 50*)

carried-on" in cooperation with him nd have continued to promote the octrine of better fertilization beause it has proven itself time and me again.

According to the Auburn recomendations, application of all the perphosphate, all the potash, and ne-fourth of the nitrogen at the time f planting is recommended. The reaining three-fourths of the nitrogen is to be applied immediately after cotton is chopped.

Prof. M. J. Funchess, director of the Alabama Experiment Station, says that while nitrogen is the key-element, phosphate and potash should not be neglected. In fact he places emphasis on these elements because the best results from nitrogen are dependent upon an adequate supply of phosphate and potash.

Dry Land Farming

(*From Page 16*)

esidual effect is apparent for three ears or more. Present experiences on hese farms are that where legumes nd wheat are grown in rotation each rop should occupy the ground about alf of the time.

Farmers in the Palouse country have ound that the wheat crop after sweet lover will produce a 42-bushel yield, while their wheat grown under exact onditions on well handled summer allow yields 45 bushels. In general, wheat yields after legumes are not uite as high as on the best handled ummer fallow, but higher than on ome of the summer fallow, and conidering the fact that the use of the and was not lost, the values lie in avor of the rotation with the leguminous crop.

In Oregon under somewhat similar onditions on large wheat farms in Jmatilla county, nitrate fertilizers have been added to land farmed under he summer fallow method. Increases n yield of more than 100 per cent have been obtained on limited acreges from the use of 150 pounds of nitrate fertilizer. The plan here is to eliminate the necessity of summer fallowing every second year for the accumulation of nitrates. Owing to weed conditions, it will doubtless be necessary to fallow every third or fourth year to clear the land, however. These results in Umatilla county check somewhat with results in the Palouse country. There, field results showed that applications of 15 to 20 pounds if nitrogen increased the yield on late fallow 13 bushels and brought the production up to where it equalled that on properly handled summer fallow.

BACK TO THE SOAP-BOX

Two colored men down in Southern Indiana were bewailing the hard times being felt in the agricultural district there. "Times is tighter than I ever seen them before," said one. "I can't even get hold of a nickel! If something don't turn up I'm going to start preaching. I done that once and I ain't too good to do it again."—*Echo.*

A Floating Fertilizer Factory

FRANCE owns what is stated to be the largest floating fertilizer factory in the world. The ship, which is to fish on the Newfoundland coast, is equipped with fish decapitating and gutting machinery that can handle hourly 1,000 to 1,200 large fish. The waste products are worked up into fish meal and 8 tons of raw material can be made into 2 tons of fish meal per 24 hours. In addition there is a plant to extract oil from the fish li ers. The displacement of the vess is 1,540 tons, its length over 200 fee It is driven by a triple-expansion e gine of 850 H.P. and in a trial ru attained a speed of 11.5 knots. Tl total crew is about 50. The co struction of the ship complies wit the most rigid requirements of tl "Veritas" Bureau for vessels havin to resist ice pressure.

Indian Summer

(*From Page* 4)

this friendly old scene again, I clambered down out of my "twin sicks" and quite promptly invested a dollar in a clog dance, a cracked version of Dear Nelly Gray, two bottles of furniture polish, and a cake of scalp destroyer.

Although I did not take my package home to my thrifty wife, I felt much the happier for my purchase, because it rolled back the years once more and cleared some of the mists away from almost forgotten autumns. I gave the vagrant vendor a dollar and got only a few scents, but it was worth it.

'Tis also the hunting season. Here, too, the times have changed, and the red tape and license business have wellnigh taken the zip out of the sport for those who listened to Grandfather's tales of the wildwoods or perhaps partook a little of the selfsame freedom.

First of all in greatest abundance were the pigeons. My father told how they came so thickly that the sun was darkened by their flights. They were mischievous and fed freely upon the grain so that the rifles, shotguns, and flintlocks were furbished up and the days were spent in pigeon killing.

A little later in the season when the corn was ripe and the treetops we sending down showers of acorn chestnuts, and beechnuts, squirr hunting became a rural pastime. Re black, and gray squirrels were s numerous of old that they devastate the cornfields. They stripped th husks from the ears and ate the ke nels, or carried them off to the nests. The farm folks in those day had little corn to spare from the sma clearings, and so the men started ou in defense of their possessions. It was sport that required more skill tha pigeon shooting. He who aspired t be a local nimrod would scorn th shotgun when chasing the squirr army. The rifle was the weapo chosen in honor of the chase and t develop steady marksmanship.

A hunt still more exciting and per haps less useful was when the boy decided to tree a coon somewhere i the deep woods and do him bodil harm. Here also it was often a ques tion of coon or corn, and the pioneer quickly decided. When the har day's work was over and the silve moon was climbing into the sky, band of youngsters would gather a some appointed spot and with gun coon dogs, and axes, strike out acros he fields and down into the marshes.

After the luckless coon was taken ither by shot or treefall, the boys vere not content to march homevard. Scrap-wood from the forest, or ven fence rails at times, were eagerly iauled together and set afire. Roastng ears were stripped from a near-by ornfield without leave or license, and n fact a party of bedlamites like this lid more damage than the whole famly of raccoons themselves.

'TIS also the time of the harvest moon, the gathering and garnering—corn husking in the North ind black hands reaching for the oursting bolls in Dixie. The fall furow opens, the crows hold their caucus, and the turkeys come homeward to the fattening coops.

Provident husbandmen rejoice at *individual plenty* and the college economist sharpens his pencils to prove another woeful *collective surplus.*

Furnace fires are kindled in the towns to drive out the clammy mustiness. The base burners are hauled back to their places on the ornamental zincs in the country living rooms with the usual subdued curses of a godly sire struggling with sooty hands to make rusty stove pipes come to a joint understanding; bats, swallows, and streaky creosote in the chimney; drafts and stifling smoke.

With us Northerners it is a season of preparedness, a general refunding of finances to meet the shock of a long, cold siege. Where in this case is the protesting voice of the pacifist to rail against this marshalling of resources? He has probably gone to California, according to his means and ability, either by box car or cabin airplane. He has left us to thaw frosted fingers around our campfires, and presently he will mail us a post-card of himself basking on the beaches.

Self-sufficing agriculture in the technical sense may be obsolete, but at this period of the year we see many evidences of snug independence. Farm folks may not spin yarn or pour tallow into molds, mend shoes or fashion dishes out of wood, but they still adhere to the central theme of family life. The significance that lies in the conical woodpile and the rows of canned goods on cellar shelves is never more apparent than it is now.

It means that farming is more than harvesting and hoping, more than counting cash and talking pedigrees. It means that after all the ultimate good in any satisfactory way of life lies in the security of the home and the reasonable comfort of its inhabitants. Although the household is a twelve-month institution, the nearness and dearness of its spirituality become more potent and poignant when the last leaves fall to a frozen ground.

Sadness and craven fear seldom grip the mind of a healthy mortal with gainful occupation as the year wanes. Of course there is always an exception made for the unfortunate. But all other things being equal, there should be enough of the ancient faith in us to withstand the deadening dread, for after all blue jays are still at our door waiting for another season. Trees have started a new crop of buds, and there is June buried in the grass roots.

'TIS likewise the time when the conservative has his innings both in politics and economics. The grand old party of my state, which stands pat on the theory of the steady pay check and the full lunch box, usually goes to bat after a bountiful harvest and elects its favorite son. It has happened thus, often because the great electorate knows that winter is just around the corner! It is easy to vote for extreme liberal ideals when sap runs and the birds sing, but the ardor of the enthusiast is tempered by the advent of cold nights and short change. This effect of Indian summer campaigns upon the history of America is written large and bold. To correct it we must either change the seasons or tack on another amendment somewhere. Take your choice!

Economic and civic history gives many examples like the May Day riots and the storming of the Bastile in July, but there are few such manifestations of super-heated mass psychology when the chill of October is in the air. Most of these revolutionary changes await the turn of the year and require the imminence of Old Sol and his fiery rays to kindle their resolve. This is probably because man's energies are taxed to keep merely what he *has* secure against the long season of inclemency without borrowing trouble elsewhere. So the fervid radical merely stacks his arms and does not surrender to his traditional foes, conformity and conservatism. He may read Karl Marx and the Appeal to Reason this winter, but the storm windows must go on first!

My wife's kitchen economy brings me the final blessing of the harvest term, and adds something by the way besides vitamins to my supply of wealth and welfare. Throughout the more abundant seasons she has been culling, cooking, and canning, and now I have brought up the pumpkins for pie stock, the fall pippins for making apple butter, and the purple Concords to give us jam and juice.

What a waste would have ensued after all my enthusiastic culture had she not wielded the skimmer and the wooden spoon! What an aching void for our family this winter had she preferred Eleanor Glyn to Fanny Farmer!

Yet the infinite meaning in this bustling pre-occupation of hers lies not entirely in the spicy aroma and the mouth-watering edibles whose enjoyment must be deferred. I have noticed that the aim of her art is to select the very best, to cook it well, and to seal it sweet. Selection, preparation, and preservation—these three elements of success in fall canning—I have taken safely to heart.

They say good intentions make great *paving* materials in certain nether regions. But I say that good intentions make splendid *canning* materials, and if the selfsame reasonable precautions and foresight be applied to them as go to the preservation of food, we shall have no trace of mental ptomaine!

AND so I know of no better way to end that to forbear from quoting autumnal poetry of my own or somebody else's manufacture. The last drop has been squeezed from one of the most abundant growing seasons known to the oldest inhabitant, and if we cannot preserve and conserve some of this bottled sunshine to last us during the long and trying weeks of red noses and boiled dinners, it is our own funeral.

The Indian prophet who spent the summer selling fakes to foolish tourists points now to the rich fur of the muskrat and the thick bark on the hickory and advises us to order a few more blankets. That is perhaps the meanest trick which our Indian does to us, and we feel like voting to have his name removed from the title of this pleasant interval.

But I shall buy a snow shovel and a few new books, take the ice card out of the window, and dive right out unafraid into the first November blizzard. In the meantime I shall enjoy, as I always do, every day of Indian Summer.

The same to you!

A Few Whinnies

RESTAURANT SLANG

"Scrambled eggs," ordered a customer in a city market restaurant.

"Milk toast," murmured his companion, who was not feeling well.

"Scramble two and a graveyard stew," sang the waitress with the titian hair.

"Here," corrected the second man, "I want milk toast."

"You'll get it buddy," replied the girl. "That's what they call milk toast in Chicago where I was working."

The two customers held a conference and decided to "put one over" on the "fresh young thing" from Chicago. The first one wanted a glass of milk and the second one a cup of black coffee.

When the girl appeared to put a "set up" of the restaurant artillery in front of the men, the second man gave the following order:

"A bottle of lacteal fluid for my friend and a scuttle of Java with no sea foam for me."

"Chalk one and a dipper of ink," shouted the girl. She didn't even smile.—*Typo Graphic.*

A Los Angeles patrolman had brought in a negro woman somewhat the worse for wear, and the desk sergeant, with his very best scowl, roared:

"Liza, you've been brought in for intoxication."

"Dat's fine," beamed Liza. "Boy, you can start right now!".

OMIT THE MIDDLEMAN

A colored man went to his pastor and handed him a letter to the Lord, which ran: "Please send dis poor darkey $50 right away." The pastor, a kindhearted man, called together several of his friends and said: "This poor fellow has so much faith in the Lord that he expects Him to send the $50 right away. We shouldn't let him be disappointed. Let's make a collection for him." This was done and $42 was contributed, which sum was sent to the ingenious petitioner.

Next day the colored man handed the parson another letter. This one ran: "Dear Lord, de nex' time You send dis darkey money, don't send it through no parson—send it to me direct."—*The Enamelist.*

Slicker: "Nice corn crop you have there."

Native: "Yeh, about thirty-five gallons to the acre."—*Carnegie Tech Puppet.*

Mary had a little dress,
  A dainty bit and airy;
It didn't show the dirt a bit,
  But, gosh! how it showed Mary!
—*Oral Hygiene.*

Voice on the Telephone—"My son will not be able to come to school this afternoon; he has a cold."

Teacher—"Very well, sir. Who is speaking?"

Voice—"My father, sir."

Better Crops with PLANT FOOD

Nov. '28 10 Cents

Thanksgiving

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
Editorial Offices: 19 West 44th Street, New York

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Agricultural and Scientific Bureau
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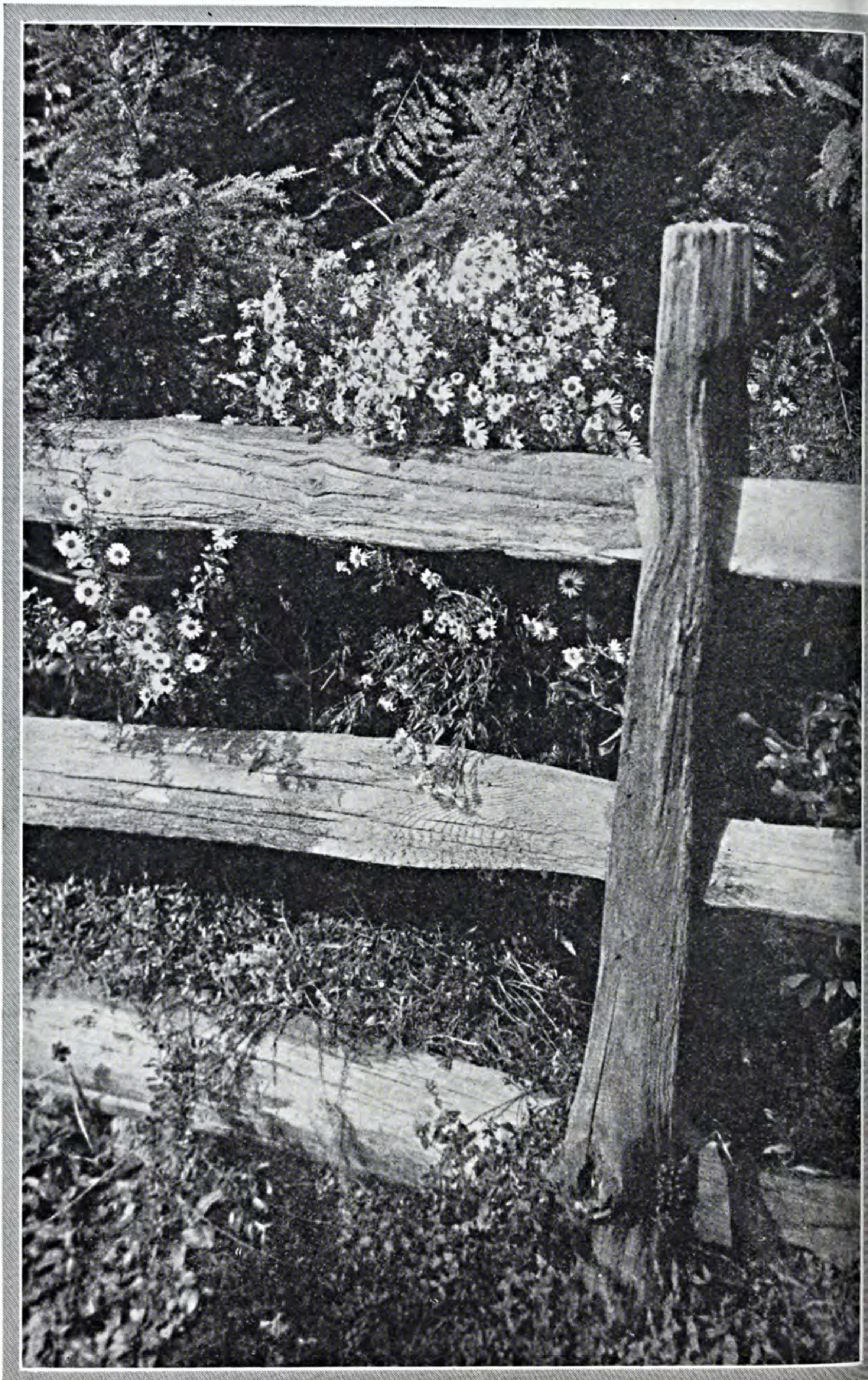

"As tall as the wild asters,
So deep will be the winter snow."

Better Crops with Plant Food

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Vol. XI NEW YORK, NOVEMBER, 1928 No. 5

Do you celebrate Thanksgiving by deliberately overeating?

Victuals

By Jeff McDermid

VICTUALS have fascinated me ever since I can remember, and probably I had a hankering for them a long time before that. My well-known penchant for regularity and capacity originated in my bib days in the high chair. Sustenance has been a flaming passion with me from my youth. By the way, youth is indeed a glorious period because somebody else pays the grocery bills!

When we reckon our family expense accounts these days, we may decry certain youthful whims that run into money, but far be it from us to deplore abundant appetites and normal metabolism. When we start complaining about the rapid depletion of the post toasties and the animal crackers, let us call to mind the way we used to reach the bottom of the sauerkraut barrel and empty the pancake batter bowl back in the days of Grover Cleveland, free trade, and fried hominy!

A food provider and a food cooker in the kitchen is as important to America as a food administrator in the White House. Making America safe for the vitamins is more serious than the Monroe Doctrine.

When the sultry summer gives way to winter and our jaded appetites rise higher with every falling leaf, we usher in the season of bilious attacks by observing Thanksgiving.

At Thanksgiving we loosen our belts and overeat deliberately just to celebrate the fact that we are not obliged to starve. It also puts us in training to withstand the "eat more" campaigns of the millers, butchers, orange growers, and cranberry merchants without counting either cash or calories.

Producers who argue that the national tendency to boyish waists and slender shanks piles up the awful agricultural surplus beyond hope of economists or legislators should pause to consider something vital. The constant campaigns of competition by those who would have us nibble here and gnaw there at everything eatable have worn us thin through *diversified consumption.*

I know from experience, for I have tried to be patriotic and considerate of the terrible situation of the producer, and I have carried home kumquats and tangerines, pomegranates and pickled pigs' feet, cottage cheese and Bulgaricus milk. I have eagerly scanned the pages of national magazines, eschewing spearmint and all candies, for the purpose of lending my best efforts at national farm relief. If your food business has not revived, it must be because you failed to attract me by well placed contact advertising. It is not too late yet, for my dietary budget still has room for more than my stomach. But if Heinz or Squire Dingee adds one more pickle to the family tree, I am undone!

NOW in all this I verily believe that I have done more for farm relief than some of my bucolic neighbors who massage bovine udders for their daily bread and milk. Knowing that I am short on fat and they are shy on protein, the vicarious friends of mine who till the soil so assiduously have spread their crusts with lard, sold me the cream, and kept the skim milk for their children. But enough of this for the nonce!

Contrary to popular notion, Fann Farmer, Doc McCollum, Benarr Mc Fadden, and Doc Wiley did not orig nate victuals. "Victuals," accordin to my handy volume on "English I Spite of Ourselves," is considered t be "colloquial and dialectic." How ever, in spite of food fads and linguis tic propensities, I shall stick to th same word that Jeremiah uses i Chapter Fifty-four, Verse Seventeer because anything that was digestibl in the days of King James' version de serves no better word to describe it

IF you have not mislaid it, look i your Bible at the Twenty-nint and Thirtieth Chapters of Genesis which is the book that follows righ after the family record your mothe kept in the fly-leaf. From the wordin in those memorable verses we gain a idea that food was one of the firs things to be considered in plannin the universe. It took only six days an twenty-eight verses to reach it.

From thence onward in tracing th march of Israel from the plains o Zoar into Egypt and thence to Ho boken and Jersey City, it is one lon riot of victuals, interspersed wit feast and famine and tempered wit goat cheese, unleavened bread an kosher meat. Fruit brought back b the scouts led the folks into th Promised Land. Solomon lived lon on the earth because he had so man wives to keep him in soup and wel supplied with stew. The whole stor of Joseph and his brethren is an epi of eats. And even before all that occurred, the fall of Adam came throug his appetite for apples.

Powerful as they are in storied history, the careers of the Assyrians, Attila the Hun, Tiglath Pileser, Alexander the Great, Haroun al Rascid, an John L. Sullivan would have been o little moment in the absence of th elixir of life that lies in the larder

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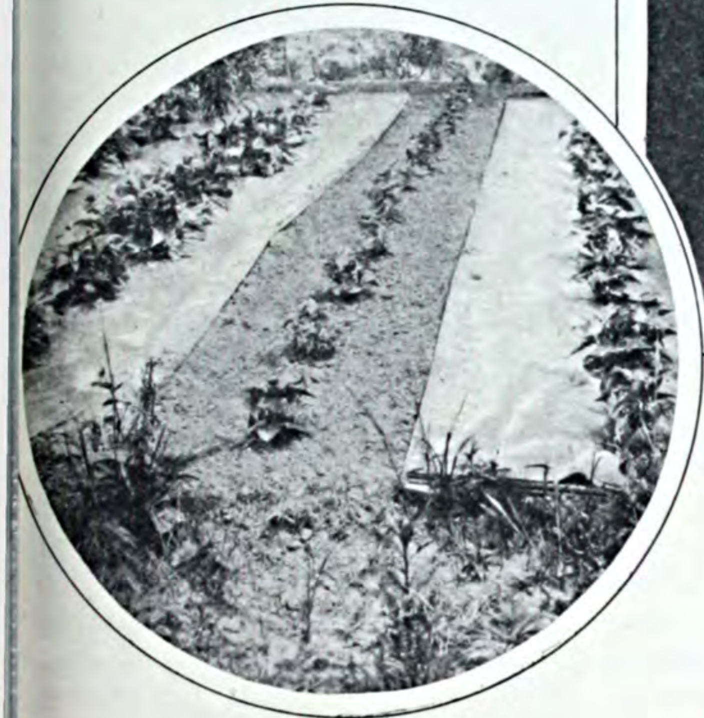
Paper Money

By L. S Richardson

U. S. Department of Agriculture



Dr. L. H. Flint, Bureau of Plant Industry, U. S. D. A.

Left: Green beans mulched and unmulched.

"PAPER money" can now be made in the backyard garden and on
ıe farm as well as in Uncle Sam's
rinting and engraving plant in the
Iation's capital. And it is no crime to
ıake it!

Rather it would seem to be criminal
egligence on the part of modern agri-
ulturists to overlook the opportunities
f making money from paper the new
ay. The accepted method is by the
se of an impervious, black asphalt-
oated paper for mulching various gar-
en and field crops.

Taking a tip from the pineapple
armers of Hawaii who use miles of
ıulching paper between the long rows
f plants, thereby increasing the yield of the fruit by 30 per cent or more and eliminating much of the usual weeding in their fields, Dr. L. H. Flint of the United States Department of Agriculture has been conducting experiments with paper mulch to determine its effects on numerous different crops grown in the United States.

Paper mulch has proved so effective in pineapple culture that the practice is now an acknowledged asset, and more than 90 per cent of the Hawaiian pineapples are grown under paper. The industry in the past year paid in the neighborhood of $500,000 for mulching paper—an impressive testimony to its usefulness and profitableness, says Doctor Flint.

Since the practice first became of economic importance in Hawaii five years ago, experiments have been conducted in widely separated regions of the world with the result that the paper has proved effective in stimulating plant growth and suppressing weed growth under varying conditions of soil and climate. Doctor Flint has completed four years' tests with numerous crops on the Department's proving grounds at Arlington, Va., and concludes that the paper mulch can be expected to give a definite and appreciable increase in yield of many different crops. Furthermore, he says, it appears quite rational to expect an economic future for the mulch in growing certain types of plants in certain localities. One of the most promising ways in which the practice may be used with profit is in the small home garden.

Grew Many Crops

In most of his trials Doctor Flint used an asphalt-coated paper that was impervious to water and of the strength of the pineapple paper. Such a paper is made to last through the several years of the pineapple plantation and is much heavier than would be needed for one season's use. It is possible, he believes, that a cheaper paper may be made which will be satisfactory for small gardens and truck farms.

Using the black, asphalt-coated, impervious paper, cut into strips 18 inches wide, Doctor Flint grew such crops as potatoes, beans, carrots, sweet corn, tomatoes, cabbage, turnips, peanuts, beets, and celery. The seeds or plants were put along the edge of a strip of paper laid across the test plot, the next strip of paper being laid down to allow about an inch of uncovered soil between strips for the plants. Strip after strip was laid until the entire area was covered and the crops planted in rows 18 inches apart. The paper was held down by placing sticks or stones on it, or in some cases with long wire staples.

In 33 trials with 12 different crops grown more than one season, the mulched plots showed an increase in yield over the unmulched check plots. Of 14 crops tested but one season, 12 showed a favorable response to the mulch. In fact, in only two instances in all of these trials was an unfavor response noted—once in a late plant of field corn in 1924 and again i planting of peanuts in 1927. Sul quent tests with corn proved favora and the failure with peanuts has b attributed to the lack of enough sp between the paper strips to permi satisfactory soil coverage for the veloping fruits.

While most crops have been stir lated by the mulch, different cr showed a difference in the nature of response. With such crops as lett or cucumbers germination was haste on the mulched areas to such an ext that plants were very noticeable l before any had appeared on the mulched plots. Furthermore, on c tain soils where the crust was hard mulched areas showed an increase number of germinating plants due the moist condition of the soil un the paper. With other crops, such beets and swiss chard, when the was relatively fertile the unmulc plants often caught up with the m ched plants by the end of the seas in other cases the same plants gro on a poor soil without mulch never tained the vegetative developm reached by the mulched plants.

Early maturity is a desired feature some instances particularly where it advantageous to reach the market fore the regular run of crops appe Mulched sweet corn plants in th trials have reached the peak of yield about 10 days earlier than u mulched plants. Potatoes in these te flowered from 7 to 18 days earlier mulched plots than on the check pl

Another promising feature of mulching practice is in the possibil of growing certain crops far north their accustomed place of growth. cooperation with Doctor Flint, a V mont farmer grew sweet potatoes un paper that compared favorably w tubers produced in their normal habit On the other hand the tubers gro alongside the mulched area were sm irregular in shape, and generally ur

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MICHIGAN

Experiment Station

By A. J. Patch

Agricultural Editor, Michigan State College

THE rapidity with which knowledge in the field of scientific agriculture has been attained at the experiment station of the Michigan State College can be judged by the outlines of experiments referred to its first director and by reports on these experiments found in the station reports made during the early years of the station.

The experiment station was organized February 26, 1888. While awaiting funds to finance experimental work, Edwin Willits, president of the college who had been made director of the station, requested the members of his staff to submit outlines of the experiments which they wished to conduct. His staff members were R. C. Kedzie, chemist; A. J. Cook, zoologist; W. J. Beal, botanist; Samuel Johnson, agriculturist; L. H. Bailey, horticulturist; and Henry Reynolds, secretary-treasurer.

In presenting his outline of experiments, Doctor Kedzie stated his desire, "to conduct some analyses of ensilage corn at the various stages of maturity, to test its value as a food for animals; also to continue experiments relating to inert nitrogen; also research as to the effect of tile draining on rainfall and drought."

The Agricultural Building, Michigan State College.

The station entomologist planned to "work out the full life history of noxious insects, now known, but imperfectly understood; and to experiment with insecticides, and methods to prevent insect destruction."

Dr. W. J. Beal erected a lightning rod to draw the thunderbolts of the unbelievers when, in his outline of contemplated experimental work, he suggested reforestation projects in a State which then echoed to the crash of falling trees and the shriek of sawmills.

The list of the station agriculturist suggested "field experiments embracing different methods of preparing soil for crops; the implements best adapted to the work; results from different amounts of seed; results from different methods of cultivation; and testing of various fertilizers with different methods and times of application."

The importance of the horse to the farmers in 1888 is intimated by the suggestion of the station veterinarian that he "experiment with horses afflicted with heaves; and to study the 'germ theory' of disease."

Liberty Hyde Bailey, horticulturist, submitted a list of experiments which were the foundation for the work of a lifetime, although most of this work has been performed in New York where he took up his duties later in the year.

The First Reports

In his report of work done during the first year at the Michigan station, Dr. R. C. Kedzie wrote, "the sampling and analyzing of commercial fertilizers has been systematically carried forward by this department. Most of the manufacturers cheerfully comply with the law, and protect their agents by paying promptly the fee necessary for a permit to sell."

The list of fertilizers given shows that the value of brand names was well understood in 1888. Celery Grower, Garden Vegetable Compound, Challenge Corn Grower, and World of Good Superphosphate were leading brands at that time.

The station entomologist reported, "during the past year, and to a less extent for two years, I have noticed many potatoes grown on low land that were so scabby that one could with difficulty place his finger on the potato without touching one of these rough excrescences. In many cases the potatoes were badly bored by wireworms, grubs of elater beetles. In some the mole cricket had burrowed. I think that Prof. Arthur has shown that this scab is not due to fungus attack. Mr. Carman thinks he knows that in some cases myriapods, or the so-called thousand-legged worms, have caused this scab. I am just as sure that I know of cases where potatoes were quite scabby, and where the most careful examination could find no myriapods at all. Another summer I shall take great pains to learn what is the truth in the matter. If by planting on soil free from insects we can avoid scab, it will be a matter of great importance."

Oscar Clute became director of the station in 1889 and acted in that capacity until Lewis G. Gorton succeeded to the position in 1894. The station came under the direction of Clinton D. Smith in 1895, and he directed its policies until 1908. Robert Sidney Shaw took charge of the station then and continued as station director until 1928, when upon his election to the presidency of Michigan State College, Joseph F. Cox became dean of agriculture and Victor R. Gardner was chosen director of the experiment station.

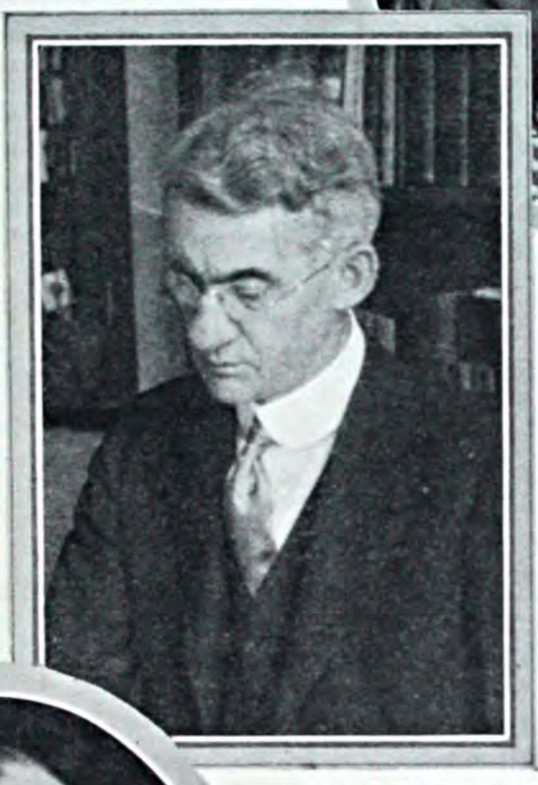
The work of the experiment station is now so extensive that the correlation of its activities and the direction of its policies are a full-size burden. The last list of the station staff contains the names of 108 members. Experimental work is carried on in a great many projects due to the varied list of farm crop and livestock interests that are of importance in Michigan.

Research workers in the botanical section of the experiment station are called upon continuously to study plant diseases and to recommend means of disease prevention or of lessening the damage done by plant diseases. The Wolverine State produces a line of crops which not only includes those produced in most other sections, but, also, such unusual ones as chicory, ginseng, rhubarb, celery, peppermint, and Christmas trees. As in a human family of unusual size, some of the individuals of Michigan's crop family are often attacked by disease and the plant pathologists strive to be able to prescribe a practical treatment.

Recent studies by members of the department have aided materially in the treatment of diseases of the raspberry, sugar beets, beans, potatoes, cel-ry, and vegetables. One of the research men found that certain diseases of the raspberry are spread by aphids which feed upon diseased plants and then move on to healthy ones. Two common diseases of vegetables which have been stored or shipped were proved to be caused by lack of oxygen, and the troubles can be prevented by providing adequate ventilation. A disease resistant celery has been selected which makes it possible for growers to produce a crop in areas where Fusarium has made ordinary varieties unprofitable.

Soils research men in many experiment stations have been aided in their investigational work by the discoveries of the hydrometer method of determining the colloidal or clay content in a soil and the alcohol method of determining soil moisture content. Both of these methods were worked out by

Victor R. Gardner, Director of the Michigan Experiment Station.



Robert Sidney Shaw, President of Michigan State College.

Joseph F. Cox, Dean of Agriculture, Michigan State College.

one of the Michigan station staff. Methods of determining by simple field tests whether or not a soil is acid and also whether a soil is deficient in available phosphates have also been worked out by a member of the soils department.

The test for soil acidity is used by extension men in many states and the materials are manufactured commercially; the test for phosphorus was perfected recently and is being checked thoroughly before being distributed for general use. Both of the tests are simple enough so that they can be worked by the average individual and the needed equipment can be carried in a pocket.

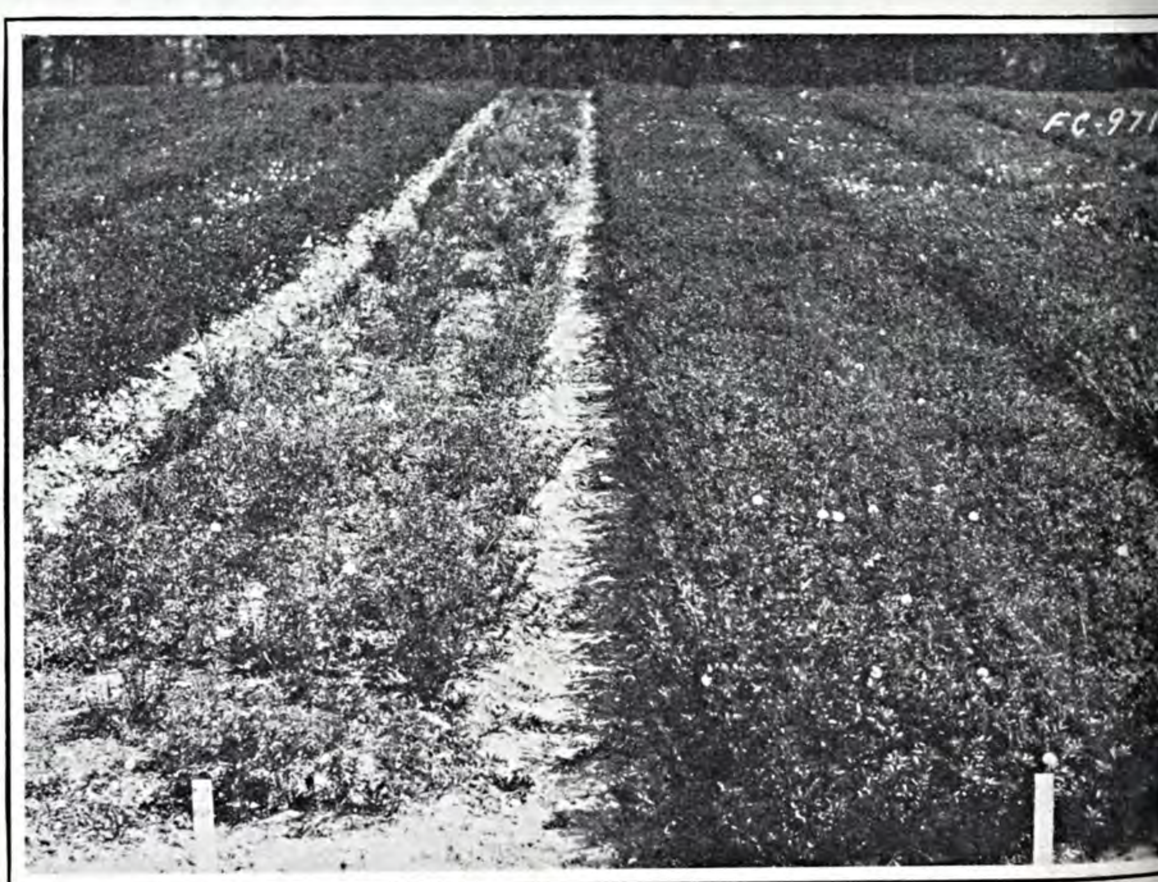
Recent studies by members of the department have shown that the common conception of why soils heave during freezing weather is wrong. The expansion of water during freezing is not responsible for the heaving of soil. The dislocation of the surface soil is caused by the formation of ice crystals in the soil and the subsequent growth of these crystals by the attraction of water from deeper in the soil. The crystals force the surface soil layer up as they grow in size. A well-drained soil will heave less than one saturated with water.

The research staff has also found that there is a relation between the amount of phosphorus contained in the juice pressed from a plant and the amount of available phosphorus present in the soil upon which the plant grew. Comparatively large amounts of phosphorus are collected in the cell sap of plants that are grown on soils where there has been a recent application of a fertilizer that contained phosphates.

Another problem under investigation is the practicability of the row method of applying lime to acid soils. The ordinary method of applying lime is to spread the material broadcast, which necessitates the use of large quantities per acre. The studies carried on by the department for sever years indicate that equal results ca be obtained by the use of a compara tively small amount of lime applie in the rows.

The study of the uses, methods c application, and the proper analyses c fertilizers for use on certain crops an in different sections of the State complicated by the fact that there ar more than 30 common soil typ which range from blow sand to heav clay. Fertilizer recommendations ca not be made on a basis of experimen station plat trials without checkin the results in field trials on varyin soil types.

To supplement the fertilizer tria made on the station plots, tests ar made with various crops on many so types in different parts of the Stat Some of these trials are placed o farms where the owner can be de pended upon for full cooperation, an others are placed on sub-station prop erty which belongs to the College. I either case, the trials are under th immediate supervision of some mem ber of the soils department.



Alfalfa varietal tests for winter hardiness. The variety on the left shows winter-killing.

Wheat varietal tests, Michigan Agricultural Experiment Station.

One of the most interesting of the series of fertilizer trials has been conducted on the Cass County Farm, near Cassopolis. This farm 12 years ago had been cropped until it was impossible to get a profitable yield of any grain crop or to get a satisfactory stand of clover. The College soils department was asked for advice on building the soil up to a productive state, and as the soil on the farm was a type of sand common in Michigan, the department began a series of field trials which could be used as a basis for recommendations for the use of fertilizers on similar types of soil.

The soil on this farm was so impoverished that lime, fertilizers, and green manure crops have all been used in the soil improvement campaign. The average yield of wheat and rye on the land where all three means of soil improvement have been used has been 24.5 bushels per acre. Where the soil has received no treatment, the yield has been 7.5 bushels. During the last five-year period, the yields on the plots under treatment have been 32 bushels per acre, and, where no treatment has been given, the yield has been 6.7 bushels.

The value of the increased yields of crops on the treated fields has been \$65 per acre during the 12-year period. All expenses of applying fertilizers, lime, and green manure crops were deducted from the returns from the crops in computing the profit per acre.

In other field trials on the Hillsdale type of soil, an application of 200 pounds of 2-16-2 increased barley yields 15.4 bushels per acre. A similar application on oats gave an increased yield of 13.2 bushels. On potatoes, 500 pounds per acre of the same fertilizer increased the yield from 97 bushels on the check plot to 147.4 bushels on the fertilized portion of the field.

In a cooperative field test conducted on the farm of Mr. W. C. Armstrong, Hillsdale, Mr. Armstrong reports that the use of 100 pounds of ammonium sulphate on permanent pastures increased the worth of the pasture four to five dollars per acre. Superphosphate, used at the rate of 250 pounds per acre, increased wheat yields eight bushels per acre, and the wheat on the fertilized area weighed 63 pounds per bushel while that on untreated soil weighed 58 pounds. The profit per acre from the use of fertilizers was computed by Mr. Armstrong to be $16.70.

For many years, the soils department at Michigan State College has advocated the use of high grade fertilizers, and the latest available figures prepared by the State analyst show that only 17 per cent of the fertilizers used in Michigan during that year were low grade. Figures from other sources in the State show that the amount of fertilizer used in Michigan steadily increases each year.

Valuable Work on Muck

In addition to the many types of upland soil in Michigan, there are millions of acres of muck in the State, and the muck shows a great deal of variation. The Michigan station has done a great deal of work to determine the proper fertilizers to use on muck and to find the best means of protecting crops on this soil from wind-injury.

Most of the Michigan celery, mint, and onions are grown on muck, but the use of this soil is not restricted to these special crops. Most of the root and forage crops produce good yields on muck if a proper system of fertilization is followed. Sub-stations for muck soil experiments are maintained in many of the counties which have a fair area of this soil.

Test plots in Allegan county show that the addition of 300 pounds of superphosphate increased the yields per acre of alfalfa .5 tons; of carrots, 1.2 tons; and potatoes, 3.6 bushels. The increase in yields secured by using 300 pounds of muriate of potash were: alfalfa, 1.3 tons; carrots, 1.2 tons; mangels, 12.9 tons; and potatoes, 44 bushels. When 300 pounds each of superphosphate and potash were used, the potato yield was increased 121 bushels per acre above the check plots which were not fertilized.

In Clinton county, an application of 750 pounds of potash on onions increased the yield of marketable onions 192 bushels per acre, and decreased the percentage of immature onions 17.8 per cent. An application of 750 pounds per acre each of potash and superphosphate increased the onion yield 512 bushels per acre and decreased the percentage of immature onions 34.1 per cent as compared with unfertilized areas.

In addition to the increased yields obtained from fertilizing crops on muck land, the hastening of maturity of the crop is very important. Muck soils are especially liable to be visited by early frosts in Michigan. Fertilizer plots were placed in a field of late corn planted on sod, a part of which had been manured. The yield of good corn was increased 36.7 bushels per acre on the plots which received an application of potash at the rate of 250 pounds to the acre.

Need Windbreakers

High winds cause severe damage to crops on muck soil where no precautions are taken to protect the soil from wind action. The liability of wind-injury increases as the muck becomes decomposed into small particles after years of cultivation. The Michigan station has found that muck land crops can be protected from damage by the use of windbreaks obtained by planting rye in strips through the fields. The rye should be planted in strips at right angles to the path of the prevailing winds, the strips should be about 50 feet apart, and should contain five or six drill rows.

Sweet clover planted on the ditch banks gives protection to crops a considerable distance from the bank on the leeward side, and corn planted in single rows offers a measure of protec-

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Left: The difference in yield obtained in testing the two methods of applying fertilizer.

The difference in growth.

The RIGHT Way

By H. H. Gardner

CHARLES GRAHAM of Howard county, Indiana, found 51.8 bushels to be the difference in yield between two methods of applying fertilizer for corn on his farm. He is thoroughly convinced that there is a right and a wrong way to apply fertilizer.

