BETTER CROPS W

The Pocket Book

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Better Crops WITH PLANT FOOD

July, 1929

The Pocket Book of Agriculture

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

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

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Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY.

of Amsterdam, Holland

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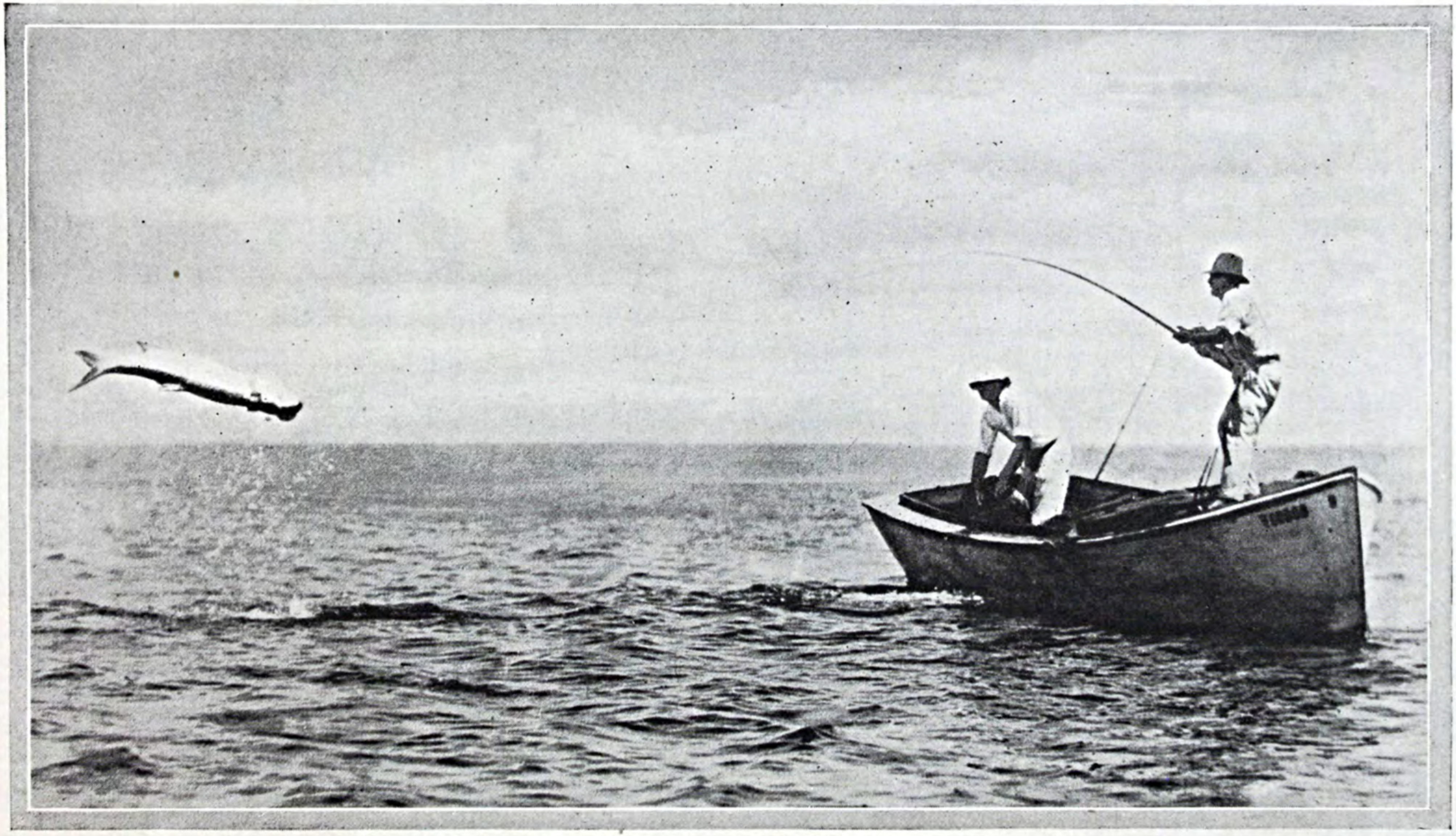

Tarpon fishing in southern Florida waters is the most exciting sport in the world.

Better Crops with PLANT FOOD

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VOL. XIII NEW YORK, JULY, 1929 No. 1

Jeff says that lip-service loyalty and hysteria are not—

Patriotism

By Jeff McDermid

NOISE and oratory once passed for patriotism, and those with the biggest cannon crackers and the leather lungs were most persistent in their July devotions. After a nation has accumulated a scrappy reputation and has taken part in a Dawes plan or two, there is not so much need for either applause or applesauce. Hence the hush!

Boys no longer measure their patriotism by red fire, burned fingers, and tin cans tied to canine appendages. By the placidity of the Fourth and the empty hospitals on the fifth, we know that exuberance of spirit has largely vanished from our natal pageantry.

I can see those old plank seats in the court-house grove, crowded with doughty and dusty citizens, while the silver cornet band played Hail to the Chief. I personally was more interested in the chef than in any chief familiar to our neighborhood, because we used to have very early breakfasts on the Fourth. But I must confess there was a native majesty about our old county judge, whose natural Hibernian forensic power was happily enhanced on those occasions by a few minutes of convivial preparation down at Mike's place.

To us who have partaken of such celebrations with their fanfare and clumsy flamboyancy, the utter stillness and somnolence of the present era of muffled patriotism is a visible contrast.

Yet we may well ponder whether this silence is a sign of a firm but quiet national pulse beat or if it means callow indifference. When my boy suddenly becomes unheard and unseen, I want to know if he is rapt in meditation like his Dad, planning some mischief like his Maternal Grandmother, or sound asleep like his Ancestors.

Spontaneous and earnest natural patriotism was part of the life of a nation emerging from the raw. Every stroke of the pioneer's ax was accent to the music of liberty, equality, and fraternity.

Perhaps it was inevitable that we should lose our old-time permanent patriots in exchange for a group of local boosters and handshakers, like the civic and commerce secretaries. The old-time patriots swore by their country because they had lost a leg for her, whereas the modern professional "greeters" often think in terms of financial opportunity and expediency.

Yet they also have their function in a democracy. Unless a citizen can know and prize his own community, how can he really retain any tangible patriotism? In the absence of these local scouts and pace-makers, some of us would be strangers in our own bailiwick.

WHEN I write of patriotism, my memory carries me back to childhood and the musty mysterious realms of a smoky Grand Army lodge room, down three flights of stone steps under the county court-house through a creaky door, into an ante-room with rush matting on the floor and a few card tables in the corners. To the rear was the "banquet hall" that in my estimation was large enough for the old Colonel's storied regiment, counting the ghosts. To the right was a thin board partition having a peep-hole station for the convenience of the watchful "outer and inner guards" who obeyed the majestic dictates of the corporal, then their chief commander.

On privileged occasions, such as camp-fire evenings, Memorial Days and on the Fourth for a few moments prior to the veterans' line formation behind the gaudy Gibson Guards, a few of us sons and grandsons filtered into the inner sanctuary unmolested. Here, indeed, was the holy of holies for boys who read history with imagination and delight—the altar with its Bible and crossed swords; the roll of frayed battle flags in the corner, wrapped in oil cloth and tied with braid; the pictures of heroic members who had died in uniform; the mottoes and emblems; and the lithographs of generals on dashing steeds, framed in smoke and leaping over stricken comrades.

I try to picture the boys of today getting their doses of country veneration in so direct a manner from the World War Legionnaires—but I doubt if it catches so quickly or inoculates them so completely. The old Civil War recruits came home from near-by battlefields, and family quarrels are more searching anyhow. I am sure the boys of the Old South have felt the same tugging at their hearts and received perpetual patriotism from the same old soldier shrine.

Now I am fully aware that some of the tenets of their veteran vehemence were tinged with sophistry and that we youngsters drew from them some rank ideas on the sacred protective tariff and the divine right of the Republican party. I also know that they voted the way they "fit" and carried the "all's fair" idea home with them from the war to use it in tight places. Yet above and beyond a few of these evident human frailties, there was in them a hopeful spark that kept the home fires glowing with provincial Americanism.

Whether our newly adopted citizens, good as they often are, ever will get the legendary thrill out of it that these original combatants imparted to their gaping grandsons is a source of con-

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"Kool Krisp" Lettuce

By H. J. Rahmlow

Secretary, Wisconsin State Horticultural Society, Madison, Wisconsin

IT may not be entirely new for a young man to put himself through college by earning money in the summer time growing truck crops. In Wisconsin, however, there is only one young man doing it by growing head lettuce. Not only is he the largest grower of head lettuce in the State, but he also produces an unusually good quality of this popular source of vitamin A.

The head lettuce is cut and packed in the fields, then placed in the shade on this wagon. When the soil is dry enough a truck is run through the field in place of the tractor and wagon.

The surprising thing is that Carl Niebauer of Phillips, Wisconsin, the young man in question, is a city boy. He first started working on this particular truck farm, which is located on the edge of the city of Phillips, in northern Wisconsin, at the age of 14 and took to gardening as a duck takes to water. When he was 16 he was made foreman of the crew of six or eight boys who took care of the lettuce, potatoes, cabbage, carrots, beets, celery, and other truck crops grown on the farm.

In addition to his daily wages, he was given a bonus of 10 per cent of the net returns on the head lettuce crop for managing the crew. This bonus brought him a neat sum every year with one exception—when the six acres of lettuce grown that year were flooded by severe storms.

So interested did Carl become in this type of work that he decided to take up the agricultural course at the University of Wisconsin. When he was a sophomore, the farm was offered for sale and Carl's father decided to buy it. Being in another line of business, he could not take care of it himself, and so Carl was given full authority to go ahead. This he did with splendid success, not only making enough money to put himself through the University, but providing work for three of his younger brothers.

Along with the energy of its youthful manager, commercial fertilizers have made possible the success of this particular farm, which consists of twenty acres of muck soil. Previous to 1920 it had never produced good crops because the owners did not know that commercial fertilizers were necessary. The soil looked so black and rich that everyone considered it to be very fertile and thought it would grow crops without any plant food being applied. As a result the crops were very poor and the owners became discouraged, thinking the soil was not adapted to growing anything but wild hay.

Begin to Use Fertilizers

About 1920 the farm was purchased by the local county agent, who proceeded to run some fertilizer experiments and discovered that potash would work miracles in crop improvement. Potatoes, heretofore a failure on the farm, were selected for the first tests. In cooperation with the State Experiment Station, one-fourth acre plots were laid out as follows:

Plot No. 1—250 lbs. potash per acre.

Plot No. 2—300 lbs. of 16 per cent superphosphate.

Plot No. 3—No fertilizer.

Plot No. 4—200 lbs. of potash and 300 lbs. of phosphate.

Plot No. 5—800 lbs. of rock phosphate.