After planting four acres of corn in part of the field in which the fertilizer had been broadcast with a grain drill, he was advised to apply the fertilizer in the hill with a corn planter. The same quantity, 100 pounds of 0-20-20 per acre, was used on the remaining 16 acres. Otherwise the field received the same cultural treatment.

The soil is a black clay loam very deficient in potash and characteristic of a large acreage in north central Indiana. The hill fertilized corn started quicker and from the very first grew more rapidly. In the part of the field receiving the fertilizer broadcast, the weeds outgrew the corn and were more difficult to control than where the corn received the fertilizer in the hill. Early in the season on the broadcast area, the plants showed typical symptoms of potash starvation. They grew slowly, the leaves were marginally fired and heavy deposits of iron were found in the nodal tissues. On July 26, the plants in the hill fertilized section were three feet taller and much greener than the plants in the broadcast rows. There never was any question during the season as to the value of the hill fertilization.

The real story, however, was told when the corn was harvested. The

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Sixty-two countries are members of the International Institute of Agriculture at Rome, which gathers and disseminates official reports on world agriculture.

Agriculture Today

I. Economics *By Frank George*

Note: *The chiefs of bureaus of the United States Department of Agriculture were asked what they regard as the outstanding current agricultural problems with which their bureaus are dealing. Their replies, together with a statement as to what is being done toward the solution of these problems are covered in this series of articles.*

WHAT are the forces that affect the economic and social welfare of farmers, and how can farmers be enabled best to shape those forces?

These are among the outstanding problems with which the Bureau of Agricultural Economics is now dealing. There are factors, to be sure, over which farmers have no control; they cannot control the weather nor the buying power of consumers, but they can control acreage adjustments and the merchandising of their products to meet market requirements.

"A major difficulty with agriculture heretofore," according to Nils A. Olsen, recently appointed chief of the bureau, "has been the tendency to organize the farm business on the basis of existing conditions instead of on the basis of what conditions are likely to be at marketing time. Farmers almost invariably have gone into heavy production under the influence of prevailing prices and created price-breaking surpluses. We must organize on the basis of future prospects if the serious ups and downs of agriculture are to be smoothed out to yield every year a satisfactory financial return and high standard of farm living."

To look into the future and determine the farmers' best course of action calls for the highest type of economic research. Fundamental has been the demonstration that prices of agricultural products are not made by chance nor by the arbitrary decisions of any one man or group of men. They are the result of the interplay of the many economic elements that make up supply and demand; elements which can be ascertained and evaluated accurately.

The first step in this type of research is to find out what are the principal factors that determine prices. Extensive research has been made by the bureau with specific commodities, including cotton, hogs, corn, apples, lambs, and other products. In each case the results of the analysis are tested by reconstructing prices over a series of years. This shows that while prices may get out of line with fundamental supply and demand conditions, they will remain out of line but a short time and will eventually return to the level determined by fundamental supply and demand conditions.

The supply part of the equation is made up of both domestic and foreign supply, inasmuch as agriculture is now an international business with American producers competing with foreign producers in world markets. To measure the supply calls for an efficient crop reporting system both here and abroad. The American crop reporting system has been in existence nearly 75 years, and has reached a high degree of accuracy; its statistical methods are being continually refined through research to make for maximum accuracy.

Difficulty has been experienced heretofore in securing accurate data of foreign crop production in time to be of value to American producers in measuring the competition which may be expected in world markets. In many cases estimates are not made until the crops are harvested. In the last few years, however, the Bureau of Agricultural Economics has been developing methods of forecasting foreign production. Climatic data and condition reports are analyzed to provide a basis for forecasting wheat crops in advance of the Government estimates in India, Italy, France, Germany, Argentina, and Australia. Thus, the Government estimates of the Argentine wheat crop have been anticipated by one month, the calculated forecasts being very close to the later official estimates. The outturn of crops in France and Germany also have been estimated fairly accurately several months in advance of the Government estimates.

On the demand side there are a multitude of factors which include chiefly the ability and willingness of consumers to buy. Close watch is kept

Above: Foreign delegates to a Washington conference on international cotton standards.

Left: Country banks bulletin the Federal market reports received by radio.

on general economic conditions both here and abroad and on the numerous factors which contribute to the general economic welfare. The state of industrial activity is continually measured and appraised in its effect on the demand for agricultural products. Consumer demand surveys are made to determine the preferences of consumers for the various products both with regard to quantity and quality.

Knowing what are the conditions as to demand, and knowing the best production program which will conserve the interests of American farmers, the bureau is in position to issue its so-called outlook reports which in reality are recommendations to farmers what acreages in the aggregate, of specified crops, it is advisable to plant. Similarly, recommendations are made with regard to livestock production. These recommendations are framed with a view to the ability of farmers to adjust acreages of alternate crops. Farmers may be told, for example, that an increase of ten per cent in wheat acreage, as indicated by farmers' own reports of intentions to plant, would, if average yields are secured, result in lower prices, whereas flax acreage may be increased profitably.

Prior to the planting season farmers are asked by the bureau to indicate what acreages they are planning to plant to various crops. The returns from this survey are considered by the economists in conjunction with all available economic data on the basis of which they can indicate the advisability or inadvisability of farmers' carrying out their intended plans. Evidence is accumulating that farmers are acting on this advice contained in the outlook reports issued by the bureau and by the extension services in many states. Better adjustment of acreages and livestock production is being manifested, a situation which has played no small part in the economic improvement of agriculture in recent years.

Knowing the relative value of the numerous factors that influence farmers' economic welfare, the bureau ha established a program of emphas upon each of them to enable farme to secure the maximum return fo their efforts. There is, for exampl the bureau's whole standardizatio program under which standard grade have been established for practicall all the important farm products. Quality of product having an importan influence on price, farmers are urge constantly to produce quality and t market quality. They are being tol to insist on payment on the quality basis instead of flat price basis.

Similarly, the market news servic which, thanks to the radio in recen years, is broadcast from one end of th land to the other, gives farmers information upon which they can know the day by day supply and demand situation in the domestic and foreign markets, and thus be in position to determine their best immediate course of marketing action. This service enables them to determine when and where to sell to best advantage, and no buyer, so minded, nowadays can misstate the marketing situation, and get away with it for long at a time.

Producers, shippers, and cooperative organizations are using Federal and State market news services to effect the most desirable distribution. Market gluts are being prevented by regulating shipments to the various markets, and by more diversified distribution, instead of concentrating upon a few markets. Recently there have been developed "clearing houses" in various areas, notably in the Pacific Coast fruit regions, in which producers and shippers meet to study the market situation and arrange for the best distribution of their products.

The individual farmer does not expect the bureau to send an expert to analyze his farm business, but he does expect information on problems which are common to large groups of farmers. He wants to determine whether he is combining his land, labor, and capital in such proportion as to give him the maximum return? Is he using the most efficient machinery? What is the credit and loan situation? How measure the returns from labor and investment? What has the bureau learned about the problems of co-operative marketing?

What are the requirements for standard containers? Is it advisable to organize mutual farm insurance companies? What is the status of farm land values? How large an acreage of wheat, corn, flax, hay, and other crops are farmers planning to plant this year? Would it pay to increase livestock herds? What are the prospects for the dairy industry? Should corn be sold or fed? What are farmers planning with regard to hog production? Will the potato crop be too large for normal consumption requirements? And so on *ad infinitum*.

To be able to answer these questions intelligently involves projects from the comparatively simple determination of the dimensions of baskets in the enforcement of the Standard Containers Act to the more complicated multiple-correlations of advanced economics. But they are the type of practical questions which farmers are asking, and the answers to which they must look to their economic research agencies.

One fact produced by the agricultural depression following the war was the lack of adequate information on the economic factors that affect agriculture. Research had been confined largely to investigating the physical processes of marketing. It became apparent that if farmers were to reorganize on a sound basis, all of the economic influences upon agriculture must be studied. There has been assembled a body of data, study of which has gone far in permitting a correct analysis of the reasons for the agricultural depression and the planning of a course of action with the hope of preventing similar depressions in the future.

The big objective of the economists both in Federal and State research agencies is the organization of agriculture, so far as is within the power of farmers to do so, with a view to eliminating the violent fluctuations which have disrupted agriculture in the past and to make for uninterrupted financial and social satisfaction one year with another. This calls for facts regarding all phases of the farm business, and a thorough understanding of their significance.

Federal and state economists preparing outlook reports at Washington.

Spinach for Canning

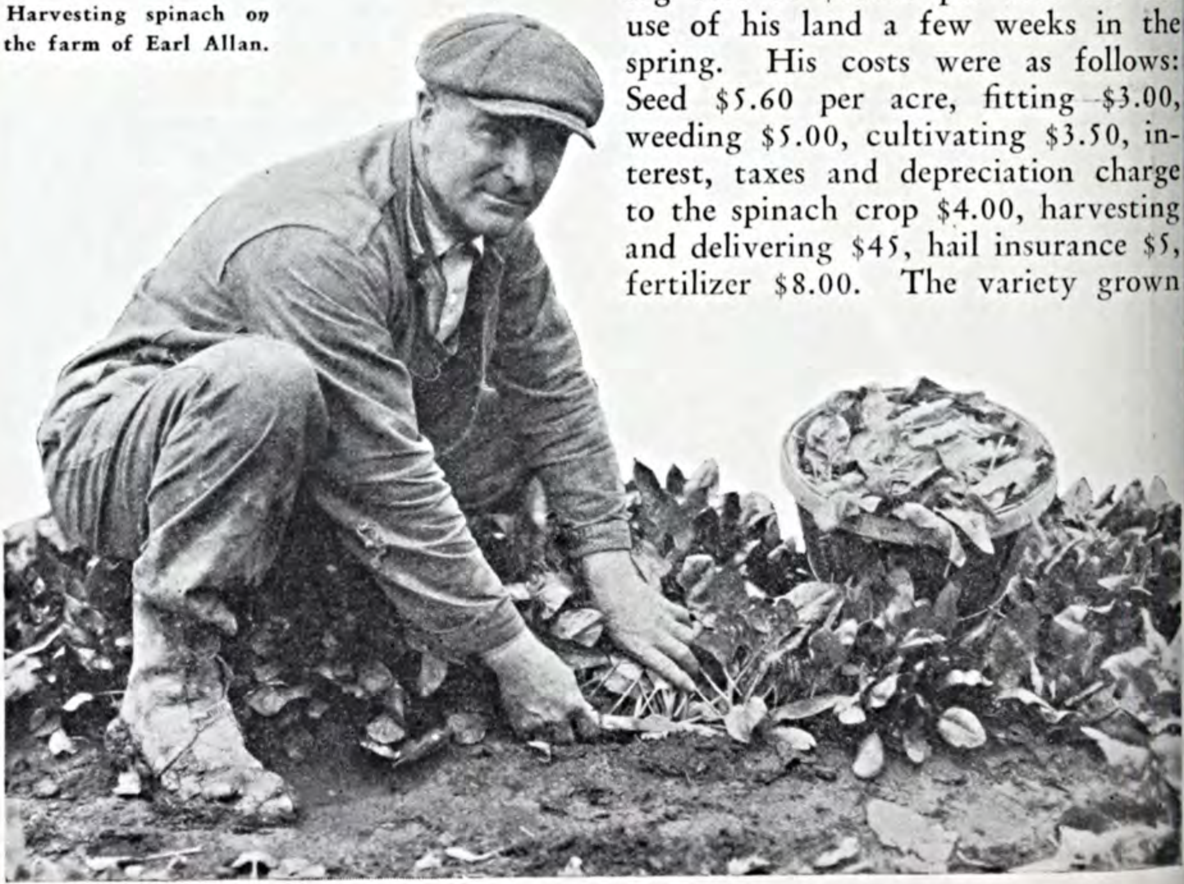
By M. D. Butler

County Agent, Marion, Indiana

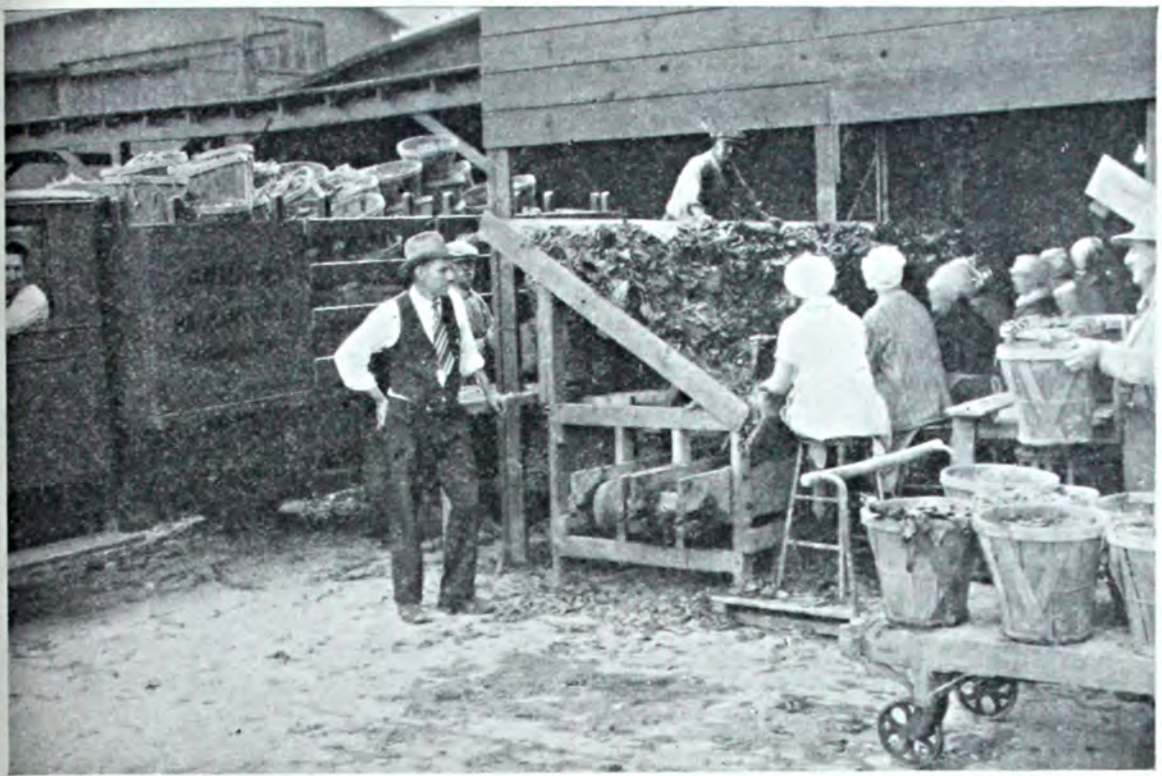
GROWING spinach as a canning factory crop has real possibilities in certain places in Indiana, if the experience of a group of growers in southern Grant county is a fair indication. These farmers started three years ago following the instructions and help of the field department of the Snider Preserving Company, which in the past has been buying large acreages of this crop in New York. The company is now developing the crop in other parts of the country where insect pests are less troublesome or not yet introduced.

The business appeared at first to have little appeal to the busy general farmer. However during the last three seasons information on date of planting, fertilizer treatments, soil conditions, etc., has shown that in a great many cases the crop has a definite place in a farming scheme. This year in one community the company paid farmers more than $25,000 for spinach where three years ago they did not grow the crop commercially. Each farmer followed his crop with beets, sweet corn, alfalfa, or soybeans.

The most accurate and complete data on the crop are from the farm of Earl Allan who grew seven acres this year. Mr. Allan's average yield was six tons per acre making a gross return of $140 per acre with a growing cost of $83.10 per acre for the use of his land a few weeks in the spring. His costs were as follows: Seed $5.60 per acre, fitting $3.00, weeding $5.00, cultivating $3.50, interest, taxes and depreciation charge to the spinach crop $4.00, harvesting and delivering $45, hail insurance $5, fertilizer $8.00. The variety grown



Harvesting spinach on the farm of Earl Allan.



Carefully sorting spinach at the canning factory.

by Mr. Allan was King of Denmark. However tests on other farms this season indicate that Prickley Winter will partly take the place of the more common variety.

A unique feature of the devolpment of this acreage is shown in the contest held this year sponsored by the Snider Company. Each grower was entered in the contest and awarded cash prizes on the basis of freedom from weeds and the quality of the crop at harvest time. The judging was done by the county agent and the head field man of the company. The cash prizes were a bonus of 20 per cent for first, 15 per cent for second, and 10 per cent for third. The winners also will receive medals at the annual County Extension banquet. The contest has stimulated interest in the crop and interest in better farming.

Growing spinach commercially has its advantages in the Midwest where a local company can pack the product. Its chief advantage lies in the fact that spinach can be grown and harvested in the spring and the same area used by another crop the same season. It does, of course, seriously affect the fertility program on the farm although following spinach with a legume crop may somewhat overcome this loss.

The most common method of fertilizing the crop in Grant county consists of an application of 500 lbs. per acre of a complete fertilizer high in potash and low in nitrogen. The analysis used most commonly is a 2-8-10. This is applied immediately ahead of planting and is followed by two applications of 100 lbs. of nitrate of soda per acre. The nitrate is applied as side-dressing, the first being made when the crop is about one-third grown and the second about 10 days later.

Indiana has been termed the "State Without Crop Failures" largely because a greater diversity of production is found in Indiana than in other states. For many years a more diversified agriculture has been recommended on every hand, and it is now apparent that commercial spinach production can be made very profitable in certain localities.

Cucumbers on Cut-over

By H. E. Zimmerman

Mt. Morris, Illinois

IT must be admitted that it is a unique thing for a lumber company to go into the pickle business, but that very thing has been done in southern Mississippi. It has proved decidedly remunerative not only to the company but the farmers who raise the pickles for them.

Usually it is a problem to put cut-over timber land to profitable use. In this case the solution has been found in growing cucumbers, the work being placed in the hands of farmers of that section.

The Finkbiner Lumber Company of lower Mississippi has established as a subsidiary the American Pickle and Canning Company with headquarters at Wiggins, Miss. This company operates receiving stations for pickles all over southern Mississippi, from Jackson south to the coast. Last year it bought a quarter of a million bushels of cucumbers from the farmers and paid them in cash more than $300,000. In addition to cucumbers, which are made into pickles at the main plant at Wiggins, the company operates at Hattiesburg, Miss., the most modern canning plant south of the Ohio River. Spinach, beets, stringless beans, and sweet potatoes are bought from the farmers for canning, and new lines are being constantly added.

When this business was started a few years ago, the pickling and canning company had about 200 farmers growing cucumbers and other garden truck for them. Last year there were more than 5,000 farmers engaged in this line of work. Most of them did well and made a good profit on their pickles. The champion pickle grower of Mississippi, and probably of the South, is Bert Cupit of Eddiceton, Miss., who made a net profit of $190.39 on less than an acre. He fertilized this plot well and took good care of it through the growing season and, as a result, won this distinction and also a $50 cash prize. Another farmer made a net profit of $179.80 on an acre and won $35 as a prize. Two others made respectively $176.58 and $169.10, earning prizes of $25 and $15. Others made net profits from $162.53 down to $124.17.

These awards were made from actual records kept by the farmers themselves and witnessed by two disinterested people. The reports were graded on the basis of 75 per cent for yield and net profit and 25 per cent on neatness and completeness of record. There were many others who made a very good showing on growing cucumbers for pickles, but the few given were the best reports received.

The value of a given piece of ground is determined by the worth of that land in production. It therefore can be seen what direct bearing the pickling industry has on the price paid for cut-over land in that section of the country. Field men are out constantly advising and helping the farmers in every possible way. As the pickling company is a subsidiary of the lumber company, owners of large tracts of cut-over land, it does not exploit the farmers for what it can get out of them, but is trying to help them and is interested in the success they make. This kind of enterprise is particularly valuable when it is considered that this cash comes to the farmer in the spring of the year when he normally has very little income.

LIGHTNIN' *done struck* dat Cotton

By J. C. Pridmore

Soil Improvement Committee

Atlanta, Georgia

"LIGHTNIN' done struck dat cotton, boss," the negro farmer said when asked the cause of its condition.

"The 'lightnin' has been pretty bad in this section this year then, hasn't it?" the white men asked.

"Yessir, boss, it sho has," chimed in another negro farmer on the porch of the small cabin.

"Lightnin' or whatever it is dat causes dese dead spots," said the third negro, "has been wusser dis year dan I ever is seen it."

"White folks, dat cotton ain't been lightin' struck if'n some of dese other people do say so. Lightnin' ain't had nothin' to do wid it," said still a fourth colored man, who chimed in with the hope of imparting some exact knowledge concerning the real cause of the spotted conditions throughout that general section of South Carolina in Marlboro and adjacent counties with which he was familiar.

"What then caused the cotton to die in these large areas, some of which are circular, giving the impression that 'lightnin' has been the cause of the damage?" a white man asked.

"Boss, de white folks tell us dat dis is rust and wilt. It is wusser dis time dan its ever been befo'. We's beginning to believe dat the wrong fertilizer or not enough fertilizer of de right kind causes dis trouble. When we used to git kainit and cottonseed meal fertilizer we made fine cotton widout any trouble. Hit didn't have dese yere dead spots in it. De white folks don't give us no fertilizer wid kainit and cottonseed meal no mo', but done gone makin' us use potash in our fertilizer. Dis potash ain't no good! We sho did need some kainit dis year." Thus mused the tenant farmers as they sat upon the porch of the small cabin, describing conditions and giving the cause of these in their own language based upon their beliefs and observations during long-time practices.

The conditions under discussion, as

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The sweet clover at the right received a treatment of commercial fertilizer; that at the left, only lime.

Why Fertilize?

By A. A. Burger

Cedar Falls, Iowa

"WHEN I started in on soil improvement, I was willing to bet my boy that I could beat him growing crops without using any fertilizer by simply practicing a good rotation, including legumes and the liming of soils. I found that it could not be done. Now, it is no longer a question with me of whether I can afford commercial fertilizers, but rather, whether I can afford to do without them. I have found, with some little experience, that commercial plant food increases the yield of my corn from 10 to 15 bushels per acre and also that it has improved the quality."

This statement was made by Mr. Heuck, a farmer in northwestern Iowa, at the annual Farm-and-Home Week conference recently held at the Iowa State College at Ames. Peculiar and important significance attaches to it, for it is a conclusion that was reached after 10 years of practical farm fertilizer experience on some of the good land of the state, representative of the best land of the Corn Belt states. Nor are these the results simply of building up a worn-out soil This was a good farm, even as our best farms go. Heuck was a livestock farmer. He had made good use of his barnyard manure, for he had appreciated fully the value of soil fertility in reducing crop production costs. As nearly as possible he had been in the habit of applying eight tons of manure to the land every two or three years, and in addition to that, he began to use commercial fertilizer.

Mr. Heuck found that good farming, rotations, manure, and limestone, were not enough.

With these he had been in the habit of getting 45 bushels of corn and 32 bushels of oats per acre. But when he made his start with fertilizer, he secured a yield of 65 bushels of corn and 50 bushels of oats per acre. The labor costs in producing these crops remained practically the same. In other words, he had reduced the cost of producing each unit of crop—the important economic factor in our farming operations, for it determines, largely, the net profit of the farm.

I have chosen to present this illustration of the growing belief in the necessity of adding commercial plant food to the soil, because it is typical of thousands of other cases in the state. Subsequent to the World War we did our major experimenting in the use of limestone. A car load of perhaps 40 tons was distributed to 10 or 15 farmers. We saw good results. The practice grew slowly at first, but it took root. Within the short space of 10 years, liming has become a general practice and in the majority of the counties limestone is now being shipped in, not only in car loads, but frequently in train loads through the cooperation of railroad officials.

Now we are turning our attention to the use of fertilizers. It was my privilege recently to pass through Buchanan county and I was amazed to learn from county agent Walters that in this strictly agricultural section over 24 car loads of commercial fertilizer had already been shipped in during 1928. And with what results was fertilizer used here? On the Chas. Mythaler farm superphosphate had increased the crop of oats by 10 bushels per acre. On corn its use increased the yield some, but it hastened the maturity by from seven to ten days. The corn so treated weighed out better, fed better, and kept better in the crib. This spring the story of the untreated portion of the cornfield was told in the unmistakable language of a strip of immature, mouldy, and rotten corn through the center of the crib, for by mistake that corn had gone into this crib last fall.

Did the phosphate pay? Let the corn answer. Unless the untreated

Barren sandy soil treated with limestone, phosphorus, and potash yielded over two tons per acre for the first cutting.

corn—the rotten strip in the crib—is removed it will spoil the entire crib. This year Mythaler ordered three tons of fertilizer. The larger part of this was a 2-12-2, for he has found that on his lighter soil the addition of both nitrogen and potash has paid. And all around him his neighbors, Troy brothers, Julius Cappel, C. E. Turner, Frances Schinka, Jake Arnold, and several others, have had a similar experience. Phosphate they used at first, but they think now that the complete fertilizer pays them best.

Soils Vary

These experiences are typical of other sections of the county. The soil varies all the way from a sandy clay loam to a mixture of sand and peat, and consequently different fertilizer mixtures have been used. On the Chris Emerson farm an 0-8-24 has given good results. The soil here is a sandy peat. Prior to the time that fertilizer was applied grain crops could not be grown. Two hundred pounds of fertilizer were responsible for a 40-bushel yield of sound corn. It is true that such cases are the exception to the general run of farms of the county, but the use of complete fertilizers over the entire county for the average farm has been so good that county agent Walters is recommending a 2-12-4 mixture for general use. This does not mean that the farms are worn out or that the soils here are infertile. That is decidedly not the case. But this does indicate the trend of public opinion with reference to the use of fertilizers.

What do we find when we shift the scene of this inquiry to the state? Figures from demonstration plots show definite and conclusive results favoring the use of some kind of fertilizer, the kind depending, of course, largely upon the nature of the soil. On the other hand the increasing demand on the part of farmers for either simple or complete fertilizers indicates that we are launching out on a major project of soil improvement that seems to be quite general in the Central West. No doubt phosphorus will be used first, and perhaps most extensively. It is in most of our soils the most limiting element, and further than that, our experiments and demonstrations have been conducted primarily with reference to it. Our greatest trouble is that we do not have enough experiments and the result is, as our soil authorities admit, that the use of fertilizers is proceeding much faster than our available information.

"Necessity is the mother of invention." This is literally true when applied to the use of artificial plant food. We are trying to find a way out of the economic depression in which we find ourselves. Unable to get a decent profit at the prices which now obtain, we are attempting to reduce the cost of production per acre or per unit, which ultimately is one of the important items as a measure of the efficiency and permanency of any business. The individual farm is no exception to this rule.

Apply Rule to Crops

As farmers we have applied this rule to our livestock. We tested out the cows and sold the poor producers. But we have not until recently applied it to our farms in this section; if our plants suffered from malnutrition, we simply footed the bills. If we bought a worn-out, low-producing farm, a farm from which perhaps all the crops and grain had been sold for a number of years, we attempted and often did bring it back to profitable production by returning to the land in the shape of barnyard manure the products which it had grown. It can be done, especially if we can buy and feed on our own farm the fertility in grain and feed that somebody else is willing to sell to us. By this process we can wait, if we are so situated financially to do so, until our farm becomes profitable. At the same time our neighbor loses what we gain.

When our land was newer and more

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Which Wheats Are Best?

By C. B. Sherman

U. S. Department of Agriculture

"UNCLE SAM has a mill down in Washington where he produces flour, makes bread, and tells farmer, miller, baker, and consumer how each may get the most for his money invested in wheat, anywhere from the seed to the loaf." So ran a headline in a New York paper in telling of the experimental milling and baking investigations of the Department of Agriculture.

The Department might not make quite such sweeping claims for the work, but it does believe that the results are extremely practical and that their benefits extend back to the farmer, and on through the millers and bakers and other handlers, and to the actual consumers. And it is a fact that if the best uses are made of these results, thousands upon thousands of dollars can be saved all along this route from farmer to housekeeper.

To get just the desired conditions for these studies, the Department of Agriculture equipped its own small experimental mill and a complete testing laboratory used for preliminary testing of samples of wheat and for making practical baking and quality tests of the flour manufactured in the experimental mill. Some of the apparatus in this laboratory was especially developed by the chemists in charge for these milling and baking investigations.

For the Farmers

The phase of the work which is of especial use to the farmers is the determining of the exact relative values of different varieties of wheat. "Before a new variety of wheat is distributed," say the investigators, "some agency should ascertain if it meets the demand of the market, or it will not be desirable either to the farmer or to the miller. It is not enough to introduce a new variety of wheat that yields more than the variety the farmer is growing. The new variety must be of such quality that the farmer will receive a higher total price for his wheat. Therefore, the plant breeder and the market specialist must work together to see that only those varieties are distributed that are at least as good as the varieties now generally grown."

A section of Uncle Sam's experimental mill.

As a result of this getting together of plant breeders and market specialists it has been possible to issue definite recommendations for the discontinuance of the production of certain varieties of poor quality wheat and increasing the production of varieties of good quality. Then, several varieties that were recently introduced or developed by breeding have not been distributed for commercial growing, because these experiments showed them to be undesirable on the whole. On the other hand, the production of several other varieties has been rapidly increased after it was determined by checked experiments that they possessed good milling and bread-making qualities.

Inherent qualities of a variety are found to be basic and are usually the principal factors in the milling and baking value of any sample or lot of wheat. Varietal differences have been found to be more important than effects of season, locality, rainfall, elevation, and soil. So the little experimental mill is of great help to the farmers in determining the best varieties to grow.

For Buyers and Millers

When identification is possible, the determinations are useful to the wheat buyer and miller in selecting and blending wheats to meet particular milling and bread-making requirements.

Tests must be made from many points of view. Milling yield and the color of the flour or bread are significant factors in "milling quality," and there are other considerations such as the "strength" of the flour, and its capacity to absorb water. The result of one kind of test is of practical value only when considered together with the results of the other tests.

Although not in all ways comparable with commercial milling, experimental milling gives results which indicate the relative milling value of the different wheats as definitely as do tests made in a commercial mill. It is a well-known fact, that different commercial mills that are milling the same kind of wheat, or different operators at the same mill, or even the same operator milling in the same mill at different times, will get results at different times that vary considerably. Tests made in the experimental mill by standardized methods show less variation in milling yield and in baking quality of flour than some of the variations observed in commercial mills.

For the Housekeeper

Results for use in the household in everyday life are secured through the cooperation of the Bureau of Home Economics. Methods and formulas for getting the best results in baking bread from the various commercial types of flour are now found in the retail markets—methods primarily for the use of the housewife—are being determined. Types chosen for study are representative, such as a Minnesota hard red spring wheat flour, a Kansas hard winter wheat flour, a Pennsylvania soft red winter wheat flour, and an Oregon white wheat flour.

Announced Results

As a result of extensive experiments with American wheat varieties extending through several years the Department has now announced results in terms that are understandable by every farmer and miller. "Marquis is the best variety of hard red spring wheat in milling and baking quality. It is also the most productive variety, except in northwestern North Dakota, and northeastern Montana, where it is slightly outyielded by Red Fife and during the frequent seasons in which rust occurs in North and South Dakota when it is outyielded by the Kota variety. With these exceptions, Marquis should replace all other varieties of hard red spring wheat in the northern spring regions," says the report.

"Prelude, Pioneer, Ruby, and Kota are only slightly inferior to Marquis in quality and only slightly superior to Kitchener, Red Fife, Glyndon, Haynes Bluestem, Power, and Preston.

"Kubanka excels all other varieties of durum wheat in baking quality, followed by Kubanka No. 8, Kubanka No. 98 (Nodak), Arnautka, and Peliss. Pentad, Buford, and Mindum are of poor baking quality. Baking quality, however, is not necessarily a measure of the macaroni value of durum wheats. Kubanka is the most generally adapted variety of durum wheat in North and South Dakota, but during most seasons of severe rust, it is considerably outyielded by Acma and Monad. In Minnesota, Mindum is more productive than Kubanka, while in Montana, Wyoming, and Colorado, Peliss is the most productive durum wheat.

"The three leading varieties of hard red winter wheat—Turkey, Kharkof, and Kanred—are practically equal in milling and baking value. All of the varieties of hard red winter wheat are satisfactory for milling and bread making, although Blackhull, Minturki, and Alton are softer wheats and in some respects somewhat inferior to the others.

"Kanred is the most productive wheat in the central hard red winter wheat region, but outside of this region Turkey and Kharkof, or selections from them, yield about as well. Minturki is the highest yielding winter wheat in Minnesota. Blackhull yields nearly as well as Kanred in central Kansas.

The Soft Wheats

"The Red Rock variety has the highest bread-making qualities of the soft red winter wheats. Other good varieties are Purplestraw, Minhardi, Odessa, Fulcaster, Fultz, and Buffum No. 17. The poorest varieties in quality are Red Russian, Jones Fife, and Hybrid 123.

"Bobs, Hard Federation, White Federation, Federation, and Galgalos are among the best of the white wheats for bread-making. Baart, Dicklow, and Pacific Bluestem are of good milling and baking quality, while Goldcoin and the club wheats, Hybrid 128, and Little Club are low in bread-making qualities.

"Baart is the most productive spring wheat in the dry sections of Washington, and is well adapted to central and eastern Oregon and drier sections of California. Hard Federation outyields Baart on the dry lands in Oregon. Federation and Dicklow are the most productive wheats on the irrigated lands in Idaho and Oregon. Hybrid 128, a winter variety of club wheat, is the most productive wheat in the subhumid sections of southeastern Washington and northeastern Oregon.

Compare Classes

"Comparison of the milling and baking qualities of the various classes of wheat shows hard red spring to have averaged lowest in test weight per bushel of dockage-free wheat, and in yield of "straight" flour, and highest in volume of loaf, while in yield of bran it was one of the two classes showing the highest percentages. It also averaged high in protein content and yield of shorts.

"Durum wheat showed the highest average results in test weight per bushel of dockage-free wheat, protein content, yield of shorts, water absorption of flour, weight of loaf, and ash content of flour. This class averaged lowest in yield of bran and in color score of bread and was low in yield of flour.

"Hard red winter wheat averaged highest in yield of flour, and in color and texture of bread, and second highest in test weight per bushel, yield of bran, water absorption of flour, and weight of loaf. It averaged lowest in yield of shorts.

"Soft red winter was one of the two classes averaging highest in yield of bran. It averaged second highest in yield of flour. It averaged lowest in crude protein of wheat and in water absorption of flour, and second lowest in yield of shorts, and in weight, color,

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Certified Potato Seed

By M. R. Ensign

Florida Experiment Station

IT may seem somewhat trite to write upon potato seed certification. Those quite sophisticated ones in seed potato lore will likely deem or dub it but "another case," but those who have been prone to look upon seed certification as a guaranteed standard of excellence may find their complacency rather rudely upset.

The discovery was quite accidental. The outcome was never in doubt after the first look. It happened this way.

The time for planting the last lot of seed in a "time of planting" test arrived. In order to plant the buffer row it was necessary to secure another bag of seed. This was secured through the local potato growers' association at Hastings, Florida. All of the seed used in the test rows were certified Maine grown seed of the Spaulding Rose variety and purchased through the above agency. The regular lot of seed and the extra bag of seed were planted in adjacent rows on February 14 at La Crosse, Florida. They were given identical cultural treatment and the seed pieces in the two lots very closely approximated each other in average weight.

The rows were 560 feet long and these were divided into 10 blocks 50 feet in length. Each block was harvested separately where a record of total tubers, number of primes and seconds, together with the weight in grams was made. Blocks 3 and 7 were harvested so as to give individual hill records on 35 hills for each seed strain in each block. Harvesting was completed on May 20, 1928. From planting to harvest, therefore, a period of 96 days elapsed.

Comparative data regarding the yield from the two strains of certified seed, based upon 350 hills from each strain, show a computed difference of 24.22 barrels of primes between strains I and II. There were 7.84 barrels more of No. 2's and 2.38 barrels more of culls in strain II than strain I. At an average price of five dollars per barrel for primes the increased yield from strain I would return $121.20 more per acre.

Marked Differences

The largest and most significant difference was noted in the number of primes per hill and the computed yield for each strain on an acreage basis. This computation was based on a 67 per cent stand for each. As a matter of fact there were fewer missing hills in strain I. The increased number of barrels of No. 2's and culls in strain II was significant.

The inherent difference between these two strains was noticeable from the time they began to appear above ground. The growth of strain I was much more uniform and rapid than II. The former, also, had a much darker color which was maintained longer. The vines in strain II assumed a more upright bristly appearance and produced an abundance of bloom in contrast to I. Normally, the Spaulding Rose variety produces little or no bloom in this part of Florida.

No doubt some of the characteristic quantitative and described differences are to be explained by the percentage and relative severity of rhizoctonia in the two strains. In strain I an aver-

(*Turn to Page 54*)

Complete fertilizer increased the yield of this timothy and clover meadow more than one ton.

FERTILIZER Turns *the* Trick

By

Sam D. Preston

County Agent, Flint Hill, Va

An application of 300 lbs. of a 4-16-4 fertilizer produced the largest yield of wheat in the community.

UP until very recently here in Rappahannock county, Virginia, fertilizer was fertilizer, and most of it was 16 per cent superphosphate alone, or as a great many farmers knew it, just 16 per cent.

Last spring meetings were held all over the county for the purpose of discussing fertilizers from a standpoint of plant foods, or plant rations, and to make the farmer see, if possible, that there is just as much art in feeding plants as there is in properly balancing a ration for a hog or dairy cow. The extension specialist was present, and we held what we called barn meetings, meeting at the barn of one farmer in each community. Aside from a part of the week, which was rainy we had the best attendance and more enthusiasm than at any meetings held in the county during the past four years.

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South Dakota Soils

By George L. Winright

County Agent, Salem, S. D.

SOIL maintenance is not a popular subject in this section. Few people take any thought of soil fertility until it is depleted and then it is always a question of "getting it back." The same principle holds good with soil as with any other property—that it is easier and cheaper to keep it in condition than to rebuild or move.

The soil survey for the counties in South Dakota which have been completed show some very interesting facts, and it is further interesting to note that the findings of the survey compare favorably with the records of yields in early days. The analysis of the farm lands in McCook county compared to the virgin soil or native prairie along the roadside shows a decrease of approximately 20 per cent in the nitrogen content and very little of this land has been farmed for more than 30 years.

In the Old Days

Old-time farmers agree that they could raise much larger crops under similar moisture conditions in the early days than is possible at the present time, but they never question the condition of the soil. In fact, most of them are retired and seem to take a certain degree of pride in the fact that the young farmers can not come up to what they were able to do when they were on the farm.

The records show that in 1889 there were $300 spent for fertilizers in this country. In 1909 only $205 worth was purchased, and in 1920 there is no record of any being used. During the same period, the assessed value of land increased from $16.38 per acre to $160.13 per acre. General development was in proportion and this great development seems to be sufficient reason to cause many people to think that their land is different from land in many other places and that it will never wear out. But the history of many places in other states proves that the same condition has prevailed there, and that the soil was neglected until worn out, and other property decreased with the decreased fertility of the soil.

The writer was at one time on a cotton farm in one of the poorer sections of Alabama for a period of six years and had a chance to observe the final results of a system of farming which took from the land but put nothing back until the land had been ruined. The fertilizer problem was a very serious one at the time mentioned. "As the land is so are the people," and both land and people were so poor that it was impossible to buy more than enough fertilizer to run one year at a time. So they lived from one year to the next on land that had at one time been very productive and very valuable, as some of the older inhabitants could remember and as the ruins of many wonderful sets of improvements also bore evidence.

It was possible for the land to be brought back. A Chicago manufacturer demonstrated this thoroughly on one particular farm, but it was not possible for the farmers to develop the land and live at the same time, and for that reason those who really needed

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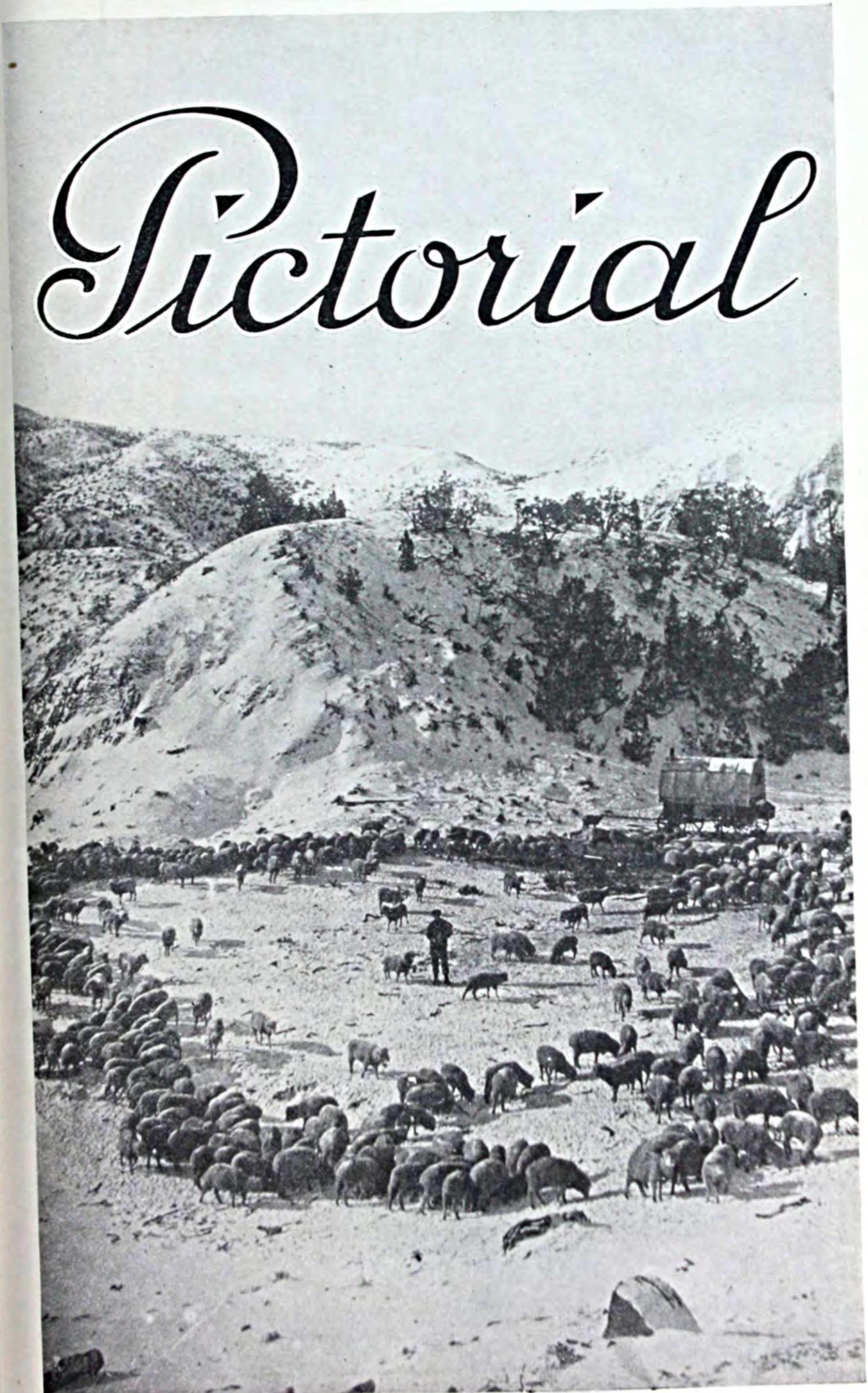
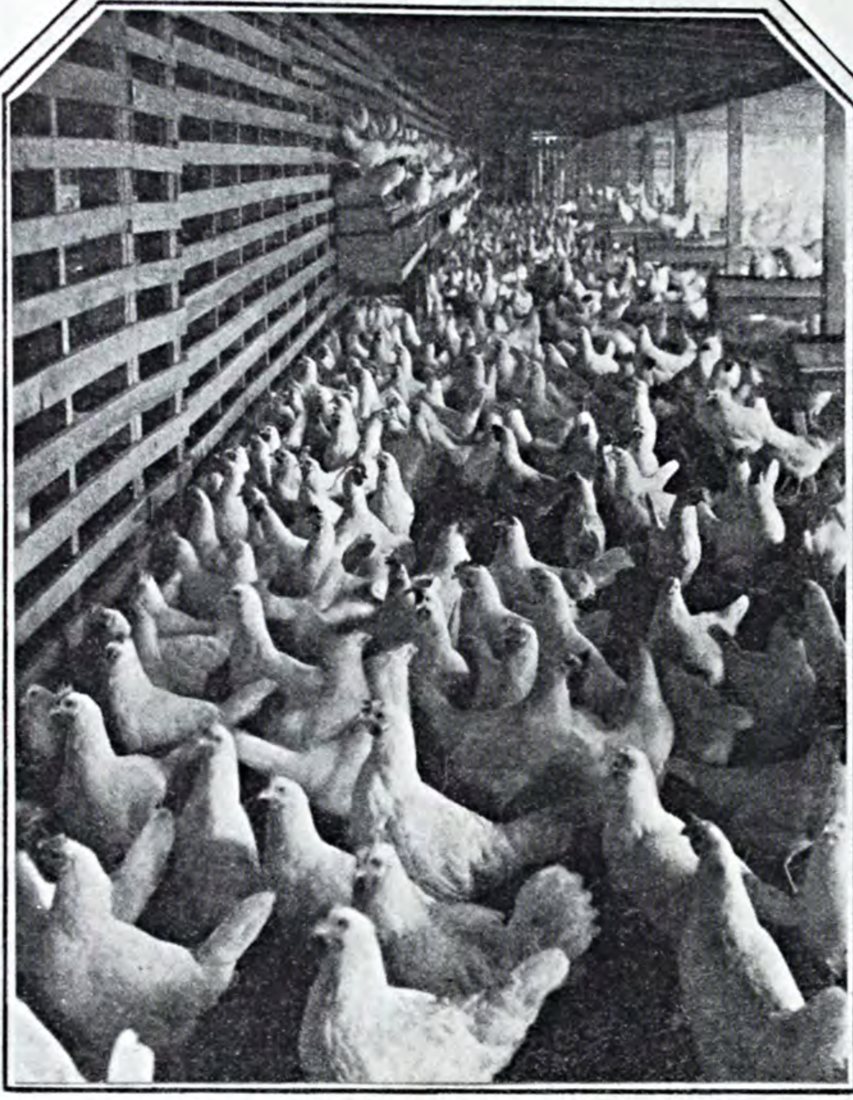

Pictorial



A fine flock of white leghorn layers in the poultry house of a Georgia farmer.

An old water power-mill at Anderson, S. C. It will shell and grind corn, gin cotton, grind wheat, and it also operates a sawmill and planing mill.

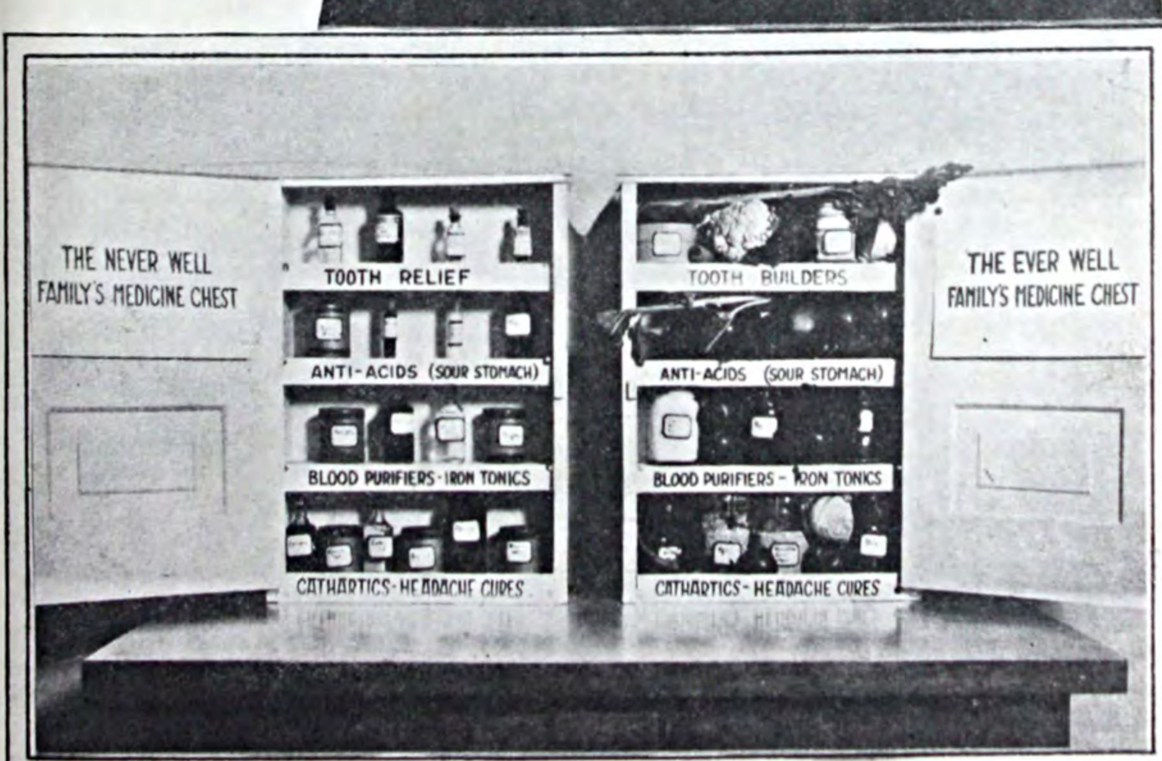
Hanging up tobacco leaves to dry inside the tobacco barn of L. C. Weaver of Moultrie, Georgia.

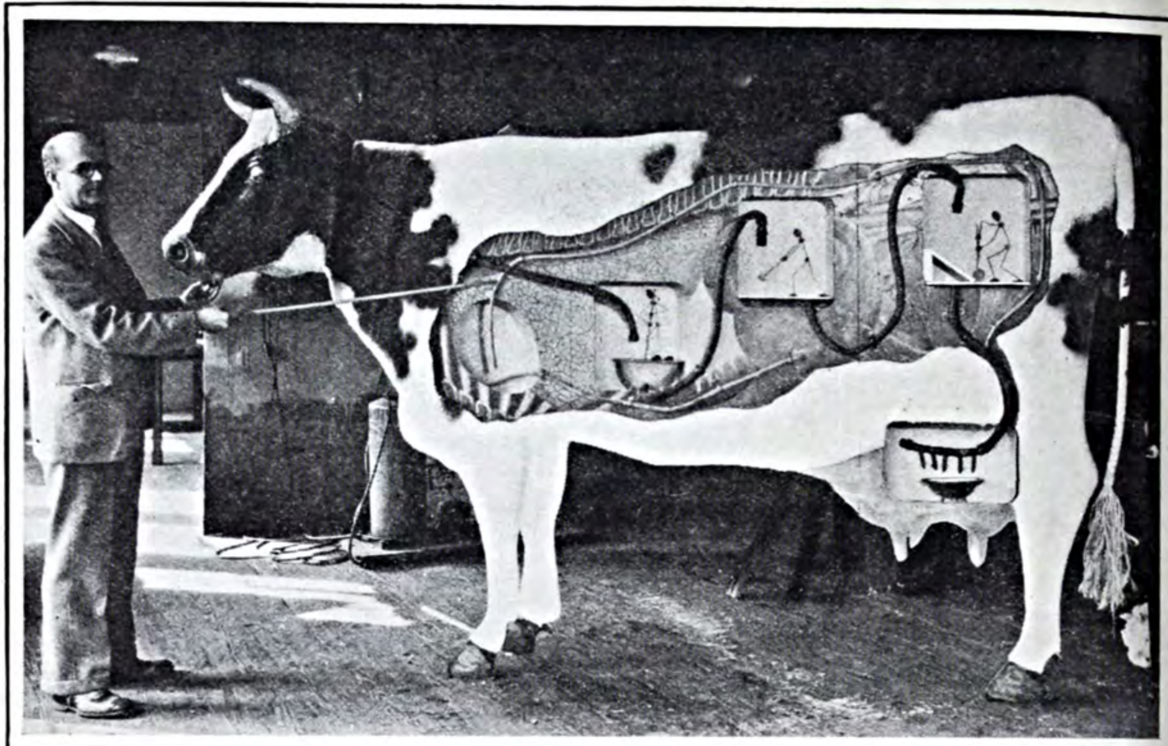
Below: Delbert Swindell of Alexandria, Indiana, with his world's record team weighing 2,390 pounds, exerting a tractive pull of 2,600 pounds at the 1928 Indiana State Fair. The near mare is a three-year-old and the team is used regularly for farm work.

Dr. H. W. Mumford resumes direction of the Illinois College of Agriculture, after a three months' leave of absence spent as one of ten Americans on a commission which made a study of German agriculture for the agricultural, banking and industrial interests of that country. He is shown examining the season's corn crop on America's oldest soil experiment plots, the Morrow plots at the Illinois agricultural college.

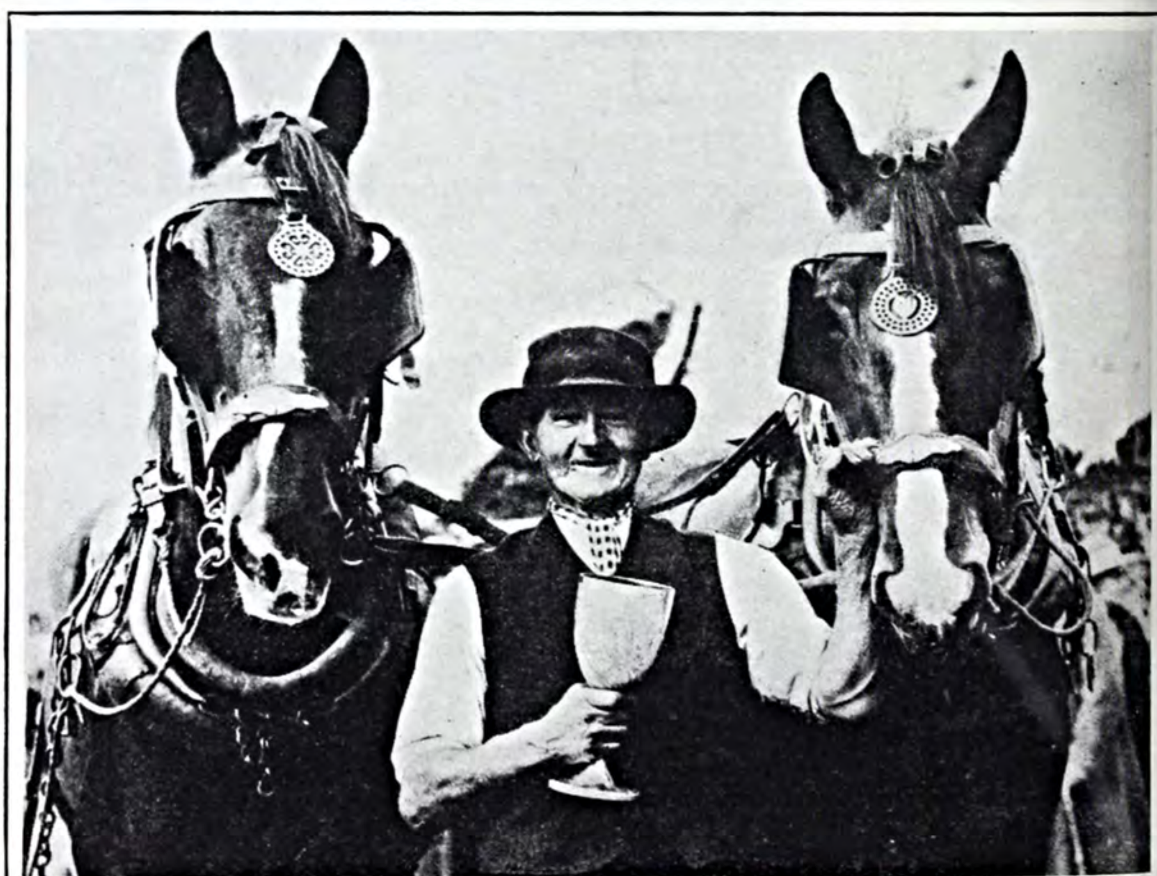
Below: Dr. E. W. Brandes, Bureau of Plant Industry, U. S. D. A., has just returned from New Guinea, where the tropical wilderness was searched for new sugar cane plants that might prove more resistant to disease than the sugar cane now being grown in this part of the world. He is shown planting some of the canes which he brought back with him.

iss Lucy J. Folsom, Home emonstration Agent, Madison ounty, Ohio, has an ambition aid in the development of e master cook, along with aster farmers and master ome-makers. In line with is plan, Miss Folsom has deised a most clever and unique edicine cabinet, really two abinets, to concretely demonrate the right and the wrong ay to live in so far as the mily health is concerned. She as termed the two chests the Ever Well" and the "Never Vell Family Chests." The Ever Well" cabinet has a shelf or tooth building foods, making a sharp contrast with the 'Never Well" family's shelf f medicines for toothache reief. The lemons, oranges, pples, celery, spinach and ther good foods in the one hest, place in the background he soda mints and charcoal ablets for sour stomach cures n the "Never Well" cabinet. Miss Folsom desires to interest the people of Madison county in what foods are most proper to cook, those which will aid in general health and not detract.





The mechanical cow which was exhibited by the U. S. Department of Agriculture at the National Dairy Show at Memphis, October 13-20. The side is cut away so as to illustrate by various contraptions the important processes that go on in the transformation of feed into milk. The cow is equipped with a phonograph and records which make it possible for her to tell the dairyman what he ought to do to make milk production profitable.



Mr. Henry Davis, of Barnesfield, England, with his team of horses with which he won the ploughing championship of England. He is shown holding the cup awarded him by the Middlesex Agricultural Society which conducted the contest. Davis has won the title nine times, taking it the last three years in succession.

The Editors Talk

"In Everything Give Thanks"

Thanksgiving is a day for inventory. It is a time for stock taking. We tabulate the blessings that have come to us and instinctively lift our hearts, if not in audible words at least in silent gratitude, to the Giver of All Good.

But in this process of stock taking it is inevitable that many of us find the year has not been one of unalloyed and unmitigated blessings. There have been times when it has been exceedingly difficult—if not impossible—for us to sing the Doxology. Adversity has come to many of us—loved ones have departed from us—ill winds have blown upon us—sickness has laid some of us low.

The fortitude with which we meet the calamities of life is the yard stick of our characters. The calamities through which we pass are like the refiners' fire—burning out the dross and leaving the pure gold of character.

The Apostle Paul remarks, "I have learned no matter what my state in life, therewith to be content." It was no doubt a bitter lesson, but having *learned* it, he was content. And no matter what our trials—our sorrows—some one has had to travel that same road before, and if out of all the travail of adversity we can learn the lesson of contentment, we can still lift our hearts in gratitude to Him who doeth all things well.

And to those of us who have prospered, who have escaped during the year the deep, dark waters and upon whom have been showered in rich measure the blessings of life, "Unto whom much has been given, of him shall much be required." To such of us comes the clarion call to dedicate our talents, our time, our money in consecration to the service of our fellows in every land and every clime. Thus can we manifest in tangible form our gratitude for the bounties that have been bestowed upon us, and carry forward in person in the program of Him who once said—

"IN EVERYTHING GIVE THANKS."

Supply and Price

No matter where scientific effort starts, if it is to be of any great benefit to the practically minded people of today, it ends up with a price or cost relationship.

Our standard of living, our prosperity, wealth, social stability, much of our happiness, our modern achievements in transportation and communication depend largely on the relationship of different prices, and the relationship of such prices to supply and demand.

The relationship is the vital matter. It is in this field of relationship that economic research has done much of its best work and made the greatest progress in the last generation. But it is just this concept of relationship that is not yet fully appreciated.

Most of us like to think of one thing at a time. We have good single track minds, but a relationship means thinking of two things—that is different. Overproduction as a cause of agricultural depression is single—easy to comprehend—but when it is said that the most serious single factor in causing the agricultural depression is "the maladjustment between farm and retail prices," this denotes two things and a relationship—which is more troublesome.

And yet little progress can be made in achieving agricultural prosperity unless the problems are examined from the point of view of interrelationships. For this reason a recent publication by Warren and Pearson of Cornell University on the "Interrelationships of Supply and Price," are particularly valuable for any one who wants to put any serious thought on the causes of agricultural depression. The effect of supply on prices has been fully studied in this bulletin, No. 466.

It is pointed out that the maladjustment between farm and retail prices has been caused largely by increased costs of distribution and handling. For instance, in May, 1927, food sold by farmers was selling at 72 per cent above prewar prices, but farmers were receiving only 46 per cent above prewar. Distributing charges averaged 91 per cent above prewar. This makes farm prices low. The agricultural depression is therefore primarily due to high handling charges due to deflation.

The law of supply and demand will eventually remedy this situation, but in the agricultural world it works much slower than in the industrial world. Before agriculture is again prosperous, several relationships of prices, costs, and production will go through a slow but certain change—apparently the general trend of such changes can be foretold.

One thing seems fairly certain—depression is not the result of a single isolated cause. It is the result of maladjustment in price relationships. If we quit looking for such a single isolated cause, at least some progress will be made.

Waste Products

If the chemist were a magician instead of a patient scientist the farmer would soon find himself in possession of good markets for the 10,000,000 tons of waste products, so-called, that are incidental to the production of such crops as corn, wheat, oats, cotton, sugar, soybeans, and peanuts. Dr. Henry G. Knight, Chief of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, says that in order to make use economically of the great volume of farm by-products which are now farm wastes, the chemists believe it essential that long continued research be carried on to reveal the chemistry of the carbohydrates, the celluloses, the pentosans, and lignin. "The chemist," says Dr. Knight, "looks upon the products of agriculture as the raw materials to be worked up by industry to obtain their hidden values which, in turn, would decrease present wastes and relieve the farmer to some extent by widening the market and stabilizing the demand for his products. For example, sugar-cane bagasse, which ordinarily is useful only as fuel, is worked up by industry into wallboard and other products. Corn is worked up into starch, commercial corn sugar, corn oil, etc., and by fermentation the corn sugar is converted into butynol, acetone, and grain alcohol which may be put to many commercial uses."

In a recent issue of BETTER CROPS WITH PLANT FOOD we published an article showing almost undreamed of uses to which corncobs, formerly considered purely a waste product on farms, could be put. With the aid of chemical research wheat straw is being made into a paper board of great structural strength and fireproof quality. Many products have been made from cottonseed, from unsalable fruit, and new uses are being found for milk solids heretofore counted as waste.

The field was never better for the young man with an agricultural inclination who does not wish to actually farm. Scientific research is making tremendous strides and in providing new uses for farm products will do more to relieve the farmer than all of the legislation that can be passed.

As Ben Franklin would say today, "He who by the plow would thrive, must have a chemist hold or drive."

Supplant or Supplement Which?

Automobiles have supplanted the buggy—wireless has supplemented the cable. Street cars propelled by electricity have supplanted horse-drawn cars, but as a medium for disseminating political discussion the radio has supplemented all other means of the written and spoken word. And strange as it may seem, the more the radio is used to carry the political speech into the home, the greater the demand for speakers and the newspaper to read all about it.

In this age of new things and new ideas—does the new supplant or supplement the old? If progress is to be made in the application of scientific research to human activities then more than ever is it necessary to distinguish between supplement and supplant.

Much useless opposition, much friction and confusion may arise, simply because of the latent fear of vested power and authority that the new may supplant the old established order.

There are several fields in agricultural endeavor where the distinction needs to be more sharply drawn. Two such instances are shorter methods for the determination of the fertilizer requirements of our major soils and crops and the other closely akin is the concept of ratios in stating plant food requirements.

Both can only supplement what has gone before, and in supplementing pioneer work, they add an interest and vitality in the agronomic field that in turn must stimulate further achievement.

There is a great practical need for shorter methods than the use of field plots as a guide to the profitable use of fertilizers. There is a great need for a simple basis of fertilizer analysis that will coordinate and profitably distribute experimental work. But faulty as some of the results from some experimental plots are, leading international opinion agrees that field experimental plots in some form must continue.

Shorter methods for determining soil fertility needs supplement such plots, but do not supplant them. With thousands of soil types on which no fertilizer work has been done, such short methods as are being developed are needed as an aid to judgment. There are urgent uses for both plots and shorter methods, each adds to the value of the other.

As in many other cases of modern developments, shorter methods of determining plant food requirements and the ratio concept, properly used to supplement other work, will add a vitality and interest that cannot be gained by the most determined sort of opposition.

The Weather in Verse

Remember your old weather rhymes—they may help you decide what to do today. According to Dr. W. J. Humphreys, senior meteorologist of the Weather Bureau, U. S. D. A., they have a value.

Almanacs and other long range predictions on the weather are not reliable. Intelligent farmers nowadays should pin their faith on official reports by radio and on their own observations. Scientific forecasting of the weather does not place any value on many of the old signs, particularly those that are supposed to forecast one season from occurrences in the previous season. However, Dr. Humphreys believes that many of the sayings in regard to the weather that have been handed down from generation to generation are based on many observations and are often reliable. For example, he believes that a warning of some value is:

A rainbow in the morning
Is the shepherd's warning;
A rainbow at night
Is the shepherd's delight.

Another good guess is:

If the sun sets in gray
The next will be a rainy day.

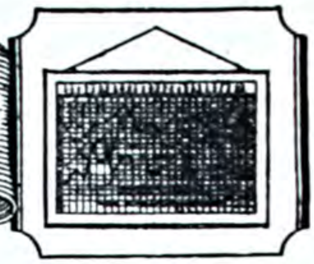
According to Dr. Humphreys, one of the best indicators for the weather for the day is the state of the dew in the morning. Dew gathers on grass and other exposed objects when they are cool enough to condense it out of the air, just as moisture is condensed out of the air on the side of the pitcher when filled with ice water. Grass and other outdoor things cool considerably only on still, clear nights, the kind that occur during a spell of fine weather and at no other time. Hence a heavy dew means that the air was still and the sky clear, at least during the latter half of the night. It is probable that if there was neither wind nor clouds during that time the day will be a good one for all outside work. On the other hand, if there is no dew in the morning, it is almost certain that either the sky was clouded or that there was an appreciable wind or both; and both, as a rule, precede a general rainstorm by 6 to 12 or even 24 hours, according to circumstances.

When the grass is dry at morning light,
Look for rain before the night;

When the dew is on the grass
Rain will never come to pass.

Dr. Humphreys believes there is sound reason for these two proverbs.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

LEARNING FROM THE HOOSIERS

Early this fall a group of Illinois chicken raisers, under the leadership of men from the Illinois College of Agriculture, made a tour of seven Indiana commercial poultry farms. The poultry extension specialist of the college, H. H. Alp, reported a number of practices that could be adopted with benefit by many of the farm flock owners of his own State. Among the practices which distinguish these successful poultry farms are: Strict sanitation, including keeping the birds off dropping boards during the day; liberal grain feeding; plenty of fresh drinking water and means of preventing freezing; feeding a home-mixed mash; houses of shed-roof type and 20 feet deep, equipped with board or cement floors; planer shavings for nesting material. These successful commercial poultrymen did not favor the strictly all-mash method of feeding layers, most of them believing in grain feeding at times.

WATCHING SOIL BACTERIA

A method of watching soil bacteria under the microscope, which may some day be of practical value to the farmer, has been developed by Dr. H. J. Conn, bacteriologist at the New York State Agricultural Experiment Station. His discovery is considered by French, Italian, and German investigators as an important addition to the equipment for the study of soil science. This method of watching the soil bacteria in their natural surroundings is one more step ahead in the determination of which soil organisms are beneficial and which are harmful.

Another scientist at the same station, Dr. R. S. Breed, not long ago developed a method for studying milk bacteria under the microscope. By the microscopic method it is possible to determine rather quickly whether or not an organism when inoculated into the soil will grow there. This is an opening wedge which should give scientists and farmers some surprises and no doubt new means of meeting old problems.

BARLEY IN TROUBLE

In recent months scabby barley has given that dependable grain somewhat of a black eye. At least that is the case in some places where considerable scabby barley has been fed to hogs. Not so long ago reports came from Germany that some hog feeders had had trouble with imported scabby barley and now the question is being discussed in various sections of this country. Barley affected with scab is not new but the disease has reappeared in the Midwest and is common in the Corn Belt this season. The University of Wisconsin has recommended that farmers in that State before buying large quantities of barley run a week's feed test to see if it will make pigs sick. The College of Agriculture is also offering to test samples. J. D. Dixon, plant pathologist at the College, says the disease is undoubtedly caused by a scab which seems to damage barley every five or six years. He says that it is spread by a parasite that lives over the winter in old corn-stalks and grain straw and that good plowing which turns under stalks and straw will cut down the damage greatly. The animal husbandmen at the station are making experiments in feeding scabby barley with the hope that it can be made palatable and harmless when fed in any amount to pigs and other livestock. Tests made in Indiana have shown that pigs can be fed safely on a ration of 1/3 scabby barley, 1/3 corn, 1/3 oats, and 10 per cent tankage.

DUST STOPS SMUT

Smuttox, a formaldehyde dust, originated by the Department of Botany and Plant Pathology of the Ohio Agricultural Experiment Station, Wooster, Ohio, has been found successful in preventing oat smut. Check plots averaged 8.8 per cent smut infestation, whereas the plots that were treated with the dust averaged only .136 per cent. Twelve of the treated plots were completely free from smut. Those plots on which the oats had been given the old formaldehyde treatment showed very good control results, the average infestation being .92 per cent. The patent rights to this formaldehyde dust were turned over by the State to a commercial concern which is now making it.

FAVORS CALCIUM ARSENATE

In the early days of spraying fruit trees, faulty calcium arsenate did much damage by burning the fruit, but at the present time, according to the results of six years of careful experiment at the New Hampshire Agricultural Experiment Station, this chemical is so made that there is no reason for prejudice against it. For a long time arsenate of lead excluded the calcium arsenate in spraying for apple scab, even though arsenate of lead caused some injury. The final conclusion of the experimenters is that lime sulphur and arsenate of lead controlled scab but caused russetting of fruit, while lime sulphur and calcium arsenate effect the same control without causing this damage.

PIGS USE COPPER

Copper sulphate, commonly known for its poisonous property, has been found by investigators at Iowa State College to be beneficial to pigs when fed in small quantities. Pigs were given rations complete in proteins, vitamins, energy producing and inorganic substances—in fact the best kind of ration according to modern feeding practices—and yet the addition of small quantities of copper sulphate increased weight and growth. The animals seemed to make better use of their feed when they had the copper along with it. Some rats that were fed copper sulphate along with their rations were killed, and it was found that most of the copper had been stored away in the liver. Scientists venture the suggestion that this fact may have a bearing on the value of liver in the treatment of certain human ailments. Tests similar to these Iowa investigations have been carried on at Wisconsin where it was found that copper is closely associated with the assimilation of iron in the body.

CORELESS CARROT WANTED

Because the consumer demands a coreless carrot, horticulturists of the University of Minnesota, gardeners, and seedsmen got together recently to provide just this kind of a carrot. It is thought that by careful and persistent efforts a uniform strain of a desirable root can be developed in a few years and the University vegetable experts are going at the job. At the same time they are undertaking to improve the Table Queen squash (also called the Des Moines or Acorn) which has too many colors and is not uniform enough.

Foreign and International Agriculture

Lime *and* Fertilizers

By A. Lancaster Smith

Sidmouth, England

A TOPIC which should receive considerable attention at the present time is the value of lime and artificial manures* when used in conjunction. It has been estimated by such a well-known authority as Sir A. D. Hall that one of the most important factors affecting crop production is the question of liming. He said,

"What does the farmer want to find out about his soil? First of all the analyst can be asked whether it is short of lime or not. Sometimes the analyst is not needed because the land is so sour and so short of lime that the weeds bear witness. The presence of much spurrey (Spergula arvensis) or corn marigold (Chrysanthemum segetum) or sheep's sorrel (Rumex acetosella) is a sure indication of the need of lime, as is again an abundance of foxgloves in the hedgerows. The analyst may be able to tell the farmer how much lime is neded to correct the sourness, and again whether to use quicklime or ground carbonate such as chalk or limestone."

In numerous cases it has been shown that artificial manures* do not produce the best results by reason of soil acidity. That fact was brought out quite clearly in the tests made at Rothamsted on hay during the years 1903-1906, and later tests on different types of soil lend weight to the contention that liming is frequently a necessity if fertilizers are to produce the best results. The following table shows the yields of hay harvested from the plots which were treated with an application of 2,000 lbs. per acre of ground quicklime at the commencement of the experiments.

Rothamsted Grass Plots

Year	Plot 7 Yield with mineral manures*, no nitrogen		Plot 9 Yield with mineral manures and nitrogen	
	Unlimed	Limed	Unlimed	Limed
	Cwt.	Cwt.	Cwt.	Cwt.
1903	49.5	51.9	50.1	60.5
1904	61.9	61.8	63.7	69.8
1905	44.3	47.2	36.9	52.2
1906.	34.4	41.4	39.0	50.0

The writer in Great Britain has urged in season and out of season the more extensive use of lime in conjunction with artificial fertilizers and there is sound reason for believing that in the long run those who ascertain if the soils on their holdings contain a sufficiency of lime, will be taking the first step to increase the better use of chemical fertilizers.

* Artificial or mineral manures are called fertilizers or commercial fertilizers in the United States.

Adsorption and Accumulation of Potash in the Soil

ACCORDING to observations made by M. Demolon, Director of the Research Station of Laon, France, on the soils of the Aisne, potash is fixed on organic matter through adsorption after the fashion of dyes used for woven material. It is substituted for lime in soils that contain enough of it, and for hydrogen in acid soils, but the substitution for hydrogen is much slower, and in M. Demolon's experiments the adsorbing capacity for potash in acid soils, has been doubled and even trebled by an application of lime or marl.

Potash fixed, or adsorbed by the soil is freed and put at the disposal of plants by lime.

M. Demolon draws the following practical conclusions from these observations:

First, lime and potash should not be applied at the same time, as it is sometimes recommended. The logical order of applications should include first an increase in the amount of removable lime in the soil in order to increase its adsorbing power, then an early application of potash. For such conditions the various soluble potash salts ought to be considered as equivalent.

The amount of potash applied should be proportionate to the adsorbing power of the soil. Those soils which retain potash most strongly, such as clay soils, have the greatest adsorption capacity. Heavy applications should then be the rule on these.

Attention should be given to this fixed potash and not on the potash in the rocks, the solubility of which in the soil, is much slower.

The following example is quite typical: clay extracted from some loams is particularly rich in potash since it analyzes about 3½ per cent. This analytical result sometimes brought the conclusion that potash fertilizers are useless in such soils, a statement which experience proved not to be true.

We have observed that this potash cannot be considered as adsorbed potash but as an element in the constitution of the clay with a much lower solubility. (*Journal d'Agriculture Pratique, Paris, France*, 6/11/27.)

Pasture Management in England

NEWER methods for the more efficient use of pastures are discussed by Sir A. D. Hall and J. W. Stewart in their article "Recent Developments in Grassland Management," (Journal of the Ministry of Agriculture, Vol. 35, No. 7, pp. 607-612, October, 1928).

The pasture is divided into several areas, about one acre for each 10 cows pastured, in each area. The animals are moved from one area to another about once a week, thus always affording them fresh pasturage, and allowing for recuperation of the pasture.

Lime is applied as needed and generous basic applications made of potash and superphosphate once a year (during the winter in England).

Top-dressings of nitrogen fertilizers are made just before spring growth begins and after each pasturage period. This system has been found not only to make a higher quality pasture but to allow the pastures to be used during a longer period of the year.

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 need of asparagus plants for large amounts of potash and the ability of sodium salts sometimes to increase yields are clearly brought out by Professors B. L. Hartwell, J. D. Smith, and S. C. Damon, in Rhode Island Agricultural Experiment Station Bulletin 213 entitled "The Effect of Sodium Chloride and Carbonate on the Growth of Asparagus."

The experimental plots received varying proportions of muriates and carbonates of potash and soda, in addition to a standard application of nitrogen and phosphoric acid.

The largest application of muriate of potash was equivalent to 400 lbs. per acre, while that of muriate of soda was 3,895 lbs. The carbonates were applied in amounts equivalent to the potash and soda respectively in the muriates. Each treatment received a high and low amount of lime.

The authors found that in general there was an increase in yield for increasing the amounts of potash even when soda was applied in the largest quantities. When potash was applied in insufficient amounts, soda gave increases in yields, the chloride being better than the carbonate. Where the least potash and lime were applied, a great number of plants have died during the six years of the experiment, while comparatively few died where larger amounts of potash were used.

Muriate of potash tended to decrease soil acidity, and muriate of soda to increase it. Both carbonates decreased acidity.

It is planned to continue the experiment by replanting all plots and making larger applications of potash and soda.

While this bulletin is technical in character, the practical grower will find helpful ideas in it.

"A Study of the Effect of Commercial Fertilizers on the Performance of Apple Trees," Agr. Exp. Sta., Fayetteville, Ark., Bul. 227, June, 1928, J. R. Cooper.

Quarterly Bulletin, State Board of Agriculture, Dover, Del., Vol. 18, No. 2.

"Winter Killing of Young Alfalfa on the Fertilizer Test Plats at Athens," Ext. Div., State College of Agriculture, Athens, Ga., Vol. XVII, Cir. 148, Sept., 1928, Paul Tabor.

"Commercial Fertilizers," (State Control Report) Agr. Exp. Sta., Lafayette, Indiana, Cir. 155, June, 1928, H. R. Kraybill, O. S. Roberts, O. W. Ford, L. E. Horat, M. H. Thornton.

Soils

A summary of the results from all the experimental fields in various parts of the State away from the experiment station is given by Professors B. L. Hartwell and J. B. Smith, in Rhode Island Bulletin 214, entitled "Concerning Rhode Island Soils in Different Parts of the State." These results cover the period of 1893 to 1925.

Much of this work was concerned in the pioneer task of increasing the use of lime to correct the high acidity of the soils. On one interesting experiment when no lime was applied, corn responded to fertilizer materials in the following order: phosphorus, first; potash, second; and nitrogen, third. When lime was applied the corn responded principally to potash, followed by phosphorus and nitrogen, showing that soil reaction influenced the efficiency of the fertilizer.

For spring wheat, potash was found to be very important. A low phosphorus content of turnips was found to indicate a need of the soil for that material.

This bulletin serves to give general ideas of soil needs on various soils of the State. Detailed reports can be found in the reference given.

"Soil Survey of the Sun River Irrigation Project," Agr. Exp. Sta., Bozeman, Mont., Bul. 207, Sept., 1927, William DeYoung.

Crops

The Florida Experiment Station in Bulletin 198, "Tobacco Culture in Florida," offers to the farmers of Florida an opportunity to grow better tobacco at bigger profits by proper use of fertilizers. Professor W. B. Tisdale, tobacco specialist, emphasizes in this bulletin the importance of an abundance of organic matter. Stable manure where obtainable is recommended and may be used in amounts around 10 to 15 tons per acre. Recommendations for use of commercial fertilizers are on the basis of amounts of each element to apply per acre as well as analyses that have the elements in the right proportion. Particular stress is given to sources of potash.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVII, No. 8, Aug., 1928.

"Flowering Bulb Culture in Florida," Agr. Ext. Div., Gainesville, Fla., Bul. 48, June, 1928, T. A. Brown.

"Report for the Fiscal Year Ending June 30, 1927," Agr. Exp. Sta., Gainesville, Fla.

"Annual Report of the President," State College of A. & M. Arts, Athens, Ga., Andrew M. Soule.

"Air-Cooled Apple Storages," Agr. Exp. Sta., Lafayette, Ind., Cir. 154, June, 1928, Clarence E. Baker.

"Fortieth Annual Report," Part I, Agr. Exp. Sta., Lexington, Ky., Thomas Cooper.

"A Comparison of Some Properties of Normal and Frosted Wheats," Agr. Exp. Sta., Bozeman, Mont., Bul. 204, Aug., 1927, Arnold H. Johnson and W. O. Whitcomb.

"The Relationship of Weather to Crops in the Plains Region of Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 206, Aug., 1927, P. Patton.

"Building a Program of Agriculture Extension," Agr. Ext. Serv., Raleigh, N. C. Ext. Cir. 169, Aug., 1928.

"Boys' and Girls' Club Work," Agr. Ext. Div., Fargo, N. D., Cir. 84, Sept., 1928, Harry E. Rilling and Pauline M. Reynolds.

"Akenes of Some Compositae," Agr. Exp. Sta., Fargo, N. D., Bul. 218, Apr., 1928, Anita Mary Blake.

"Fruit Varieties in Ohio, III, Damson Plums," Agr. Exp. Sta., Wooster, Ohio, Bul. 426, September, 1928, J. S. Shoemaker.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIII, No. 5, Whole No. 134, Sept./Oct., 1928, A. E. Perkins and C. F. Monroe.

"Field Crops for Pump Irrigation at Harney Branch Experiment Station, 1920 to 1927," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 236, June, 1928, Obil Shattuck and Roy E. Hutchison.

"An Analytical Study of the Putting Greens of Rhode Island Golf Courses," Agr. Exp. Sta., Kingston, R. I., Bul. 212, June, 1928, Basil E. Gilbert.

"A Chemical Study of Varieties of Cotton Seed," Agr. Exp. Sta., College Station, Tex., Bul., 374, Jan., 1928, M. T. Harrington.

"Varieties of Cotton for Central East Texas," Agr. Exp. Sta., College Station, Tex., Bul. 384, Sept., 1928, H. F. Morris and G. T. McNess.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 249 and 250, Sept. and Oct., 1928.

"The Relation of Season of Pruning Out Old Cuthbert Raspberry Canes to Amount of Winter Injury," Exp. Sta., Puyallup, Wash., No. 9-W New Series, July, 1928, H. D. Locklin.

"Propagation of Fruit Trees," Agr. Exp. Sta., Pullman, Wash., Pop. Bul. 141, June, 1928, C. L. Vincent and W. A. Luce.

"Cultural Experiments with Wheat for Grain and Forage Production," Agr. Exp. Sta., Pullman, Wash., Bul. 227, July, 1928, C. E. Hill.

"The Irrigation of Cotton," U. S. D. A., Washington, D. C., Tech. Bul. 72, May, 1928, James C. Marr and Robert G. Hemphill.

American Potato Journal, The Potato Assn. of America, East Lansing, Mich., Vol. V, No. 9, Sept., 1928.

Economics

"Oranges," Bul. 457, by H. R. Wellman and E. W. Braun, is one of the series of bulletins published by the California College of Agriculture on California crops and prices. The average per capita consumption of oranges is 51. This is 46 per cent greater than prewar consumption. Even though there has been a marked increase in orange production, there is a relatively large acreage of young orchards still to come into bearing. Thus it seems probable that orange production will still continue to increase.

The data presented in Ohio bulletin 424, "Dairy and Other Livestock Production Costs in Medina County, Ohio," was obtained from a cost route in Medina county. This is in the dairy region of northeastern Ohio. The cost of producing milk on the various farms varied from \$2.13 to \$3.98 per hundred pounds with an average of \$2.60. The average selling price was \$2.67. Herds averaging less than 6,000 pounds of milk per cow produced milk at a cost of \$3.08, and those averaging more than 9,000 pounds at a cost of \$2.29 per hundred pounds.

With the increasing expenditures of the local, state, and federal governments, the tax problem becomes of greater interest. Ohio Bulletin 425, "Public Revenue in Ohio with Especial Reference to Rural Taxation," shows the sources of revenue collected in Ohio, and the expenditures of the same. Educational costs take about 40 per cent of the state and local revenue combined. Highways are second with a cost of 26 per cent of the total. These two services take nearly two-thirds of the revenue income.

"Farm Credit in a Plantation and an Upland Cotton District in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 228, *June,* 1928, *B. M. Gile and A. N. Moore.*

"Illinois Crop Reporter," U. S. D. A., Washington, D. C., Cir. 382, *Sept.* 1, 1928, *Nils A. Olsen and S. J. Stanard.*

"Markets for the Farm Products of the Billings Trade Area," Agr. Exp. Sta., Bozeman, Mont., Bul. 212, *Jan.,* 1928, *E. J. Bell., Jr.*

"Marketing High Protein Wheat," Agr. Exp. Sta., Bozeman, Mont., Bul. 213, *May,* 1928, *E. J. Bell, Jr.*

"Services, Facilities, and Costs of Marketing Vegetables in the Lower Rio Grande Valley of Texas," Agr. Exp. Sta., College Station, Texas, Bul. 378, *Mch.,* 1928, *G. L. Crawford.*

"Marketing American Cotton in England," U. S. D. A., Washington, D. C., Tech. Bul. 69, *June,* 1928, *Alonzo B. Cox.*

Diseases

"Sclerotinia Wilt of Sunflowers," Agr. Exp. Sta., Bozeman, Mont., Bul. 208, *Sept.,* 1927.