The results were surprising. The owner stated he had lost $100 due to the experiment because of decreased yield where no fertilizer was applied.

Plot No. 1 with 250 lbs. of muriate potash produced 325 bushels per acre.

Plot No. 2 with phosphate alone produced 115 bushels per acre.

The check plot without fertilizer, produced 103 bushels per acre. The combined fertilizer, potash and phosphate, resulted in a yield of 336 bushels per acre, and the rock phosphate 108 bushels per acre.

It certainly proved that without potash, which potatoes need and which was not present in the soil, the other elements of fertilizer gave no results. Potash was the limiting factor, and no amount of other fertilizer could increase the crop.

It was also noticed that cabbage did not grow very well. There were complaints by consumers that the heads contained black spots on the inside leaves. The cause of this was a mystery for some time. Some of the cabbage heads were sent to the Plant Pathology Department at the College of Agriculture, and the report came back that the spots were absolutely sterile, showing that there was no fungus or bacteria present, and consequently no disease. The suggestion was made that some element of plant food was lacking.

The following year 250 lbs. of muriate of potash were applied to the cabbage in the row at the time the plants were set out with the result that the crop was doubled in quantity and the black spots disappeared.

When both potash and nitrogen were added to celery some wonderful results were obtained, the stalks being practically double the size they had been before the fertilizer was used. The quality was also improved a great deal, the stalks being more crisp and of better flavor.

A grower of head lettuce once made the remark, "Lettuce is a crop which will either fill your pocket with money or your heart with woe." Because of this element of chance, it is an attractive crop to grow, and if one can win more times than he loses, it is quite profitable.

Heat is the most difficult problem in growing lettuce. A few hours of hot weather will ruin a crop just about ready to cut. Imagine having an acre of fine green heads almost hard enough for cutting, with the market active. A shower comes up and soaks the ground and is followed by a hot clear day. Chances are when the heads are

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NEW MEXICO

Experiment Station

By C. P. Wilson

Editor, New Mexico College of Agriculture

IN the fall of 1889 the Board of Regents of the New Mexico College of Agriculture and Mechanic Arts met and organized the College and Experiment Station at Las Cruces, in the part of the Rio Grande valley known as the Mesilla valley. Las Cruces is 22 miles north of the New Mexico-Texas boundary line.

The citizens of the valley donated to the institution a farm, containing approximately 100 acres, in addition to a quarter section of mesa land. Additional tracts, totaling about 300 acres, have been purchased since, and a few years ago Congress turned over to the college nearly 100 sections of unirrigated Government land for experimental, instructional, and demonstrational purposes. This tract at the present time is being used principally as an experimental cattle ranch, it probably being the largest ranch of the sort controlled by an agricultural college.

Only a small percentage of the mesa ground so far has been placed in cultivation, as it is necessary that water for irrigation be pumped onto this tract. The 238 acres in the valley are irrigated with gravity water from the Elephant Butte Dam, which is located about 70 miles north of the institution.

When the Agricultural College was established, most of the land that was donated to it was still in the "wild" state. Much of it was covered with mesquite and other desert shrubs, while

The staff of the New Mexico Agricultural Experiment Station.

a smaller acreage was occupied by sand dunes. Needless to say, it presented a very unpromising appearance, parched and ill-favored.

The average annual precipitation in the vicinity is only 8½ inches, so that irrigation is essential for crop production. With irrigation, the climate in the Mesilla and most of the other valleys of New Mexico is favorable for the production of a majority of the temperate zone crops and the growing season is comparatively long.

Problems Vary

The irrigating that had been done on the farm was of a rather primitive sort. Much of the attention of the first station staff, consisting of three members, was devoted to the necessary grubbing, leveling, and construction of laterals to the main ditch, so that additional land could be placed under cultivation. The first investigational work conducted was with field and horticultural crops.

On account of its wide variations in climate, both as regards temperature and precipitation and varied soil conditions, there are an unusual number of important fields for agricultural research in New Mexico. In addition to extensive irrigation and dry farming, or combinations of the two, there are considerable areas at the higher elevations on which the precipitation is usually ample, but the growing season is short. So far as acreage is co cerned, however, by far the larg part of the State is devoted to stoc raising, about 98 per cent of Ne Mexico still being used for this pu pose.

A dry-land field station at Tucun cari, in eastern New Mexico, and a acclimatization field station at Sta College are operated by the Unite States Department of Agriculture i cooperation with the Agricultural Co lege. The main experiment station h plots in different parts of the Stat for the testing of various garden an field crops and range forage plants, a though most of the experimental wor is done at State College.

Through its variety tests of cotto and its advocacy of the formation c pure seed districts in some of the irri gated valleys, the station has aided ma terially in placing the production c this crop on a sound basis in the south ern half of the State. Although th irrigated valleys of New Mexico ar comparatively narrow, some of ther now are recognized to be among th best cotton growing districts in th United States. The average yield i the Mesilla valley is nearly a bale o high-grade lint to the acre. The cro also is grown to a moderate extent un der dry farming in eastern Nev Mexico.

One rather peculiar fact that ha been brought out at the station in re cent years is that whil sugar beets cannot b grown profitably in mos parts of New Mexico, o account of the curly-to disease, it is possible t produce large crops o sugar beet seed of satis factory quality and a comparatively small ex pense. At the presen time nearly all of th seed of this plant that i used in the United State is imported from Europe where it takes two year

Young chamiza on an unirrigated gravelly hill. The darker shrubs are creosote bushes, which have no value for forage purposes.

to produce the crop. At the end of the first season the stecklings, or small beets, are pulled and stored, a loss of about 20 per cent occurring in storage. The following spring they are transplanted and a seed crop is harvested some months later. In the lower irrigated valleys of southern New Mexico, it has been shown that if the planting is done early in September a good crop of seed is ready for harvesting the following July. The beets remain in the ground throughout the winter, no storage or transplanting being necessary. The time required for production is thus cut in half and the necessary labor greatly diminished.


The agricultural building, State College, New Mexico, with the new dairy laboratory at the extreme left.

The station also has carried out field tests of large numbers of varieties of alfalfa, grains, fruits, and vegetables, as well as with many of the ornamental plants. Other important phases of its work have been the determination of the suitability of waters for domestic or irrigation purposes, fertilizer tests, and investigations on the control of insect pests and plant diseases. A few years ago the station originated a variety of pecans that is much in demand in the Southwest, the tree being quite prolific and the nuts large, thin-shelled, and of excellent quality.

While the growing of peppers cannot be considered one of the major agricultural enterprises of the State, the research work with this crop at State College has been worth hundreds of thousands of dollars. Through a long period of selection, a member of the horticultural staff produced a variety that yielded more heavily than any other sort grown. The large, smooth pods sell readily in the market. A method of irrigation was also devised that resulted in greatly reducing the damage done to the chili plants by the blight, a serious disease of the crop.

Numerous feeding experiments with livestock have been conducted during the past quarter of a century. It has been found recently that while the meal made from cotton seed produced in the irrigated valleys of New Mexico is of excellent quality for feeding to most classes of livestock, it is quite a poor source of protein for laying hens. If more than a very small percentage of the ration is of this concentrate, the eggs are not only of inferior grade, but are about a third smaller than normal.

One of the highest producing Guernsey cows was a year or two ago developed at the station; in fact, for over a month she gave several pounds more milk a day than any other cow that the breed ever has produced.

Among the largest, if indeed not the most important agricultural or livestock problem of the Southwest, is that concerned with the production of more forage on the ranges. The grasses are unusually nutritious. Some of the native shrubs also furnish a large amount of good feed for cattle and sheep, and this is often available when there is little grass, on account of drouth or by reason of its being covered with snow. There are still about 16,000,000 acres of Government land in New Mexico, in addition to several millions of state land and other extensive areas in forest reserves, Indian reservations, and railroad holdings. Much of this is still open range, with little or no fencing. This has led to the ranges being badly abused, a large percentage of them now being in deplorable condition. Even when there is considerably more moisture than usual, some areas produce little forage, aside from a few weeds.

Open Land

Quite apart from the extensive researches that have been conducted by the United States Forest Service on the Jornada and Santa Rita Range reserves in New Mexico and Arizona on natural reseeding, clipping studies, estimation of carrying capacity, etc., in recent years the New Mexico Station has devoted considerable attention to the artificial reseeding of some of the ranges. It has been estimated that at the present time the average gross returns from 100 acres of New Mexico range land amount to only about as much as the returns from one acre of irrigated land. An annual increase of only a half a cent an acre from the area in the State that is devoted to the production of range livestock would mean an added return of about $380,000 a year.

Aside from the fact that there is so much Government land that cannot be fenced and which is not sufficiently productive, on account of the scant rainfall, to be of value for homesteading, recent researches have shown that rodents are important factors in preventing valuable forage plant from returning more promptly to a great deal of the arid or semi-arid open range land of the Southwest. Soil conditions, in some cases, also appear to exert a marked influence in determining the flora of certain sections. It has been found, for instance, that chamiza (*Atriplex canescens*), one of the saltbushes, seldom grows in New Mexico in soils that do not contain calcium carbonate in pulverized form at or near the surface of the ground. This shrub endures drouth exceptionally well, even when only an inch or two tall, but it frequently is destroyed by rabbits or other rodents. With an annual precipitation as low as eight or nine inches it often makes quite a vigorous growth. It is among the most valuable of the browse plants, furnishing, in many sections, a great deal of feed when there is little grass available. On the recommendation of the experiment station, a number of the stockmen of the State have planted seed of this bush on their ranches and some of them have met with considerable success with it.

One of the most useful services that the station has performed has been in connection with discouraging the growing of crops that experiments have demonstrated are not suited to the region, or in advising careful consideration before the expenditure of funds on such propositions as the pumping of water from deep wells for the production of ordinary field crops. With the healthful climate and frequently an abundance of water at a

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This is a field of sugar beets harvested for seed at the New Mexico Experiment Station.

In this experiment near Conway, Arkansas, the Irish potatoes on the right received no fertilizer; those on the left received 800 lbs. of a 4-8-12 per acre.

Diversification Wins!

By Kenneth B. Roy

Agricultural Editor, University of Arkansas

COTTON, very little livestock, systems of farming ranging from the plantation to the small owner-operated farm, and one-crop farming were in the main the major problems confronting W. L. Hall, Faulkner County Agricultural Agent, Arkansas, in building a county-wide program that would make for an improved agriculture.

From a study of the acreage production data, Hall knew that the one-crop system of farming that had been followed for so many years in Faulkner county had depleted the soil of its virgin fertility. These data told the story of low cotton and corn yields, and the small acreage of soil-improving crops. Hall saw that to bring farming in Faulkner county back to a profitable business, it was going to take a definite, long-time program for soil management and soil improvement.