"Factors in the Inception and Development of Fusarium Rot in Stored Potatoes," U. S. D. A., Washington, D. C., Tech. Bul. 62, *May,* 1928.

Insects

"Economic Poisons," Dept. of Agr., Sacramento, Cal., Spec. Pub. 88, *Warren G. Marshall.*

"Insects Attacking the Peach in the South and How to Control Them," U. S. D. A., Washington, D. C., Farmers' Bul. 1557, *Oliver I. Snapp.*

Connecticut Valley Tobacco

THE report of the Tobacco Station at Windsor, Connecticut, was recently issued by the Connecticut Agricultural Experiment Station (Bulletin 10). The report covers various important phases of tobacco investigational work, conducted by Messrs. P. J. Anderson, N. T. Nelson, and T. R. Swanback. Every tobacco grower would profit by reading and studying the results obtained in these important experiments.

The writers dwell on the "factors which influence the burn" of tobacco, mentioning the locality, the climate, the soil, the season, the method of handling, the cure, and fermentation. Either one or more than one of these factors may seriously influence the burning quality of tobacco.

In judging the burning quality of tobacco they take into consideration the following points: fire-holding capacity, color of ash, closeness of burn, evenness of burn, flavor, aroma, and coherence of ash. The two methods used in testing the burn are termed "the strip test" and "the cigar test." These methods are carried out separately and then checked against each other.

In the nitrogen series, tobacco grown on soil treated with nitrate of soda in general shows a satisfactory burning quality.

In the phosphorous series, by the strip burn test, the heavier applications of phosphorus showed a depression in the fire holding capacity.

In the potash series, carbonate ranked first, nitrate and carbonate second, and sulfate third. A combination of the three carriers, however, gave almost as good results as the carbonate. These "strip burn tests" covering two crops are of sufficient interest to warrant a repetition of the two-year average, given in seconds:

Sulfate	40.0
Carbonate	46.9
2/3 Nitrate	
1/3 Carbonate	42.3
1/2 Carbonate	
1/2 Sulfate	40.2
1/3 Sulfate	
1/3 Carbonate	
1/3 Nitrate	44

The authors consider these diffe ences to be small.

In another series where muria is compared with sulfate as to burn the muriate-grown tobacco is far b hind, indicating that where the bur for example in cigars is importan tobacco should not be grown wit muriate applied in large quantities.

Some very noticeable compariso of the "strip burn test" and the "cig burn" are that lime seemed to depre the burn in the first case, whereas i the cigar test the fire-holding capacit was good. Likewise urea did not af fect the fire-holding capacity, but i did increase the whiteness of the ash Large quantities of phosphorus low ered the fire-holding capacity in th strip test, but did not affect the ciga test. The writers seem to be of th opinion that the sulphur obtained b the application of certain fertilizin constituents, is detrimental to th burning quality of tobacco, but the are by no means certain on this point and therefore they leave it for furthe consideration.

Why Fertilize?

(*From Page* 24)

productive than it is now, our fathers depended upon this "perpetual motion," unexhaustible fertility theory of farming to maintain crop production at a maximum point and, as they thought, indefinitely. Eighty per cent of our crops in Iowa—a comparatively high per cent in comparison with other states—is fed to livestock. At the very maximum we do not return to the soil more than 80 per cent of the crops which we do feed, in the shape of manure. In a ton of fresh mixed cattle and horse manure we returned —if we could save everything—about 10 pounds of nitrogen, 2 pounds of phosphorus, and 8 pounds of potassium, whether it needed these particular elements for plant production in just that particular proportion or not. Then we took from the soil in a 50-bushel crop of corn (stocks and grain) 74 pounds of nitrogen, 11.5 pounds of phosphorus, and 35.5

pounds of potassium; in a 50-bushel crop of oats (grain and straw) 52 pounds of nitrogen, 8.5 of phosphorus, and 39 of potassium; in two tons of clover hay 80 pounds of nitrogen, 10 of phosphorus, and 60 of potassium. The lime removed in these crops varied, in the corn and oats around 27 pounds to 146 in the clover.

Then it remained for the soil specialist and the county agent to tell us why we no longer grow spring wheat in the state; why clover stands are more frequently thin and winter-killing more common; why sweet clover refuses to grow in the field, but grows along the roadside; why certain rots and diseases attack our grain; and why our corn refuses to mature as it did in earlier days. On many of our run-down farms the cause of low crop yields needed no investigation nor explanation—it was self-evident.

Our most progressive farmers are taking the lead in correcting the conditions which our earlier, unbalanced methods of farming brought about. On the Chas. Mythaler farm at Independence, I saw fine sweet clover hay in the manger for the dairy herd. It was grown on land treated with limestone and a 2-12-2 commercial fertilizer. On the Chas. Robinson farm at Jesup, soils specialists marveled at the sweet clover crop that was grown with somewhat similar soil treatments, and they saw when this soil was put to corn increases of 20 to 30 bushels per acre over corn on adjoining land not similarly treated. The benefits are not alone of increased yield but also of better quality.

Commercial fertilizers either alone or in different combinations are used in many localities, successfully placing our farming operation upon a new and more profitable basis. Their use in many cases is that of a necessary supplement to our livestock farming; but with either livestock or without, we cannot well avoid the conclusion that we cannot remain in the business of farming without use of artificial plant food to help keep our cost of production down so that we may make a profit.

Paper Money

(*From Page 6*)

for use. Paper mulch also made it possible to double the yield of cotton at Arlington, Va., which is far north of the Cotton Belt.

Increases in yield, measured in some instances by total weight of the plant growth and in others by the weight or number of fruits, tubers, ears, or edible portions, have been nothing less than phenomenal. With tomatoes and potatoes the yields for three successive seasons were increased 33 per cent. With green beans Doctor Flint secured a 66 per cent increase in yield. With other crops yields have in general tended to exceed 33 per cent and on poor soils have frequently been more than 100 per cent. The maximum increases were obtained with sweet potatoes, amounting to an average of 150 per cent over three seasons. In this crop, however, it is assumed that the paper had an additional value through preventing the rooting of the runners.

Although Doctor Flint's experiments were designed primarily to study the "biophysical aspects" of the paper-mulch, rather than to develop improved cultural methods, the practicability of the application became evident early in the tests. The remarkable ability of the mulch to increase plant growth, to hasten maturity, to retain soil moisture and maintain uniform temperature of the soil, and above all to suppress the weeds and eliminate plowing or other preparation of the soil where paper was left from one year to the next—all of these advantages were so pronounced that this phase of the study could not be overlooked. Accordingly what practical results are available have been made public in the hope that many growers will become interested in carrying out small-scale experimental trials.

Already a number of paper manufacturing companies have become interested in the development of mulching paper of different grades, weights, and prices. At the suggestion of the department they are offering only limited quantities for sale and trial until experimental results have shown more conclusively the kind of paper to use. Most any kind of paper, so far as these experiments show, is suitable for stimulating plant growth if it is free from toxic soluble materials such as tar.

The use of paper as a mulching material marks a new and promising development in agricultural practice. In the past, the soil mulch and straw or plant residue mulches have been thought of primarily as a method of conserving the soil mixture. The effectiveness of paper mulch is no doubt due to other factors as well.

Since the paper is absolutely impervious to light and moisture, it is very efficient in conserving soil moisture. Then again, the black paper readily absorbs heat, and the temperature of the soil in mulched areas is often noticeably higher than that of neighboring unmulched areas. Soil moisture and temperature often are limiting factors in plant development.

Quite as important as the increase in soil moisture, however, says Doctor Flint, is the distribution of the moisture. Under normal conditions a light rain falling on a porous soil is often of no consequence whatever. When such a rain falls on the paper it is drained to the plants and its effectiveness is not lost but increased. Under the paper the top surface of the soil, which is rich in plant food, is kept in a moist condition so that plant roots can feed there; whereas under ordinary conditions this rich area is often unavailable to the roots because of the dry condition, and what is even mo harmful the plant roots may be e couraged to start growth near the su face by early rains and suffer fro drought later.

Then there is the possibility that t paper mulch exerts some influence the fertility of the soil through t stimulation of the growth of micr organisms. In one of the tests an ar of heavy clay soil of low fertility w planted to sweet corn, half of whic was mulched and the other half le for checking results. The corn on t mulched area made a satisfacto growth and the influence of the mulc was noticeable somewhat beyond i actual limits. Analysis of the soil both areas did not indicate any sig nificant differences in percentage of n trates; when the Hoffer test for ex cess nitrates was applied to the plant however, those from the mulched are were found to be rich in nitrates whi the others showed none whatever. Doc tor Flint believes the explanation li in the assumption that stimulate microorganisms produced an increase i available nitrates which was readil used by the mulched plants. At an rate this instance shows the possibilit of producing a crop with paper mulch on soil of low fertility which under th same climatic conditions did not pro duce a crop without the mulch.

While in all these studies no effor has been made to study the economic of the practice of mulching wit paper, it is obvious that any wide us will depend on the cost of the pape and the expense of laying it. Ther is no question but that crops grov luxuriously with paper and it woul seem that the increase in many of th crops would be sufficient to justify th practice. Especially does it promise new way to "paper money" for th backyard gardener or the truck farme whose income would be greatly increase by producing an earlier crop, a cleane product of better quality, and whos cost of production would be materiall lowered by the elimination of the tedi ous and expensive job of weeding.

Pages From A Field Note Book

A Practical Teacher

By J. L. Baskin

L. E. BARNES, Smith-Hughes teacher of the Winchester High School, Winchester, Tennessee, is a great believer in properly fertilizing crops. "I know it pays," he said, as he invited me to visit his corn and soybeans. Located in the outskirts of town on Highland Rim soil, Mr. Barnes had one of the most outstanding demonstrations of what fertilizer means in growing crops that I have ever seen.

When Mr. Barnes related his activities, one could readily understand why his crops were good. He followed his plowing with a disk and then with a planter having a fertilizer attachment. Certified seed corn was planted on the two acres. At planting time 300 pounds of 4-12-4 fertilizer were applied to which 100 pounds of muriate of potash were added.

The reason for this additional potash on this soil, as explained by Mr. Barnes, was because last year his corn had a spindling stalk, blew down badly, and cracked badly at the bottom joints, thus making the ears "windshaken" or "chaffy." There were no stalks like that this year.

As we passed out of the corn-field, we entered a field of soybeans sowed in rows. The beans were of the Laredo variety and had apparently been seeded at two different times, but Mr. Barnes explained that all had been planted the same day, the difference being in the fertilizing. Two hundred pounds of a 4-12-4 showed wonderful results. Where the distributor had clogged the rows were far behind the rows on either side that were fertilized.

Mr. Barnes believes that it pays to fertilize everything in his section of the country and that many farmers are poor because they are trying to wrest a living from a soil too poor to produce economically.

The soybeans on Mr. Barnes' right were fertilized with 200 lbs. of 4-12-4; those on his left received no fertilizer.

HOME-GROWN SEED BEST

A. L. Baumgardner, a progressive farmer of Cabell county, West Virginia, has just completed a test on the adaptation of clover seed. Mr. Baumgardner's test showed native adapted red clover seed to produce a thousand or more pounds of hay per acre above that produced by imported seed.

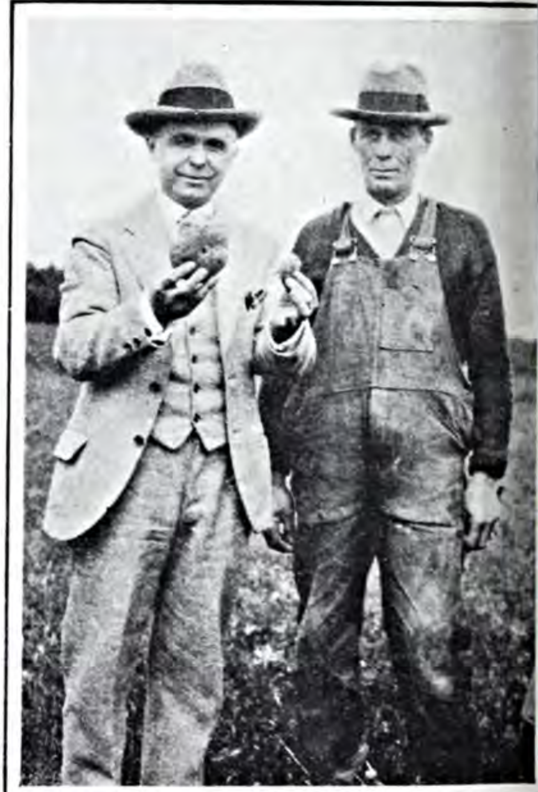
In 1924 probably 200,000 acres in West Virginia were seeded with unadapted or imported seed. The yield at that time averaged about one ton of hay per acre. Such tests as that conducted by Mr. Baumgardner and the campaigns for adapted seed conducted by county agents and reliable seed dealers have changed this.

In 1926 the average yield was 1 1/3 tons per acre and in 1927 it was 1½ tons per acre. One half of the increase has doubtless been due to favorable seasons. The other half may reasonably be attributed to the more general use of adapted seed. There are 379,000 acres of clover in West Virginia. A 500-pound increase in yield means 94,750 tons of hay worth for hay or soil fertility on the farm $947,500.—E. E. Pittman, Elizabethtown, Ky.

CABBAGE PROFITS

AN interesting fertilizer test with cabbage on a sandy loam soil was completed a short time ago on the farm of Mr. T. M. Puller, a leading truck grower of Elleson, Hanover county, Virginia. Mr. Puller tried three different fertilizer combinations at the same rate per acre on equal areas of ground. He used the same number of rows of the same length and took the weight of 100 cabbages from each plot, using the rows near the center of the plot in each case and taking them as they came. Knowing the number of plants set per acre, he was then able to calculate the rate of production per acre.

His results are as follows: Plot 1 = 12,000 lbs. cabbage per acre sold for $240.00; Plot 2 = 16,800 lbs. cabba per acre sold for $336.00; and Pl 3 = 19,200 lbs. per acre, sold f $384.00. The three different fert izer mixtures were as follows, and t same sources of ammonia and pho phates were used in each one: Pl 1 received 1,500 lbs. of 6-9-0; Plot received 1,500 lbs. of 6-9-5, and Pl 3 got 1,500 lbs. of 6-9-10. The ca bages were more even in size and we ready about two weeks earlier on t third plot than on either of the oth two. Evidently a complete fertiliz is the thing for cabbages in that se tion. The addition of potash to t phosphate and ammonia resulted the increases in yield and value stated above.—W. L. Myers, Rich mond, Va.



J. A. Fortin, agriculturist for Champlain Co Que., holding in his left hand an average potat from a row where no fertilizer was applied, th distributor being plugged. In his right hand a potato from a hill that received 1,800 lbs. pe acre of a 6-8-12 fertilizer. The picture wa taken during a recent tour of Canadian agricul turists through the famous Aroostook Co. potat district. The gentleman on Mr. Fortin's left Roy S. Libby, Caribou, Maine, in whose field thi striking difference in growth, due to fertilization was noted.

South Dakota Soils

(*From Page* 30)

ood land to work could not make the ecessary outlay of money to put the oil in proper condition. It may be roper to note that the business men vere no more prosperous than the armer, and all the descendents of a ne time prosperous people suffered like.

The fertility of South Dakota land s decreasing, the same as it has de- reased in other states. There is no eason to believe that it will not run lown in fertility to a point where it vill be impossible to make a living arming it unless a definite system of farming which will maintain fertilty is adopted and followed consistently. We are fortunate in being able to grow a wide variety of legumes and in being able to use them to such splendid advantages in livestock feeding, which is now our major industry. However, this can not be accepted as the final solution to the whole problem, as it can at best take care of only the element nitrogen, and we will need phosphorus in considerable amounts and potash and lime to keep the elements properly balanced.

Fertilizer Turns the Trick

(*From Page* 29)

Comments from two of the leading fertilizer dealers made to the county agent gives some idea as to the effect of the campaign. The agent asked one of the dealers for an advertisement for the county fair catalogue. His reply was, "What's the use of me advertising when I have one thing to sell and you recommend another which I do not carry? Why I had a man drive away from my place a few days ago because I did not carry the fertilizer you recommend and nothing that I could say changed his mind in the least. He had to have what you recommended." Another one said, "I will have to hand it to you. You sure did wake these farmers up on the fertilizer question. I never sold as much high analysis and complete fertilizers in my life. I had ordered a little as per your request, but my scotts! I could hardly keep in the stuff. Your propagandar is right in keeping with my ideas. I am glad you've got them going."

The idea of a balanced ration for plants was tried out on everything from gardens to meadows. Potato yields were increased from 50 to 100 bushels per acre; tomato yields were increased 25 to 50 per cent. One man reports a yield of 55 bushels of corn per acre where he used a 4-16-4 fertilizer and 35 bushels where he used straight 16 per cent superphosphate in the same field.

A wheat field in one community on which 300 pounds of a 4-16-4 fertilizer were used produced a yield which was the largest in the community and doubled more than half of the yields gotten by other farmers. The threshed grain from this field weighed out two pounds per bushel more than the standard for a measured bushel, while nearly all other wheat in the same community weighed from two to six pounds under the standard. Probably the difference would not have been so marked had this not been a very poor wheat year for this section. Anyway, the fertilizer proved good insurance for this farmer.

A timothy and clover meadow on which 300 to 400 pounds of a complete fertilizer was used yielded 2½ tons of a first-class hay per acre, while the average for that community is 1¼ tons.

On another field the timothy sod was top-dressed in the spring with 100 pounds of nitrate of soda and 200 pounds of 16 per cent superphos phate per acre. The difference i growth was 100 per cent. This chec could be seen as far as one could se the field.

Farmers should study their condi tions and soils and apply the thin that will give best results. Success ful agriculture depends more upo economic production than anythin else. There is no economy in culti vating two acres to get what one wi produce if properly cultivated an fed.

Certified Potato Seed

(*From Page* 28)

age of 20.5 per cent of the hills were affected only moderately by rhizoctonia, while in strain II 87.1 per cent of the hills were severely attacked by the disease.

This difference in percentage of rhizoctonia in the two strains can hardly be attributed to infected seed. There was no evidence of sclerotia on the seed in either case, and instances are well known where untreated seed badly infected by rhizoctonia has been planted at Hastings with no detrimental effect upon the growing crop. It is equally noteworthy that clean seed planted at La Crosse under certain conditions may show severe infection in 85 to 90 per cent of the hills. It is difficult to explain this difference in the two areas since the Hastings section has a higher percentage of soil moisture and lower soil temperatures at the time of rhizoctonia infection. But this is not pertinent to the problem.

The most satisfying explanation for the difference noted in the two strains as regards rhizoctonia infection is that based upon the relative vigor and growth. The plants in strain I came through the ground more quickly than those in II. Richards* showed that the rate of growth at this stage wa directly correlated with rhizoctoni infection, the slower growing plant showing the higher percentage.

A number of hill secetions wer made of both strains at the time o harvesting. These were sent to P. M Lombard at Presque Isle, Maine, to b grown out during the summer o 1928. Progeny from these will b planted again in Florida in order t observe essential differences.

The facts related above may serv to stimulate more careful thought o the part of the potato grower whe he buys his seed potatoes. It certainl emphasizes the need for more researc in discovering and propagating certai strains showing a peculiar adaptatio to certain climatic and soil conditions It shows quite clearly that certain in herent plant characteristics showin wide variations under different en vironment conditions are bound up i seed potatoes, and that these importan factors are beyond the ken of presen methods of seed certification.

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* Richards, B. L. Further studies on th pathogenicity of Corticium vagum on th potato as affected by soil temperatures. Jour Agr. Res. 23: 761-770, 1923.

elow: This cotton, well fertilized, re-eived in addition a side-dressing of nitrate of soda and potash.

Above: Poorly fertilized cotton, typical of large areas in the Coastal Plains area this year.

Lightnin'

(*From Page* 21)

one of the farmers expressed it are rust and wilt, which are more prevalent in the Coastal Plain sections this year than during any other season. They have doubtless been accentuated by the lack of proper fertilization to begin with, and the heavy rainfall conditions prevailing during the growing season as an important secondary and contributing cause. Cotton must have a liberal ration of well-balanced fertilizer to grow and develop normally. The lack of any one of the essential plant food elements brings about an abnormal condition in the plant.

The condition referred to is caused by a lack of sufficient potash, more than the lack of any other single necessary plant food.

While the impression has been given by some, both white and colored farmers, that kainit is the only source of potash that will control rust or give better resistance to wilt, it is known that other sources of potash are just as valuable in this respect as the crude salt of kainit. Especially has this been demonstrated in Arkansas and Mississippi, where wilt and rust have been studied rather extensively.

Thousands and thousands of acres in the Coastal Plains of the Carolinas, Georgia, and Alabama are affected this year and conditions similar to those shown in illustration No. 2, where, due to lack of plant food in sufficient quantities and properly balanced, from 10 to 15 acres will be necessary to make one bale.

On the other hand, similar soils properly fertilized on adjacent or nearby fields, such as are shown in illustration No. 3, will make a bale or more per acre due to different fertilizer practices.

CAT ADOPTS "POLE" KITTENS

Alva, Okla.—Ward Chase, Vocational Agriculture Instructor of this city for Alva and Northwestern State Teacher's College high schools, is claiming the Oklahoma championship for a side line to regular project supervision. Paul Weibner of N. W. S. T. College high school, who has wheat as a regular project, is claiming his instructor's time to observe his cat that has one kitten and two adopted skunks. The skunks are doing nicely and do not resent handling by Paul according to the "aggie" instructor.

Go West, Young Man, But Not Too Far

By Lee VanDerlinden

Chicago, Illinois

AMERICAN people in general are led to believe farming is in a bad way. This opinion has been brought about by certain politicians, as well as by information given out by some farm organizations. We are especially asked to believe that farmers in the Northwest, or in Iowa, Minnesota, North and South Dakota, Nebraska and Kansas, which states comprise the important wheat, corn and hay belts of the United States, are suffering from the past economic change which came as a result of post-war deflation.

However, the writer feels that, like Mark Twain's death, most of these stories are "exaggerated." A trip through these states fails to disclose great suffering. There is no doubt that farmers in these states are paying interest on a great deal of paper held by banks. But so are farmers of Maryland, Indiana, Texas, California, and all the other states. And so are the business men all over the country.

Farmers in the Northwest are handling more money per acre, generally, than they ever did with the exception of the war years. But, the habits of the farmer changed with the war. He wants, and has, many luxuries now, that it was impossible to have a few years ago. The farmer of the Northwest today enjoys the automobile, various magazines and newspapers, moving picture shows and other entertainments that his predecessor of but 25 years ago could not have.

His hours are not as long as they used to be. It may be true that hired help costs more now, that taxes are higher, and that machinery is still high. But, this new machinery enables him to farm more acres with less help; it enables him to grow more bushels per man. And it is because his wants are greater now than ever before that many are convincing themselves that farming is not as profitable as it used to be.

In this general discussion, let us not forget that much of the credit for the present condition of prosperity is due the agricultural college people, the county agents, and the teachers of vocational agriculture, who have worked untiringly to keep up the production of various crops, despite the fact that the store of plant foods in the soils are being so rapidly depleted, and not very much being replaced. This has been accomplished by the improvement of seed, by weed control, and by the various experimental work carried on by these untiring workers.

Corn is now being matured in parts of these states where it was believed impossible just a few years ago. Sweet clover and other legumes have been introduced, and liming has become a widespread practice, in the last few years. Crops are not always good, for this region sometimes suffers from a lack of water, but on the whole the Northwest is a wonderful farm territory, with plenty of opportunities to all who wish to work. These farmers have money and can pay their bills. A few are being sold out, it is true, but mostly they are the ones who have no interest in farming, and who were not farming as well as they knew how.

For the man who wishes to buy a farm, where the opportunities are unlimited, say to him as did Horace Greeley, Go West, young man, go West.

But I would add to this not too far West, stop off at one of the Dakotas, Kansas, Nebraska, Iowa, or Minnesota.

For there's money in those hills and plains.

The Right Way

(*From Page* 13)

oadcast section of the field yielded the rate of 21.7 bushels per acre, hile the hill fertilized corn yielded .5 bushels per acre. In addition, alk tests revealed that the limiting ctor at this rate of yield was an insufficient supply of potash. Twenty pounds of K_2O were inadequate for a yield higher than 73.5 bushels this season. Accordingly, Graham is planning to use larger amounts of potash next year in his hill fertilized corn.

Which Wheats Are Best?

(*From Page* 27)

nd texture of loaf. It was one of he three classes averaging lowest in h content of flour.

"White wheat did not excel in any actor. Its best points were its high color score and low ash content of flour. It averaged lowest in volume, weight, and texture of loaf, and second lowest in test weight per bushel and crude protein content of wheat, and in water absorption of flour."

Michigan

(*From Page* 12)

on. A row of barley planted between every fifth or sixth row of onons will give fair protection to the onion crop. Permanent windbreaks may be obtained through the planting of rows of shrubs or trees. Norway spruce, white cedar, box elder, and willow may be used for permanent plantings.

Plant varieties of major importance have been developed at the Michigan station. Perhaps the best known of these, Rosen rye, has so completely replaced other varieties in this state that it is practically impossible to find a field of rye which does not plainly show that it has drawn upon the store of quality present in the few seeds of this variety originally planted at the station. The desirable characteristics of the rye has led to its wide distribution throughout the country, and the same characters have made it a consistent winner of first place at the International Hay and Grain Show.

Robust beans, a variety resistant to blight and anthracnose and immune to mosaic, is another plant variety which is widely used in Michigan and other northern, bean-producing states. This variety made almost a clean sweep of the prize money in its class at the International last year.

Red Rock wheat, a variety developed on the station, is one of the leaders in Michigan. Berkley Rock wheat is a high yielding variety with an unusually high gluten content for a winter wheat. One milling company in Michigan bought all of this variety which they could obtain, and sold the flour produced from it abroad where the flour was used for bread prescribed for invalids. These millers, by paying a higher price, have encouraged the planting of this variety in the area where the mill is located.

Several varieties of oats which are popular in the State have been produced by the plant breeders at the station. Spartan barley, a smooth-awned white variety is a recent production of the department. When canners in the

State complained that the common varieties of red kidney beans did not make a satisfactory appearance when canned, the men at the station found that the beans contained strains of beans which bleached when cooked. Selective breeding produced a variety of red kidney beans which are fast color.

Varietal tests of clover and alfalfa have saved Michigan farmers from great monetary losses which formerly resulted from the planting of unadapted varieties. Residents of the State now have no excuse for sowing seed which will not produce a satisfactory crop. The station plant breeding work has been the basis for a development of certified seed service in Michigan which not only furnishes seed for farmers here but also for thousands of farmers in other States.

The effect of cultural practices on a crop has received its share of attention. Experimental work with sugar beets shows that fall plowing materially increases the yield, and that when land was plowed eight inches deep it yielded one ton to the acre more beets than when plowed six inches deep. Fields of beets blocked carefully to bunches 12 inches apart and thinned to the strongest plants produced four tons to the acre more beets than similar areas blocked and thinned according to common practices. Field men representing the sugar manufacturers attend schools each year where they are informed by members of the staff of the proved practices that are recommended for use in the field.

The increased use of alfalfa in the state soon proved to the growers that hay making methods in use formerly were not entirely satisfactory for making a high quality of alfalfa hay. Investigations by the crops department led to the recommendation of a method which included the raking of alfalfa soon after cutting, and curing the hay while it was in loose windrows. The hay, then, could be loaded from the windrow with a hayloader. T method proved entirely practical. resulted in a better grade of h little shattering of leaves, and less e pense for the operation.

An investigation by the dairy d partment concerning the mineral r quirements of growing animals h shown that bone flour furnishes all t minerals needed by animals which a receiving a normal ration. It has al been shown that animals which recei a mixture of ground raw rock pho phate and lime rock are seriously i jured. Animals which are fed th mixture for a long time have faul teeth which are so sensitive that it necessary to warm their drinking w ter in winter before the animals w drink. Even in summer, these anim lap water like a dog instead of drin ing normally.

Another experiment has proved th the so-called cotton seed injury, whi has been the subject of many exper ments, is not caused by any deleterio properties of the cotton seed meal, b is a disorder which is caused by ov feeding of concentrates. Identic symptoms of physical deficiencies c be noted in animals which are f other concentrates and an insufficie amount of suitable roughage.

Soils Needed Lime

Many Michigan farmers who wish to grow alfalfa several years ago four that the acidity of their soil wou have to be corrected before a satisfa tory stand of the legume could l obtained. The cost of applying lim however, proved to be a stumblin block in numerous instances. Marl d posits were plentiful in the state b there was no satisfactory method getting the material in quantities fro most of the beds.

The agricultural engineering sectio of the station was given the proje of perfecting equipment which woul enable a group of farmers to get o the marl needed to prepare their lan for planting legumes. The depar ment designed machinery which was inexpensive enough so that it could be used by small groups and which would satisfactorily do the work. To familiarize farmers with the machinery, a model rig is sent out from the College in charge of members of the department to dig marl from beds located in many sections of the state.

The mole drainage project now being carried on by the department promises to be of great economic importance to the farmers of the state. The station work on the project indicates that a drain which will give satisfactory service for two or three years can be placed by this method in clay soil at a cost which is less than the interest charge on the money which would be invested in a tile drain.

The department is cooperating with the engineering experiment station and a public utilities company in an investigation of the adaption of electrical power for use with farm machinery. Last year's work on this project proved that electric power is an economical and satisfactory form of power for filling silos.

Old theories concerning the pruning of mature apple trees proved fallacious after a systematic study of the effect of severe pruning upon the yields, of bearing trees. Orchardists of the State are now advised to use extreme care in pruning producing apple orchards, and that a heavy pruning is directly reflected in a decrease in yield.

The old quarrel between the owners of bees and the horticulturists who were forced to use poison sprays to save their fruit has been made less rancorous in Michigan by the studies of station workers which show that, in many orchards, bees are necessary to insure a paying crop of fruit. One of the largest canning companies in the state rented 200 colonies of bees this year to be placed in their own orchards, and many farmers now own or rent bees to carry pollen in orchards planted with large flocks of self sterile varieties of fruit.

Variety testing and breeding of varieties of vegetables has been of material assistance to the truck growers of the State. One of the best known developments of this work is the John Baer tomato which is now widely grown for canneries in this and other States.

Control of Insects

The difficulties encountered by the entomologist at the Michigan station sometimes bring him to a mental state

Cass county plots. The plot in the foreground received no treatment; the middle plot limestone; the plot in the background limestone and 400 lbs. of complete fertilizer.

in which he expresses a desire to visit that promised land, "where there's never rain or snow, nor ever wind blows loudly." His problems are complicated by a climatic variation that brings fruit trees into blossom at the south end of the fruit belt two weeks or more before trees reach a similar stage at the north end. Spray recommendations that are correct for South Haven are not applicable at the same time at Traverse City. Latitude, altitude, and the influence of the Great Lakes combine to make a climatic puzzle.

To enable worth while information to be given on the control of fruit insects, it has been necessary to do a great deal of work in the determination of sections within which trees are at a similar state of growth and insects are at an identical stage of development. Thirty observatory stations have been placed at strategic points of the fruit belt to determine the date of emergence of the second brood of the codling moth. As the insects emerge, spray warnings are sent to the growers within the area which is climatically similar to the point at which the observatory is stationed. The success of this system during the past few years has led to the establishment of similar observatory stations as a basis for spray recommendations for the control of the cherry fruit fly.

A sub-station as a cooperative project with other college departments is maintained at Monroe for research work on corn borer control. This pest together with the Mexican bean beetle which finally has invaded Michigan are present major problems for investigation.

Research in Disease

The capital invested by Michigan farmers in dairy herds needs the insurance given by a continuous study of the disease affecting dairy cattle, and the research men of the veterinary and bacteriology sections have given material assistance in diseas control work. One of the best know projects has been the work done o contagious abortion of cattle. Thousands of tests of blood samples ar made in the college laboratories eac year, and, recently, a more efficien and rapid agglutination test has bee developed. Another test for the determination of animals immune to th disease shows great promise at th present time.

A member of the staff has develope a new remedy for the treatment o internal parasites. The remedy is being thoroughly tested and its use ha proved it to be satisfactory. Th preparation is being prepared commercially by a firm of manufacturin chemists.

Commercial chick hatcheries an the importance of the poultry industry to the state have made it necessary to do an immense amount o work on the control of poultry diseases. Blood tests for the determination of bacillary white diarrhea ar made in the college laboratories. A nominal charge is made for the tests and the number made can be judge by the receipt of more than $1,50 for making the tests last year.

Many Other Lines

This story of the station activitie can not give a just account of many lines of work that are being carried on. Several departments that are of major importance have not been mentioned, and it is impossible to do justice to the work of each individual on the staff within an article of this length. Research workers, however, have become accustomed to perform their tasks with a minimum of credit, and their work is usually given proper credit only when it has been applied in the field for years; and when someone discovers that a test tube, a little plat of ground, or a few seeds contained the magic which has materially changed the practices and rewards of the agricultural industry.

Victuals

(*From Page* 4)

[H]e who writes the songs of a nation [ma]y be very effective, but she who [sel]ects its sustenance is the final [ar]biter of destinies.

Custom has laid down the law that [he] who works must eat, but not al[w]ays has it been possible to enforce [th]e other edict that he who eats must [w]ork. There have been far more [w]orkers going hungry than there have [be]en overfed men at work. I am not [op]ening any socialistic plea at this [po]int, however. Suffice it to mention [th]e fact that the real cause of the fall [o]f Rome was the practice of feeding [a] large part of the population in idle[n]ess at the expense of the state. If [w]e put on a few more armies of food [a]nd drink inspectors in America our [d]oom may be sealed for similar rea[so]ns.

In my exhaustive prehistoric re[se]arches in the most redundant ency[c]lopedia I have, it says that the cliff [d]wellers had a sort of "cave-e-teria" [s]ystem, embodying the snaring or [s]toning of a few hapless fauna and [t]oting them back to a hole in the [w]all. After their supplies of moss [a]nd mushrooms for salad and nuts [a]nd ground cherries for dessert grew [s]carce, they used more ingenuity and [s]lowly devised more effective lunch [h]ooks. Instead of remaining collec[t]ors they graduated from the antique [b]usiness and soon became gardeners [a]nd herdsmen. From this it was but [a] step to the life of the pastoral [n]omad whose wanderings were deter[m]ined largely by his need for provi[s]ions.

Man's economic and social progress have mostly come through his conquest of nature. The human engine had to be stoked regularly and there had to be plenty of fuel for the stiffest grades.

Little if any intelligence marked the early days of mankind in relation to food. Some of that early zeal for rapid reception clings to us still, but we are at least less noisy about it than our ancestors. Even our boarding houses have largely discarded the Marquis of Queensbury rules.

By and by mankind learned that the soil which grew the food and the human system that received it merited some consideration. The naked fallow system of land resting was slowly adopted and at the same time a few of the heaviest feeders were obliged to take time out. Hence they began to fast.

WHEN the fallow and fast failed to do all that was expected the later generation under Roman influence in Britain gave the land a diet of legumes and the stomach a diet of more varied victuals. And now we have reached the vitamin-mineral stage of food progress, while the land around us receives more thoughtful replenishment.

Within the limits of a short dissertation on dessert like this must be, one cannot give a course in dietetics, gastronomics, or diabetes. The nub of the subject lies to my notion in the change in our attitude as a generation toward victuals. We have come to think of their *quality* and their *health promoting* and *protective* attributes.

Of course, a few of my acquaintances still adhere to the fallacy that the test of a good meal is the pressure exerted on the vest buttons, but I have ceased to invite them over. Our menu is run on the *once around* service plan, and we hold out no deluding promise of more down cellar in a tea cup.

In this I am making no attack on the corn pone, hoe cake, and venison of Daniel Boone and the conquerors of the continent. They had to take a lot of punishment and absorb nourishment accordingly. But that they escaped pyorrhea and restaurant fare is often overlooked. And as far as stamina is concerned, many of our statesmen can filibuster as long after a breakfast of corky crisps as the Continental Congress could do on a Virginia table d'hote dinner. Compare the tons of victuals that Columbus carted over with the small sandwich package that was taken back by Colonel Lindbergh. It isn't what you eat, but what you don't eat that saves you.

Lack of food used to be the greatest terror known to man. Bad food has since been proved to be a far worse catastrophe. The genius of science and the progress of machinery have combined to strengthen the arm of the producer, so that as far as this nation is concerned we seem to hear more about surplus than deficiency. This is well, because it gives the folks bent on quality consignments a better chance to pick and choose.

My grocer points to the label, "Food and Drug Act of June, 1906," and declares that his potted ham and canned beans are certified by Congress. Here and there he may be mistaken, but on the whole he is right. The Spanish American War bully beef scandals and the upheaval of noisome stories in the stockyards and packing plants started a Klean Kitchen Klan movement that worked wonders. Deleterious preservatives and poisonous coloring compounds went down to defeat and raised the standard of public opinion. While it could not stop the greasy cooking in private life, the general effect has been toward merit and moderation in the way we absorb provisions.

Most blessed of all, it paved the way for the opening of those college courses that made classics out of custard pies and poems out of pork chops. The rise of the culinary curriculums taught us that the "why" and "what" of eating was as important as th "when." The first timid overtures c this kind, relegated to side rooms ar offered with apologies, were calle "domestic science courses." Sinc then they have been brought to th front of the building and are know as "home economics degrees."

Such an army of women who trea ured recipe books as much as the mothers hung to love letters could nc help but affect the hygienic we fare of the populace, and they hav done much to rid the marriage vow c the leaden threat of bridal biscuits.

THE general effect of quality vic tual campaigns and lessons o vitamins and variety are even ob served in the erstwhile pork-sausage and-sinker sections. Farm folks ma be poorer paid than of yore, but the are far better fed. Nowadays I ge some of my most pleasing meals (out side of our own domicile) where farn women spread milk dishes, gree salads and raw fruits among th heavier pastries. (The above paren thesis was needed to preserve domesti serenity.)

The protective properties of huma food are equally evident in moder home literature. The milk men sa it first and got the head start on the beefy brothers in capitalizing suc virtues. Unfortunately, it started lot of bother anent what substitute the householder could safely use whe prices of the "only original" soare too high. Unless they page anothe Volstead to introduce another arb trary limitation ordinance, I am afrai many people are going to be indepen dent in this at the risk of losing the normal plane of nutrition.

Whichever way that little side issu may be settled concerns me not. M chief premise is that certain foods ai known to be protective above other and that the fellow who wrote th adage about the "apple a day" an the absence of the doctor was a cer tury ahead of his time. It may tak crate of oranges to equal one box pills, but who wants to eat the ls?

I dare not enter too technically into s theory of the protective qualities grub. The reasons are obvious. I ıst remain at a distance and admire e work of others. Besides, I am ore familiar with Feeds and Feed- ; and you are not asking the advice a veterinarian.

Mineral intake is a little abstruse me yet. I have endorsed the use salts for the soil and I believe that ions and such plants become onger through the use of minerals. et I am aware that minerals for mor- ls are getting to be quite "it." dine is idolized and calcium is capi- lized.

I had an infant cousin once who e dirt. I tried a mouthful just to chummy, but I decided that I had herited all the grit required from y Scotch-Irish ancestors. Where e made her error in the experiment as in acquiring it from original urces. It is not thus advocated. inerals must go through a perfect lter of tissues in the vegetable and nimal kingdom before I can get any ck out of them. I am willing to at at the third or fourth table under nese circumstances without murmur.

"Tell me what you eat and I will ell you what you are"—"The hand nat stirs the ladle is the hand that ules the world"—"Digestion waits on ppetite, and health on both"— When eating here watch your hat nd overcoat!"

One could go on quoting and para- hrasing numerous wise saws and nodern instances concerning the otent part which viands play in the ife of man.

But after all the research and wis- lom has been spilled, the most of us ean back in our chairs and dream quietly of those olden golden days when patient old Father called in his irm and resonant voice at the foot of he stairs on winter mornings: "Bill, get up now, breakfast is ready." After summoning up all your resolu- tion in a swift plunge for your pants, you opened the bedroom door and got a whiff of griddle cakes, oat meal, and milk toast, and you heard the kettle singing on the hob. And when you came down with tousled hair, Mother was standing there in her benevolent majesty ready to fry and bake and parboil from sun-up to sun-down for a hungry family of heedless, growing children..

Much as I revere those sacred rituals of the cook stove and treasure them in memory's record, I earnestly ad- monish you not to repeat to your wife those brooding words: "These are not like mother made!"

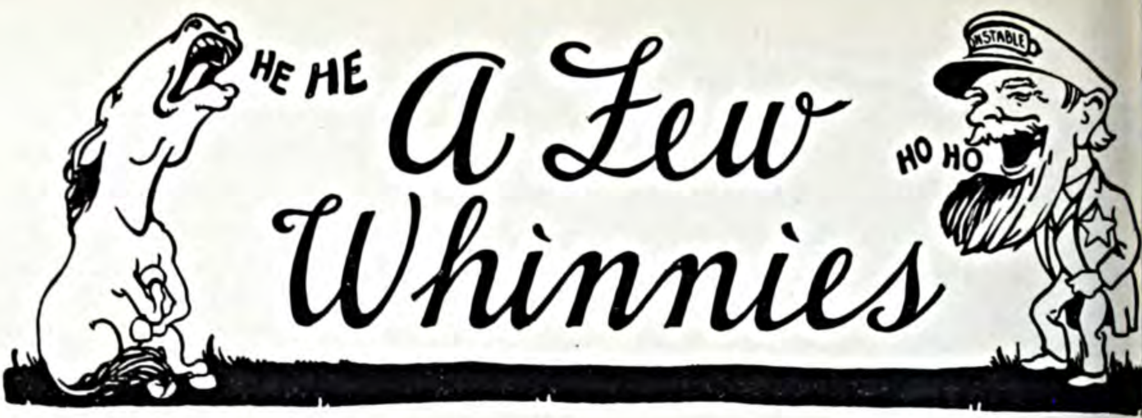
Just notice how deeply satisfied your children are over the provender which your table supplies, and then realize that your wife is your mother's successor as high priestess of the side- board. When they grow older and take on dyspeptic habits, perhaps they will in their turn invest your wife with the glamor of Rector's or Del- monico's.