The program that was evolved as a result of close study of the county's farming condition called for more livestock, with particular emphasis on the dairy cow; better pastures; increased acreages of legumes; control of soil erosion; increased supply of organic matter; conservation and utilization of manure; increased yields per acre through use of high-grade fertilizers; and crop rotation.

The first definite step toward the establishment of better pastures was made in 1925 by County Agent Hall. The recommendations for the establishment of these demonstration pastures were based on the plans furnished by the University of Arkansas College of Agriculture. These demonstration pastures were established, one acre in size, and the specifications called for fencing, convenience to the barn and lot, information on soil type, preparation of soil, establishment of Bermuda grass as a foundation, proper fertilization, and three cultivations during the season, supplemented with lespedeza. These demonstrations were pastured one year after their establishment. The first pasture was established with John Moix of Conway.

In the same year a cowpea growing contest constituted the first effort to-

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Agriculture Today

VIII Biological Survey

By Frank George

Rats are the most generally destructive of farm rodents.

MORE than half a billion dollars' worth of crops and livestock are reported destroyed annually by predatory animals and injurious rodents. The destruction would be much greater were it not for the cooperative control work by State and Federal agencies. By the same token, according to Paul G. Redington, chief of the Federal Bureau of Biological Survey, more intensive control campaigns would very materially reduce the destruction under the half a billion dollar figure.

Recently, at the request of Congress, the Bureau has been conducting field operations and research at its laboratory at Denver, Colorado, with a view to developing a more effective cooperative program for the eradication, suppression, or bringing under control of predatory animals. A 10-year cooperative program of predatory animal control has been worked out now, calling for an annual Federal appropriation of $1,378,700. State officials and other cooperators have assured the Bureau that they would support the program and continue the present ratio of cooperative expenditures on the average of approximately 2½ to 1, if and when the increased Federal expenditures are authorized.

The 10-year program, according to Mr. Redington, should make it possible to prevent constant reinfestation of cleared areas, and thus make the savings permanent, and to conduct control operations on the public domain and cooperatively on areas where heretofore no work has been done for lack of funds. The plan does not contemplate complete eradication of predatory animals, because in some areas this is neither practicable nor advisable, but the control of such animals so that their damage will be negligible and in many cases ended completely.

Asked to indicate the three outstanding current agricultural problems with which the Biological Survey is now dealing and toward the solution of which it is working, Mr. Redington enumerated (1) the control of injurious rodents; (2) the determination of the relations of birds to agriculture and the attitude the farmer should assume toward the various species; and (3) the control of predatory animals.

"County agents," he declared, "are coming more fully to appreciate the very close relationship that exists between wild life and agriculture. Some animals and birds are economically beneficial and are considered friends of the farmer. Others are looked upon as pests, in many cases to be endured. It is one of the objectives of the Biological Survey by educational methods to better acquaint the farmer, the fruit grower, and the stockman with their friends and foes among wild-life forms and with steps that should be taken to encourage the presence of the former and to bring the latter under control."

Gassing rats in a corn crib is a good means of extermination.

The injurious rodents include such widespread species as ground squirrels, prairie dogs, jack-rabbits, pocket gophers, and brown rats. Less generally known, but locally exceedingly destructive, are rodents such as woodchucks, porcupines, house and field mice, wood rats, and kangaroo rats. These various rodents are so numerous that if no measures were taken toward the control of their activities their damage to crops would be appalling. As it is, the losses amount to hundreds of millions of dollars annually.

Experiments in Arizona have shown that prairie dogs destroy from 25 to 80 per cent of the annual production of forage in infested areas. Rabbits in one Texas county incited a loss of $95,000 on the cotton crop. A break in an irrigation ditch in Arizona, caused by pocket gophers, resulted in a $35,000 crop loss and a $5,000 repair bill. Less spectacular but continuous losses come from the depredations of these and other rodents, and in some localities settlers are reported to have been faced with the necessity of abandoning their ranches to the rodents. The total toll levied by the Norway, or brown rat, alone, is estimated to exceed $200,000,000 a year.

An example of rat depredation that

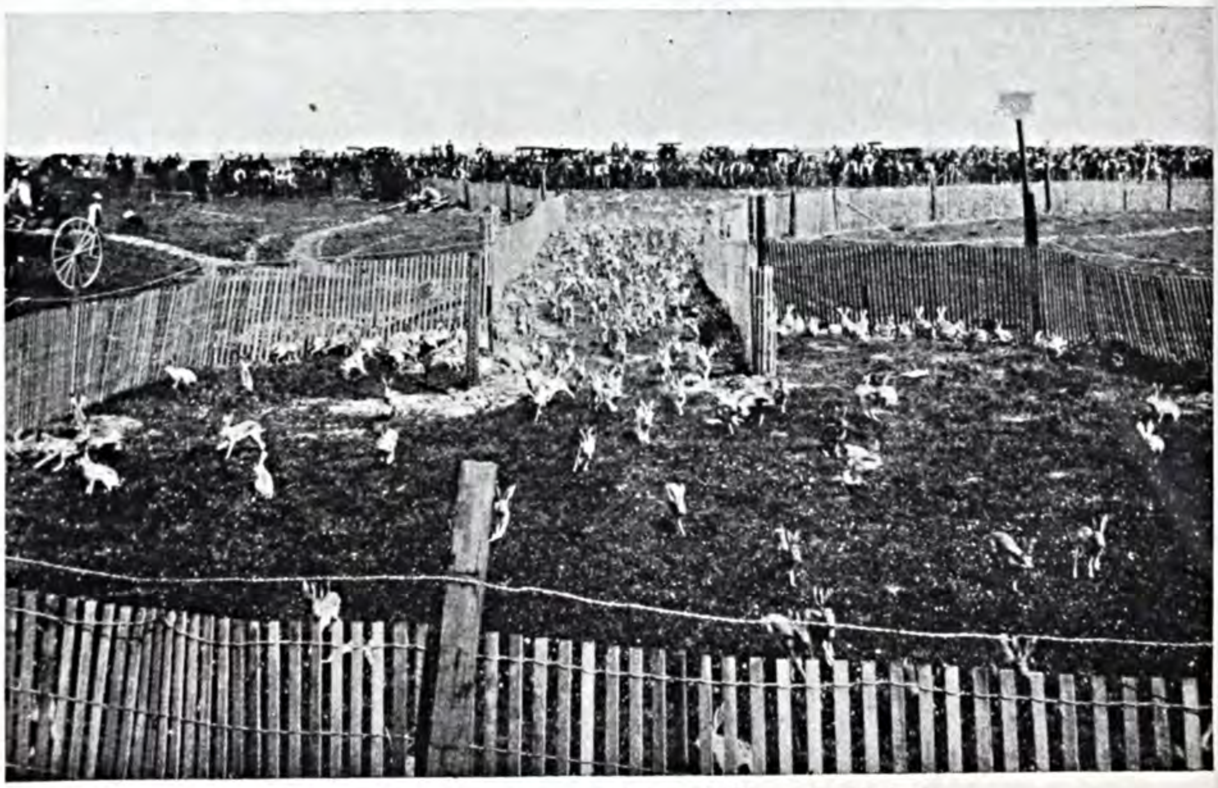
indicates the extent of its destructiveness was reported recently from Galveston county, Texas, where a fruit grower declared that rats had ravished his berry patch to such an extent that instead of his being able to ship 115 lugs of berries as he had the preceding year, he could pick only 4 lugs last year. Another farmer reported a loss of $500 in sweet potatoes and turnips from 20 acres, and still another reported a loss of $60 in figs, $1,500 in trees girdled, and $100 in truck crops. Losses in watermelons, cantaloupes, tomatoes, carrots, beets, beans, and corn were also reported from Galveston county, one farmer declaring that he had lost $1,000 in watermelons on 10 acres through depredation of rats.

Organize Campaigns

Organized anti-rat campaigns were conducted in cities and country districts in 16 states last year. Notable among the campaigns in country districts was one in Texas organized in 54 counties which yielded nearly 4,000,000 dead rats. In the campaign in Ellis county, Texas, where there is a population of less than 57,000 persons, nearly 250,000 rats were destroyed in one month. Many cases were reported to the Federal authorities where 20 per cent or more of the trees in orchards were killed by field mice. One orchard in the State of Washington suffered 50 per cent damage, and a heavy infestation of mice in Jones and Lyman counties, South Dakota, was responsible for the loss of more than 40,000 acres of corn.

A systematic cooperative rodent control program is in effect by the Biological Survey, the country being divided into 15 districts for that purpose. These districts are state-wide in parts of the West and in the East include many states. District leaders correlate the control operations and direct the work of cooperators. The cooperating agencies include agricultural colleges, state departments of agricultural agents, other state and county officials, farmers' and stockmen's associations, and private individuals. The funds contributed by these cooperators during the past year were three times the amount expended from Federal appropriations and made it possible to conduct operations on more than 15,500,000 acres of land.

Predatory animals that Mr. Reding-



Organized drives on jack-rabbits yield many victims.

More than 4,800 bobcats, which are especially destructive of sheep during lamb season, were captured last year.

ton estimates take an annual toll of livestock valued at $30,000,000 include wolves, coyotes, bobcats, and mountain lions. Bears sometimes become predatory. The most persistently destructive of the lot, however, is the coyote, an animal that is responsible also for transmitting to livestock and human beings such dread diseases as rabies and tularemia. This animal is not confined to Western ranges. Last year, in a New York county bordering Lake Ontario, coyotes destroyed $10,000 worth of sheep.

Each wolf and each mountain lion is charged on the average with destroying annually livestock worth $1,000; each stock-killing bear, $500; and each coyote and each bobcat, $50. Some animals become so notorious from their depredations that they are individually named, either from the locality about which they range, or from some peculiarity of footprint. Examples of such renegades are "Old Leftie," a wolf that traveled on three feet after leaving one foot in a trap; the "Split Rock" wolf of Wyoming; and the "Custer" wolf of South Dakota. Many others have been similarly named and have had prices set on their heads.

One wolf in New Mexico is reported by stockmen to have killed 150 cattle worth $5,000 during six months preceding his capture by a Biological Survey hunter. A predatory-animal leader of the Survey declares that each mountain lion will kill on the average two deer a week, and in Colorado one case is on record of a lion killing 100 sheep in one night. Three coyotes in Utah killed $500 worth of sheep in an hour. One bobcat in Texas destroyed 35 head of sheep in a month. A stock - killing grizzly bear in New Mexico slaughtered 50 head of cattle one season, and the following spring had 32 more to his discredit when overtaken by a Survey hunter.

Employed Hunters

From 300 to 500 predatory-animal hunters are now operating under 14 district leaders. These men are instructed "to get" the animal they are after; when they are sent to sections where stock killers are at large, they stay there until they dispose of the last one. During the past year hunters brought in the skins or scalps of 35,709 coyotes, 9 large gray wolves, 716 red wolves, 219 mountain lions, 40 lynxes, 4,838 bobcats, and 226 predatory bears, thereby preventing

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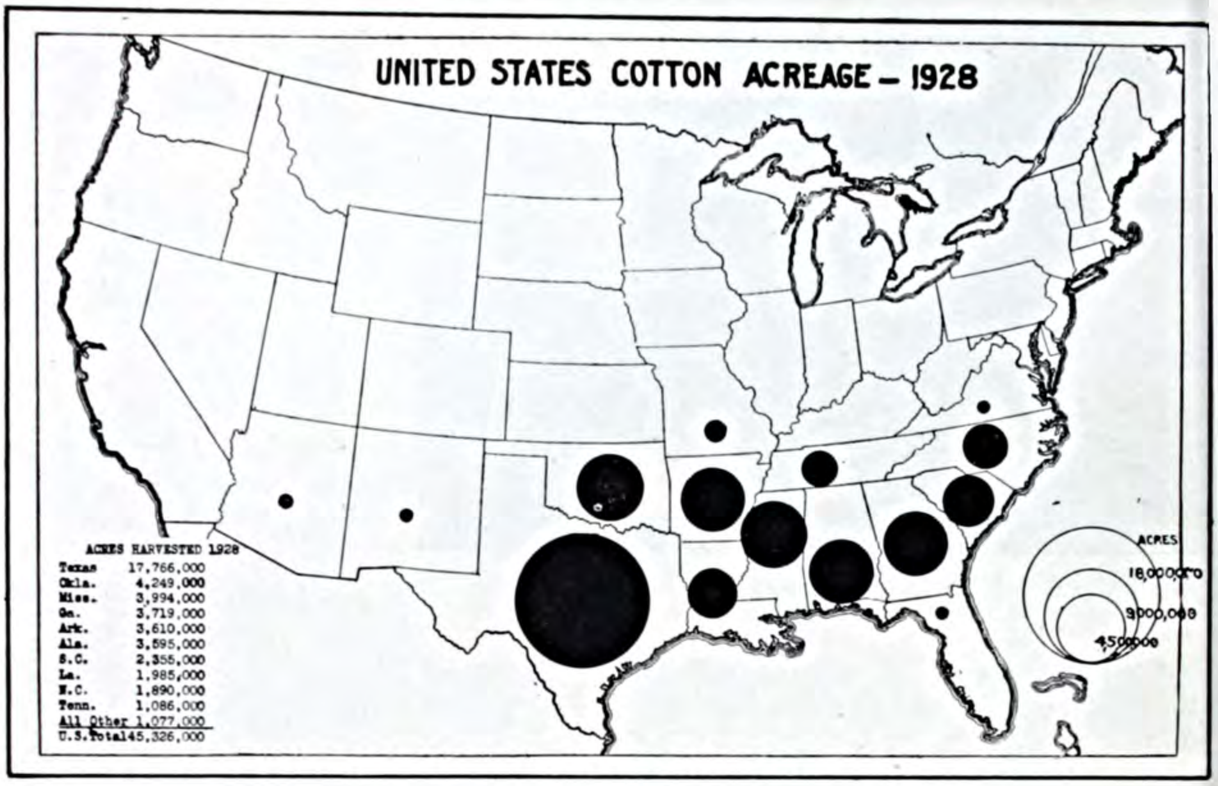
Calcium cyanide dust is used in destroying rodents.



COTTON

¶ *Eighth of the crop series*

By Walter H Ebling

Agricultural Statistician, Wisconsin

COTTON is a tropical fiber crop grown very largely in the Northern hemisphere, the United States usually producing more than 60 per cent of the world's total. It is the world's leading fiber and one of the important crops of commerce. Since the invention of the cotton-gin by Eli Whitney, an American, in 1793, cotton has come into world-wide use.

The cotton plant may be described as a small tropical shrub growing numerous seed bolls in which small oily seeds are imbedded in fine white fibers. These bolls burst open when ripe, and the fluffy cotton containing the seed usually is picked from the plants by hand. Before the invention of the cotton-gin, the separation of the seeds from the lint was a slow and difficult hand process and cotton was expensive because of the large amount of labor required in this separation. With the coming of the saw gin, the amount which could be so separated was limited only by the quantities that could be grown and used.

Cotton ranks high among the crops, it being second in value

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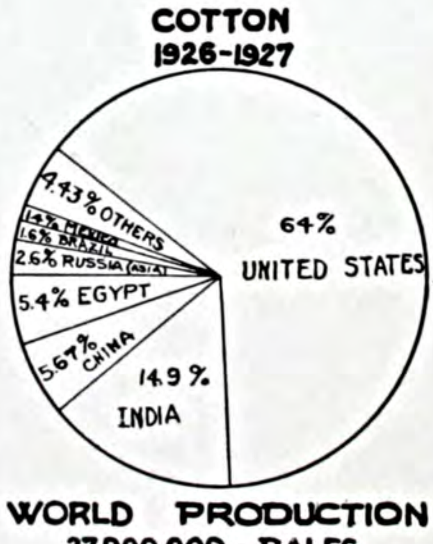

On the Threshold

By A. A. Burger

Cedar Falls, Iowa

EDITOR'S NOTE: *At the beginning of each year it is customary to take stock of ourselves and corral all the optimism possible. Therefore, with six months of the year gone, and with the farmer in the midst of the growing season with all the attendant worries of dry-spells, insects, hired help problems, etc., this hopeful article should prove interesting and helpful. It will help to tide over tired workers to harvest time and another check-up.*

"AGRICULTURE is today at the threshold of the greatest prosperity in its history." This statement may well be questioned. Taken at its face value it is a visionary dream. On the other hand, there is plenty of sound evidence and opinion upon which we may base an conservatively optimistic attitude of the future. It is the purpose of this article to set forth the reasons for this belief and to analyze the more pertinent facts and opinions that have been expressed by those best qualified to speak—statements which we believe would most nearly represent the consensus of opinion of our best authorities and the sentiment of the majority of our rural people.

Since the drastic deflation of 1920, we have passed through one of the most trying periods in American agricultural history. We here want to recognize this fact and also to admit that this period of deflation has blighted the hopes and ambitions of many of our most progressive farmers and has put to the acid test of adversity the very character of our people. From the standpoint of our future progress, one of the most unfortunate conditions that has remained with us as a result, has been a pessimistic, discouraged attitude, which we have, unfortunately, allowed to distort our judgment and perhaps somewhat confuse our vision.

We need but call to mind that in the time of our greatest prosperity extreme optimism prevailed, and that at that time most of us thought that those prosperous conditions, for the most part, likely never would materially change. We acted accordingly. Time has shown that we were mistaken. And so it is not strange that through the long years of our great depression, we have come to look upon the future with misgivings and mistrust. The trouble is that we have allowed our experiences rather than our judgment to control our viewpoint. This is one of the recognized and peculiar traits of human nature.

The pendulum of economic forces—the fluctuation of prices up and down—is based upon this peculiarity of men. If we but stop to think, we know that there is no such thing as complete stability. We know that the pendulum always swings too far in either direction. From extreme prosperity, it swung too far into extreme depression, and it is now on its return to better times.

This is no time to lose faith in agriculture. Since the low point of 1921, the purchasing power of agricultural products—the value of the farm dollar in buying commondities—has risen from 69 to 90 in October of 1928. We cannot expect that this buying power will be steadily upward, for there may be times when it will become stationary or may drop, but the average of these fluctuations up and down will represent a general trend that is upward. It is an economic fact that the price of land always follows the decrease or the increase of farm commodity prices. As we come to consider the situation with reference to agriculture at this time, we should not overlook the fact that the present price of land, in comparison with the inflated American dollar, is one of the cheapest commodities on the American market.

Farm Values

It is estimated that the average for farm values in the State of Illinois for 1928, was 96 per cent of prewar. In Indiana they are reported as 84 per cent of prewar values. We do not have the figures for the State of Iowa, but it is likely that the average present values would be somewhere between these figures. It is, of course, well known that there are many farms in all of the corn belt states that are now selling far below their actual productive value. Many of them are now being purchased at prices that will return a fair rate upon the investment.

With the land situation in view, we call to mind a statement made by Professor Warren of Cornell University a number of years ago—and the facts since 1921 will bear him out—that the economic tendency of prices of products which the farmer buys is to become less and of those which he sells is to increase. This adjustment can have but one effect upon the price of land. A similar adjustment has taken place after every great war.

Just after the close of the Spanish-American war, or from 1900, we witnessed a gradual increase in the price of farm commodities. From that time to 1910 the price of lands in the corn belt states advanced nearly 10 per cent per year, and we purchased farms for the increase of the value of the land, and not alone for the income which they would yield on a productive basis. During all of this time more lands were being brought under cultivation.

The figures of the Government show that for the last 25 years, from 1900 to 1925, the number of farms in the United States increased from 5,737,372 to 6,371,640, or 11 per cent, while the number of acres in these farms increased 10 per cent. Population increased during this time from 76,000,000 to 116,000,000, an increase of over 40 per cent. That meant that there were 40,000,000 more souls to feed and clothe, that much more cotton, linen, wool, silk, furs, leather, and food of all kinds needed to support them. With all the increase in the acreage of new land brought under cultivation, lands steadily advanced.

But there is now little more new land to be brought under cultivation. The number of farms and the acres in these farms is now at a standstill. The population of the country goes on increasing steadily at the rate of 1,500,000 per year. Think of this great advantage to agriculture, if we but keep out the cheap products produced by cheap labor on lands that, in many countries, are very much cheaper than our own.

The present conditions in the agricultural situation in this country has led John Lee Coulter, noted economist and president of the North Dakota Agricultural College, to make this statement: "Agriculture is today at the very threshold of its greatest prosperity. It is the soundest industry in the United States today. Owners of farmland, whether they live upon the farms or are non-resident owners or have investments in farm mortgage loans, will undoubtedly hold the most advantageous position of any class of citizens of the United States during the 25-year period just ahead of us."

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Good hay crops can be obtained from properly handled Volusia soils.

Babying Soils

By Hugh Fergus

Slippery Rock, Pennsylvania

A FEW million years ago when the earth took a cold spell and the glaciers visited the northern part of the United States, there was created a type of soil rather variegated and different from any of the soils south of the line where the glaciers ended. Soil scientists have named it Volusia.

I have lived in the "Volusia" country for 13 years and find that these soils need to be "babied" constantly in order to keep up production. If they are neglected, they quickly "go back" and grow cinquefoil, moss, and poverty grass. I know of at least three of these farms less than two miles from my own that at one time were as productive as any of the farms in the community. Now, if they were fenced, one cow would starve to death in a summer if she depended on the blue grass growing on them.