Good food is like old friends—we remember the whipped cream in their make-up and soon forget the burnt crusts.

SO as you eat Plymouth Rock rooster in honor of the Pilgrim Fathers on the craggy coast, try to recall the rest of that honored High- land blessing which runs: "for we hae meat and we can eat, for which the Lord be thankit!"

But before you sweep the crumbs away, there may be a few baskets of victuals to fill for those who are not financially able to discriminate be- tween vitamins A, B, C, or X. And if there are such within the reach of your bounty, so much the merrier will your feast become.

For no matter how widely some of us are separated by artificial things, we are all kin in the kitchin!



A Few Whinnies

"Nose Wipin" Free

An enterprising youngster has started a new business.

His business card gives the following information:

Mr. Gerald Allen, Jr.
Personal Escorter
Tots and Kiddies took
to school and returned,
prompt in perfect cond-
dishin—if received that
way. Military discipline.
Rates 25c a week. Refined
conversashin. No extry
charge for nose wipin.
All I ast is a trial.—*Tawney Kat.*

Gentle hands were lifting Pat from the wreckage of his automobile, which had just been struck at a grade crossing by a fast passenger train.

"How did it happen?" asked a friend, who was with the rescue party.

"Begorra," fumed Pat, "'tis more than Oi can understand. Ye'd have thought that the engineer of the train could have seen me comin' in broad daylight!"

Cash and Carry

A dusky lady hurried into the drug store the other day and said she wanted a cent's worth of insect powder.

"But, lady," said the druggist, "that's not enough to wrap up."

"Man," exclaimed the lady, "Ah doesn't ax you to do no wrappin' up —jus' blow it down mah back."

SOPHISTICATED

A little boy from Canada, who h
never seen a negro, was riding in N
York with his uncle when he spied
colored lady.

"Uncle, why does that wom
black her face?"

"She doesn't; that's her natu
color."

"Is she black like that all over
"Why, yes," uncle replied.

The boy looked up beamingly
his uncle. "Gee, uncle, you kn
everything, don't you?" — *Ty
Graphic.*

"I shall die," throbbed the suit
"unless you consent to marry me."

"I'm sorry," said the maiden kind
but firmly, "but I will not mar
you."

So the fellow went out West a
after sixty-two years, three mont
and a day became suddenly ill a
died.

"The best thing for you to do
said the doctor, "is to give up smo
ing, drinking anything but water
your meals, late hours—"

"Wait," entreated the patien
"what's the next best thing?"

Swallowed His Destination

A Negro employee of the expre
company approached his boss with t
query:

"Boss, what we gwine to do 'bo
dat billy goat? He done et up whe
he gwine."

Better Crops with PLANT FOOD

Dec. 1928 10 Cents

The Pocket Book of Agriculture

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

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

Editorial Offices: 19 West 44th Street, New York

VOLUME XI NUMBER SIX

TABLE OF CONTENTS, DECEMBER, 1928

Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY.

of Amsterdam, Holland

Directors: J. N. HARPER G. J. CALLISTER

Lo! now is come our joyful'st feast!
Let every man be jolly.
Each room with ivy leaves is drest,
And every post with holly.

—Wither

BLISHED MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION, WEST 44TH STREET, NEW YORK. SUBSCRIPTION, $1.00 PER YEAR; 10C PER

L. XI NEW YORK, DECEMBER, 1928 No. 6

ff says, "You must be a
rt of what you part with."

Holly Time

By Jeff McDermid

OST-CARD designers, sketchy correspondents, and motto mongers who persist in lazily writing it "XMAS" have my sympathy. By their own dmission in perfectly good algebra, the Originator of the Day is to them an nknown quantity.

This is my only peeve at Holly ime—the only incident in the whole eason of buy and bustle that in the east way makes me intolerant. To nar the great name of our best holiay by using the sign manual of an literate, and to do so without logical xcuse whatsoever is enough to turn nerry Tom Pinch into the most sullen f Scrooges. Now that this petty rritant is off my chest like an oldashioned court plaster, let us turn to he subject in hand with all the enhusiasm becoming such a happy heme.

Christmas is a children's holiday in our minds because it has been such to each and all of us in our fondest personal memories. It takes us all back home.

Children remember Christmas as the time of exchanging presents. Some of us recall past Christmases by the gifts we *received;* while others conjure up and hold most dear those Christmases when things or services were *given* to those in need out of the fulness of a kindly heart.

Whether we prefer to be collectors or distributors at Christmas time depends upon the propensities to selfishness or generosity gained in childhood.

Exchanging presents or the donation of gifts in itself has no relation to Christmas because it was a custom among mortals long before Christmas originated. I recall that my friends in Dakota, the Oglalla Sioux, told me that for centuries it has been their custom to have a "give away" at funerals, wherein the mourners pass out all of their personal belongings to the guests.

IN former times, before man had nerve enough to venture outside of a castle without his armour on, the giving of presents was largely a groveling tribute or a sly bid for favor. As long as men were ruled by fear and dominated by greed, the exchanging of presents must have been a futile old farce.

But if we recall the Christmas happiness of Tiny Tim, despite his cruel infirmity, or see again the ecstasy of poor, abused, little Cossette when Jean Valjean gave her a doll in the sordid old inn—then do we receive anew the perspective of a richer form of giving and of living.

For the chief secret of its alchemy of delight is this: that *living* is *giving* and *giving* is *living*, whether it be on December 25th or not. Those ancient and variously interpreted forms of giving have been transformed by means of Christmas to a nobler plane. Unselfish interest in the lives and welfare of others cannot be substituted by any flashy present, from a set of tiddley winks to a diamond tiara. You can't live unless you give, and you can't give unless you live!

In other words, you must be a *part* of what you *part with.* Likewise, the receiver must give a *token* with all that's *taken,* instead of forgetting about the love that lies behind the gift and trying to trade it back tomorrow at the dime store!

I was brought up in a Yankee hon presided over by a dear Mother, t memory of whose voice reciti Moore's "Night Before Christma comes once more as a benediction. Y we lived in a settlement of cosmopo tan people, and it was from them th I learned the variations in the holid theme as traced in the legends a traditions of the world.

We had neighbors who brought the Tannenbaum, the German festi fir tree, in remembrance of the custo of ancestors who spent Weihnacht abend along the glittering Rhine. W children joined their chorals and ni bled their spicey Kuchen. Other go neighbors told us of "Jule Nissen," t Danish sprite of countless Christm revels in their native land. John V der Donk, our township chairma taught his children to watch for Sai Nicholas and to expect their wood "klompen" to be full of stick canc on the morrow's dawn. One Itali family spoke with mysterious gladne of "Il Santissimo Bambino," th saintly child of the cloister where th candles were brightest on Christm eve. Our jolly English friends con tributed roast beef, plum pudding, an masquerade pantomimes to the po pourri of Yuletide lore which ou neighborhood could muster.

Sometimes it was hard for the fo eign-born parents to understand a their neighbors said in ordinary dai intercourse, but they did not need t children to open their hearts and fee ings toward each other at Christm time. Smiles and handclasps requi no interpreter.

IN fact, it was an American com munity which asked only of it members that they lay aside morbi cares and petty foibles to join in an in terval of wholesome fellowship unde the light of the winter stars.

Our best foundations for a unitec understanding America were laid an

(*Turn to Page* 61)

nual Field Day and Picnic, Bradford County, Pennsylvania, Experiment Fields. Farmers studying the effects of fertilizer treatments on the production of the several crops.

A Potash-hungry Soil

By J. W. White

Soils Research Chemist, Pennsylvania State College

N northeastern Pennsylvania among . a succession of smooth contoured ills and narrow, steep-sided valleys is ound the soil which becomes the subct of this story. Derived from a ixture of glacial till, decomposed ale and sandstone, this soil which we all Volusia is worthy of special conderation.

From the scenic standpoint this secion of the Keystone State claimed by olusia soil fills all the requirements f the landscape artist. With little magination he should be able to depict n his canvas the invasion of the reat ice barriers from the north which left so clear a record on the mooth-topped hills of Bradford ounty.

Traveling north from Williamsport oward Elmira on the Northern Centtral, we leave the train at Columbia Cross Roads, or if you prefer to travel by auto go direct to Springfield. Better come in August for each year at that time is held our annual field day and picnic. From three to five thousand farmers and their families gather on this day for pleasure and serious thought concerning the problems of economic farming, with special reference to the production of crops upon which they are dependent for the maintenance of the dairy industry, so highly developed in northern Pennsylvania.

Since the establishment of our field plot experiments this soil has been subdivided into Volusia, Wooster, and Canfield. Each of these is represented in the field experiments. The three soils include gravelly silt loam and differ with respect to drainage and depth of soil. In relation to our field experiments, the term Volusia soil therefore includes, to a limited extent, these other two soils. Volusia soil mass is normally three feet or less in depth resting on broken shale or sandstone. The subsoil is generally heavy, frequently a silty clay or clay that is quite impervious to water. In many cases, the glacial material represents but a small part of the soil mass. The soil is poorly drained and very sour and is typical of our so-called "late soils."

This "Volusia group" of glaciated soils includes 19.4 per cent of the state soil area and is located in the northeastern and northwestern sections of the State. The chemical composition of Volusia soil differs from other soils of the State in that it contains relatively high percentages of organic matter, nitrogen, and phosphorus, and a low percentage of potash and lime. Compared to our Hagerstown series of limestone origin, our most productive soil of the State, Volusia soil is 49 per cent higher in nitrogen and organic matter, 46 per cent higher in phosphorus, but contains 30 per cent less total potash. The value of potash in the production of crops on Volusia soil as compared to the soil's response to applications of phosphorus and nitrogen is parallel to the proportions of these plant food elements present. This statement is especially true in case of the relative value of these three fertilizer constituents in the four-year rotations.

Local Farm Conditions

A study of the local farm conditions prior to the establishment of the field plot experiments, brought out some interesting facts concerning the farming system, or lack of system followed in this remote and rural section of the "North Tier" county where the roads are heavy and the haul is long—the home of the little farmer who lives over the hill and not very far from the poor house. The soil is too wet in the spring and likewise too dry in the summer.

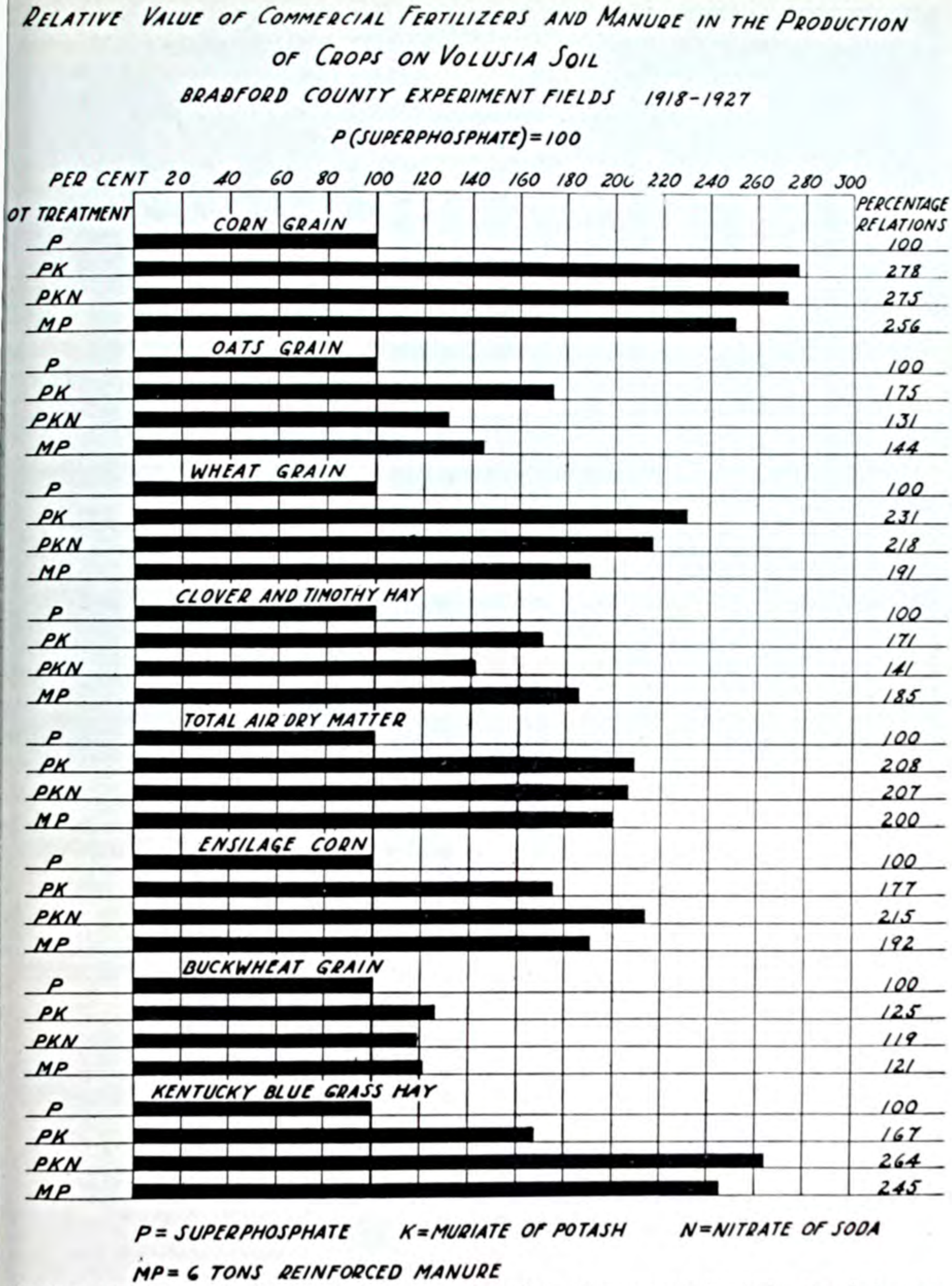
The shallow rooted plants whi fail to send their roots deep into t wet soil are caught when the drou comes. It becomes evident th drainage is the first essential, but costs about $40.00 per acre and t land is valued at about $15.00 $30.00 per acre. No doubt tile drai age would double the value of the la per acre, and a drainage experiment now under consideration. The e treme acid condition of the soil, ass ciated with poor drainage, was four to be another limiting factor.

Rotations Vary

The crop rotation followed w found to vary considerably usually accordance with weather condition Every farmer has lots of land (t much) and is privileged to rotate his heart's content in any directio The following rotation is followed b those who despoil the land withou thought of tomorrow — oats, clov and timothy, timothy six years, tin othy and daisies two years, daisies an paint-brush one year, and on th twelfth year the land is plowed fo corn, but it rains and it is seeded t buckwheat.

The soil under proper managemen where deep plowing is followed, pro duces excellent ensilage corn, buck wheat, and hay. The grazing lan supplies abundant early grazing, large ly red top and timothy, but the graz ing season is too short and the dair farmers are spending too much of thei milk checks for summer feed. Th county stands first in hay and buck wheat, and near the top in the pro duction of milk, honey, maple syrup and eggs. It is truly a land of mil and honey. If acid soils are condu cive to a sour disposition, then th Bradford county farmer should con sume all his honey and maple syrup

In the spring of 1918, the Pennsyl vania Agricultural Experiment Statio established a series of field plot experi ments on Volusia soil on land typica



The above chart shows clearly the relative values of the four treatments in the production of the seven crops on Volusia soil. Potash stands out conspicuously as a major factor in the production of cro;s on this soil.

of that described above. These experiments include 102 plots arranged in six fields and including several different cropping systems. The various experiments were planned to test the comparative value of various forms, combinations, and amounts of commercial fertilizers, lime, and manure in the production of the more common crops grown in Pennsylvania. The detailed report of the first eight years' results is published in bulletins 211 and 229 of the Pennsylvania Agricultural Experiment Station.

This paper is limited to the results

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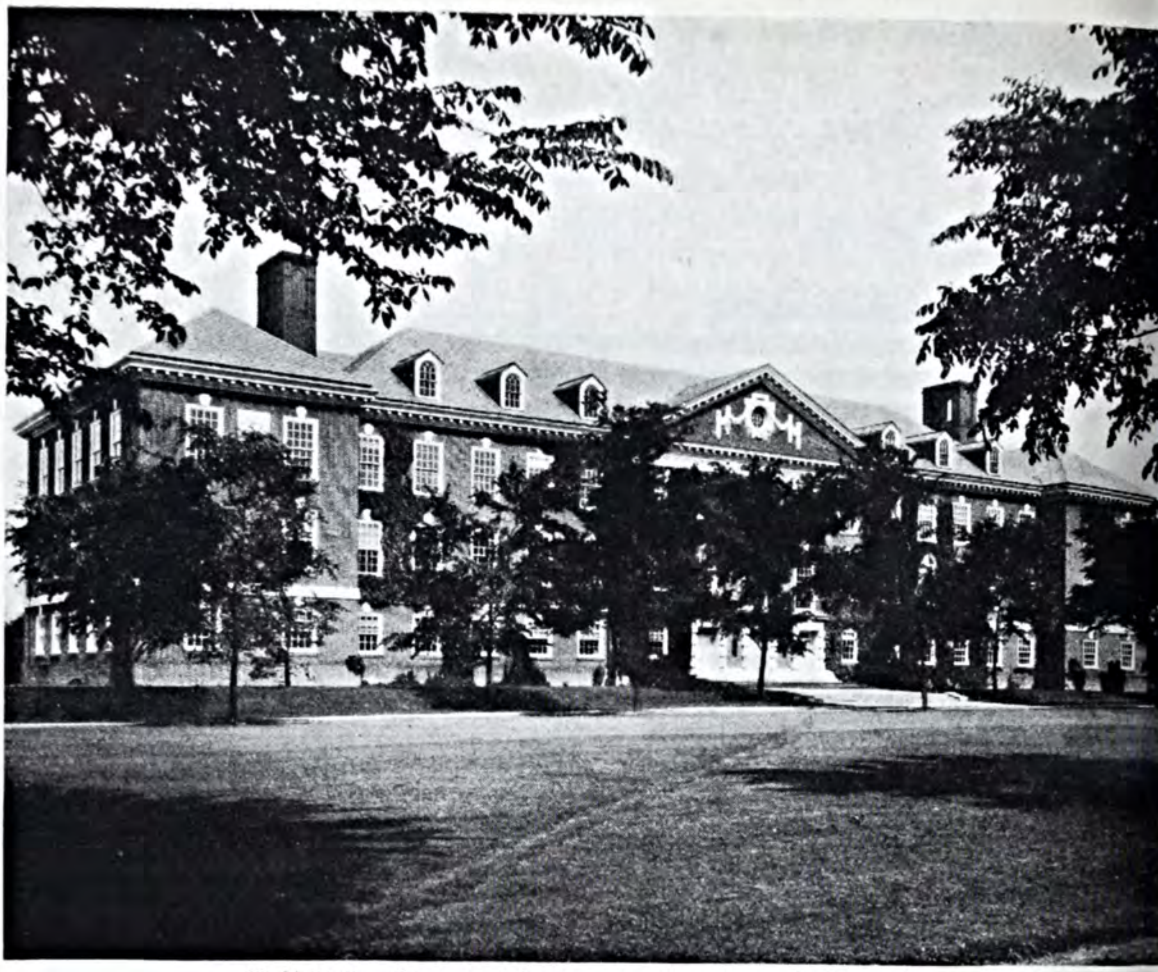

Wolf Hall, office and laboratory headquarters of the station.

DELAWARE

Experiment Station

By C. R. Runk

Former Associate Agronomist, Delaware Experiment Station

DELAWARE'S experiment station was founded in 1888 at what was then Delaware College, now the University of Delaware, located in Newark. A study of the early reports reveals that at that time the station employed a director and four men for part time teaching and part time experimental work. This was largely in the nature of demonstration and control work. Permanent field experiments were started in 1908. Since that time the activities have broadened out into many lines of investigation until now a total force of 24 is employed in research work.

The station has been particularly fortunate in retaining its directors. There have been but three directors in 40 years. Arthur T. Neale served from 1888 until retirement in 1906. He was succeeded by Harry Hayward who remained until 1919. C. A. McCue has been Dean of the College of Agriculture and Director of the Experiment Station since 1919.

In agronomic work the first fertilizer experiments were begun with fertilizers in rotations and continuous cultures. Almost the entire state nsists of the Coastal Plains soils d the experiments have been con- rned largely with the Sassafras and orfolk series of this region.

The oldest series of fertilizer plots the station have been in progress ice 1908. The results have been blished in Bulletins (137, 138, 146). bsequent experiments deal with (1) tations, (2) fertilizer ratios and tes for the more important crops for elaware, (3) pasture mixtures and rtilization, (4) fertilization of eadows, (5) testing and improve- ent of varieties of corn, wheat, ts, soybeans, alfalfa, and clovers, 5) relation of soil acidity and crop owth, (7) the use of lime, (8) een manures and cover crops.

The soils of the state vary from nds and loamy sands in the southern art of the state to clay loams and silt ams in the northern part. Conse- uently the station has experimental elds located on the various soil types hroughout the state, to study the elationship of soil type to the differ- nt experiments in progress. Descrip- on of these experiments and some of ne results obtained have been pub- shed in the various bulletins issued y the experiment station.

Through an experiment completed several years ago on a peach orchard with commercial fertilizers including nitrogen, potash, and phosphoric acid, the horticultural department has demonstrated the need of maintaining a higher nitrogen content for soils in Delaware and similar soils elsewhere. A new peach orchard was established in 1921 in which 10 test blocks were located to discover the best source of nitrogen for peach production. Conclusive results are not yet at hand.

The dropping of immature orchard tree fruits is a problem that has occupied the attention of the department since 1921. By sectioning the shed fruits at various intervals of time, beginning with the petal fall stage, it was found that lack of pollination and fertilization were not chief factors in the dropping of such fruits but that some other factor, not yet discovered, was the deciding one. A few years ago a genetic factor was discovered which seems to so regulate the time of abscission that trees of different varieties and different species and kinds shed their fruits in unlike waves. A large number of factors of environment have been studied, but so far no relationship between these and normal dropping of fruits has been discovered.

The staff of the Delaware Agricultural Experiment Station.

Another problem closely studied by the department is heredity and improvement in cabbage. Cabbage is a crop that always has been taken for granted as being just plain cabbage. Aside from the question of season of maturity, very little has been done to improve the crop. The department during the last six years has uncovered and pointed out a number of factors touching on the heredity of the plant. Annual blooming or "bolting," as it is popularly termed, has been shown to be fundamentally of a hereditary nature although it may be modified by environmental factors. Sterility of the plants has been pointed out and particularly that due to incompatibility in its several forms. The value of selection in the breeding of different strains has been emphasized. The heredity of headlessness, plant size and color, leaf character, type of inflorescence, shape of head, and season of maturity are some of the characters studied. The lack of uniformity in cabbage varieties illustrates the variability in most of the garden crops.

Fertilizer Experiments

In 1927 an experiment was concluded on the relation of fertilizers to apple production especially in regard to the three elements, nitrogen, phosphorus, and potassium. The clean culture system was used in this experiment. The main conclusions reached were these: wherever nitrogen was applied, fruit production increased; where no nitrogen was applied, the trees grew as best they could, taking whatever was available in the soil, and then grew less and less each year until very little growth and very little fruit was produced. Wherever nitrogen was applied, the response was noticeable in increased vegetative growth and fruit production. However, without other elements, especially phosphorus, maximum production was not attained. Nitrogen was found to be the chief limiting factor, followed by phosphorus.

Studies of the effect of nitrogen on the internal composition of the app tree and its relation to fruit produ tion have been under way for sever years.

The effect of nitrogen from diffe ent sources on the time of fruit bu differentiation in the Elberta peach, being studied and will be report soon.

The old but unanswered question whether to make single or split appl cations of nitrogen to apple trees early spring, is receiving attention, is also the question of fall application

The need of maintaining organ matter in our soils is acknowledged the most serious cultural problem i our orchards. This is particularly in the sandy soils of Sussex count Accordingly, a study of what cro will best serve this purpose is bein made in a large peach and apple o chard in Sussex county.

Through the application of 2 pounds of nitrate of soda early eac spring, an attempt is being made t throw some 20-year-old Stayman an Paragon apple trees into an over vegetative condition.

Because of hereditary differences i seedling rootstocks, an attempt is be ing made to establish trees upon thei own roots. If this can be accom plished, a study will then be made t determine the variation between self rooted trees and similar trees grafte upon seedling stocks. If less varia tion is found to occur in the trees o their own roots, we shall have elim inated one of the supposedly unavoid able errors in all experimental work t date on apple trees.

At this station, as in other orchar sections of the country, the pollina tion problem is likewise a vital one Studies at this and other stations hav shown the J. H. Hale peach to b self-sterile from a commercial stand point, but it has been found to se well when interplanted with Belle o Georgia, Hiley, or Elberta. The Scarlet Pippin, Crimson Beauty, Nyack Pippin, Chaplain, and Lilly of Kent apples were also found to be practially self-sterile, but were successfully pollinated with other varieties.

The increased funds provided by the Purnell Act made it possible for the station to begin research work in agricultural economics in 1925. The first study made by the department was the "Marketing of Delaware Eggs" published in 1927. At the present time the department is making a study on the marketing of Delaware sweet potatoes. In addition to this a study in farm taxation is about half completed. An investigation to study the effects of land tenure upon types of farm management found in the state is now in progress. As soon as these studies are finished, other investigations, which have already been planned, will be started both in the fields of marketing and farm management.

Director C. A. McCue.

The chemical department of this station, for the past eight years, has been interested in the hydrogen ion and its relation to the growth of seedlings, to the physico-chemical properties of soils, and to the formation of fruit jellies. The work was started when there was very little information on the determination of hydrogen ion concentration so that the technique involved had to be developed as the work progressed. This station was among the first to show the effect of hydrogen ion concentration on the growth of seedlings in nutrient solution, and among the first to study the relationship of hydrogen ion concentration to certain soil phenomena.

It was the first to point out that the formation of fruit jellies is controlled by the hydrogen ion concentration of the juice rather than by its total acidity. A very thorough investigation of the factors influencing jelly formation subsequently followed and is still being pursued. So far five bulletins have been published on fruit jellies.

A contribution of considerable importance to soil science may develop from a study of the "Mechanism of Buffer Action in Soils" now being conducted at this station. Buffer action of soils has been associated with their colloidal content, since soils low in colloidal matter exhibit little buffer action, while those high in colloidal content exhibit considerable buffer action. But when the colloidal fraction is removed and electro-dialized the buffering power of the colloid disappears so that it cannot be attributed directly to the colloidal fraction but to the ions that are held by the colloidal fraction either by electro static attraction, adsorption, or double decomposition.

The major experiment in swine feeding is the study of the utilization of ground soybeans for fattening pigs. Feeding trials have been conducted under dry-lot conditions and in connection with forage crops. A study of forage crops for Delaware is being carried on at this time.

A study of the effect of using superior sires upon a foundation herd of mediocre purebred Holstein cows is in progress. An experiment with powdered skim-milk for rearing dairy calves is now being carried on. Trials covering a period of two years indicate that ground soybeans are two per cent less efficient for milk production than peanut meal.

Experiments are in progress to determine the most efficient utilization of soybeans for growing chicks and for laying pullets. An experiment covering a period of three years indicates that artificial illumination materially increases winter egg production. It was found that eggs could be produced more economically under artificial illumination during the winter months than under natural conditions. A breeding experiment with Single-combed White Leghorns has been in progress for several years. Other experiments deal with the confinement of laying pullets without succulent green food and with the all-mash method of feeding laying pullets.

Plant Diseases Studied

Work in plant diseases is distributed over a number of major crops because of the extensive diversification of crops grown throughout the state. The study of plant diseases of sweet potatoes has been continued over a number of years and only recently pox or soil rot was found to be caused by a form of fungus closely related to that which causes the scab of white potatoes. Investigations on the major diseases of this crop have been completed and the principal control measures are seed selection and treatment along with proper rotations and good fertilizing.

The cucurbits including cantaloupe, cucumber, and watermelon have long been troubled with foliage diseases which have been thoroughly studied and respond to treatments that are now becoming accepted. Copper-lime arsenate dust has proved effective in controlling foliage diseases and has also resulted in improving quality and greater yield.

Considerable attention is also being given to the breeding of resistant tomatoes as well as the control of tomato root-rot. This crop is one of the extensive canning crops planted throughout the state.

Orchard diseases are of considerable importance. Studies on fruit spot, bitter rot, bacterial spot of peach, and peach yellows are being conducted. An extensive spray service is being supplied to the growers of the state.

Some of the projects completed recently have covered the diseases of canning peas, root, stock, and ear rot of corn, apple scab, disease of cabbage, and grape diseases.

Much work is being done in soil bacteriology covering the biological processes in soils and composts that make for the most economic returns from the practices of fertilizing, manuring, and liming. The proper reinforcement of manure and humus has been given much consideration, particularly the nitrogen and mineral requirements for maximum results.

Much attention also has been given to the important bacterial processes in the soils known as nitrogen fixation, both that of the symbiotic bacteria (those working in the nodules of legumes) and the non-symbiotic in maintaining the nitrogen supply. The great importance of cellulose (organic matter in the soil) in feeding these nitrogen fixers has been shown. In all general farming, these bacterial processes of nitrogen fixation are supplying many times the nitrogen that is supplied by fertilizers and manures.

The results of the experimental work of the Delaware station have been published in some 200 bulletins and circulars and in various journals and periodicals. No attempt will be made in this article to summarize the accomplishments of the station. The staff, like those of other stations, can point with considerable pride to the work that has been and is being done for the agricultural industry of the state and nation.

Field Bindweed

By F. E. Charles

Kansas State Agricultural College

FIELD bindweed, or wild morning glory, designated as the most serious weed pest ever to infest Kansas fields, can be effectively controlled and eradicated by the use of sodium chlorate spray. This has been demonstrated in experimental work at the Kansas Agricultural Experiment Station at Manhattan, Kansas.

The tests have been made by Prof. J. W. Zahnley of the agronomy department and Prof. W. L. Latshaw of the chemistry department of the college. The sodium chlorate solution is made by adding one pound of the chemical to a gallon of water. A hundred gallons of the solution will treat an acre.

Three rules have been laid down by the Kansas station for bindweed control. First, only seed that is positively known to be free from bindweed should ever be planted. Small grains, such as oats, wheat, and barley, are the most common to carry seed of the field pest. The State Board of Agriculture maintains a seed-testing laboratory where field seed will be tested free of charge. Second, every farmer should learn to recognize bindweed at first sight and keep on the lookout for it. Third, the pest must be fought persistently from the time the first plant is noticed.

Three or sometimes four applications of the sodium chlorate solution are necessary to completely kill the bindweed. The first spraying should not be made until the plants have reached full bloom. If made earlier there will be some shoots not yet out

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A power spray may be used effectively on large fields which are infested with bindweed.

The County Agent in an Emergency

By J. William Firor

Georgia State College of Agriculture

AN emergency situation calling for immediate attention is likely to develop in any county at any time. The appearance of a new insect pest, a variation of rainfall greatly above or below normal, the cutting off of the outlet for some staple crop, or seasonal conditions favorable for some crop pest which has been of minor importance for several years may bring about an emergency from the standpoint of the farmers and the county agent.

I am thinking of hard practical problems needing immediate treatment and not those conditions which create a great deal of political discussion and newspaper treatment, finally getting nowhere. For example, during the month of June, 1926, the farmers of Dooly county, Georgia, noticed that the tiny squares on their cotton plants were turning brown and dropping off. The squares of cotton develop into the flower and finally into the boll, containing the fibre. Injury to the squares means no cotton.

County Agent E. C. Mann had been noticing this injury. More and more fields showed the symptoms. He met with his agricultural board and advised them that the trouble was due to the cotton hopper or so-called cotton flea; that it was possible that after a few weeks the hoppers would leave the cotton fields, but it was also likely that they might do serious damage if conditions were favorable to their development. He suggested that if farmers were not immediately informed of the dangers of this new insect trouble and also advised of correct control methods, a near panic might be created owing to the fact that during the past 10 years the coming of the boll weevil and the deflation after the World War had made farmers fearful of uncertainties, and surely the cotton hopper was uncertain. The agricultural board decided that the best thing to do was to inform everybody of the true nature of the new trouble.

Spreading Information

It was of course impossible for the county agent to visit every farmer in the county or any considerable percentage of them. As it was necessary to point out the insect and its method of work, meetings were impractical. However, it was possible to visit several farmers in each community and by selecting leading farmers to act in the capacity of informers, enough people could be reached in a few days to get across the correct information about this insect.

County Agent Mann was thus able to get to his farmers the solution for the situation quickly and accurately. Without his good judgment there might have been hundreds of conjectures and possibly an equal number of suggested remedies, many of which would have been worse than nothing.

Besides this sort of emergency where the county agent deals with the situation as a county unit, I have in mind another which shows sectional action and group cooperation. During the

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Cotton Needs Potash

By R. B. Fairbanks

THAT rust and wilt both reduce the cotton yield very materially, is a well-known fact. It is equally well known to those who have given any study to the matter, that liberal fertilization with potash will almost entirely prevent these diseases. It is only in recent years that it has been generally known that liberal applications of potash would very greatly reduce the damage done by wilt. Potash is not a cure for these diseases, but is an almost sure preventive of rust. If applied in liberal quantities, before a piece of soil becomes infested with wilt, potash will reduce this disease to a very appreciable extent.

The thinking cotton growers understand that a liberal application of potash fertilizer is most highly desirable for cotton, when planted on cold, or crayfishy types of soil. Considerable increases in cotton yields also have been secured from liberal potash fertilizer applications on the brown loam, or sassafras loam soils, such as are quite common in West Tennessee. A test on a Madison county, Tennessee, farm this year on soil that is described as sassafras loam, and which was not wet, nor infested with wilt, nor attacked by rust, showed a very considerable increase in cotton. Some estimated it as much as 25 per cent; some as low as 15 per cent. Even with a 15 per cent increase, the potash application paid a handsome profit.

Where rust is prevalent, it is foolish not to use potash liberally. Recently we saw a test in a field where 600 pounds of 8-6-0 fertilizer were applied as compared to 600 pounds of 8-6-8. The portion that received the 8-6-0 fertilizer rusted badly and the plants were entirely defoliated in August. The result was that the bolls on the defoliated plants were stunted and six average stalks had only 28 stunted bolls on them. Six average stalks where 600 pounds of 8-6-8 fertilizer were applied had 57 bolls on them and would certainly yield twice as much per boll as the cotton which did not receive the potash fertilizer. It is, therefore, not over-stating it in the least to say that the potash increased the cotton yield in this instance by three or four times.

The six stalks that had not received any potash fertilizer had a shallow root system; were very easily pulled up; and in fact were stunted stalks in every sense of the word, having died along in August, making it impossible for anything like a normal yield of cotton to be produced. Instances of this kind could be multiplied over and over again by inspecting fields where rust is prevalent. Where rust is bad, the cotton yield is frequently divided in half and some times considerably more.

Keeps Cotton Growing

It is also noticeable on practically all types of soil, that cotton receiving a liberal application of potash fertilizer along with nitrogen and superphosphate remains green late in the season, and produces cotton right up to frost. In other words, the top bolls, or the late ones, frequently develop completely, whereas cotton that did not receive the potash fertilizer ceases to grow much earlier. Very often this top crop alone may mean the difference between a profit and a loss.

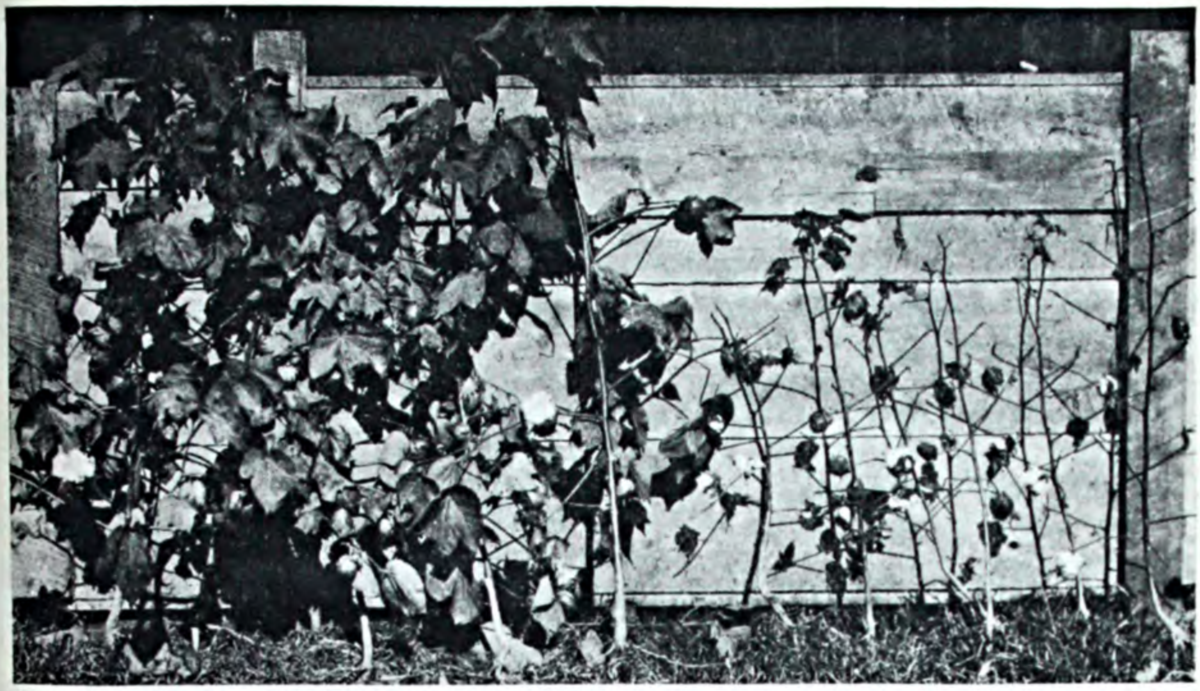
Then, too, one often hears the state-

Rust has almost defoliated the cotton to the left liberally fertilized with an 8-6-0. To the right the cotton is green, vigorous, and growthy. It was fertilized with an 8-6-8.

ment made that heavy potash fertilization, along with nitrogen and superphosphate, delays maturity of cotton. Many think this to be true by making a casual observation, whereas, if a more careful inspection was made it would be found that this conclusion is drawn because the leaves of the cotton remain green longer and hide the open bolls, thus making it appear that this cotton is slow in maturing and opening. A count of the bolls almost invariably reveals that there is nothing to this frequent statement that potash delays the maturity of cotton.

A careful study will reveal to any one that there are few if any types of soil to which an application of potash fertilizer will not pay on cotton, provided, of course, that a grower also

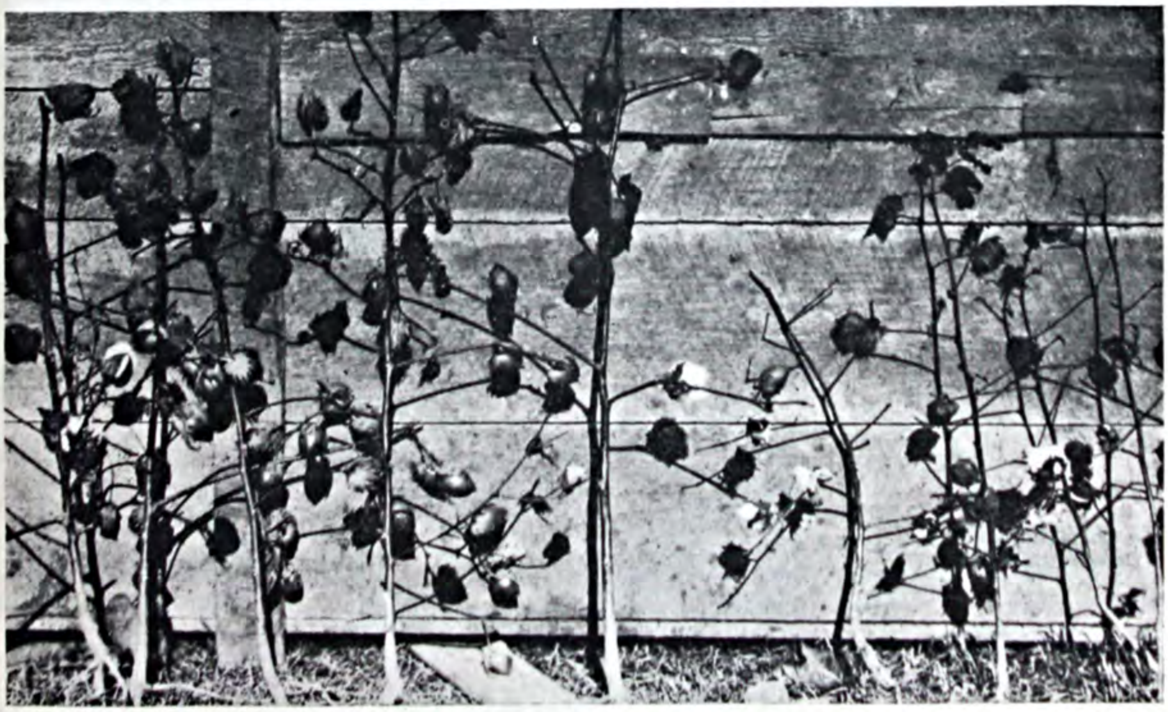
The six stalks at the left, fertilized with an 8-6-0, were attacked by wilt. The six stalks on the right were from the same field and adjoining rows, but were fertilized with an 8-6-8.



On the left are six average stalks of cotton from a field fertilized with 600 lbs. of 8-6-8; at the right six stalks from the same field and adjoining rows fertilized with 600 lbs. of an 8-6-0.

uses liberal quantities of nitrogen and superphosphate. Potash fertilizer cannot perform its full duty unless the proper quantities of these other plant foods are applied also.

The advisable thing to do is to use a properly balanced plant food in liberal quantities for the cotton plant. On soils where cotton wilts, where it rusts, and where the soil is cold and crayfishy, comparatively heavy applications of potash fertilizer are advised and will prove profitable, and we repeat that on almost all types of soil, three to four per cent of potash should be contained in the cotton fertilizer. In almost nine cases out of ten, even where these special reasons for heavy applications of potash do not exist, this amount will pay.