On the other hand, some of these farms that had reached this wild state, taken hold of by good farmers, in a very few years became productive and profitable. One striking case in particular was a field on one of these "rundown" farms that had grown nothing but poverty grass for so long that when the farm was bought by its last owner the old timers told him there was no use in trying to grow anything on it. He turned a deaf ear on these pessimists. By liming, manuring, and fertilizing the corn, fertilizing the oats, and manuring and fertilizing the wheat, in three years from poverty grass this field turned off a crop of wheat that yielded more than 30 bushels per acre.

I do not believe any State records

have been broken here in Pennsylvania on Volusia soils, although some very good yields have been made. Proof of this is in the fact that last year the county north of me had four members of the 400-bushel per acre potato club. The highest yield of ear corn on a measured acre in this community was 160 bushels made by a corn club boy. Ninety bushels of oats per acre have been secured. Once in a long while 40 bushels of wheat per acre is grown, but more often even on the best farms wheat is a losing proposition and is gradually dying out of the rotations. Hay has produced as high as four tons per acre in two cuttings.

My farm is a Volusia farm. I am not enough of a soil specialist to know the various sub-types by name, but do know that we are near enough a terminal moraine to have several of them. The predominating one is a heavy loam underlaid with a heavy clay (not a limestone clay) that always drains off slowly. In some places this clay is so hard that it is almost impervious to moisture. Hardpan is the local name for it. In spite of the fact that we have drained most of these places with tile laid in rows 35 feet apart, they still have a soggy tendency.

Then we have one of a grayish black color. When I first came here, I used superphosphate almost wholly and rarely got even a fair crop of this kind of soil. I did not think nitrogen was lacking, for most of our farm gets two applications of eight loads of manure once in every four years. Then I tried adding potash, usually a 12-5 mixture, and since then we have had pretty good yields.

We have an almost black loam and a gravelly loam. These two need potash, too, but not for the same reason that the grayish black soil does. Straw grows rank and is weak. An 0-12-5 helps stiffen up the straw on these soils.

There are three types that we fertilize in a special way. In two of the fields the acreage is so small that we load the drill up and plant them separately.

For thirteen years we have been trying out various rotations and fertilizing systems in an effort to get the best ones, until now we have the farm producing 50 per cent or more above the state average. While we have been doing this, we have made it a practice to keep enough dairy cows and young stock to consume all the roughage and most of the grain from the 74 acres we run in the crop rotations. If we do sell $200 or $300 worth of grain each year, we make up for it in 2,500 to 3,000 pounds per month of 32 to 48 per cent protein feeds that are used to balance up our home-grown feeds for milk production.

Use 3-Year Rotation

My farm is separated by a public road and on account of this and the topography we cannot make less than six fields to run a three-year rotation of corn, oats, and clover. We will average about 25 acres of each crop every year. We have been averaging about 100 bushels of ear corn, 60 bushels of oats by weight, and 2 to 3½ tons of hay per acre, depending on the kind of second crop we get. If we have a surplus of corn, we can always get at least 50 cents per bushel of ears for it. We grow a pure variety of oats (Cornellian). By advertising in local papers we have never gotten less than 75 cents per bushel for it as seed. Our cows return us, according to our cow-testing association records, two to three times as much for the hay as if we sold it off the farm. Wheat was not only unprofitable, but since we grow only clover hay it interfered with hay harvest, and again in the fall the planting of it interfered with the harvesting of the corn crop.

Each year we buy from five to seven tons of fertilizer. Two times we have tried drilling 200 pounds per acre of superphosphate on the corn ground

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Weeds or Crops?

By A. L. Stone

Agronomist, Wisconsin College of Agriculture

"KILL *the weeds*" is the slogan on most farms these July days. On some farms weeds have taken possession of the fields. On others they are fighting with the crops for existence. Weeds have fought for existence for centuries and are more hardy than the crops, hence, if given sway, the weeds will win and the crop either will be killed or the yields greatly reduced.

There are some weeds which spread by the underground parts, but if no weeds were ever allowed to go to seed, the spread would be much slower and the injury to the crop much less. Therefore, one important part of the program is to keep the weeds from going to seed.

ANNUALS—Plants which live but one year. As weeds of this class reproduce themselves by seeds only, it is important to keep them from going to seed and any method which will accomplish this eventually will eradicate them. Ragweed, foxtails or pigeon grasses, wild mustards, Russian thistle, red root, and corn cockle are examples. They are found in cultivated fields, in yards, along fences, and in grain fields after harvest.

BIENNIALS—Plants which live two years, producing only leaves and roots the first year and a flower stalk and seeds the second. Like annuals they can be killed by preventing seeding. Usually they are found growing in meadows, pastures, and out-of-the-way places, and on the whole easily are controlled. Burdock, wild lettuce, bull thistle, mullen, cheat, wild parsnip, and wild carrot are examples.

PERENNIALS—Plants, the roots of which live for more than two and often many years. The stalks arise from the root and seed may be produced each year. There are some perennials which never produce seed and spread only by the roots or portions of the roots. Horse radish is one of these, and in some instances Canada thistles produce no seed. It is important to prevent perennials from seeding, because they easily may be spread by their seeds, but they can-

Railway companies are sometimes careless in preventing weeds from seeding and spreading.

not be eradicated by preventing seed bearing. It is necessary to kill the underground parts. Quack grass, Canada thistles, wild morning-glory, ox-eye daisy, snapdragon or butter and eggs, common milkweed, and perennial sow thistle are our worst perennials.

Annuals which escape the cultivator in cultivated crops like corn, potatoes, and sugar beets usually grow into splendid specimens of their kind. Such plants bear almost unbelievable numbers of seeds. Ragweed 19,000, pigeon grass 142,660, wild mustard 143,000, lambsquarters 608,300, barnyard grass 1,292,700, and tumbling weed 6,150,850 seeds to the plant are amazing figures found by actual count. Their seeds will lie buried in the soil unharmed for years. Only a very few weed seeds will decay in less than three years. Wild mustard, Canada thistle, common ragweed, and pennycress are plants, the seeds of which will lie buried for ten years or more only to grow when brought up to the warmth and light by plowing or cultivation. Seeds of sweet clover, buried 44 years, and Indian mallow 56 years, have grown freely when turned to the surface.

Biennials resemble annuals in the above respect, but bear fewer seeds to the plant. Examples are roadside thistles with 15,196, burdock 47,883, wild lettuce 242,825, and mullen 1,294,040 seeds to the plant. As biennials like annuals depend wholly upon seeds for their reproduction, the importance of killing them before seedings is plain.

Perennials bear less seed to the plant than either annuals or biennials. While it is necessary to kill the root to eradicate the plant and while some of them like Canada thistle, perennial sow thistle, wild morning-glory, quack grass and others spread by their underground parts, it is also necessary to keep them from bearing seed. This is shown by the fact that the common milkweed bears approximately 10,302, dandelion 14,079, snapdragon 16,966, common plantain 59,400, buckhorn 117,700, yellow dock 143,500, and

Partial summer fallow followed by a smother crop is a good way to eradicate bad weeds. This buckwheat was sown about July 1, following intensive cultivation.

yarrow 577,600 seeds to each well-developed plant. In addition weeds belonging to all of these classes have seeds which may be carried by wind, snow, and water, so there are good reasons why they should not go to seed.

For the dairy farmer, the following rotation is a good one. The first year corn, in which no weeds are allowed to go to seed, should be grown. The second year the field should be sown to oats or barley, seeding at the same time to clover and timothy using eight pounds of red clover and six pounds of timothy seed per acre. The third year two crops of clover hay or one crop of hay and one of seed can be taken. The fourth year will produce a crop of timothy hay or pasture. In the fall of the fourth year, the sod should be manured and plowed so as to be ready for corn the next spring. If the corn is kept *clean* this rotation will very largely prevent annuals from going to seed.

By the time the soil is ready to work

in the spring, millions of young weed plants have started to grow. Careful cultivation with disc or spring-tooth harrow will kill them, but the cultivation brings more weed seeds up to the warmth and air and if the weather is warm, in 24 hours another crop of weeds is started. One weed killed at this time means a weed less in the grain or corn. At no time in their lives can weeds be killed more easily, and a little more time and labor than farmers usually give to the preparation of the seed bed will pay good dividends in the crop.

Use weeder, spike-tooth harrow, and cultivator freely in all cultivated crops like corn, potatoes, etc. The weeder and harrow will kill many small weeds and will do little harm to the crop if used in the afternoon after the plants are wilted. In the morning when the plants are fresh, they break off easily, and some damage will be done. The weed plants can be most easily killed when they are young and advantage should be taken of every opportunity to catch them at this tender stage of growth.

"Do you know," said one young farmer, "I had a good lesson last spring on the value of using a spike-tooth harrow on a potato field where the potatoes were just coming up. We had planted 15 acres of potatoes and had harrowed about one-half of them when it began to rain. The rain kept up intermittently for 10 days, making it impossible to harrow or cultivate. On the part of the field which was not dragged, the weeds got such a start that no further attempt to kill them was made and the field grew up to weeds, producing no potatoes whatever. On the dragged portion of the field, the potatoes yielded 150 bushels to the acre. I would not have believed that one harrowing could make so much difference."

This is a good instance of what one harrowing will do. It must be remembered, too, that it is much more economical to kill weeds with a wide tool like a disk, spring-tooth or something harrow than with a one-row cultivator.

Cut or pull all scattered weeds along fences, roadsides, and in fields, so the seeds cannot be blown, washed, or dropped on the fields. This must be done before the seeds are formed, because most of the weed plants will ripen their seeds after the plant is cut or pulled. If for any reason the work cannot be done before the seeds are formed, the plants should be burned to prevent any chance of reproducing their kind.

Before seeding time is reached, the plants may be left where cut. Cut below the surface of the ground so that no small branch will be left for the well-developed root to furnish with a large food supply. Such a plant will ripen its seeds in much shorter time than if allowed to grow naturally.

Be sure not to wait too long before cultivating, cutting, or digging. Many weeds are very deceiving in appearance, and while seeming to be perfectly green and still in bloom will be found to bear ripened seeds. Red root, lambsquarters, chickweed, pursley, and pigeon grasses are good examples of such weeds. There are others having the same habit, so begin early and do not let them reach the seeding stage.

Scattered plants of the perennial weeds which appear upon the farm should be pulled up or dug up during damp weather while the ground is soft and before the seeds have formed. If seeds have once formed, do not drop

This is a good way to kill small patches of noxious weeds. The paper does the work while the farmer is busy elsewhere.

the weeds upon the ground, but carry them off the field and burn them. There is often enough vitality left in the plant to ripen the seed even after it is pulled up. If weeds spread by running roots or rootstocks, great care must be taken while digging to see that no portions of the root are left in the soil.