The same stalks as shown above with the leaves taken off to give a better comparison as to number and size of bolls. These are representative stalks, not the worst and the best.

FARM CONDITIONS

The General Situation as Shown by What the Farmer Does

By ARTHUR P. CHEW

United States Department of Agriculture

IN the farm-relief agitation period that was terminated by the decisive result of the national election, it was pretty hard to identify either the bona fide optimists or the bona fide pessimists about American agriculture. More often than not, the optimists turned out to be the opponents of the McNary-Haugen plan, and the pessimists its advocates. Men are naturally more impressed by evidence that favors their desires than by evidence of the opposite character. Hence, the farm-relief groups usually painted the situation black, while their adversaries painted it either not so black or fairly rosy.

This was an inevitable result of the controversy. On the one hand it seemed necessary, in order to justify the demand for radical innovations in agricultural policy, to represent the patient as sick enough to be in absolute need of such assistance. On the other hand the conservative viewpoint quite as inexorably insisted on the lack of need of heroic measures. All that is now history. The country has elected to accept farm relief by means not involving dumping or price control, and at the same time it has prepared to rid itself of prejudice in regard to the agricultural situation. For the first time since 1920 the condition of agriculture can be discussed without any implication that the scales are being weighted for or against any particular policy.

It is indisputable that agriculture has had hard going in the last few years. What we need to ascertain now is whether the outlook is good or bad. Is the patient getting better, getting worse, or merely holding his own? All sorts of evidence might be marshalled to throw light on the problem, did space permit. It would be pertinent to give statistics about prices and price relationships, about land values, about farm bankruptcies and foreclosures, about gross and net incomes, and so forth. Such data in general would show that American agriculture has made gains in commodity purchasing power while suffering declines in land valuations; that tenancy has increased since the slump of 1921; that the efficiency of agriculture has increased enormously; that net incomes have increased proportionately more than gross incomes in the last seven years, apparently as a result of a decline in unit costs of production, and that the earnings of agriculture are still not yet back to the prewar level, when allowance is made for changes in the value of the dollar. But this material is capable of diverse interpretations. From the same facts one man will deduce a favorable and another an unfavorable conclusion, depending essentially not on the data but on his point of view. Information about the post-war loss of farm population to the cities, for example, will incline one person to think that agriculture is going to the dogs, and another to rejoice that it is producing nore food and fiber with less labor.

For the present, therefore, let us gnore prices and land values and income statements and purchasing power ndex numbers and so forth, and try n altogether different approach to the question. Let us adopt the method of the behaviorists, and endeavor to nterpret the farmer's mind, not by what he or anybody else says about farming, but by what the farmer veritably does. Actions are usually a better index of beliefs than words. If a potato grower plants his seed by the light of the moon rather than by the light of science, you need no further proof that he is superstitious. If farmers as a group by their actions manifest faith in the future of their business, and at the same time give evidence that they do not lack the power to translate their faith into results, they can not change that proof of their real frame of mind by registering depression in public meetings and in petitions to Congress. The best possible evidence that American agriculture is not a moribund industry is to be found not in prices and income statistics, valuable though such evidence may be, but in what the farmers have done during the depression. It is appropriate, in short, to consult the record of their behavior. Specifically let us see what they have done about production, about acreage, about technical progress.

Agricultural production is less readily adjustable to market changes than industrial production. Sometimes farm output increases while demand slackens. For a time after the war American farm production continued to increase from the stimulus imparted to it in war time. Indeed, the increase was partly the result of an effort to compensate for low prices by large production. Eventually, however, agricultural production obeys the law of supply and demand. When the output steadily and materially increases, the inference is that the industry is responding to economic rewards either current or prospective. In the 10 years since the world war ended, American farm production has greatly increased despite a sharp decline in the number of farm workers. Crop production in the period of 1922 to 1926 was nearly five per cent greater than in the period 1917 to 1921, and the output of animal products increased fully 15 per cent. Such facts are utterly inconsistent with the notion that our agriculture can not prosper without making a present of its surpluses to foreign nations.

In 1928 the acreage of crops harvested was the largest on record. The area harvested of 19 principal crops was 357,400,000 acres, compared with 349,554,000 acres in 1927. Acreage of crops not included in this total increased in about the same proportion. The previous high year was 1919, when the acreage in the 19 principal crops was 351,209,000. For each year intervening between 1919 and 1928 the acreage of the 19 crops was less than in 1919. In the case of many crops annual variations in acreage are as important as annual variations in yield in determining variations in output. The 1928 acreage, whether well-advised or ill-advised, was clearly a mark of confidence among the farmers in the future of agriculture. It was a positive indication that the men engaged in the business of farming have not thrown up their hands in despair.

In the South

Consider what is doing in the cotton fields. In 1926 cotton was planted on an area of nearly 48,000,000 acres, compared with only 33,000,000 acres in 1922. It is well known that this increase in the area planted to cotton was largely the result of the adoption of large-scale methods of cotton growing in Texas and Oklahoma. In 1926 the large area planted, coupled with high yields, produced a record crop and the price sank to an extremely low point in the early marketing months, whereupon a cry of distress went up from the Cotton Belt. Farmers got together to reduce their cotton acreage, and the next year they did reduce it. In 1927 the output of cotton was cut down by acreage reduction, boll weevil damage, and the Mississippi floods. As a result, the price advanced.

Immediately the cotton grower's heart rose once more, and he prepared again to grow more cotton. In 1928 cotton was planted on about 46,700,000 acres, an increase of 11.4 per cent over the acreage planted to cotton in 1927. The area in cotton was only 4 per cent below the record acreage of 1926. This expansion might have produced another collapse of cotton prices had Nature seconded man's efforts to produce another large crop. But the boll weevil was active and weather conditions were not good. As a result, the output of cotton was only slightly more than 14,000,000 bales. This quantity was consistent with reasonably good prices, and the income from cotton in the 1928-1929 season promises to be satisfactory. That, however, is not the point for the moment. The point is that cotton growers of the United States, at the slightest encouragement, are prepared to increase their production. They are not scared, but optimistic. Perhaps they ought to be more cautious, but the fact remains that expansion rather than contraction is the normal order of the day in the cotton States.

On the Great Plains

The same thing is going on in the Great Plains region. Since the war the cultivated area in the six principal Great Plains States, namely the Dakotas, Nebraska, Kansas, Oklahoma, and Texas, has greatly increased. As a matter of fact, the increase was continuous throughout the depression period. In the three-year period 1925 to 1927 the average area of the principal crops in those States was more than 8,000,000 acres greater than in the three-year period 1919 to 1921. Texas had an expansion of nearly 5,000,000 acres; North Dakota and Nebraska had an expansion of about 1,000,000 acres each, Kansas, South Dakota, and Oklahoma accounted for the remaining million. Montana expanded its cultivated area about 1,000,000 acres, and Colorado about one-half million acres. Another million acres were added to the country's cultivated area by Minnesota. Conditions have not been altogether satisfactory for the farmers in these States during the depression period. As a matter of fact, some of the States in question have had an exceedingly high bankruptcy rate and much distress. Yet agriculture forges ahead in that whole region. Are we to conclude that it does so because the farmers concerned are unwise, or because they know what they are doing?

A field of spinach, ready for the canning factory, on an Indiana farm.

America's leading agricultural enterprises are cotton growing, wheat growing, corn and hog raising, and beef raising. These enterprises have had their share of depression since the war. But they refuse to stay depressed. Cotton, as already mentioned, was grown in 1928 on an area only slightly below the record area of 1926. Wheat in 1928 was produced in a volume exceeding 900,000,000 bushels for the first time since 1919. The inspected slaughter of hogs in the hog crop year ended October 31, 1928, was 47,800,000, the third largest on record. It was 11 per cent larger than that of 1927 and 17 per cent larger than that of 1926, though smaller than the slaughter in 1923 and 1924. These evidences of economic energy can not be brushed aside by calling the farmers who manifested it ignorant or ill-advised. Certainly the expansion of farm enterprises is not always followed by satisfactory financial returns. In 1928, for example, the Department of Agriculture specifically advised against expanding the acreage of certain classes of wheat and of potatoes. This advice was not generally heeded, and incomes from grain and potatoes were considerably lower than in the previous year. In the long run, however, production can not be expanded unless the market justifies expansion. American agriculture since the war has expanded its production because that course, despite relatively low prices, has not been vetoed by the economic forces of the world. On the contrary, it has been indorsed. An expanded world demand, coupled with increasing facility in production, is the source of the optimism which our farmers show by their actions if not by their words.

Efficient Production

American agriculture derives its principal justification for increased production from its rapid technical progress. It should not be forgotten that conditions which may dictate reduced production for agriculture throughout the world may nevertheless be compatible with increased production in favored areas, or under exceptional technical conditions. This country has unsurpassed agricultural resources, and it has no superior in agricultural production per unit of labor involved. On this basis our wheat growers and cotton growers may be entirely justified in forging ahead in production without paying over-much attention to the balance of production and demand throughout the world. They may feel confident that in the comparative struggle for a restricted demand, the best way to insure their own ultimate advantage is to do battle with producers elsewhere. They have pretty good weapons. Their slogan is: When contraction is necessary in agriculture, let our foreign competitors do it.

Watch the Market

The American farmer can stand difficult price conditions as well as any of his competitors. In the three crop years 1924-1925, 1925-1926, and 1926-1927 the farm price of wheat in this country averaged $1.28, $1.46, and $1.23, respectively. This year it will probably average lower. In relative purchasing power wheat has averaged lower during the last few years than it did before the war. Nevertheless our production has been maintained and in some States greatly expanded. This is evidence that our wheat growers enjoy an advantage in the world-wide competition their business faces, and the source of that advantage is not far to seek. It is chiefly the result of accelerated mechanization—the use of trucks, tractors, combine harvesters, and so on. Combine-harvesting, which reduces the labor requirement of threshing by some 75 per cent, has swept eastward from the Pacific slope like a prairie fire in the last decade. It explains why increased world production of wheat does not frighten the American grower. When the situation finally requires a reduction of acreage, he may let the reduction take place on foreign farms less well equipped than his own.

As proof that increasing production is really a sign of vigor and progress in agriculture, we may point to the fact that the American farmer does not practice it always and everywhere. He does not persist in increasing his output in circumstances that make that course profoundly inadvisable. At all events he does not make that mistake year in and year out, although each season furnishes examples of erroneous expansion. The beef industry illustrates the point in question. In the post-war depression the beef industry suffered severely. Did the beefmen keep right on producing in the blind faith that it is a long lane that has no turning? They did not. Between January 1, 1918, and January 1, 1928, the production of beef in the United States was curtailed to such an extent that the number of cattle in the country was reduced by 15,500,000 head, or about 22 per cent. Today, although the population is 23,000,000 greater, the country has no more beef cattle than it had in 1913. As a result, beef prices are high, the beef industry is looking forward to several years of prosperity, and the trend of beef production is turning upward.

Trend Is Upward

The trend of production in agriculture is a pretty good index of its basic conditions. Note, however, that the important thing is the *trend*, not the output of a single year, which in the case of field crops may be greatly influenced by yields per acre. Sufficient evidence that the post-war basic trend is upward has been given. It may be well to supplement the figures above quoted concerning the comparative output of the period 1922-26 with that of 1917-21 with the estimated figures for 1928. In field crops for 1928 the production was about five per cent greater than in the preceding year, and the output of certain classes of livestock increased also. This information, however, is scarcely necessary to show that the depression has not curtailed production. That admits of no question. Only in regard to its meaning may controversy arise. The contention of the writer is that the post-war expansion of agricultural production is at once

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¶A *novel way to bring farmers to see a demonstration.*

A Shucking Contest

By W. H. Byrne

Virginia A. & M. College


Carroll Herndon.

A MAN small in stature, yet rugged and alert, is Carroll Herndon. It could be seen from his actions as soon as he started that he was a dangerous man to his opponents. They watched him carefully, but before the contest was over he had shaded all of them by shucking nine and one-third barrels (46½ bushels) of corn in six hours of actual shucking time. His closest opponent shucked slightly more than seven barrels (36.9 bushels), and the average of the five winners was only 7.6 barrels (38 bushels).

The contest is probably the first of its kind held in the State of Virginia. The idea originated with County Agent E. V. Breeden. Thirty-five men and women were present during the contest and saw the judges measure the corn. The corn was shucked from the shock and the contestant was not allowed to tie the fodder so that the judges could examine it carefully to see if any ears were left.

The main purpose of the contest was to have the farmers of the community see the results of a fertilizer demonstration on corn carried on by Ed. Ester, a farmer living near Orange, Virginia, in cooperation with County Agent Breeden, the results of which were very convincing.

The demonstration consisted of a six-acre field of corn. The field was measured and divided in half. The entire field was limed at the beginning of the rotation and before planting one of the three plots received 300 pounds of 16 per cent superphosphate per acre, broadcast with a drill. The yield on this three acres was 151½ bushels, or 50½ bushels per acre. The other three acres received an application of 200 pounds of nitrate of soda, 300 pounds of 16 per cent superphosphate, and 67 pounds of muriate of potash per acre. This three acres

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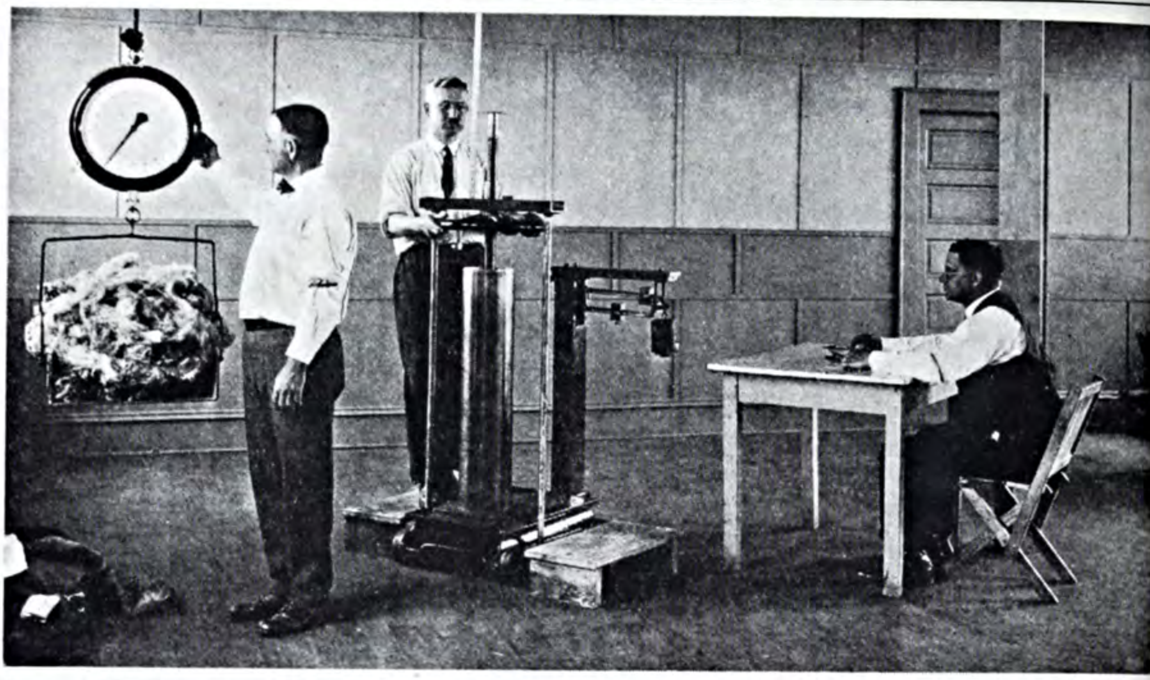


Weighing and compressing fleeces at the United States wool laboratory.

Agriculture Today

II. ANIMAL HUSBANDRY

By Frank George

CHANGED economic conditions are having a far-reaching effect upon animal husbandry organization and breeding methods. The need for lower production costs and the consumer demand for lighter weight cuts of meats are emphasizing more rapid turnover in the livestock industry in the production of lighter weight steers, bacon-type hogs, and sheep which yield a profit on both wool and mutton.

In the beef cattle industry, according to Dr. J. H. Mohler, Chief of the Bureau of Animal Industry, the requirement is for the 1,000-pound steer produced within two years on relatively high priced feeds, as contrasted with the 1,500-pound steer grown in five years on grass, hay, and other roughage. This calls for the keeping of more breeding cows of high quality, early maturing type, and good conformation. Fifteen hundred pounds of dressed three-year-old beef represents the product of two steers which require three cows to produce, whereas an equal quantity of yearling beef represents the production of nearly five beef cows.

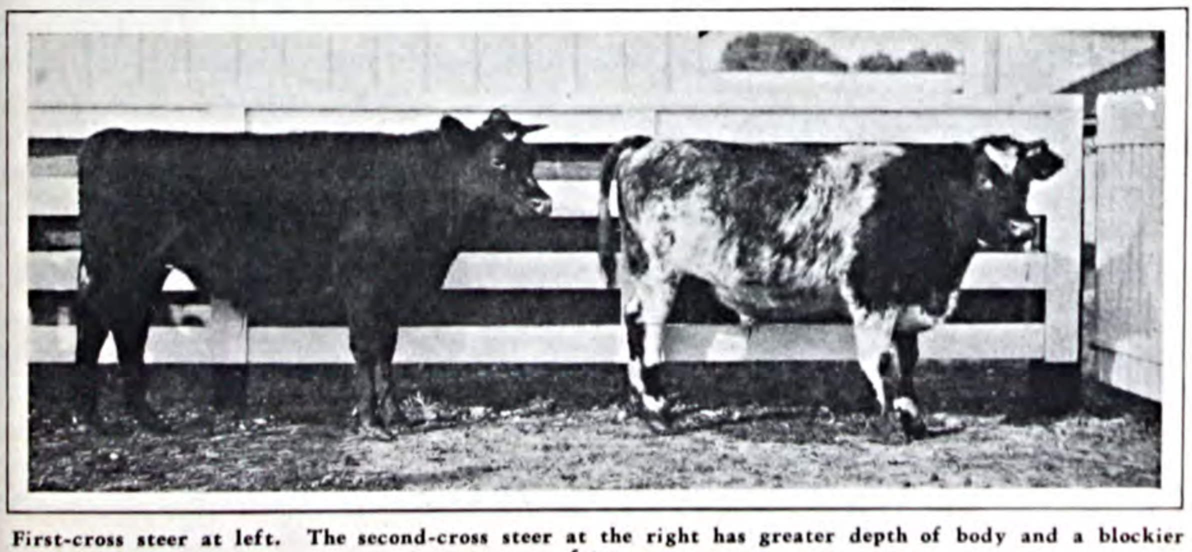
"The problem of the cattle raiser," Dr. Mohler declares, "is to find practical low-cost methods of production and at the same time to turn out a product of such uniform high quality that the consumer will be willing to pay prices which will mean a fair return." The day has passed when cattle producers were not especially concerned over how long their cattle remained on range. Range was cheap and so long as land values went steadily higher, there was no economic pressure for rapid turnover in the livestock enterprise. But with the cessation of steadily mounting land values, it became necessary to look to the livestock as the chief source of profit.

In the opinion of livestock marketing specialists there will always be a demand by hotels, restaurants, and dining cars for heavy beef, and so long as this demand is not over-supplied, heavy cattle will sell for more than light cattle. Another angle to the situation is the utilization in this "hot dog" age of considerable quantities of old stock in the manufacture of delicatessen products. However, the bulk of the household demand is for the four to five-pound roasts as compared with the six to nine-pound roasts of former days.

At Sni-a-Bar Farms, Grain Valley, Missouri, the Bureau of Animal Industry is making studies of low-cost methods of production, by making comparisons between calves allowed to run with their dams on grass without additional feed, calves with dams on grass and allowed grain fed within creeps, and calves kept on separate pasture from dams with access to grain and allowed to nurse twice daily. A national research project is also under way to discover the factors which make for uniform high quality in beef.

Federal inspectors making ready to go into disease infected livestock areas.

Similar changes have come about in the sheep industry. Whereas most of the sheep slaughtered formerly were from four to eight years of age and were mostly of merino or fine-wool breeds, the demand now is for a carcass ranging from four to twelve months of age. Lambs of this age now make up at least 80 per cent of the market supply of all sheep. They come mostly from the mutton-type breeds or crosses between the wool and



First-cross steer at left. The second-cross steer at the right has greater depth of body and a blockier form.

mutton types.

"The chief problem of the sheep industry," Dr. Mohler says, "is to secure the utmost advantage from the two crops which a sheep produces each year—lambs and wool. To do this, sheep must be selected for breeding purposes both on the basis of their mutton qualities and the character of the fleece. That one crop must be sacrificed if the other is to be improved, is not necessarily true. For example, the average weight of fleece sheared from American sheep today is approximately four times that of the sheep grown in this country in 1840. And yet, the better-fleeced sheep of today is also a better-muttoned sheep. The heavier and higher quality fleece has gained in conjunction with a better leg of mutton."

The Bureau of Animal Industry has developed the Columbia type of sheep to meet the modern demand for emphasis on both wool and mutton. Though not yet absolutely fixed in type, this sheep after 15 years of development is showing less variation each year. The ewes are very prolific and consistently yield long stapled fleeces of one-quarter blood quality. Under range conditions the fleeces will average over 11 pounds, and the lambs at weaning time will weigh 78 pounds. During a recent year the bureau's Rambouillet flock returned $10.16 per ewe, the Corriedales $10.28 per ewe, and the Columbias $11.34 per ewe, considering the lambs worth 10 cents a pound and the wool 50 cents a pound.

Better Lambs

The bureau, in its studies of the factors influencing the quality and palatability of lamb meat in cooperation with a number of State experiment stations, is endeavoring to aid sheep men in producing the kind of a handy-weight market lamb in greatest favor in this country. It is endeavoring to ascertain, also, in its cooperative wool studies, what methods of breeding, feeding, and management will obtain the greatest quantities of high-quality clean wool.

Consumers want lean bacon, small hams, and more fresh pork than formerly. Producers, instead of keeping hogs until they are a year to a year and a half old, are forced by economic pressure to secure more rapid turnover by shortening the production period and marketing hogs at from eight to ten months of age. Stress is being laid on the production of larger litters, inasmuch as the relative profitableness of a hog enterprise corresponds closely with the number of pigs weaned and marketed per sow.

More Pigs

A study made of 51 droves of spring pigs in Iowa and Illinois in 1921 showed that droves weaning less than three pigs per sow had an average pig cost of $8.13, while those weaning seven pigs to the sow showed a cost of $3.35 per weaned pig. The one important cause of this wide variation in the cost of weaned pigs, Dr. Mohler says, was the death losses in some droves, due in many instances to the careless management and feeding of the breeding herd. A total of 340 in every 1,000 of the pigs farrowed were lost before weaning time. More little pigs were killed by the mother sow lying on them than by any other cause. A simple guard rail in the farrowing house would have eliminated most of this loss. The fact that fifty pigs in every thousand, or one in twenty, were farrowed dead or so weak that they could not stand up to suckle indicates that the selection of sows and their feeding and handling before farrowing are important factors in the health and vigor of the offspring.

"As the cost of feeding and caring for the sow throughout the year must be borne by her offspring," Dr. Mohler points out, "it follows that those sows whose litters are large and whose

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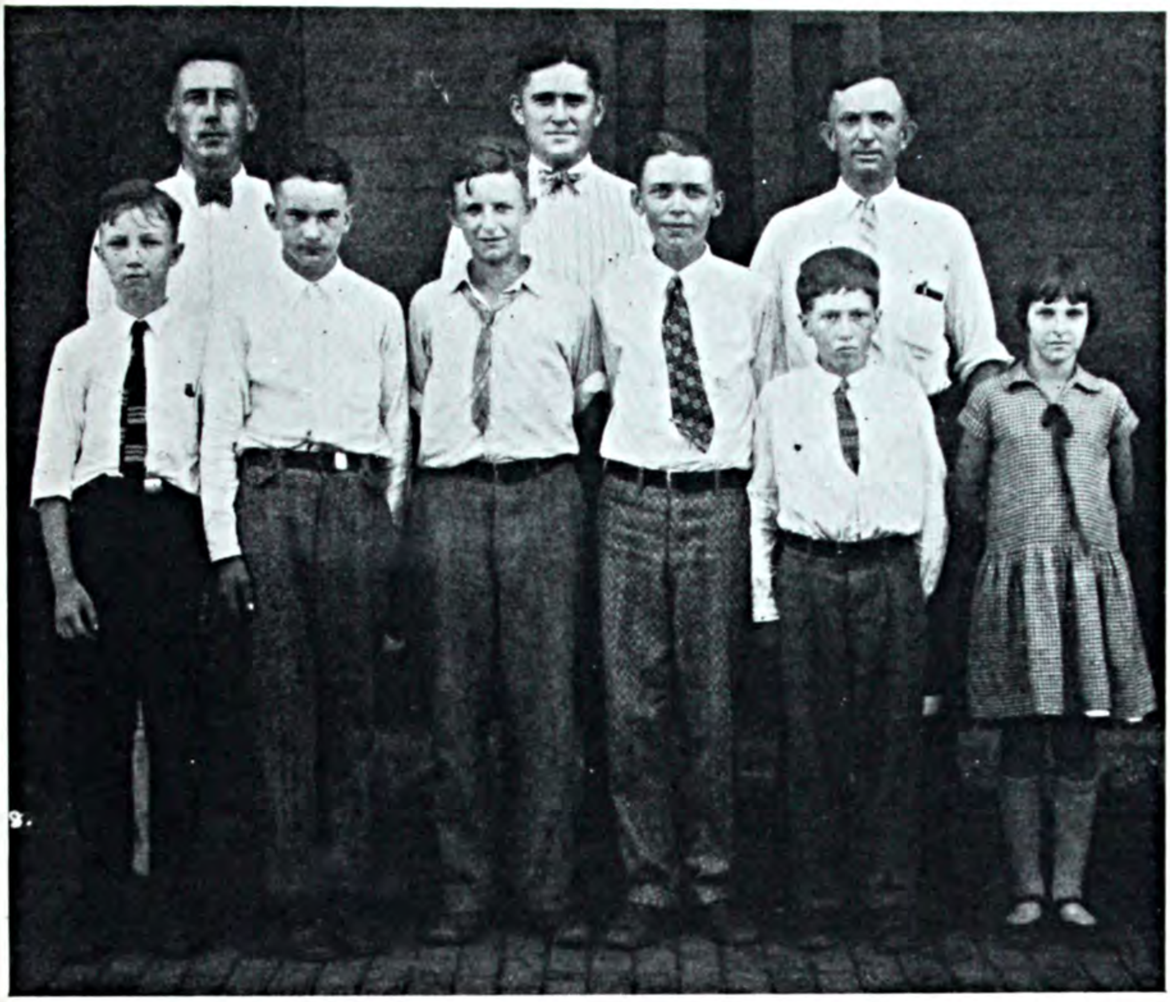

These youngsters raised 100 bushels of potatoes on ¼ acre. Left to right: Malcom Troutman, David L. Fawcett, Charles Tierney (highest yield), Robert Malcom, Earl Emmons, and Ethel Powell; (2nd row) W. B. Ward, Purdue University; P. O. Hurley, B. & O. Railroad; and Jesse A. Wood.

A 100-Bushel Club

By Jesse A. Wood

County Agent, Martin County, Indiana

FOR the past six years Martin county, Indiana, and the Baltimore and Ohio Railroad have been cooperating in Potato Club work. They started six years ago with 12 members and this year had 82 boys and girls from 10 to 20 years of age engaged in raising ¼ acre of potatoes.

This year 74 of these members finished their project and exhibited a peck of potatoes at the local show and at the Indiana State Fair. Six of these 74 members raised more than 100 bushels per ¼ acre, with an average yield of 110 bushels, the high yield being 117.9 and the lowest 100.7 bushels.

The average total cost of production was $26.68 per ¼ acre or 24.2 cents per bushel. The lowest cost per bushel was 18.4 cents, when 51 man-hours of labor were used, or a total cost of $21.80. The highest cost per

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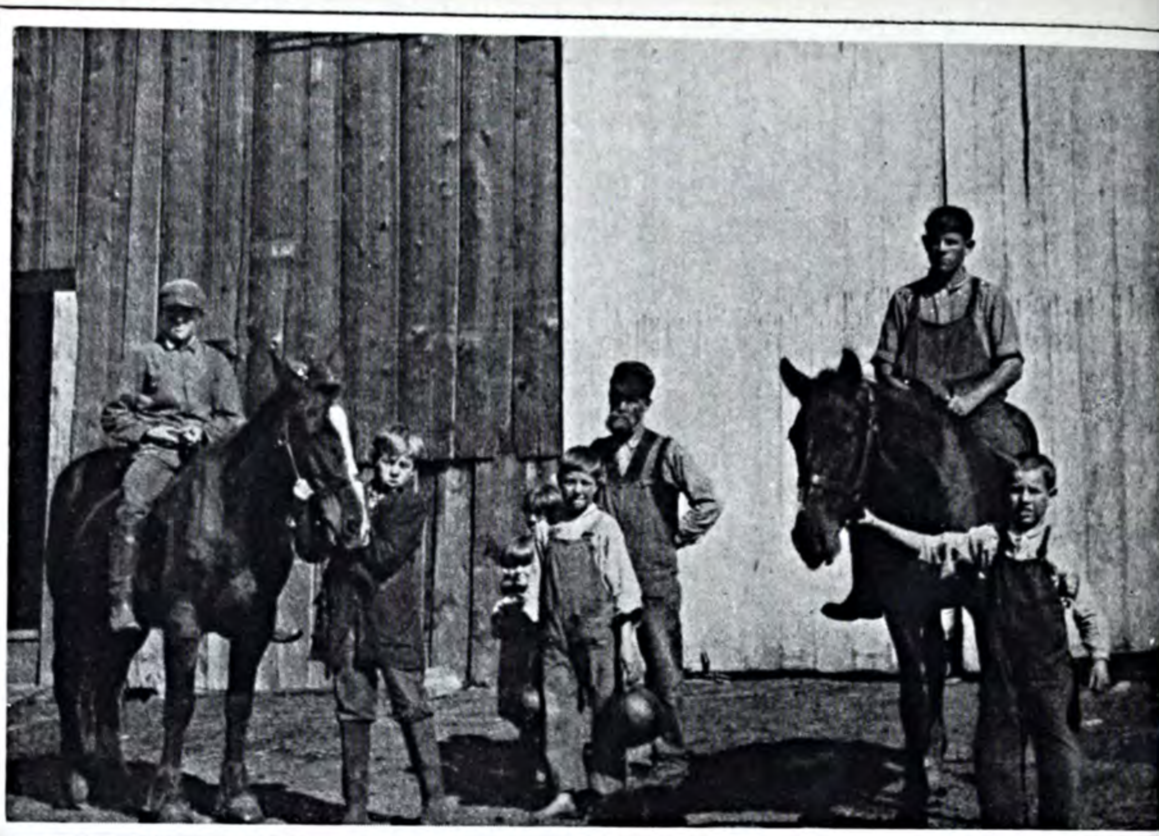

Mr. Barton and a part of his family of twenty.

L. R. Barton, *Optimist*

By H. N. Wells

County Agent, Sullivan County, New Hampshire

"THERE is a better opportunity in farming now for young men and women who really want to farm and are willing to work than there was 34 years ago when we went to farming," said Mr. and Mrs. Lemuel Barton of Sullivan county, New Hampshire, in a recent interview with the writer. "Prices are much higher, there are better markets, better transportation and better organization for handling products than back in 1894.

"Take milk, for instance. We sent it to Boston and got around three cents a quart, and now it brings from six to eight cents. Thirty-four years ago we sold a 10-pound turkey for a dollar, and today it will bring from five to six dollars. Maple syrup, one of our big sources of income, sold formerly for ninety cents to a dollar and today the best brings around $2.50 a gallon. Dairy cows and meat stock are also selling well. In fact, all livestock and crops have advanced very materially since those times.

"Of course, costs of production and our living have gone up too, but a farmer who will devote his time to his work can make a good living and lay something aside. There has got to be still more adjustment, for even with higher prices, there is too much difference between the price we get for our products and what we have to buy."

Mr. Barton was born 61 years ago on the old Barton farm on the Goshen road, two miles south of Newport, New Hampshire. In 1893 he married his good wife, now 51 years of age, and to them has come a wonderful family of children. There are 20 in all, 10 boys and 10 girls, all in good health, the oldest being 34 and the youngest five years past. They are rugged, thrifty boys and girls such as are usually found on the farm, and are a credit to the community in which they live.

Their names are Addie M., Nellie F., Levi M., Jennie A., Lucy M., Cloie B., John L., Fred R., Josea R., Clark K., George A., Alice B., Ella R., Charles M., Franklin E., Edwin C., Orrin O. C., Emma A., Paul Andrew, and Dora H.

Every one has arrived singly, there being no twins or triplets. Four of the older children are now married, and collectively have seven children of their own. The nine youngest children are still at home where they help with the work when not in school. Three of the children now attend the local district school; three are in Junior High; and three are in the Senior High School. Those in Junior and Senior High rattle out early in the morning and leave home about seven, either by bus or bicycle for town four and one-half miles away. Some of the older children have already graduated from high school.

Lemuel R. Barton.

Mr. and Mrs. Barton are farmers of unusual thrift and judgment, or they could not have raised the large family they have and at the same time accumulated the property they now have.

"When we started farming after we were married," said Mr. Barton, "we had less than a thousand dollars to invest in land, buildings, farm equipment, and livestock. Thirty-five years ago we bought the home farm of 100 acres; later added 20 more; bought another farm of 150 acres, principally for the wood and timber on it; and later a pasture of 26 acres; making 296 acres in all that we owned up to 10 years ago. We have always practiced general farming, keeping six to ten dairy cows, making butter to be sold at retail, and have raised the necessary feed for them in so far as we could. There have also been some potatoes and apples to sell, and

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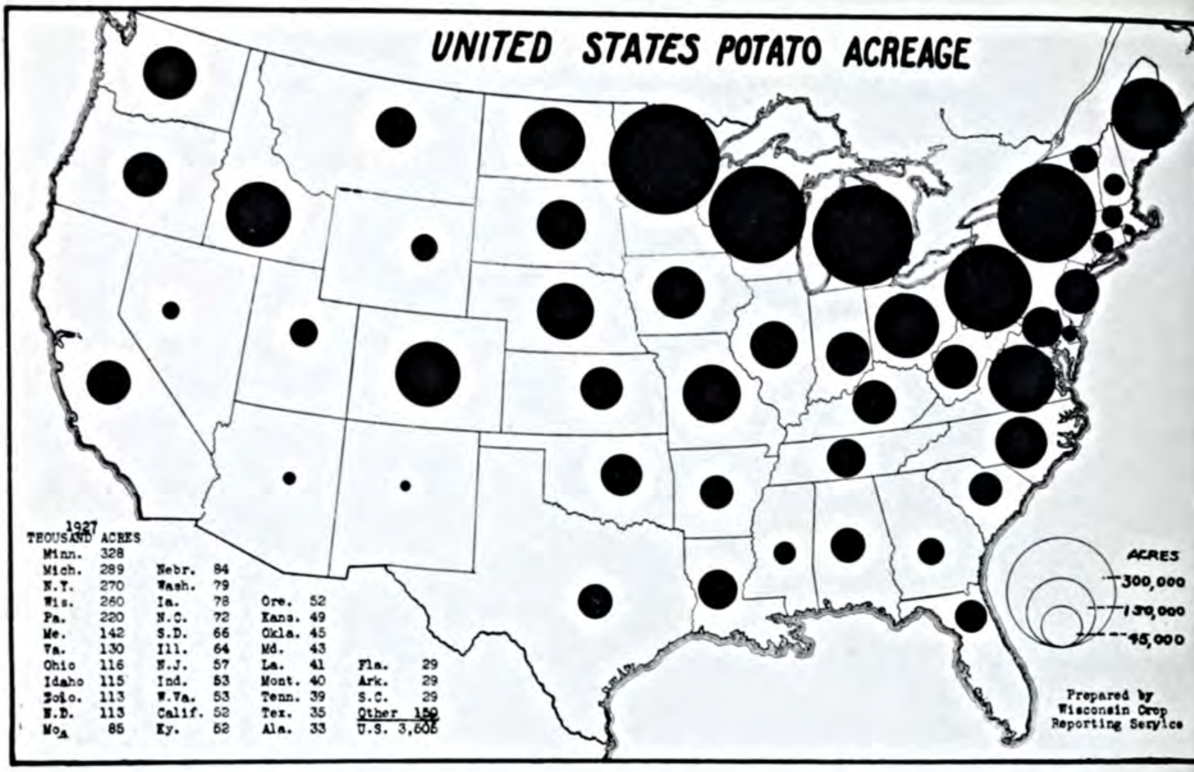


POTATOES

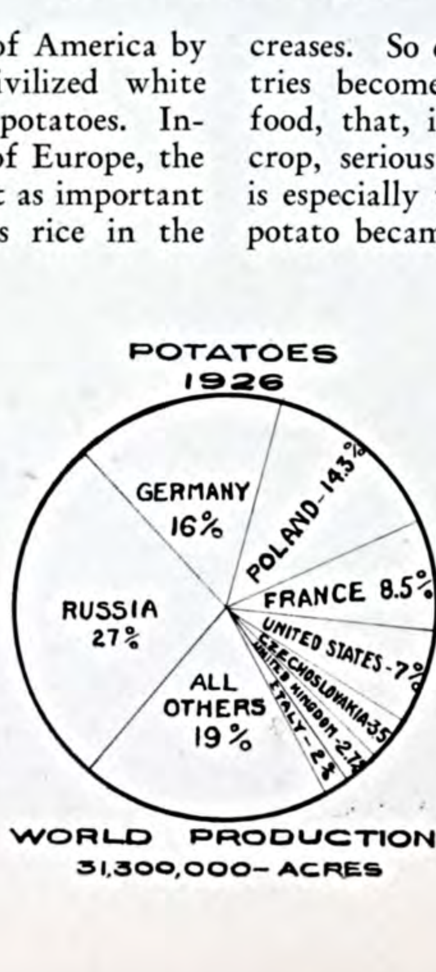
First of a new series on crop statistics

By Walter H. Ebling

Agricultural Statistician, Wisconsin

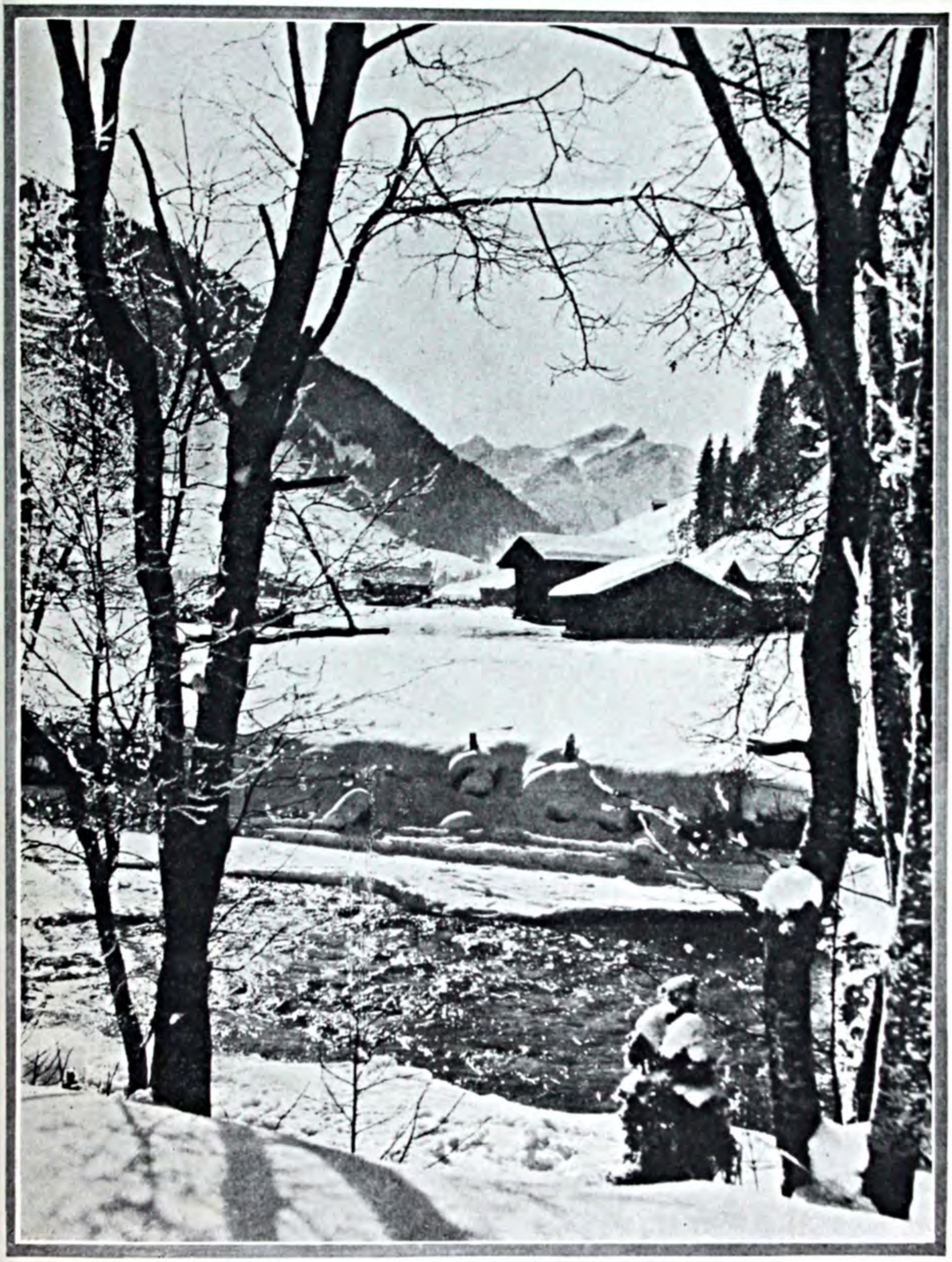
SINCE the discovery of America by Columbus, most civilized white men have learned to eat potatoes. Indeed, in some countries of Europe, the potato has become almost as important an item of food as has rice in the Orient.