Small patches of weeds not over two rods square can be killed most economically by mowing the weeds close to the ground when plants are budded, and covering with heavy building paper. Tar paper is preferable because it sheds water better. Overlap the strips of paper carefully for about eight inches; extend the paper three feet beyond the edge of the patch so that no plants can come out from under it. The paper should be held down by planks, fence rails, or stones. Sixty to ninety days of this treatment should completely kill the weeds. Although the paper is somewhat costly, it does the work while the farmer is busy at other farm operations, and hence is comparatively economical.

Another means of killing perennial weeds is to set the plow just deep enough to turn running roots to the surface. Plow as early in the fall as possible. Keep patch cultivated until ground freezes. Allow no leaves to get above the earth's surface. Plow again in the spring, about two inches deeper than the preceding fall. Cultivate as before until the first of July. Sow buckwheat or millet at the rate of one bushel per acre, or sudan grass seed, 25 pounds per acre. This cultivation will so weaken the weeds that the millet or buckwheat will be growing vigorously before the weeds recover and will smother them completely if the season is favorable. Hemp also may be used as a smother crop but requires very fertile soil for best results. It should be grown in cooperation with other farmers, as it is difficult to dispose of the crop in small quantities.

Perennial weeds may sometimes be killed in cultivated crops like corn and potatoes if planted in hills far enough apart so that they can be cultivated lengthwise, crosswise, and diagonally. The cultivation must be very thorough and persistent. Complete destruction of the weeds may require some hoeing in addition to other cultivation. This method is an excellent one for sandy soils if the cultivation is sufficiently careful and persistent. If weeds are not entirely killed the first season, it may be well to plant a cultivated crop and repeat the process the second year. Persistent cultivation is the key-word to success by this method.

Summer fallow should be used only where the weeds so thickly infest the ground as to make any of the other methods uncertain. It requires that no crop be grown upon the field for one year. Plow and cultivate as outlined in above, but continue the process throughout the season, plowing at least three times and cultivating often enough to keep the weeds from getting above the surface. If, by September 1, the weeds appear to be dead, the ground may be properly prepared and sown to fall rye, which may be plowed down in the spring for a green manure crop, and corn planted upon the field. If any weeds then appear, they can be killed by use of the hoe. Fall seeding of timothy and spring seeding of clover on the rye will allow for a hay crop the next year if this seems desirable. With weed eradication, as with other farm operations, weather conditions may upset all plans, but the chance must be taken or nothing will be accomplished.

In these days when it is necessary to raise every pound of human and animal food to the acre that it is possible to produce, no weeds can be allowed to take the plant food and moisture from the crop or to compete with it for air and sunshine. Every weed kept from going to seed makes possible the growth of a crop plant. Keep the weeds from seeding and keep them under control.

Southern Dewberries

By R. B. Fairbanks

BECAUSE the fruit crop ripens soon after strawberries are gone, and comes in just ahead of blackberries, the dewberry as a fresh fruit crop rapidly is gaining ground in the South. Not only do the southern markets take this berry, but the northern and eastern markets are taking it in ever-increasing quantities. This berry fits right in the little niche between the strawberry and blackberry crop, and just that few weeks' time that comes in between the ripening of these two crops offers the dewberry grower his opportunity. The commercial production of southern dewberries is heaviest in North Carolina, South Carolina, Georgia, and Texas, although the crop is grown to a lesser extent in several other sections of the South.

The dewberry plant has been properly trained.

The common method of growing dewberries is to set the plants in checks five feet apart each way, with the vines tied to stakes that are seven feet long and driven 18 inches in the ground, thus giving a stake 5½ feet high for the vines to grow on. These vines are tied at two or three different places with a soft cotton twine string and when the tip is about a foot to a foot and a half above the top of the stake it is clipped off, the idea being to check further terminal growth and to throw the growth into the lateral branches.

The dewberry produces fruit only on wood that grew the previous season. For this reason, it is urgently important that an abundance of strong, vigorous, disease-free wood be grown each year, and it is here that liberal feeding in the form of commercial fertilizer enters. Fertilizers, of course, play an important part in the production of almost all crops, but this is doubly true in the case of the dewberry.

In the South the usual method of growing this new wood each year is to pull up the stakes and cut off the old vines immediately after harvest is completed. Not only the old vine, but all of the new shoots that may have come up during the spring and early summer are cut smooth with the crown of the plant. All of this material is taken off and burned, the burning being highly important as this helps to control anthracnose and double blossom, the two most serious diseases of the dewberry.

New canes spring up quickly. Then fertilization and cultivation take place. This is one of the most important parts of the work, because if a strong, vigorous cane growth does not take place between harvest and the fall of year, the crop the following season will naturally be reduced.

Immediately after cutting off the old canes, therefore, a liberal application of fertilizer is applied. Usually 500 to as high as 1,000 pounds per acre is given. The fertilizer used should be high in nitrogen, usually something like 6 per cent is used, and around 3 or 4 per cent of superphosphate, and 2 or 3 per cent potash. This fertilization is purely for cane growth and that is the reason for the liberal amount of nitrogen being applied and the small amount of superphosphate and potash.

When to Apply

The dewberry crop is fertilized twice annually, the application mentioned above being given immediately after harvest for cane growth and the other one just as growth begins in the spring. This second or early spring application is given for fruit production, and, therefore, a fertilizer high in superphosphate and potash and comparatively low in nitrogen is used. Usually the growers apply a fertilizer at this time analyzing around 2 to 4 per cent nitrogen, 8 to 10 per cent superphosphate, and 6 to 8 per cent potash. This high per cent of potash is necessary in order to give proper firmness and quality to the berries. All the way from 500 to 1,000 pounds or more fertilizers per acre are given at this application. Thus we see that the successful dewberry grower uses from 1,000 to 2,000 pounds of fertilizer per acre, making two applications, one in the spring, just as growth starts, and the other in the summer, immediately after the old canes are cut.

Not only is this liberal fertilization considered necessary to get a good berry, but it also aids, indirectly, at least, in the control of anthracnose and double blossom. But cutting off the canes immediately after harvest, both the old and the new, and burning them, these diseases are naturally reduced to a minimum. Then the liberal application of fertilizer aids in the production of vigorous, strong canes, which in turn means that they are less susceptible to disease attacks. It is a well-known fact, that any strong plant or animal is more able to successfully withstand disease or other adverse conditions than is the poorly nourished plant or animal.

After the fertilizer is applied in the summer, cultivation is kept up until the fall, or until the new vines grow enough and spread out over the middles to prevent further cultivation. These vines are allowed to lie on the ground until the following spring, at which time the stakes are again driven in the ground and the vines tied to them. At this time the spring cultivation takes place.

However, liberal fertilization, the cutting and burning of canes each season, and thorough cultivation will not entirely control. It is advisable to spray. Bordeaux mixture applied at the proper time and used in connection with the preventive measures mentioned above enable the dewberry grower to control almost entirely the two destructive dewberry diseases, anthracnose and double blossom. The 4-4-50 bordeaux formula is the one usually applied. The first application is given to young vines when they are a foot long. This is in the summer and is usually from two to four weeks after the old vines are cut. This spraying is repeated once every two or three weeks

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Good Potato Yields

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College, Storrs, Connecticut

WHEN a grower produces from 523 to 559 bushels or approximately 100 barrels of potatoes per acre, in the slang language he is "going some." He is not only "going some" for Connecticut, but he is "going some" for any state in the United States. In fact he is going so strong that he is right up among the leaders in potato production. J. J. Bermant of Vernon, Connecticut, is such a grower.

Mr. Bermant had not had very much experience with potatoes. In 1926 his first attempt at growing this crop called for 40 acres. It was taken on as a side-line, the main crop being shade-grown tobacco, 80 to 150 acres. In order to help him in his work the first year he hired some of his neighbors to work with him. The neighbors happened to have had some experience in potato raising. In addition to the neighbor's experience he was aided largely by the writer in determining a careful plan for his crop. As a result of these plans and hard work, 16,000 bushels of potatoes were gathered from the 40 acres or 400 bushels per acre—a very good yield and particularly so because some of the land had been lying idle for a number of years and was not in as high a state of cultivation as other portions of the farm.

The next year against all advice, Mr. Bermant launched on too big an enterprise or too much of an increase job for one year. He planted 150 acres to potatoes. The yield was not particularly good. The large acreage was beyond the knowledge and experience of the men. Approximately 250 bushels per acre were harvested. In many sections this would be considered a good yield, but not so when one has produced 400 bushels or more.

In 1928 a more sensible acreage was agreed upon, the total being approximately 55 acres. On some of the land 523 bushels per acre were obtained; from still other portions of the farm 559 bushels were harvested. The crop was very fine; 94 per cent of the potatoes were number ones, 5 per cent seconds, and less than 1 per cent culls or big potatoes. For three years' experience this, of course, was excellent.

How is it possible for a man with a limited knowledge of a crop to produce such a large yield? A little study of the man and his work with tobacco may help to enlighten one on the subject. Mr. Bermant raises, as previously stated, about 80 to 150 acres of shade-grown tobacco. He is a very careful grower, willing to spend a little extra time and money in having his rows straight, his rows spaced correctly, the soil well cultivated, enough plant food to grow a good tobacco crop, and every detail even to the very small-

The potatoes were carefully graded and bagged for the market.

est looked after as it should be. This careful attention has resulted in good yields of tobacco yearly.

Applying these things to potato growing, Mr. Bermant tried to get the latest information in potato production, not only the last word on certified seed, but on fertilizing, sprayings, spacing, time to plant, depth of planting, and the other thousand and one things that make up for successful potato production. After he had learned these things, as far as possible he tried to apply them in a thorough, businesslike manner.

Used Certified Seed

In more detail, Mr. Bermant purchased seed of the very best certified strains obtainable. These strains were purchased from men known in competitive growing to have produced seed stock that is yearly high yielding. In looking at the certification, Mr. Bermant paid more attention to the growers than to the fact that they have practically disease-free seed stock. These potatoes were stored under ideal conditions and were brought to Mr. Bermant from the first to the middle of May just before planting so that he was able to cut the potatoes on the day of planting or at least not more than one day ahead. In every instance the potatoes were cut by hand, using an upright, fixed knife on a bench, the operator pushing the potatoes against the knife. Each seed piece was of a generous size and had one or more thrifty eyes. He spaced his potatoes in row 34 inches apart, and the seed pieces in some cases 9 inches and in others 12 inches apart. It readily can be seen that a large number of plants per acre were obtained. At the same time enough space to grow the plants correctly was allowed. There was a uniform depth of planting of seed, the average depth being approximately four inches. A new two-man planter of the 1928 pattern was purchased for this work.

A very interesting and important part of Mr. Bermant's potato raising was the fertilizer which he used. This fertilizer was made up so that it would not injure tobacco if it should be grown on the land in a year or two following the potato crop. I personally criticized the formula as not being necessary. The formula analyzes 8½-11-10½. This is too strong and wasteful of material for average potato raising in this state and probably would be for any other nearby states. Approximately 1,800 pounds per acre were applied, mostly broadcast, althought a slight amount was placed in the planting machine and distributed in the row. The fertilizer consisted of 550 pounds of castor pomace, 250 pounds of nitrate of potash, 200 pounds of sulphate of potash, 300

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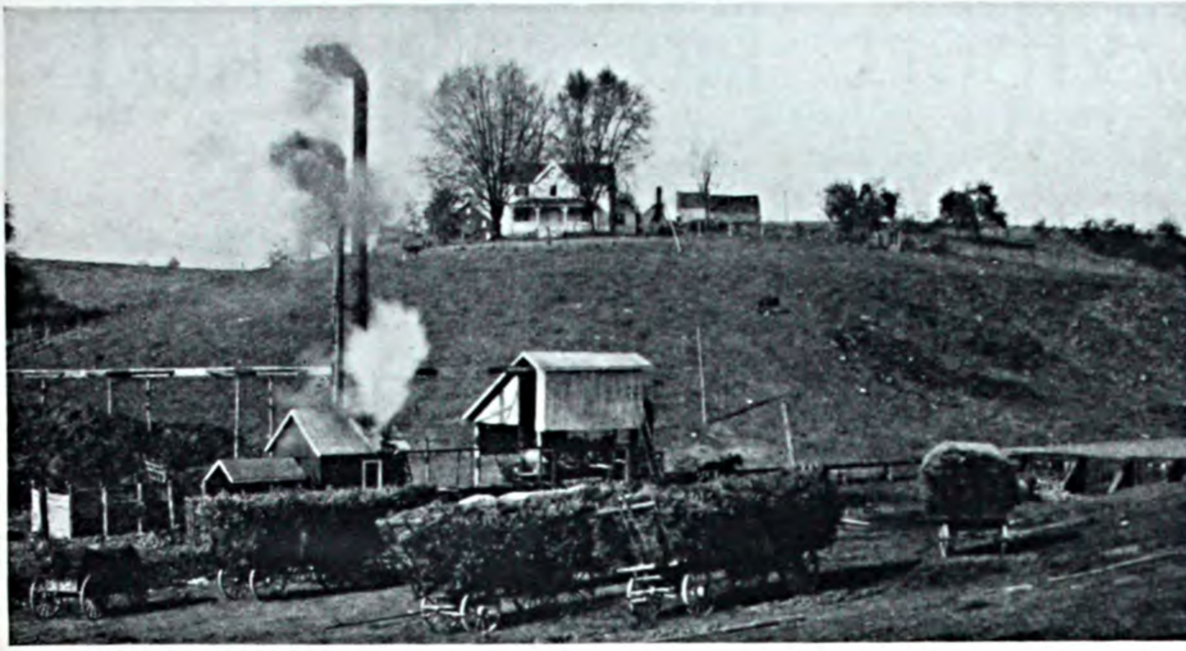
The cutting was done by hand against a knife on the edge of a barrel.



A wormseed oil distillery near Woodbine, Maryland.

Doubling *the* Yield

By E. K. Walrath

Westminster, Maryland

DOUBLING his acre yields of wormseed oil by seriously studying fertilizers on his own farm is the profitable experience of Francis Hering, Westminster, Maryland.

Five years ago in 1924 Mr. Hering planted 13 acres to wormseed. The crop was fertilized that year in the row with 300 lbs. of a 2-8-5 mixture per acre. The 13 acres produced 517 lbs. of oil or 400 lbs. per acre. In 1925 the herb from nine acres fertilized with 300 lbs. of a 2-8-8 per acre distilled 500 lbs. of oil or 44 lbs. per acre, practically the same amount of oil on three less acres than the previous year.

The response of the wormseed to a higher analysis of potash was so great that in 1926 Hering increased his analysis to 2-8-12 and also applied double the amount of this fertilizer or 600 lbs. per acre. The yield on seven acres was 504 lbs. or 72 lbs. of oil per acre, more fertilizer, more potash, and the same amount of oil on six less acres than in 1924.

Still Mr. Hering was not satisfied. He thought he was growing too large an herb, so in 1927 he used sulphate of ammonia instead of hen manure for his nitrogen, and increased the acre application to 800 lbs. of 2-8-12 per acre. He also reduced his planting to five acres, and the yield was 404, or 81 lbs. per acre.

Last season he further increased his fertilizer analysis to a 2-8-14 at the rate of 800 lbs. per acre. This was applied with a corn planter, and the plants were set by hand. On the rows where the men and boys transplanted the wormseed plants directly in contact with the fertilizer a large number of plants were injured. Where the plants were set to the side of the fertilizer, there was no injury. In spite of the poor stand Mr. Hering reports that the field made 258 lbs. of oil on

(*Turn to page 52*)

Albert Tarr's Methods

By G. R. Cobb

Salisbury, Maryland

FARMERS should grow the ammonia they need for crops, according to Albert Tarr, leading farmer in Sussex county, Delaware. And Mr. Tarr surely practices what he preaches, for although producing more corn per acre than anyone else in the county, he purchases no ammonia from his fertilizer dealer.

The name of Albert Tarr is well known among the farmers and business men of Delaware because of his success as a premier corn grower. In 1928 Mr. Tarr won first place in production with a yield of 82.1 bushels of shelled corn per acre. Compare this yield with the 23-bushel average of the state as a whole. Not only was the yield large enough to surpass all others, but the quality was so outstanding that samples of the corn grown on Mr. Tarr's farm won prizes at corn shows throughout the entire State of Delaware.

In addition to being a corn grower par excellence, Mr. Tarr is leader of the 4-H Boys Club of his community, and by constant effort he has now taught the boys how to produce more and better corn. As a result of his work in this connection none of the farmers in this community imports corn but has a surplus, whereas in the olden days much corn was bought by the owners of these several farms.

Unlike and yet like many other successful farmers, Mr. Tarr spent many of his earlier years working with machinery as he was a pattern-maker. But he realized that his health was more important than high wages and so he resigned his position and bought the farm where he now resides.

At the time he bought his present home, some 17 years ago, the land, a Sassafras sandy loam, was so impoverished that on 7 acres Mr. Tarr was able to produce but 98 half-bushel baskets of corn and much of this was nubbins. Today the same 7 acres will average 75 bushels of shelled corn per acre, a gain of more than 50 bushels per acre.

Mr. Tarr first used a commercial fertilizer mixture analyzing 0-12-5, which was a popular mixture for corn and wheat in his section. But somehow or other he believed that more potash was needed and so each year for the past three years he has had his fertilizer dealer add one more per cent of potash until at present he is using an 0-12-8, with the intention of trying out extra potash next year as a side-dressing.

"I believe that on this land and with my method of farming, a top or side-dressing of 150 to 200 pounds of muriate of potash per acre will increase both the yield and quality that I am now getting with 8 per cent potash. Anyway I am going to try it out and see what happens," said Mr. Tarr when asked about his plans.

The idea of using more potash came to Mr. Tarr as a result of one of his experiments. He applied 400 pounds of an 0-12-7 fertilizer per acre, on his corn and then told his wife that he was going to see if there was anything to this side-dressing idea. To make a long story short, Mr. Tarr side-dressed with 250 pounds per acre of the same analysis and harvested a larger and better crop. He left out 12 rows that