The crop came originally from the Andean mountains of South America. It was cultivated as a food by the natives on that continent before the white men came. Its introduction to Europe revolutionized life and food habits and brought about one of history's most spectacular population increases. So dependent did some countries become upon the potato as a food, that, in years of a poor potato crop, serious famines occurred. This is especially true of Ireland where the potato became a most important food item. So general was the use of the potato as a food in Ireland, that this originally American crop is very commonly referred to as the "Irish Potato."



This crop the world over shows a preference for regions having a cool climate with fairly uniform tempera-

(*Turn to Page 54*)

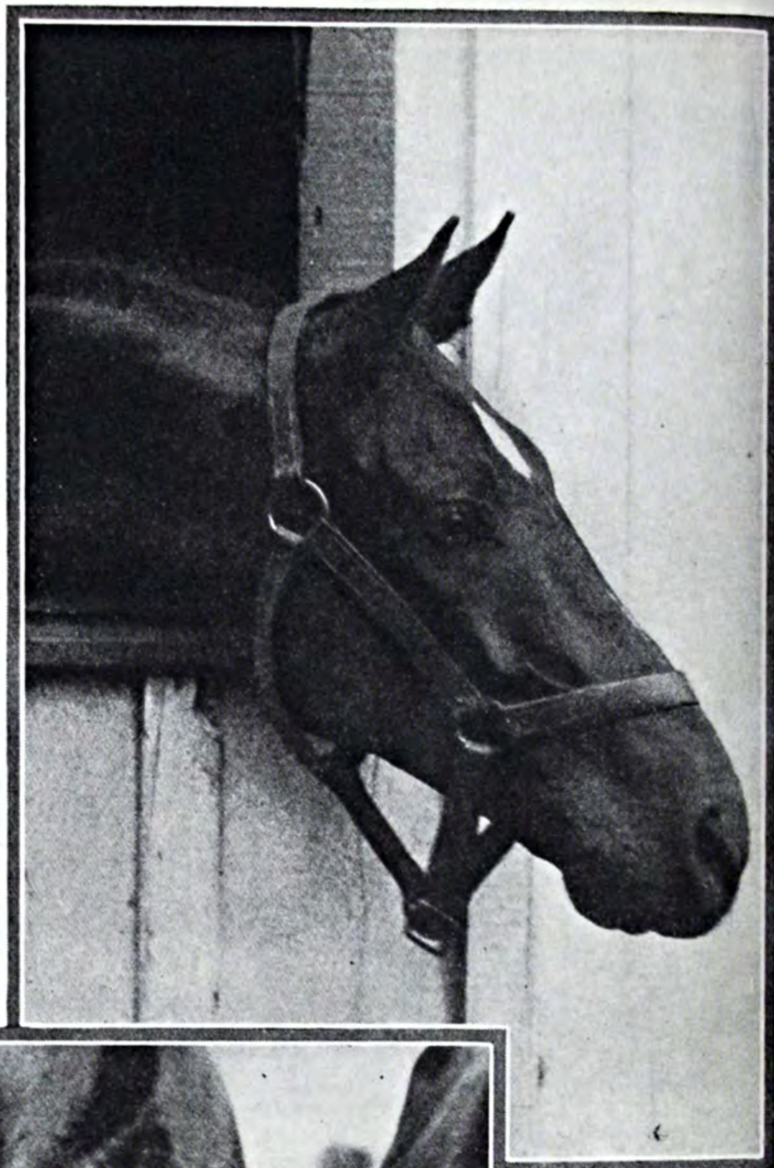


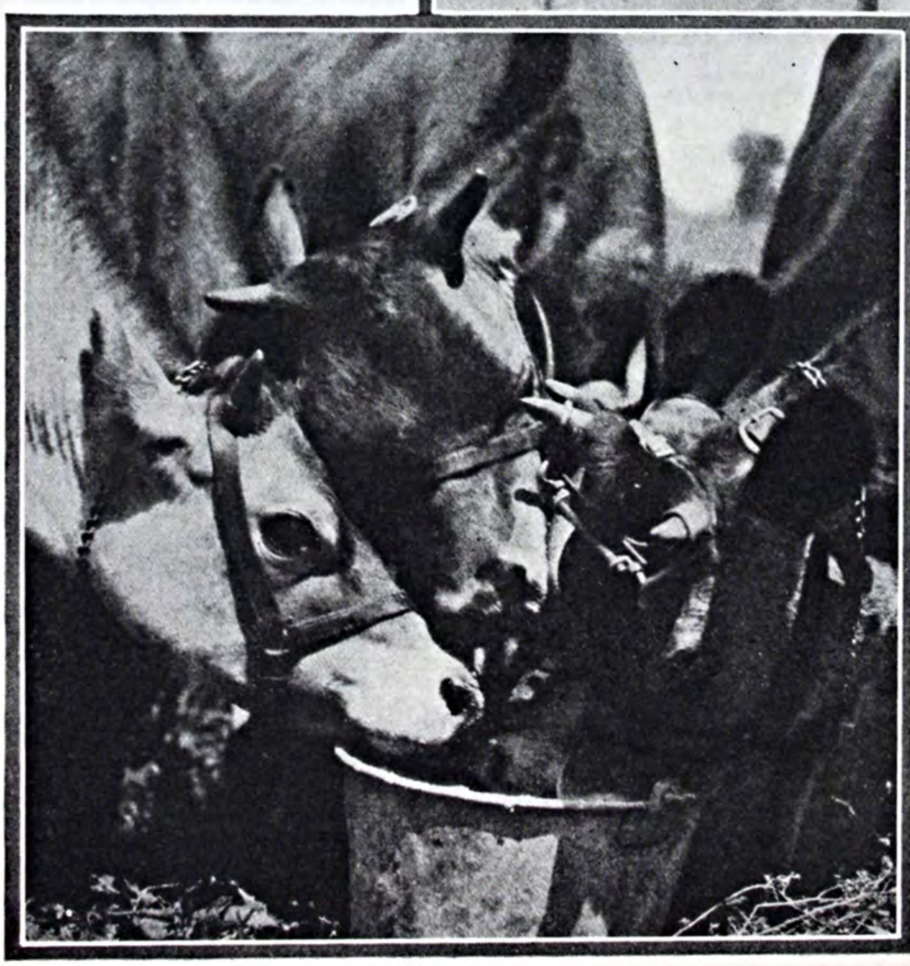
The keen, clear air—the splendid sight—
We waken to a world of ice,
Where all things are enshrined in light,
As by some genii's quaint device.

—Andrews Norton

PICTORIAL

Waiting for his Christmas dinner.

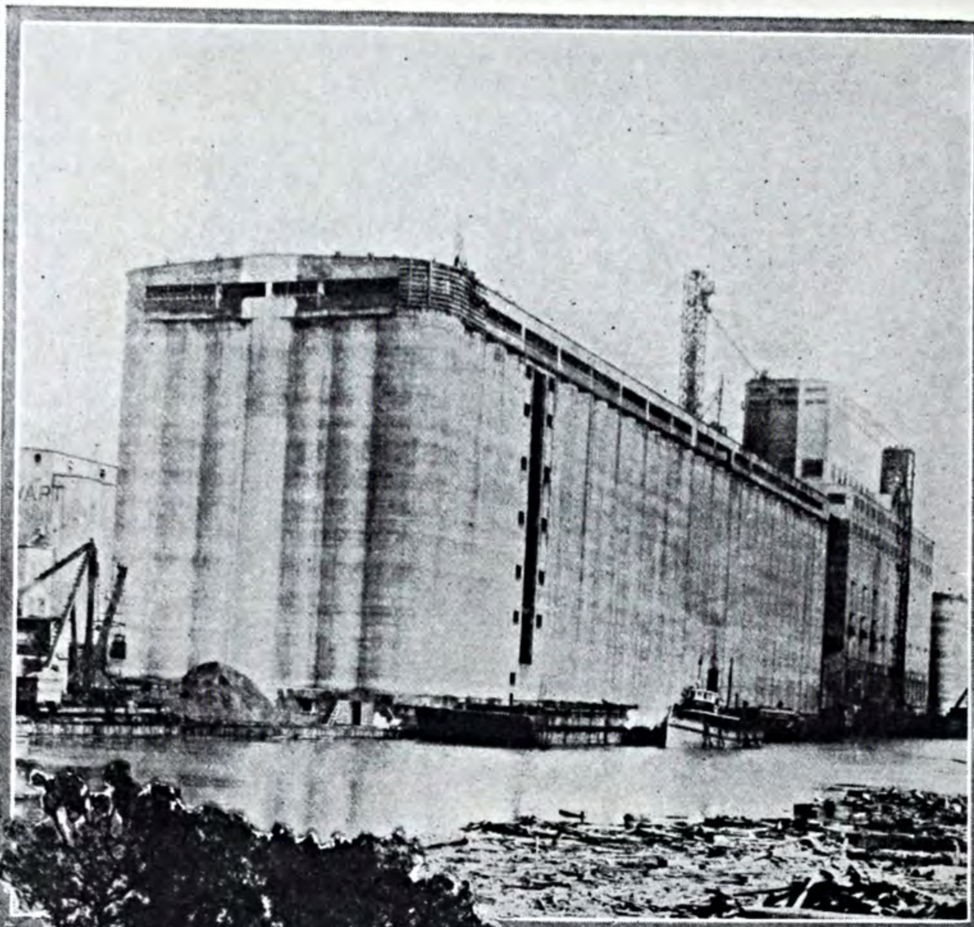




First come first served.

A great gift for an active youngster.

A barrel of pork.

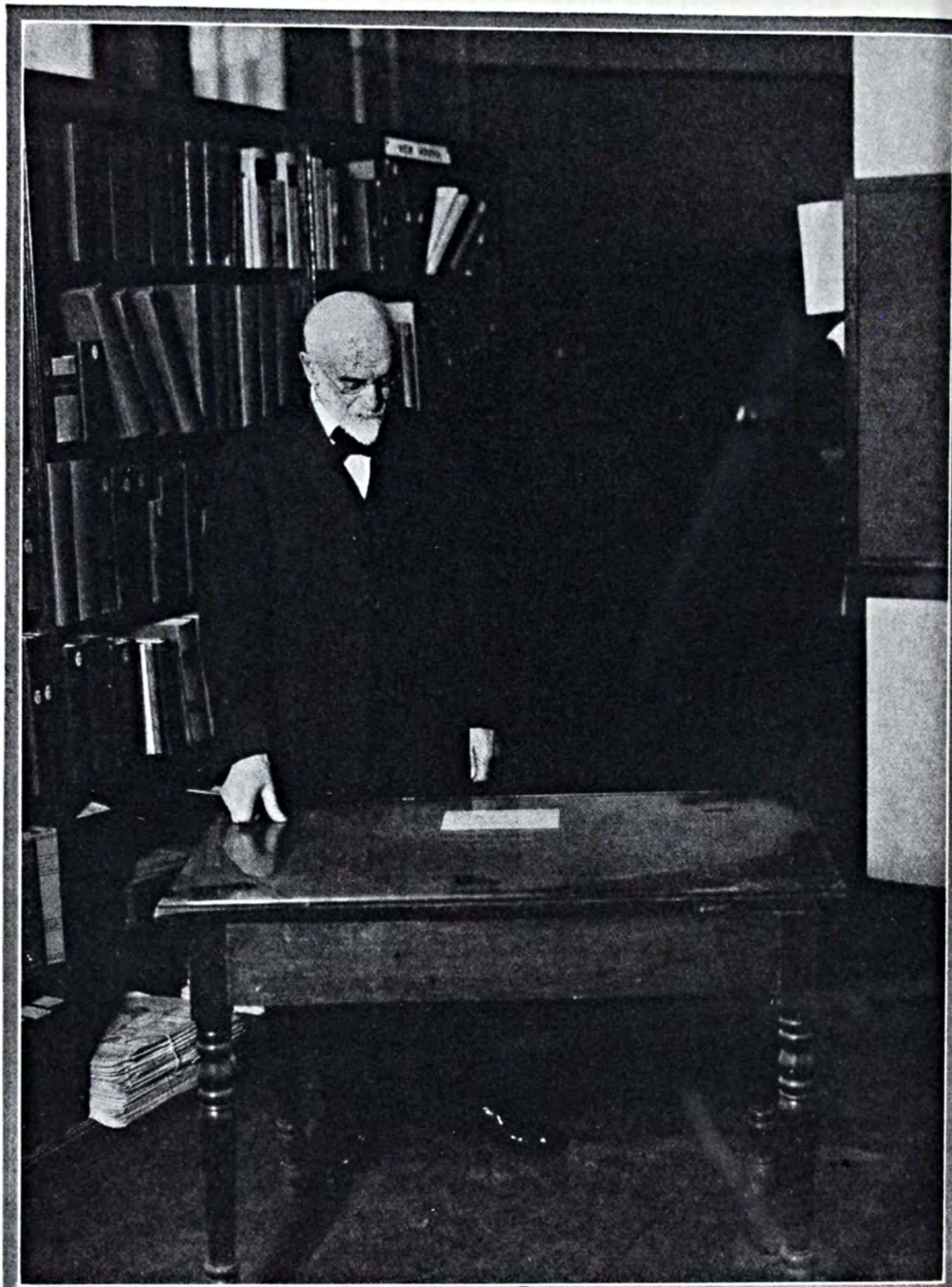


The world's largest wheat elevator at Port Arthur, Ontario, Canada, owned by a cooperative marketing association of Saskatchewan farmers.

A German oak tree 1,000 years old.

These are not footballs nor balloons, they are lemons grown by Mrs. Charles A. Massie at Ball, California, so big that they weigh two pounds apiece.

The smallest purebred Shorthorn cow in the world, owned by Theo. J. Tegelar of Nebraska. This midget stands 39 inches in height and is 7 years old. On the cow are Tegelar's two children, Doris and James.



DR. STEPHEN MOULTON BABCOCK

While Professor Stephen Moulton Babcock, known the world over as the modest inventor of the great dairying test which bears his name, is not a collector of antiques, he does thoroughly enjoy re-examining this service-battered and time-worn table. Its story is best told by the legend which Dr. Babcock is reading. Here it is just as it was penned by Professor W. A. Henry, the first dean of the Wisconsin College of Agriculture and director of the pioneer experiment station established in connection with that institution.

"The agricultural department of the University of Wisconsin under my direction was first housed in the 'University Farm House' in 1880. In 1881, my wife and self occupied three rooms, the other being given over to the farm help. I started the form of an office by purchasing this table for $2.50 and placing it in the front room, second story of the farm house. This table may be regarded as the first and oldest piece of furniture belonging to the College of Agriculture." W. A. Henry, Madison, Wis. July 30, 1907.

The Editors Talk

In Retrospect

The year 1928 started out with as bright an agricultural outlook as there has been since the war. Crop and livestock prices were favorable enough to lead farmers to increase their plantings and livestock holdings.

A long, cold spring somewhat dampened this outlook. This was particularly true in the case of cotton, corn, tobacco, and potatoes. Nevertheless, in spite of the weather, greater acreages of these crops were planted.

Coming along to the growing season, unfavorable weather caused considerable depreciation in crop quality, especially along the Atlantic Seaboard where tropical storms damaged the cotton and tobacco. On the whole, however, the season was favorable, with the result that the production of crops in 1928 was greater than in 1927.

As this increased production has come upon the market this fall, farm prices, naturally enough, have reacted and declined. However, they have not declined to the low level which occurred in the spring of 1927.

The price of cotton has been considerably below that of last year. This holds true also of tobacco, potatoes, corn, and grain. Yet, even though the prices of these crops are not as favorable as last year's, agricultural prices as a whole are a lot better than in 1927.

Farm prices this year have averaged 45 per cent above prewar. During 1927, they averaged 37 per cent above, and in 1925, 54 per cent above, so that in comparison, this year's prices are better than in 1927, but not as good as in 1925.

The fertilizer sales during this year have been decidedly greater than in 1927. This would indicate that in spite of the fact that the chief fertilizer crops —cotton, tobacco, corn, and potatoes have brought lower prices in 1928 than in 1927, farmers in general are optimistic.

As further evidence of this optimism, we would refer our readers to the article on farm conditions as shown by what the farmer actually does, appearing on page 18 of this issue, and written by Arthur P. Chew, of the United States Department of Agriculture, well-known writer of economic articles. Mr. Chew believes, in line with the above, that 1928 is clearly a mark of confidence among the farmers in the future of agriculture.

Agricultural Workers Meet

During the week of November 19 to 24, more than 500 of America's leading scientists assembled in Washington to discuss problems of vital interest to American farmers.

Three groups of workers were represented at these meetings: The American Society of Land Grant Colleges, the American Soil Survey Association, and the

American Society of Agronomy. All of these groups focussed their attention on the fundamental problems and ills of agriculture, and endeavored to show that if conditions are to be greatly improved, science must assume a more aggressive role. This is a most commendable attitude since agriculture is looking more and more to science for a solution of its problems.

Of particular interest were the symposiums on "Soil Organic Matter and Green Manure," "Application of Base Exchange Methods," "Lime," "Soil Erosion," and "Tobacco Research," sponsored by the American Society of Agronomy.

The program of the American Soil Survey Association was confined largely to discussions of the relation of soil types to crop adaptation, to crop infestation with special reference to the corn borer, soil erosion as a national problem soil survey, to timber production and forest policy.

Judging from the interest manifested in the scientific papers presented and resultant discussion, it is quite evident that the soil has always been, is now, and is likely to remain, the basis of a permanent agriculture and, therefore, of our civilization.

Publicity and Lime

The use of lime has become so wide-spread and common that we may be prone to overlook the comparative youth of the extensive adoption of this practice. It is true that liming has been practiced to some extent since early historical times in European and Asiatic countries, and in this country for about 150 years. However, the general use of lime dates from around 1900. Since that time the consumption of this material has increased by leaps and bounds.

The rapid increase in the use of lime is due to the fact that it was profitable, and particularly to the wide publicity that has been given to the benefits derived from the use of this material. One is impressed with the volume and extent of this publicity and the results secured, when reading Dr. H. J. Wheeler's article "Results of Publicity as Measured by Lime Sales for Agriculture" in Rock Products for September 15, 1928. Dr. Wheeler lists by experiment stations the publications issued on lime, together with the apparent effects of these publications, as measured by increased lime consumption.

A few selected instances illustrate the value of these publications. In Kentucky, 60,000 tons of lime were sold in 1923, while 132,000 tons were sold in 1927. In Pennsylvania, twice as much lime is used now as was used when a special experiment on Volusia soils was begun. The consumption in this state is about 400,000 tons a year. The first carload of lime is reported to have been sold in Illinois in 1902. In 1906 there were 122 tons used, in 1916 there were 113,000 tons used, and in 1927 there were 718,000 tons used. Many other states reported similar trends. Such astounding increases in the use of lime speak well for the benefits that accrue from it and for the effectiveness of the publicity.

It should not be thought that the experiment stations were alone in presenting the story of lime to the agricultural public. Many railroads gave effective cooperation by using publicity material and by running agricultural trains over their lines. They also have hauled lime free on their roads, in order to introduce its use into certain sections. These practices, of which Dr. Wheeler mentions several, result in benefits for both farmer and railroad. The increased use of lime has made more profit for the farmer and more hauling for the railroad through the bigger and better crops grown, aside from the increased railroad business of hauling the lime to the farmer.

The agricultural press and literature of the fertilizer companies have certainly played an important part in this educational campaign. They have served to spread widely and quickly the teachings of the experiment stations. Last, but not least, we have the publicity of the lime industry itself.

Thus, we have a great mass of educational matter being spread, and a most favorable response has come from it. However, the task is not completed. There are yet many acres of land that could be made efficient for crop production if they were limed; and we have other acres that do not receive lime frequently enough, or in large enough quantities.

It is very fitting that Dr. Wheeler, who is now manager of the Agricultural Service Bureau of the American Agricultural Chemical Company, should have made this comprehensive survey of lime. During his long and successful service as Director of the Rhode Island Experiment Station, he was one of the outstanding pioneers in the investigation and use of lime. He modestly makes only a passing reference to his own work, but it has been truly great. Much of the investigational work of the country on the principles and practices of liming was inspired by the work of that notable quartet—Wheeler, Frear, Hopkins, and Thorne. The fruitage of their labors is seen in the thriving fields of alfalfa and clover one sees on all sides of the country.

The Potash Industry

A very important day in European agriculture is Potash Day held in Berlin. Guests of the occasion are offered an unusual opportunity to review the latest developments in this phase of the fertilizer industry.

The seventh of these Potash Days, held on the 30th of last January, assumed an international significance in calling together as it did such well-known agriculturists as Professor Dr. A. Binz of Berlin; Geh. Hofrat Professor Dr. Paul Wagner, Darmstadt; Sir John Russell of Rothamsted; Professor Dr. Ulrich Duerst of Bern; Professor Dr. Neubauer of Dresden; and Professor Dr. H. Kappen of Bonn Poppelsdorf, as speakers.

Among the guests, the names of many leading scientists from other countries were found. The presence of professors of American and Japanese universities revealed that interest in the consumption of potash is by no means restricted to the European continent.

With this widespread interest in mind, we are calling the attention of our readers to the following abstract of the inaugural address by Dr. Gerhard Korte—

"At the first six 'Potash Days' held in the years 1906 to 1912, the lectures dealt primarily with geological, chemical, and technical questions. As milestones in the development of the potash industry, the second and sixth Potash Days with the outstanding contributions by van t'Hoff and Svante Arrhenius deserve special mention. The seventh Potash Day on the other hand is dominated by the idea of the importance of the potash industry as an important factor in food production, and is devoted, therefore, to the use of potash salts in agriculture.

"Nine-tenths of the potash salts produced annually are used for agricultural purposes and are, therefore, important raw materials for the most vital of all industries; only one-tenth of the output is consumed by the chemical and allied industries.

"Expressed in round figures, approximately 5 million tons of potash salts serve annually to promote the growth of grain and root crops and thus to help materially in the production of our daily bread. These potash salts, which so many thousands of busy German hands raise from the bowels of the earth, are returned by the farmer to the soil to build up the substance of the plants.

"Hence the potash industry constitutes a unique link between industry and agriculture. This characterizes its significance as a promoter of the world's food supplies.

"The main task of the potash industry is consequently to aid in increasing food production and at the same time to enable the farmer to grow his crops at the lowest possible cost.

"The maintenance of such low prices has only been made possible by a most rigorous rationalization of the industry such as probably has never been undertaken by any other concern. A large number of mines have been closed down and production thus confined to the most efficient works, which have been enlarged and modernized.

"Germany's aggregate output of potash salts supplies three-quarters of the total demand of the world for potash. In amicable cooperation with the French potash interests the German potash industry helps in supplying 19/20 of the entire world-demand for potash.

"The understanding existing between the French and German potash interests, aims above all at cooperative scientific research. This research work shall be conducted on scientific agricultural lines throughout the world, as has been the case for many years in Germany."

Fertilizer Economics

In recent years, considerable work has been done in the field of agricultural economics and statistics. In line with the advance in this science, Better Crops Publishing Corporation is now printing and distributing a new 8-page pamphlet called *Fertilizer Economics*.

The information contained in this new publication is designed to give a clear picture of important price indexes as they relate to fertilizer consumption in the United States. It is believed that this is the only source of such complete and authoritative data now available to buyers of fertilizer material, economists, financial editors, bankers, agricultural workers in economic fields, and others. The data are complete for 31 years, 1897 to date. They are useful in showing important trends and price changes.

These index numbers were made under a fellowship established in the Department of Agricultural Economics and Farm Management of Cornell University, in 1926 and 1927. Dr. E. E. Vial who did the original work is keeping the data up to date and is editing each issue of the booklet, *Fertilizer Economics*.

We shall be glad to send a copy of this publication to any one interested.

AGRICULTURAL DEVELOPMENTS

By P. M. Farmer

WHAT MORE SNUFF?

Although the once numerous official snuff boxes in the United States Senate have dwindled to one lone container, presumably patronized by one lone Solon, the consumption of this old-time tickler has been increasing in this country during the past half century. Fifty years ago our consumption was about 4,000,000 pounds annually, while now, official reports say, we use about 41,000,000 pounds. It is estimated that approximately one-fourth of the population is addicted to the stimulant which, by the way, is made of high-grade dark fire-cured tobacco of Virginia, Kentucky, and Tennessee. Snuff is said to be of better quality than it used to be in the early days of its manufacture in France and England when refuse and scrap were used. Modern users here are predominantly persons in industries where smoking is prohibited, southern laborers, and immigrants from countries where snuff using is a widespread habit.

SCORE TWO FOR MERCURY

In his struggles against a host of direct and indirect enemies man has found mercury one of his most useful weapons, and the years are adding new uses, some of them conspicuous in increasing crop production. After four years of research at the University of Illinois, Dr. Benjamin Koehler has found that ethyl-mercury-chloride dust is much more successful in controlling oats diseases than the old standard formaldehyde treatment. Crops from seed receiving the new treatment have shown increases nearly twice as great as those produced by the formaldehyde treatment, the reason given by Dr. Koehler being that the mercury compound not only gave perfect smut control but also checked other diseases including seedling disease caused by infection from the soil. Seed oats can be treated for a cost of about 10 cents a bushel for the material. One commercial concern is making the compound under the name of Ceresan.

Progress in the control of the "damping off" disease of sugar beets by the use of mercury compounds on the seed is announced by the Wisconsin College of Agriculture. This disease, thought to be caused by fungi, is especially bad where sugar beets are grown with truck crops, but where the beets are grown on dairy farms the trouble can be greatly reduced by proper rotations. The Wisconsin scientists hope soon to be able to recommend a specific treatment.

Successful dust treatments have been available for some time for the treatment of seed corn and seed wheat.

"COUNTERFEIT" CALVES

Good baby beef may be produced nearly as efficiently on Wisconsin dairy farms as on beef cattle farms of the corn belt, according to J. G. Fuller of the Wisconsin College of Agriculture, who bases his conclusion on results obtained in experiments at the college. In the experiments Holstein cows were bred to Aberdeen-Angus bulls, and the calves closely resembled the sires—black, polled, compact, and blocky. Because the calves gave no indication of the blood of their dams they have been called "counterfeit." Nursed for six months, the calves are fed for eight months on a full grain ration and are ready for market at about 15 months of age, and command a premium because of type and finish. Prof. Fuller says a Holstein cow producing 6,000 pounds of milk a year will have no trouble in nursing two or three beef calves. The plan, he says, is well suited to farms where there is a shortage of labor, as a part of the herd can be milked while a few cows are used to give the beef calves a good start.

ENGINEERS FIGHT SOIL EROSION

Valuable information on the practical control of soil erosion probably will result from a study of terracing begun by engineers of the Bureau of Public Roads of the U. S. Department of Agriculture on a 150-acre farm near Guthrie, Oklahoma, leased for the purpose by the Guthrie Chamber of Commerce, which is cooperating. This large-scale study of soil saving and restoration of eroded fields will be carried on while the farm is operated as a going economic concern. This region has suffered much from erosion, and cultivated fields of the test farm have been badly damaged by rain water, while there is pasture land that has not been affected. Terracing will be done according to the best knowledge of agricultural engineers, and runoff and erosion will be accurately measured. The farm work will be done with modern machinery.

PARCEL-POST COW TESTING

A new convenience in the dairy industry is the use of the postal service in aiding farmers in having their cows tested economically for milk and butterfat production. Recently 75 meetings were held in one week in Monroe county, Wis., to popularize testing by this new method which makes it unnecessary for the tester to visit the farm. The farmer takes samples of each cow's milk and mails them to the office of a trained supervisor who maintains a book of test results for each farmer. In two other counties of the State more than 400 dairymen are now having their herds tested by mail.

OKLAHOMA JOINS TICK-FREE STATES

Territory released from the cattle tick quarantine by the Bureau of Animal Industry order that went into effect December 1 included areas in Oklahoma which made that State entirely white and placed it north of the crooked line that separates the ticky from the unticked. The former ticky or partly ticky States now above the line are: California, Georgia, Kentucky, Missouri, North Carolina, South Carolina, Tennessee, Virginia, and Oklahoma. It won't be long now until the last hungry tick has dropped noiselessly from a grass blade after a futile and lonesome wait for his leather-upholstered lunch wagon.

IMPROVED MILK POWDER USEFUL IN BREAD MAKING

Improvements in methods of drying skim-milk, developed by the U. S. Department of Agriculture, have resulted in a product very satisfactory for use in making bread. When used with a good quality of flour, it has been found possible to get a loaf 10 per cent larger and 4 per cent heavier than when no dried milk is used. In addition, the bread made with the milk powder is more nutritious, has good texture and excellent flavor. Bakers will not object to the cost of milk powder, for they will get more loaves from a barrel of flour.

Justus von Liebig

By Dr. Paul Krische

Translated from Die Ernaehrung der Pflanze, No. 10, 1928 by G. Brate

JUSTUS von Liebig was born on May 12, 1803, in Darmstadt, in the oldest quarter of which his father kept a drug and grocery store. Liebig's father liked to occupy himself with the preparation of drugs for his store and had established outside the town at the Kuhschwanzwiese a sort of laboratory where Justus always gladly assisted his father. He obtained for the boy the necessary books out of the Court Library and thereby became acquainted with the Librarian Hess who later enabled the politically suspicious student to study in Paris.

Liebig plunged with such hot enthusiasm into chemical literature that he neglected his school work with the result that in a class examination, the Director blamed him for his want of diligence. "He is the tormentor of his teachers and the grief of his parents, what does he think will become of him?" When Liebig replied that he wanted to become a chemist, his classmates and the teachers burst out laughing, because at that time nobody had any idea that it was possible to study chemistry.

Heart Set on Chemistry

Owing to his small success in College, in 1818, his father made him an apprentice to an apothecary in Heppenheim. He remained there for only 10 months, because he did not want to become an apothecary but a chemist. At first, he went back to his father, and when at the age of 16 he had studied all the chemical works that were available at the Library of Darmstadt, he urged his father to send him to the University of Bonn where he was sent in 1820. There, Professor Kastner, who was said to be the most eminent chemist of the German Universities, used to lecture. Liebig followed him in 1820 to Erlangen.

Became a Professor

But also in Erlangen it was impossible for Liebig to obtain what he was looking for, namely, the introduction into scientific research work, and when in 1822 he became involved in the liberty revolt of the students and had to leave Erlangen secretly, he decided to go to Paris to Gay-Lussac. He was received there very warmly in the Fall of 1822 and felt entirely in his element.

Alexander von Humboldt's attention was drawn to him and through his recommendation he became in 1824 assistant professor and in 1826 Professor in Giessen. Prior to that, on June 21, 1823, he passed his doctor's degree with the dissertation on "The Relation of Mineral Chemistry to the Chemistry of Plants." In Giessen he founded the first modern chemical educational laboratory and there he developed such an activity and educational work that Giessen became the "Mecca" of young enthusiastic chemists from all countries. In 1852 Liebig became Professor in Munich and he died there on April 18, 1873.

The chief merits of Liebig are in the line of organic and agricultural chemistry. In the chemical technology he worked out a process on the silvering of glass for the manufacture of mirrors, as well as the manufacture of a "patent fertilizer." On account of his theoretical views on the processes in the organism of the animals and plants, he became the "founder of agricultural chemistry."

Plant Nutrition Ideas

His ideas on the nutrition of the plants which for decades were the foundation of agricultural chemistry and which are still applied at the present time, although modified, were about the following:

The foodstuffs of the plant are inorganic substances, as carbonic acid, water, ammonia, nitrogen, potassium, lime, magnesia, iron, phosphoric acid, and sulphur.

Life and growth of the plant are dependent on the presence of all these foodstuffs. If one of them is missing, even the largest surplus of the others has no effect. Therefore, crop yield is dependent upon the quantity of that foodstuff which is in the minimum or smallest amount. This is the famous "Law of the Minimum" by Liebig, which was recently changed by Mitscherlich and others through the "Law of the Growth of Plants."

The plant obtains only from the soil those substances which after combustion are left as ashes. Therefore, the fertility of the soil is measured by its contents of these ashes.

The other foodstuffs which supply carbon, hydrogen, and nitrogen are not contained in the soil, but in the atmosphere in unlimited quantities. Liebig calls them, therefore, in contrast to the foodstuffs contained in the soil or "mineral foodstuffs" the "atmospheric foodstuffs."

In order to keep a field permanently fertile, the mineral components taken out of it at harvest time, have to be completely substituted. A farming system which does not provide for this is unmethodical or "soil robbing."

All the so-called organic fertilizers such as stable manure, excrements of men and animals, compost, etc., do not have effect through their organic ingredients, but through their inorganic substances which are formed after putrefaction and decomposition, such as carbonic acid, ammonia, mineral substances. (In this respect, recent research work led to more attention to the importance of the organic substances, such as humus, contrary to Liebig.)

Patent Fertilizer

Liebig worked steadily on the practical use of these ideas. For instance, he eagerly supported superphosphate, first produced technically in England and by Lawes. This was a water soluble phosphoric acid obtained by treating bone meal with sulphuric acid. The aim was of course to supply the plants with important foodstuffs in a soluble form. As the lime of the soil changes the superphosphate into a neutral phosphate not readily soluble by water, a washing out of the phosphoric acid by the water of the soil was not to be feared. But leaching, according to Liebig was important with regard to potash. In melting together potash and marl he therefore produced a composition not easily soluble in cold water, the so-called "Patent Fertilizer," which was introduced in England. As it proved unprofitable, the manufacture was was abandoned later on. Afterwards Liebig recognized that he had greatly underestimated the absorption of potash by the soil and had overestimated the leaching quality of the potash.

(*Turn to Page 47*)

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

Unproductive spots in fields that are alkaline or neutral may be due to a manganese deficiency or unavailability in the soil. At least Professor L. G. Willis found that the unproductiveness could be overcome by the application of manganese sulphate to the soil, according to his bulletin, "Response of Oats and Soybeans to Manganese on Some Coastal Plain Soils," North Carolina Experiment Station Bul. 257. The corn is stunted in growth and the soybeans are chlorotic on these deficient soils. These signs are similar to those considered as evidence of potash deficiency, since potash fertilization has been found an effective remedy for this condition. Pot experiments with oats show that lime or calcium phosphate can be used on these soils without harm if manganese sulphate is added. Pure potassium chloride was not found to be absolutely effective in overcoming conditions typical of manganese deficiency. However, the use of crude potash salts in the field is much more effective due possibly to manganese present as an impurity or to the chloride content.

"Fertilizer and Cottonseed Meal Analyses Report," Dept. of Conservation and Inspection, Little Rock, Ark., Dr. W. F. Mangledorf and G. W. Roark.

Soils

"Whiteside County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Report No. 40, June, 1928, R. S. Smith, O. I. Ellis, E. E. deTurk, F. C. Bauer, and L. H. Smith.

Crops

Of especial interest to the readers of BETTER CROPS WITH PLANT FOOD in the large amount of outstanding experimental work done by the Illinois Agricultural Experiment Station as reported in its 41st Annual Report, "A Year's Progress in Solving Farm Problems," is the work done with soils and crops. With particular reference to plant food problems, the Station reports from its findings that crop residues may increase the annual acre value of grain crops all the way from 2c on one field to more than $7 on another; that phosphate may be worth as much as $41 a ton in grain systems of farming; and that both dark and light colored soils may be made to yield better through the use of potash. The value of crop increases from the use of potash ranged from $1.89 an acre annually on one field to $8.75 on another field in the case of light colored soils, while in the case of dark soils, the increases ranged from nothing to $4.98 an acre for the various fields.

Another interesting study on which more data has been obtained is the way in which different corn strains excel in the use of fertilizers. In the Station's last annual report, it was pointed out that strains of corn had been found which varied in their response to potassium fertilization. Another season's results on some of the experimental fields confirm these results. The experimenters therefore conclude that it may be possible to isolate strains of corn that are superior in the utilization of plant food materials already in the soils or applied in fertilizers.

In the truck growing sections of Cook county results have demonstrated that many vegetables will respond as well to commercial fertilizers as they will to manure, the supply of which is dwindling. In these investigations, the effectiveness of various commercial fertilizer materials is being tested out, especially when they are used as a supplement to or substitute for animal manures.

The report is quite complete in its detail and covers all divisions of the experimental work of the station.

The October issue of the *American Potato Journal* carries an interesting little story of the 30 men in Ohio who made the Ohio 300-bushel club this year, with an average of 358 bushels per acre. The largest yield was 606 bushels per acre. The largest amount of fertilizer used in any one case was 1,600 pounds to the acre; the smallest 300 pounds. The average amount used by all of the men was 883 pounds, and the average analysis was a 3-12-7.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVII, No. 9, Sept., 1928.

"Defoliation of Cherry Trees in Relation to Winter Injury," Agr. Exp. Sta., Geneva, N. Y., Bul. 555, Aug., 1928, W. O. Gloyer and Hugh Glasgow.

"Department of Agriculture-Immigration of Virginia," Richmond, Va., Bul. 251, Nov., 1928.

"Trees for Washington Farms, Why, Where, What, When, and How to Plant," Agr. Exp. Sta., Pullman, Wash., Pop. Bul. 143, Sept., 1928, E. H. Steffen and Chas. M. Genaux.

"House Plants," Ext. Serv., Coll. of Agr., Madison, Wis., Cir. 222, May, 1928, James G. Moore.

Economics

A new and very interesting statistical study of the interrelationships of supply and price is published in a new bulletin No. 466, by the Cornell University and Agricultural Experiment Station. According to the authors, G. F. Warren and F. A. Pearson, this bulletin is an attempt to express mathematically some of the relations of supply to price, the relationship of farm and retail prices and effect of supply on these relationships. Consumers pay more for a large crop than for a small crop. Farmers receive less total dollars for a large crop than for a small one. The extra amount paid by consumers remains in the cities.

Wisconsin Bulletin 402, "How Farmers Become Farm Owners," by B. H. Hibbard and Guy A. Peterson is a well worked-out study of how Wisconsin farmers become owners. It is based on the replies to a questionnaire. Most of the farm owners went through three stages—labor at home, hired man, and then ownership. Most men who continue to farm eventually become owners. Ownership comes later in life than formerly but the farm is worth more.

"Economic Aspects of the Fresh Plum Industry," Agr. Exp. Sta., Berkeley, Cal., Bul. 459, Oct., 1928, Emil Rauchenstein.

"Crop and Livestock Report 1927," Pa. D. of A., Harrisburg, Pa., Vol. 11, No. 11, Sept. 1, 1928, Gen. Bul. 465.

Diseases

"A Fusarium Wilt of Peas in Wisconsin," Agr. Exp. Sta., Madison, Wis., Research Bul. 85, June, 1928, Maurice B. Lanford.

PLANT FOOD CONTROLS DISEASE

APPLE trees suffering from mildew were treated with a 12 per cent solution of a concentrated potash salt. (Winter Treatments). Treated trees showed slight traces of the disease while non-treated trees were completely diseased.

Gooseberry trees treated with a five per cent solution kept free from disease. *(Report of the Institute of Market-Gardening Culture at Geisenheim 1924-1925.)*

Justus von Liebig

(*From Page* 44)

The confession of this error is sig-ificant. "I had sinned against the visdom of the Creator and have re-eived the just punishment for it. I vanted to make His work better, and n my blindness I thought that there vas one limb omitted in the marvelous hain of laws which fix the life to the urface of the earth and keep it al-vays fresh, that I, the weak powerless vorm had to replace. But this limb vas provided for, although in such a vonderful manner that the thought of the possibility of the existence of uch a law had up to then not pene-rated human intelligence, though nany facts pointed to it. But he facts that tell the truth be-come silent, or their voice is made naudible by the shouting of the error. So it was with me. I had the imag-nation that the alkalies had to be made insoluble because the rain would carry them off. I did not know then that the earth holds them fast as soon as their solution touches it, as the law which I found in my investiga-tions on the soil crust is the follow-ing: The organic life shall develop under the influence of the sun on the extreme crust of the earth. There-fore the Great Builder lent to the ruin of this crust the capability to draw and hold all those elements which serve the nutrition of the plants and by it also of the animals, like the mag-net draws and holds parts of iron so that no little part is lost. In this law the Creator included a second one whereby the plant-carrying earth is a huge filtration for the water out of which by the same capability all sub-stances detrimental to the health of plants and animals, all products of decay and decomposition of extinct plants and animal generations, are re-moved."

His eager fight for the abolition of "soil robbing" was of utmost impor-tance to practical agriculture which he once described as follows:

"The soil robbing which makes the land desolate and uninhabitable can be described in a few words.

"In the beginning, or on a virgin soil, the farmer grows grain after grain. As soon as the yield decreases he goes to another field. The increase in the population limits this migra-tion; he cultivates the same surfaces by letting it lie fallow alternately. The yields decrease continuously, and in order to increase them again the farmer now applies fertilizer which is supplied by natural meadows (three-field system).

"As this substitute is also not suf-ficient in time, this leads to the pro-duction of fertilizer by cultivation of fodder on the same fields. In the be-ginning the subsoil like the fodder supplying meadow is used continu-ously. After a certain time fallow years for the fodder plants are in-serted. At last the subsoil is ex-hausted and the fields do not carry any more fodder plants. Then, the pea-disease occurs, afterwards, the clover, beet, and potato diseases, and then the cultivation of the field ceases. The field does not feed man any longer."

Considered Potash

Besides phosphoric acid, Liebig has at all times in his fertilizer theory taken potash into consideration. He wrote in a letter to Guessefeld: "For many years I have pointed out the necessity for the replacement of pot-ash and have shown that the sugar and potash content of the beet are in the closest relation to each other. Now, as in the surroundings of Magdeburg on many fields the sugar contents of the beets diminishes so rapidly that replacement is beginning to be considered, and the time will come when everybody will deem the fertilization of the fields with potash just as necessary as that with phosphoric acid."

" . . . I see from your letter of February 22 that you together with others have found a process for the production of potash salts which puts you in a position to supply these salts at a price which permits the application of them as a fertilizer.

"I was very glad to hear this news as I am very much interested in the production of sugar which has gained a very great importance for Germany, and I feared already that it would gradually disappear from Germany owing to lacking replacement of potash. . . ."

While the agricultural chemistry of Liebig met in England with general enthusiasm, it found among the German teachers of agriculture and botanists a number of opponents such as Sprangel, Schleiden, and others. It began the controversy of the exponents of the humus theory as against the mineral theory of Liebig, which lasted for many years. Although Liebig was right in his appreciation of mineral foodstuffs, yet on the other hand, the importance of humus and of nitrogen for artificial fertilization was doubtless underestimated by him.

Liebig's Working Place

Nobody realizes today under what difficult circumstances Liebig had to work during the first years in Giessen, the main period of all his work. In 1832 he described in a petition for a new building his working conditions as follows:

All weighing had to be done in the small cabinet covered with stone plates which contained the collection of apparatus, instruments, and preparations and therefore could not be heated. On account of this condition he was forced to stay for hours in this room which during the winter months was mostly as cold as ice. Through the erection of a fireplace in the center of the room, it had been possible in the real laboratory to accept a number of assistants. All the more necessary was the conducting away of the damaging vapors, but as instalments with regard to this were not yet made, it was necessary to ventilate through the opening of windows and doors. Here, he had to carry out his investigations, amidst his workers exposed to the damaging vapors, the draft, the dust, and vapor of the carbon, and it was not to be wondered at if his health would be considerably affected. Even the new building finished in 1839 could not stand a comparison with the present wonderfully furnished working rooms of the agricultural chemical research institutes.

His Works

The following of his literary works are the most important: 1. The book published on the instigation of English friends in 1840 after his first voyage to England (1837) "The Application of Organic Chemistry on Agriculture and Physiology.". 2. "The Application of Animal Chemistry on Organic Chemistry to Physiology and Pathology." 3. "Theory and Practice in Agriculture." 4. "Chemical Letters." All of his works are remarkable through their vivid and peculiar style and are so fascinating and rich in ideas that their study is still at the present time delightful to the chemist and the educated layman. They belong therefore to the first literary range and are really classic writings.

No One Else But

"Rastus, does you love me?"

"Mandy, you is one woman I don't like none other no better than."

FERTILIZER RECOMMENDATIONS

For Tobacco Grown on Average Soils in Virginia, North Carolina, South Carolina, and Georgia during 1929.

I—*Fertilizers for Bright Flue-cured Tobacco*

1. *Analyses of Mixtures:*

(1) *For Heavy or More Productive Soils*—Eight per cent available phosphoric acid, 3 per cent ammonia, and 5 per cent potash, except for gray soils with red subsoils of the Cecil series of Virginia where 8 per cent available phosphoric acid, 3 per cent ammonia, and 3 per cent potash are recommended.

(2) *For Light or Less Productive Soils*—Eight per cent available phosphoric acid, 4 per cent ammonia, and 6 per cent potash.

2 *For Control of "Sand-drown" (Magnesia Hunger)*:

For sections where "sand-drown" is prevalent, it is recommended that fertilizers carry 2 per cent magnesia (Mg0). This may be derived from sulphate of potash-magnesia, dolomitic limestone, or any other material carrying magnesia in forms known to be available to the plant.

3. *Amount of Fertilizer:*

Use 800 to 1,200 pounds per acre in the drill thoroughly mixed with the soil just before transplanting.

4. *Sources of Plant Food Constituents:*

(1) Phosphoric acid—Derived from superphosphate.

(2) Potash—Derived from a combination of high grade muriate of potash with either high grade sulphate of potash or sulphate of potash-magnesia, or both.

Available experimental data at this time from bright tobacco sections of Virginia, North Carolina, South Carolina, and Georgia show that a small quanity of chlorine in the tobacco fertilizer increases the acre value of the crop. Experience has shown, however, that an excessive amount of chlorine in fertilizers used for tobacco injures its growth, producing a thick brittle leaf, and also has an unfavorable effect upon its burning quality. It is recommended, therefore, that fertilizers be compounded with the above named sources of potash in such proportions that the fertilizer mixtures shall contain a maximum of two per cent of chlorine. Since research has shown that heavier applications of high grade potash are profitable, it is recommended that the potash content of mixed fertilizers exceed that of ammonia by at least two units, except for gray soils with red subsoils of the Cecil series in Virginia.

(3) Ammonia—One-half of the ammonia should be derived from high grade organic materials of plant or animal origin such as cottonseed meal, fish scrap, and high grade tankage. The remaining half should be derived from urea and standard inorganic sources of nitrogen such as nitrate of soda and sulphate of ammonia, at least one-fourth of the total ammonia being supplied by nitrates.

II—*Fertilizers for Dark Tobacco (Sun-Cured and Shipping)*

1. *Analyses of Mixtures:*

Use 8 per cent available phosphoric acid, 3 per cent ammonia, and 3 per cent potash.

2. *Amount of Fertilizer:*

Use 600 to 1,000 pounds per acre in the drill at or just before transplanting.

3. *Sources of Plant Food Constituents:*

(1) Phosphoric acid—Derived from superphosphate.

(2) Potash—Derived from sul-

phate of potash-magnesia, high grade muriate of potash, or high grade sulphate of potash.

(3) Ammonia—One-half of the ammonia should be derived from high grade organic materials of plant or animal origin such as cottonseed meal, fish scrap, and high grade tankage. The remaining half should be derived from urea and standard inorganic sources of nitrogen such as nitrate of soda and sulphate of ammonia, at least one-fourth of the total ammonia being supplied by nitrates.

W. W. Garner, Washington, D. C.

T. B. Hutcheson, Virginia, Secretary,

T. L. Copley, Virginia,

E. G. Moss, North Carolina,

E. Y. Floyd, North Carolina,

L. G. Willis, North Carolina,

C. B. Williams, North Carolina, Chairman,

R. E. Currin, Jr., North Carolina,

T. S. Buie, South Carolina,

R. E. Currin, Sr., South Carolina,

E. C. Westbrook, Georgia,

J. M. Carr, Georgia,

W. F. Pate, Soil Improvement Committee, N. F. A. Oct. 17, 1928.

L. R. Barton

(*From Page* 29)

also wood, and we have made a specialty of maple sugar and syrup. At one time we set about 1,500 buckets, and the returns from same, together with butter, were our principal income.

"Of course, my family expenses have been large much of the time. There were times when we had 16 pairs of shoes to buy every year, 16 shirts, and other needed supplies. It took at times a barrel of flour a month to feed the family, but of course the vegetables, meat, milk, butter, etc., we supplied from the farm. But in spite of this, we had to economize in order to meet the bills and save a little for future use. But we have always aimed to keep ahead and put aside in the bank at least $100 a year.

"About eight years ago we sold the home place of 120 acres and later the Pike Hill farm of 150 acres, retaining only the pasture of 26 acres. We then purchased a farm near Kelleyville of 250 acres and a little later an adjacent farm of 100 acres, making 350 acres in all. These farms are paid for, and we have money in the bank. This past year we raised three acres of corn, one acre of potatoes, two and one-half acres oats, and one-half acre of beans. We had a good garden, and cut about 75 tons of hay.

"Of course, we use a considerable quantity of high-grade commercial fertilizer for the various crops to balance the farm manure which we have. We find this necessary to get the best yields of the various crops.

"We set about 800 sap buckets, and we have 29 head of stock. At the present time, in addition to our living from the farm, we aim to average at least $100 per month cash returns from sale of milk and other products.

"Since an injury to one of my hands, we devote more time to raising dairy cows to sell, veal calves, and beef, and do not produce as much milk as formerly. We also keep some poultry to supply our own needs."

Mr. Barton is a native-born Yankee, and a descendant of old Revolutionary stock. He and his wife know what hard work is, for it is only by hard work that they have saved and accumulated. They are teaching their large family the value of good, honest endeavor and trying to equip them mentally and physically so that they will be able to meet life's battles successfully after they leave home.

Mr. Barton believes in farm organization, is a member of the County Farm Bureau and has children in 4 H Club Work.

Pages From A Field Note Book

Find Fertilizers Pay

By Robert V. Peterson

Stillwater, Oklahoma

MANY Oklahoma farmers have contended that because their state is a virgin one there is no need to use commercial fertilizer for the production of good crops. As a result but little commercial fertilizer has been sold in Oklahoma as compared with that sold in other southern states.

However, a few scattered demonstrations this past year have shown rather conclusively that even in a virgin state the application of commercial fertilizer may increase yields considerably. For instance, there is the experiment which J. M. Stalnaker of Tishomingo, Oklahoma, conducted on the fertilization of potatoes. This farmer's soil is an upland, sandy loam which had previously been planted to cotton. This check plot which had no fertilizer yielded at the rate of 36 bushels per acre. A second plot which had 400 pounds of an 8-4-0 per acre yielded 95 bushels per acre; a third plot which had 400 pounds of an 8-4-4 yielded at the rate of 121 bushels per acre, while a fourth plot supplied with 500 pounds of 8-4-4 to the acre yielded at the rate of 140 bushels per acre, nearly four times that of the check plot.

In another demonstration conducted by Otha Johnson of the same community on similar soil, a check plot yielded 40 bushels to the acre. An 8-4-6 fertilizer applied at the rate of 250 pounds to the acre produced 77 bushels on another plot. A third plot receiving an 8-4-6 fertilizer at the rate of 500 pounds per acre produced 101 bushels of potatoes per acre.

These farmers, despite the low price of potatoes, were well pleased with the tests made, because the fertilizers not only paid for themselves but provided a nice profit.

Fertilizers for Cucumbers

By G. R. Cobb

Salisbury, Maryland

A DEMONSTRATION of importance to the truck growers on the eastern shore was that recently made on the cucumber crop of Leroy N. Huston, on his farm at Delmar, Delaware. The relative value of applications of commercial fertilizer and a commercial fertilizer and manure combination were compared. Growers in this section have used a large amount of manure thinking it quite necessary to truck crops. At the price of $6 per ton, the manure is much too expensive for general use.

Mr. Huston used the Clark's special variety of cucumber. On Plot 1 he applied 10 tons of stable manure from the city stables and 600 pounds of 5-8-5 fertilizer. On plot 2, he used 1,200 pounds of a 5-8-5 fertilizer. The first plot yielded at the rate of 203 bushels per acre; the second, 210 bushels per acre. The cost of the fertilizer and manure, including hauling and spreading, used on the first plot, was $78; the cost of the fertilizer on the second plot was $36. The returns on the 203 bushels of the first plot, less the expenses were $133.12; the returns on the 210 bushel yield of the second plot, less the expenses, were $182.40. This leaves a difference of $49.28 in favor of the commercial fertilizer treatment.

Eradicating Quack Grass *With* Sodium Chlorate

PROFESSOR A. A. HANSEN of Purdue University describes a method for the successful eradication of quack grass in the *Journal of American Society of Agronomy*, Vol. 20, No. 10, p. 1120, Oct. 1928.

Indications are that this very serious pest can be completely killed by the use of 10 per cent solution of sodium chlorate.

The grass should be mowed and after the sprouts are 6 to 10 inches high, they should be saturated with the solution. This solution is sprayed on the plants and may be made by dissolving one pound of the material in one gallon of water. Two or more sprayings usually are necessary to completely kill the grass.

Sodium chlorate has been found to be more effective than other chemicals used, killing both tops and roots. After spraying, the plants turn brown and die in about a week. A few of the more hardy plants may start again, which are usually killed with the second spraying. There are cases on record where the solution was applied to areas of quack grass and two months later all of the quack grass was dead and other grasses or clover had worked their way in. This brings up the important point that sodium chlorate seems to have no harmful effect on the soil.

Sodium chlorate is a white crystalline substance somewhat resembling common salt, although not salty to the taste. It is not poisonous to men or farm animals, but is said to be inflammable when mixed with organic matter. Although the author has had no trouble of this character, he advises mixing outdoors. In 112 pound kegs, it sells for 6½c a pound, f.o.b., Niagara Falls, N. Y.

Sodium chlorate has also been found effective against Canada thistle and field bindweed. The author states that the exact manner in which the material acts on plants is not known.

NEW BRICKS

If a man were hit with the new kind of brick which is said to be on the market now, he probably would not be deceived as to its nature, although an innocent bystander might be fooled. This new brick is made to look like a piece of log with the bark on, and is a substitute for lumber.

The County Agent in an Emergency

(*From Page* 14)

same summer of 1926, some 30 counties in the central and northeastern parts of Georgia were unfortunate in not having a soaking rain from April until October. The farmers in these counties depend upon corn for grain feed and cow-pea hay for forage for their livestock. The corn crop and the summer hay crop of cow-peas both failed. The cotton crop, from which cash is usually obtained, was reduced about 60 per cent, making it very difficult for most of the farmers to see their way clear to continue farming unless some plan was worked out.

The reports from the county agents indicated the situation to J. Phil Campbell, Director of the Extension Division of the Georgia State College. Mr. Campbell called a meeting at the college to discuss the emergency. County agents from these counties brought with them their leading advisors. It was quickly decided that the most important thing to do was to get feedstuff for the livestock as quickly as possible.

The Campaign

Southeastern Georgia had a surplus of corn which could be obtained reasonably. In view of the situation, the following plans were made: 1. Each county agent in the drought area was to assist the farmers in his county to obtain corn from the southeastern section as quickly and with as little expense as possible, as corn would be needed to feed the livestock through the winter; 2. A campaign was to be put on throughout the territory affected by the drought to get sufficient acreage sown in fall grains as wheat, rye and oats, winter hay of oats and vetch, or wheat, oats, vetch, and crimson clover, which mixtures are adapted to the section so that by the beginning of the next cropping season there would be on the farms sufficient feedstuffs to carry through the next season; 3. As there would be farmers everywhere without sufficient resources, owing to the drought, to accomplish these first two objectives, bankers and business men would be enlisted in this emergency program so that the basis for future production would be established.

To deal with 30 counties as a whole is a difficult task. If an organization had to be set up, before it could be worked smoothly, the emergency probably would have solved itself in driving many of the farmers from their farms. But a county is not a difficult unit to organize or to get started. Still easier to organize is a community. These county agents were in position to start with each community in their respective county. This was done. Weekly papers all over this drought section later reported excellent yields of oats, wheat, and unusual yields of winter hay. The plan developed for that emergency brought results because of the fixed purpose of county extension work.

It has been my observation that during an emergency, whether it is local or of importance over a wide area, the people who step into the positions of trust and responsibility are those who have by their past deeds demonstrated their good judgment, dependability, and ability to work with and for others toward an objective. If my observations are correct, I would say that it is a part of the county agent's work to function speedily and soundly during any farming emergency that may arise, and that to be in position to do this a county agent must lay a solid foundation by demonstrating correct practices on farms.

Potatoes

(*From Page* 30)

tures and moderate rainfall. Even when grown in southern States, potatoes are planted so as to mature during the cooler months of the year. Of the world acreage, the largest single portion, about 27 per cent, is in Russia. Germany has about 16 per cent and Poland a little over 14 per cent. France is fourth with 8.5 per cent and the United States fifth with seven per cent.

Europe grows about 90 per cent of the world's total. In the United States the production is less than four bushels per persons while in Germany it has been around 24 bushels per person. The actual yearly consumption as food in the United States is about 2 2/3 bushels per person as compared with about 7 1/3 bushels in Germany.

The potato acreage in the United States lies largely in the cooler northern states. The southern production is largely of early varieties and for the early markets. Nearly 42 per cent of the nation's acreage in 1927 was in six states, Minnesota, Michigan, New York, Wisconsin, Pennsylvania, and Maine. According to the 1925 census, potatoes are grown on about 36 per cent of all the farms in the United States.

A notable change has come in the American production during the last 40 years, in the increased production per acre which has been obtained. The high point in acreage was reached during the World War when, in 1917, a total of 4,384,000 acres were grown. The crop was then expanded on soils and areas not well suited to it with the result that rather low yields were made. The high point in production occurred in 1922 when over 453,000,000 bushels were grown on 4,307,000 acres. Since then the acreage has been much lower, yet with about 3,842,000 acres the preliminary estimates of production for 1928 indicate the record production of over 460,000,000 bushels.

Production per acre has advanced markedly. For the 10-year period beginning with 1880, the average production for the United States was only 76 bushels; for the decade 20 years later beginning with 1900 the average was 92 bushels. For the first eight years of the present decade beginning with 1920, the average yield is about 110 bushels. These increases may be attributed to the fact that in the earlier period yields were unusually low because of the damage from the Colorado Potato Beetle and prices were also low. The increases in yield may be explained by the influence of newer methods, such as disease and insect control, the use of better seed stock, and the growing of much of the crop under commercial conditions where good equipment, fertilizers, and other factors are available, and where reasonably good market outlets act as a stimulus to this type of production.

Field Bindweed

(*From Page* 13)

of the ground and these will not be affected by the chemical. If left until seed has formed before making the first application trouble will be encountered with seedlings after the old plants are killed.

The time of making succeeding applications of spray is difficult to determine because the normal blooming period has passed and the appearance of flowers cannot be relied upon. All treatments after the first one should be made when the plants appear to have recovered from the effects of the previous spraying, are back to a normal green color, and are making normal growth.

Sodium chlorate is highly combustible when it comes in contact with certain materials and, hence, is a dangerous chemical to work with. The Kansas station recommends that farmers go slowly in their attempts to kill out the troublesome weed, inasmuch as more experimental work is needed before final recommendations can be made. However, farmers who have areas infested with the weed should isolate them and keep them clean by cultivation.

GREEN MANURING

A NOTABLE addition to the Wiley Agricultural Series, edited by Dr. J. G. Lipman, has been made by Dr. Adrian J. Pieters, of the U. S. Department of Agriculture, in his recent book, "Green Manuring" (John Wiley & Sons, Inc., New York, $4.50). In a thorough and concise manner, Dr. Pieters discusses the principles and practices of green manuring, securing his material from his own experiences and from those of the best authorities of the United States and other countries.

The general problems of food production and the history of green manuring are briefly discussed in the opening chapters, after which the problems of organic matter and nitrogen in the soil are considered. The rest of the book discusses the chemical composition of common green manuring plants, their culture, and their decomposition; the value and benefits of green manuring; and green manuring problems and practices in general and for different farming systems and crops in the various parts of the United States and other countries. The last chapter is a discussion of the economics of green manuring.

When discussing the use of green manure, Dr. Pieters says: "The green manure crop should be given mineral fertilizer when necessary, though unfortunately, there is an idea that a soil improving crop can take care of itself. * * * If it is desired to improve a poor soil, the green manure crop should be liberally fertilized. * * * In general, 300 pounds of acid phosphate and 100 or 200 pounds of potash salts per acre, either alone or together, as may be needed, will be found to benefit the green manure crop." (Page 150).

Dr. Pieters' excellent book should prove to be of value and interest not only to teachers, research workers, and students, but also to the practical farmer attempting to secure the greatest profits from his soil, by following the best soil management practices.

POTASH FOR FLAX

"THE potassium ion seems to be an especially important nutrient for fibre flax," says Professor W. L. Powers of the Oregon Agricultural Experiment Station in an article entitled, "Fertilizers for Fibre Flax." This clearly written article appeared in the Journal of the American Society of Agronomy, Volume 20, No. 7, page 755, July, 1928.

The author further states that potash appears to give strength to the plant, increase its fibre, make the plant more vigorous and disease resistant, and increase the ratio of fibre to seed, under the conditions of these experiments. Potash and nitrates together usually gave the best results, while small amounts of superphosphate sometimes aided root and seed development.

Investigations indicated that potash was especially important in the early growth period of flax. Irrigation also improved the yield and quality of fibre in this section.

A Shucking Contest

(*From Page* 23)

yielded 210 bushels, or 70 bushels per acre. Since every one who knew the field stated that it was of uniform fertility, it can be said that the 19½ bushel increase per acre on the latter three acres was due largely to the application of the nitrogen and potash. This extra fertilizer cost approximately $7.50.

Mr. Estes is considered one of the best farmers in Orange county. When he purchased this particular piece of land a few years ago, his neighbors, some of whom were present during the shucking contest, said it could never be made to produce profitable crops. Last year (1927) more than one and one-half tons of hay per acre were cut from it, and this year's corn yield record is stated above. Wheat will be seeded this fall, followed by grass and clover.

The shucking contest shows that shucking a crop of corn has quite an influence on the cost of producing the crop. Suppose we use the results obtained by the five winners in this contest as an illustration, if each man had been paid $2.50 on the basis of a 10-hour day, the seven barrels shucked by the man who won fifth place would have cost 21c per barrel, while the corn shucked by the man who won first, would have cost 16c per barrel.

Good farming consists not only in improving the fertility of the soil, but in keeping it fertile by the proper use of crop rotations, lime, legumes, good seed, and fertilizer.

Farm Conditions

(*From Page* 22)

an evidence of vigor in the industry, and an indication that its rewards have sometimes been under-estimated.

If agriculture is as badly off as it is reported to be, why has the flight of men from the farms not been accompanied by a great decline in acreage? In 1919 the acreage of the principal crops was 351,209,000 acres. In 1920 it was 345,089,000 acres; in 1921 it was 345,893,000 acres; in 1922, 347,616,000 acres; in 1923, 349,428,000 acres; in 1924, 342,155,000 acres; in 1925, 346,575,000 acres; in 1926, 350,334,000 acres; and in 1927, 349,554,000 acres. An increase of 8,000,000 in 1928 brought the year's area of harvested crops to the figure already given, namely 357,400,000 acres, a record. The well-maintained acreage and the increased production of American agriculture since the war imply either that our farmers know what they are doing or that they do not. It is just as well to give them the benefit of any doubt that may linger.

In a short article it is impossible to give all the grounds for taking a cheerful view of agricultural prospects, but one more consideration should be mentioned. Much rather hard-boiled doctrine has been promulgated about agriculture in the last year or two. It has been contended that agriculture is in the throes of a technical revolution which must ruin thousands before prosperity is restored for the industry as a whole. It is said that the efficient few, with large farms and high-powered machinery, will make life impossible for the inefficient many. Two fundamental objections destroy this theory. In the first place, variations in efficiency, though wide between the most and the least efficient farmers, are relatively narrow when the great bulk of the producers are taken into consideration. Now it is the great bulk of the producers who supply most of the world's demands for farm products. High efficiency in the upper crust certainly obliges the others to do some hustling, but does not represent an economic advantage great enough to give what might be termed a monopoly advantage to the leaders. Combine-harvesting, for example, may tend toward a higher concentration of wheat farming in the States best adapted for that method of saving the crop, but will not abolish all the reasons for producing wheat elsewhere. Nor will large-scale cotton growing in the New South put the Old South out of business. Cotton will continue to be grown where soil and climate make it a suitable crop.

The second point about the efficiency scare is its false assumption that through competition all the advantages of efficiency pass ultimately to the consumer. It is argued that under present conditions there is no money in farming except for the very low-cost producers, whose output swamps the market and lowers prices to a point at which profits disappear for the general mass. That sounds alarming until one inquires why competition has not abolished profits heretofore. The answer is simple. Human energy aided by capital and applied to land and other natural resources returns a surplus of value above production costs. This surplus can not be dissipated though it may be subdivided by competition. Usually what happens is that competition drives out some of the least efficient producers, concentrates more than a pro-rata share of the total business in the hands of the most efficient, and forces the rest to take less than the average rate of profit. They are not compelled, however, to take no profit at all, because the claims of land, labor, and capital to the results of productive enterprise cannot be gainsaid. Lower prices to the consumer sometimes cause the surplus between production costs and prices to vanish, but that is an exceptional rather than a prevailing condition. Generally the effect of competition is not to cause the disappearance of profits but simply to determine their distribution.

It is poppycock to talk about the efficient few driving all the other farmers out of business. As a matter of fact, if the truth must be admitted, the influence of competitive efficiency is relatively less in agriculture than in other occupations, owing to the relatively greater part played by nature in farming. It is well for the farmer to be efficient; but it is seldom fatal for him not to be.

Agriculture Today

(From Page 26)

pigs are good 'doers,' making rapid gains, produce the cheapest pork. In addition to tremendous death losses of pigs in the United States, many pigs are stunted as a result of parasitic infestation, the common intestinal roundworm being one of the most injurious of swine parasites.

"The bureau is distributing bulletins, motion pictures, exhibits, and posters on the subject of practical swine management and sanitation. It is constantly conducting experiments in search of better methods of raising hogs. The so-called McLean County system of swine sanitation has been worked out by the Bureau of Animal Industry to avoid worm infestation or at least to reduce it to a point at which it will cause little or no damage.

"This system consists simply in thoroughly cleaning and scrubbing the farrowing pen to remove all worm eggs, in doing the same to the sow, paying special attention to the udder to remove the eggs of the parasite, and in removing the sow and her pigs to a field sown to forage crops within 10 days after farrowing. The field must not have been pastured to swine since it was sown. The pigs are provided with a good supply of water and shade and kept in this field for at least four months, after which time they are reasonably safe from severe or injurious worm infestation."

Includes Poultry

Numerous important problems in the poultry industry are cited by Dr. Mohler. These include the need for improvement in quality of both eggs and poultry meat, improvement in the sanitary conditions of many plants with a view to reducing mortality in young and old stock, and more efficient means of feeding all classes of poultry. The bureau is making experiments to determine the nutritional requirements of growing chicks, laying hens, and market poultry; conditions giving rise to parasitic infestation are being investigated; work is being done to eradicate avian tuberculosis; the transmission of bacillary white diarrhea is being investigated; considerable progress has been made in the study of the inheritance of egg production and in a determination of the general effects of close inbreeding.

The bureau's program of tuberculosis eradication from livestock has been in effect since 1917, and has reached the point where Dr. Mohler believes that "with the fine spirit now existing in practically all the States; it is estimated that within the next decade tuberculosis in livestock will be a rarity." It is estimated that whereas in 1917 approximately four to five per cent of the cattle in the United States were infected with tuberculosis, only two per cent are now so infected. These estimates are supported by the marked reductions in the retentions of cattle and swine at official abattoirs where meat inspection is conducted.

Disease-free Areas

There are now in the United States 581 counties, in addition to 21 towns and parts of two other counties, which have been officially declared as practically free from tuberculosis. These areas have become centers of prosperity in the livestock industry; particularly, those areas which have considerable numbers of dairy animals included in the cattle population. An evidence of the popularity of these counties is shown by their increased interstate shipments. During the past fiscal year, Wisconsin exported more than 85,000 cattle; Minnesota and Tennessee also did a big business in the sale of dairy cattle.

The increased consumption of milk in the United States, now 221 quarts per capita as compared with 172 quarts in 1918, is attributed largely to tuberculosis eradication in the assurance to consumers of a safe supply of milk and other dairy products. Tuberculosis eradication is encouraging dairy farmers to establish better methods of milk production and handling, and to introduce better producing animals in their herds.

A survey made recently by the bureau to determine the economic benefits of tuberculosis eradication indicated that the work has made for higher priced cattle and better markets, better breeding cattle in replacements, less losses in packing houses, large premiums for swine from the Corn Belt, and better and more uniform milk production.

A 100-Bushel Club

(*From Page 27*)

¼ acre was $30.82 or 29.3 cents per bushel, 88 man-hours of labor being used. In computing the cost, the labor of the club members was figured at 15 cents per hour and horse labor at 12¼ cents per hour.

Each member used certified Early Ohio potatoes, each planting 4 bushels on ¼ acre of ground. Each member treated his potatoes with corrosive sublimate by soaking in barrels for 1½ hours at a cost of 60 cents for material and 22½ cents for labor.

Each member was given proper instructions on treating the seed, preparation of ground, and cultural practices to follow before he received his potatoes.

Due to fact that potatoes were received on March 28 and were planted from March 29 to April 6, there was no time for green sprouting. Each member plowed his soil from 6 to 9 inches deep. The soil was a clay loam in all cases except one, which was a sandy loam. The sandy loam produced the highest yield, also potatoes of the best quality. Each member applied from 4 to 6 loads of manure to the ¼ acre and five applied at least one sack of 2-12-6 fertilizer. One boy used 1-8-2. The members started cultivation with the harrow soon after planting and cultivated an average of five times, using the harrow and cultivator. Four of the members raised their potatoes on soil that had never been in potatoes before and the others had soil that had not been in potatoes for several years. All except one had a sod of some kind to plow under.

There was 14 boys in the club that did not use any fertilizer and their average yield was 54 bushels per ¼ acre. Some of these 14 boys had unusually good ground or their average would have been much less.

Martin county, Indiana, has never been a potato-growing county. Statistics show that its average production is about 81.4 bushels per acre and not many acres have been raised. It looks as though the figures of these 4-H Club members will show that it is possible for farmers of Martin county to produce more and better potatoes and produce them at a profit. This year Martin county produced more potatoes than it has ever produced, and the future potato supply of the county is assured unless low prices this year cause too many to grow something else next year.

The average yield of the entire 74 club members was 64 bushels on ¼ acre. Some of the members lost nearly their entire crop by wet weather.

A Potash-hungry Soil

(*From Page 7*)

following representative treatments on limed land (1) superphosphate, (2) superphosphate and muriate of potash, (3) superphosphate, muriate of potash, and nitrate of soda, (4) six tons manure reinforced with 180 pounds superphosphate. The treatments are applied biennially (1) to corn and wheat in a rotation of corn, oats, wheat, and hay (mixed clover

	P	PK	PKN	*MP
Corn	100	278	275	256
Oats	100	175	131	144
Wheat	100	231	218	191
Hay	100	171	141	185
Total air dry matter	100	208	207	200
Ensilage corn	100	177	215	192
Buckwheat	100	125	119	121
Kentucky blue grass hay	100	167	264	245

* 6 tons reinforced manure.

and timothy), (2) to oats and ensilage corn in a rotation of oats, mixed hay, ensilage corn, and buckwheat, and (3) to permanent Kentucky blue grass pasture. The following rates per acre of the several treatments are applied—400 lbs. superphosphate, 100 lbs. muriate of potash, 300 lbs. nitrate of soda, and six tons manure.

Results Secured

Within a few months following the beginning of the experiments it became evident that the economic production of the crops essential to a good dairy system depended upon the systematic use of lime and commercial fertilizers or manure. Not only did the best treatments produce much greater yields, but considerably hastened the maturity of the grain crops, the latter a vital factor in the production of corn in this section. It soon became evident that potash had an exceptional value on this soil. The following extreme yields were secured from the various treatments. Ensilage corn was increased per acre from an average of 5.8 to 19 tons, buckwheat from 6.3 to 33.7 bushels, corn from 9.7 to 38.9 bushels, oats from 21.1 to 41 bushels, wheat from 1.0 to 22.1 bushels, clover and timothy hay from weeds to 4,430 pounds, and Kentucky blue grass hay from weeds to 3,008 pounds.

Value of Different Treatments

The summary above serves to show the relative value of four representative treatments based on the increases over the corrected (assumed) yields of check plots.

In this summary of four treatments in the production of seven crops on limed Volusia soil, the value of superphosphate is taken as 100.

The above results show clearly the relative value of the four treatments. In the four-year grain rotation of corn, oats, wheat, and hay, potash increased the three grain crops 128 per cent over superphosphate, 20 per cent over the complete fertilizer, and 31 per cent over reinforced manure. The total weight of the four crops was 108 per cent in excess of superphosphate alone. Ensilage corn was increased 77 per cent by the addition of potash to the superphosphate treatment. Only in the case of ensilage corn and Kentucky blue grass hay did the PKN treatment have a value in excess of PK.

Additional experiments must be conducted on this soil in several sections of the State before we can determine if this high potash response is peculiar to this particular soil area. Soil variation may be partly responsible for the remarkable response to potash, however, since the potash response was similar on all three fields studied based on the ensilage corn, Kentucky blue grass hay, and the results on the four-year grain rotation, it is unlikely that soil variability plays an important part. These experiments in general show that in this dairy section of northern Pennsylvania the major proportion of the necessary cattle feed can be produced economically through the systematic use of lime, commercial fertilizers, and farm manure.

Holly Time

(*From Page* 4)

dedicated under similar home environment on this sacred occasion. The quiet faith of our fathers on December 25th has done as much to establish a sounder national life as the glamor and clamor of July 4th.

Christmas is dedicated above all else to those who lead lowly and simple lives. It is the day of the ruddy hearth, the cheery greeting, and the unselfish thought. Simplicity and common brotherhood are the things we emphasize at Christmas.

CHRISTMAS is dedicated to common folks of the work-a-day world because it was that way in the beginning. Whatever pomp and embellishment mankind has added to its observance is to a great extent artificial and beside the mark and meaning of the day. I do not argue for a harsh Puritanical Christmas bereft of human jubilation, but I hold fast to the inherent truth that Christmas is of, for, and by the everyday home folks whose common tasks make the world a joy forever.

Simple and lowly folk delight in Christmas because the actors in the Great Drama and those who lived in the Light of the Star were of simple and modest lives—farmers, shepherds, stockmen, fishermen, carpenters, and craftsmen. The farmers and stockmen of Palestine had come to pay their taxes on that first Christmas eve when the inn was overflowing; and their humble beasts of burden found a consecrated resting place for the night. Out on the everlasting hills of Judea the watchful shepherds played their part. Joseph was a master craftsman, a member of the carpenter's guild. Half a dozen honest fishermen were even then picked for places of destiny. Thus we see that the first Christmas eve elevated common people to the first place of dignity and honor which it had been their lot to fill.

What then of the rulers and the emperors and the kings, the courts and the nobility? In that age-old chronicle we find no flattering mention of kings, except the King of Kings. We find no praise of nobility, except nobility of soul. It is true there were potentates galore, but they cringed on shaky thrones, and trembled as the Christmas dawn came on.

So much for kingship and rank; what of wisdom? The answer is that the Magi, the three wise men of the East, themselves sought long and far for the simple Truth and found it at last in the obscure abiding place of a stable.

The substance of it all is that kindness, simplicity, nobility of character, and hard work outweigh pomp of power and regal state, and at times even excel the accomplishments of wisdom. Loving kindness, honor, and industry are symbolized by the star that tops the glittering tree at many a cosy fireside. Special grace at this holiday, I take it, is extended to the tillers of the soil, husbandmen of herds and flocks, and fashioners of wood and metal. But men who work with their hands have also obligations to their hearts and minds.

THE first Christmas gifts were those presented by Wisdom to Love under the rays of the Bethlehem star. In modern times wisdom sometimes fails to attend the giver. Some of us imagine that Christmas gifts should be manifestations of buying power, when they are anything but that in truth.

If Christmas gifts are measured by the dollar mark, then we have lost the spirit of the day. If this were true, if the full purse meant the keynote of the day, then these brethren of lowly degree would be unable to partake. But happily this is not so! The gift bought at a ten-cent store and secretly treasured by the donor for joyful presentation on Christmas morning bears the priceless symbol of the occasion, the manifestation of love and devotion, perhaps of sacrifice.

No diamond artisan of Amsterdam could fetch more precious testimonials of affection than the simple little offering hallowed by heart's desire. And the best gift of all gifts is the one which has its donor's life woven or knitted into it.

Better even than gifts at Christmas time are the reunions of families and fond remembrances between those long separated. Back to the old home, and back to those old, familiar faces!

FAMILY love is at the root of Christmas—not family for caste or class, but family for courage and companionship. How much this means to agriculture! The farm family is the center of all things past in real achievement and the center of all things to come in the solution of agricultural problems. Devotion and renewed courage for the family at Christmas time comes handily just before New Years with its new work and greater resolves.

Were there no Christmas on the calendar, where would hope be? If there were no New Years, where our ambitions? If we had neither hope nor ambition, where would we get our faith? And a rare combination of hope, ambition, and faith gives us our ideals.

Hope, ambition, faith, and ideals have wrought mighty things. They have cleared our empires, tilled our land, built our homes, improved our livestock, and given to every farm hand the mechanical power of five before him. What more dare we expect time to bring? The answer rests with the people who gather at the rural firesides, merry with Christmas music and happily decked with holly.

There is an ancient German legend which fancies that the animals of stable and fold possess the gift of speech in the quiet solemn hours before the dawn of each recurring Christmas day.

While the rafters snap in the bitter cold, as the hoar frost gleams in the moonlight, and the children lie dreaming of the joys of tomorrow, it is pleasant to imagine now—as we imagined in our boyhood days—that the lowly herds in conversation at this reverent hour might have some words of admonition for the soul's enlightenment.

For humble and slavish as they are, bred and accustomed by ages of servitude to look to man for leadership and life, these selfsame beasts have fabled ancestors whose parts in life were cast in nobler molds.

The starry constellations bear their names, reminders of the thrones these animals occupied in mystic days of old. Aldebaran of Taurus is an echo of the bulls of Bashan. The mighty horse held place of honor in Assyrian halls.

But no borrowed glories of heathen idolatry give voices to the stabled flocks and herds in Yuletide story. They speak, if fancy pleases, because of Bethlehem, because of the Star, because of the Majesty that hallowed their mangers.

DEDICATED by that birthright to centuries of honest service, this folk-tale fancy tells us that their Christmas voices sound the common talk of brave and gentle lives. Their animal talk would be about the daily lot of each in the betterment of some precious place of little world-wide consequence—as to the plowing of a straighter furrow, the growing of more beautiful fleeces, the brimming up of flowing milk pails, the abundance of fields and pastures, the comort of still waters, and the wonderful oodness of man. About the morning nd the evening, the sun on the neadows, the chirp of the chickadee, he sweat of noontide, the cooling wilight, the scent of hayfields, and he steady light in the homestead oor. Of these would they, like us, nake quiet comment.

Toiling here and erring there, weakess and strength in touching comination, this imaginary livestock ommunion holds something perhance of benefit to men, their masers.

The day breaks, the charm ceases, he children of the happy farm arise o clamor joyfully around the tree. We unbar the doors, light the fires, nd scrape the frosty panes to see our raes and byres reflect the glory of another welcome Christmas morning.

At this time we are prone to think much in fond and reverent retrospect, counting perchance the favors and the fortunes of which we partook in those bygone seasons. Much as we male elders feel the shortcomings in the dimensions of half hose instead of childhood's long stockings on Christmas eve, it should not be altogether a time of regret over past pleasures.

Beatitudes of the vanished holidays are dearly treasured, but the present and the future are still ours in which to enjoy our lives anew amid the mirth of our children and the comfort of our homes.

He who merely lives his red letter days in a certain constrained fashion and then plunges back once more into a desert of worry and a morass of fear until the next Christmas comes is cheating himself and punishing his friends.

I am sure that you have regarded Holly Time as a relaxing and refreshing spot on the march of the months. But instead of bending down for one deep draught of its perennial springs, let us fill our mental canteens so as to carry with us some of that water of life and love to revive us on the dusty trail we shall be forced to follow in labor through the year.

Come then, my friends, smuggle those mysterious bundles into the house through the back door or the cellar window; hide them in locked drawers or leave them for awhile at the neighbors' until the time arrives when the little tree shall be trimmed and the inquisitive children unwillingly shall be forced to bed. Tune on the radio to make Christmas carols loud enough to muffle the rattling of the paper and the squeaking of those unhappy toy dogs while you are busy doing the honors expected by the expectant ones.

Stoke the furnace again, wind the clock on the mantel, pat the lumpy stockings as they hang there in a row in the ghostly firelight, count your checking account once more for the fifteenth time, and then heave yourself onto the mattress.

'Tis here once more! The Night Before Christmas with its vivid delight and maddening uncertainty; only this time *you* are the responsible one whose actions occupy the center of the stage which childhood has set for its annual drama.

Therefore, to be a good parent now is to be a successful Santa Claus. Whatever you do, beware of combustible whiskers!

A Devotional Skunk

A skunk and her four baby skunks were basking in the sun when a big hound dog made his appearance.

"Children," said the mother skunk, "let us spray."

"I asked her to kiss me, without avail."

"I don't like kissing through those things either."—*The Enamelist.*

"I'd like to git a couple gallons, Jim."

"Jest a minute, Anse. It ain't aged yit."—*Judge.*

No Fault of His

There was a fearful crash as the train struck the car. A few seconds later Mr. and Mrs. Pickens crawled out of the wreckage. Mrs. Pickens opened her mouth to say something, but her husband stopped her.

"Never mind talking," he snapped. "I got my end of the car across. You were driving the back seat, and if you let it get hit, don't blame me!"

Close Shave

"Ah wins."

"What you got?"

"Three aces."

"No you don't. Ah wins."

"What you got?"

"Two nines an' a razor.

"You sho' does. How come you is so lucky?"

Linguistic Miracle

Mrs. Nouveau Riche—"He's getting on so well at school. He learns French and algebra. Now Ronnie, say 'How d'ye do' to the lady in Algebra."

"Why the gloom, Osmond? Girl not coming?"

"Oh! She's coming, all right; but she can't even send a telegram without saying 'stop' after every sentence."—*Penn State Froth.*

Probably Does

Racterinchatzopeubedsaqpe is the verb meaning "to love" in the language of a certain Eskimo tribe. This probably accounts for the long night in the Arctic.—*Royal Gaboon.*

A Frenchman, being troubled with gout, was asked what difference there was between that and rheumatism. "One very great difference," replied Monsieur. "Suppose you take a vise, put your finger in, you turn the screw till you can bear him no longer. Zat is rheumatism. Zen s'pose you give him one turn more. Zat is gout!"

CLASS DISMISSED—NO!

Frosh: "Are they very strict at Cornell?"

Soph: "Are they? Well, when a man dies during a lecture they prop him up in the seat until the end of the hour."—*Cornell Widow.*

Worse Yet

The old lady was looking for something to grumble about. She entered the butcher's shop with the light of battle in her eyes.

"I believe that you sell diseased meat here!"

"Worse," replied the butcher blandly.

"What do you mean, worse?" demanded the astonished patron.

"The meat we serve is dead!" confined the butcher in a stage whisper.

The Dawn

Pat was a bashful lover, and Biddy was coy, but not too coy.

"Biddy," Pat began timidly, "did ye iver think of marryin'?"

"Sure, now, th' subject niver intered me thoghts," demurely replied Biddy.

"It's sorry Oi am," said Pat, turning away.

"Wan minute, Pat!" called Biddy softly. "Ye've set me a thinkin'."

The Scotchman's Lament

A Scottish minister was on his usual rounds when he came across one of his old friends.

"And how is the world treating you, Jock?" asked the minister.

"Very seldom," replied Jock sadly.

Worst to Come

Wife (during quarrel)—"After all, I've given you the best seven years of my life."

Hubby—"My God! Are those your best?"

Mildred (icily)—"And shall I return the engagement ring?"

Frank—"Oh, no, don't bother; I'll just have the notice of the next installment sent to you."

Presumptive Evidence

Mose: "Whar you goin', Rastus?"

Rastus: "Ah's lookin' for work."

Mose: "Clar to goodness, Ah's glad to heah Mandy's up and aroun' again."