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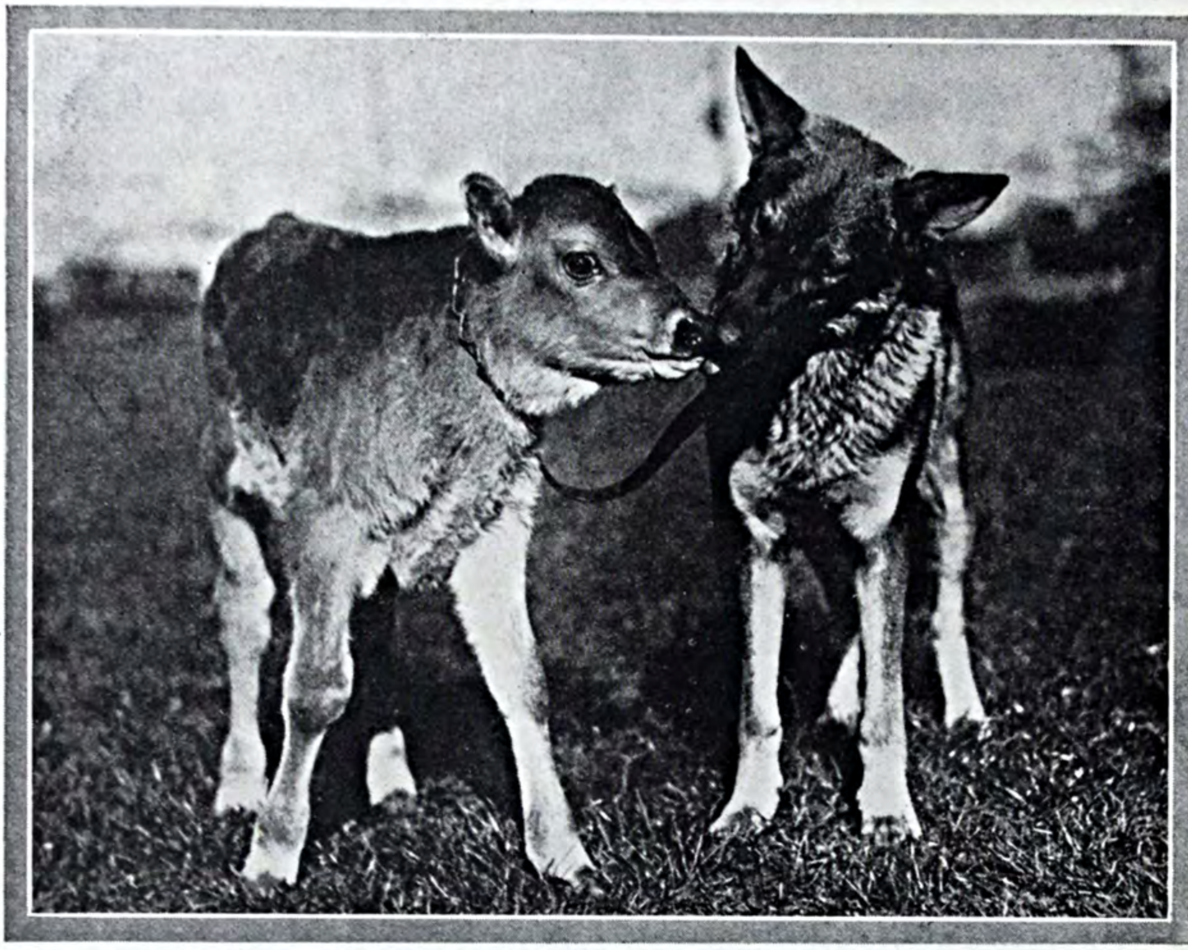
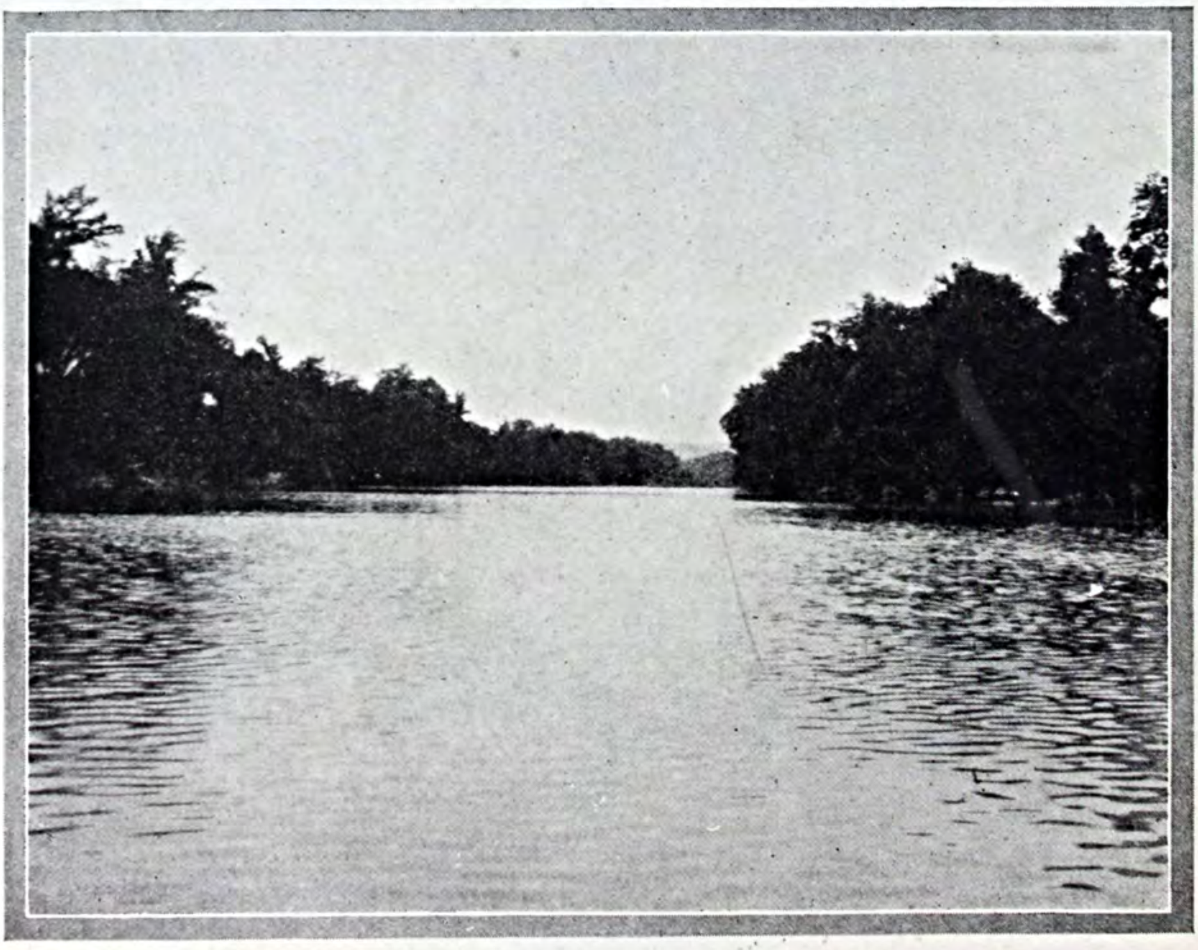
PICTORIAL

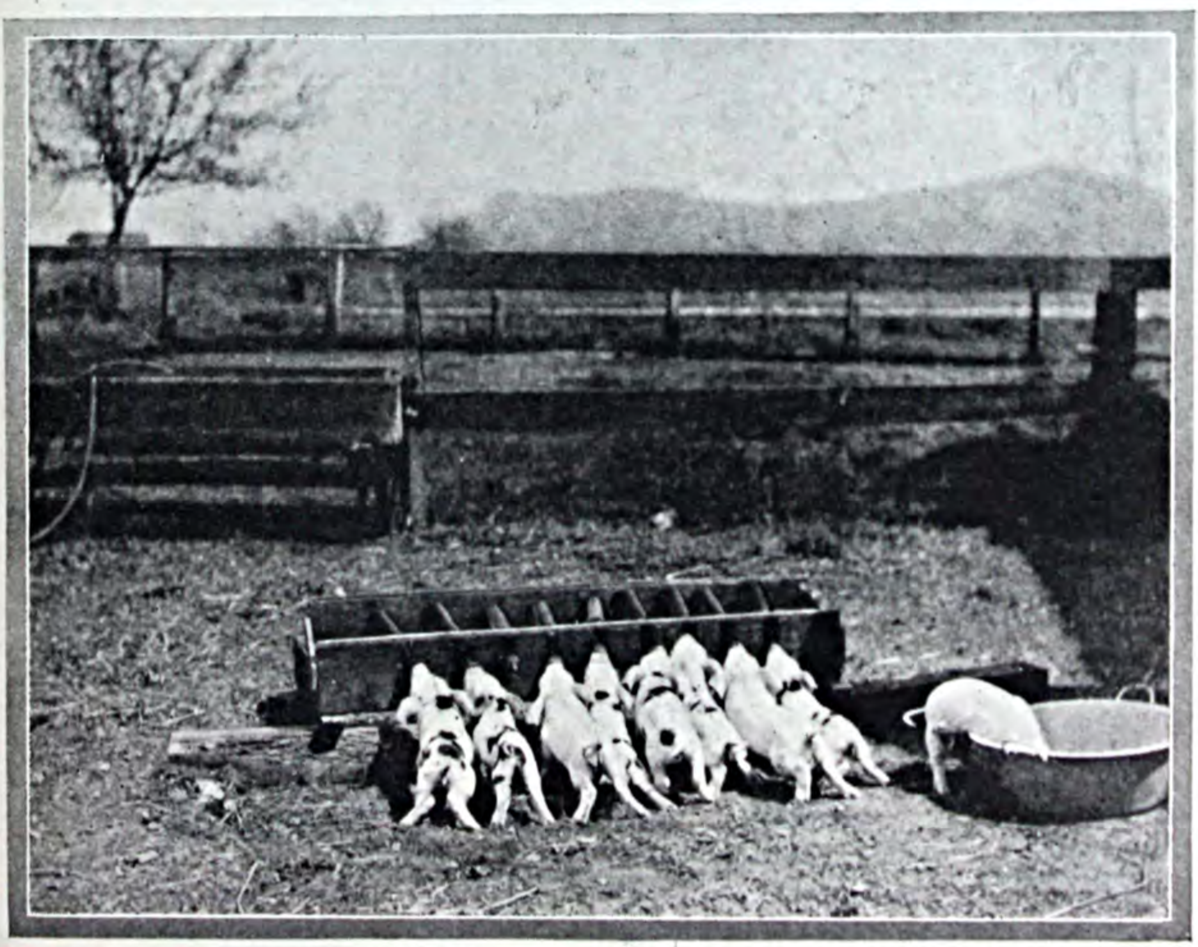


"Buddy," the police dog, is making a real buddy out of "You'll Do," a little Jersey calf.



The White river in the Ozarks of Arkansas is a famous fishing spot.

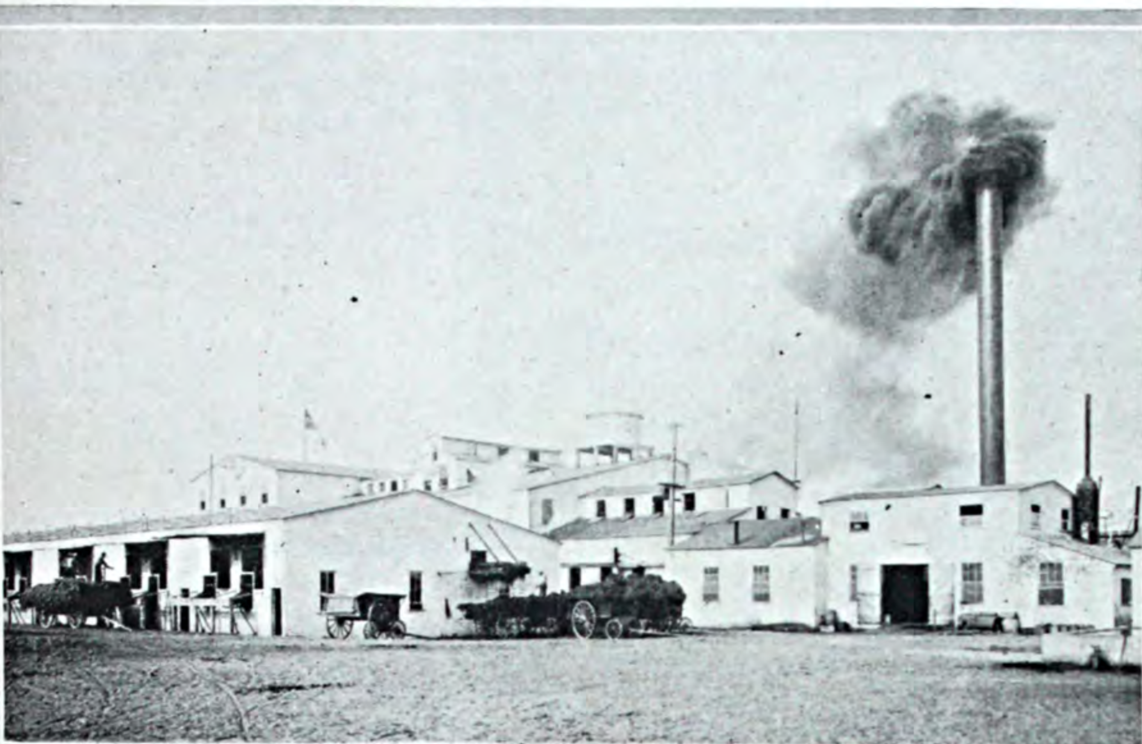
Long Island, New York, is noted for something besides its ducklings, as evidenced by this potato field.



An ingenious Wisconsin farmer made this foster mother for a litter of pigs whose mother had died.

Left: J. J. Aulenbacher of Milwaukee county, Wisconsin, has seven boys and seven girls and seven farms and even his cow has seven on its forehead.

Below: W. B. Hartsell, said to be one of the world's fastest meat cutters, recently put on a series of demonstrations in Washington, D. C., for the benefit of housewives and persons in the U. S. Department of Agriculture. He is shown exhibiting a mock duck which he prepared from a part of the lamb carcass with a few deft strokes of the knife and saw.

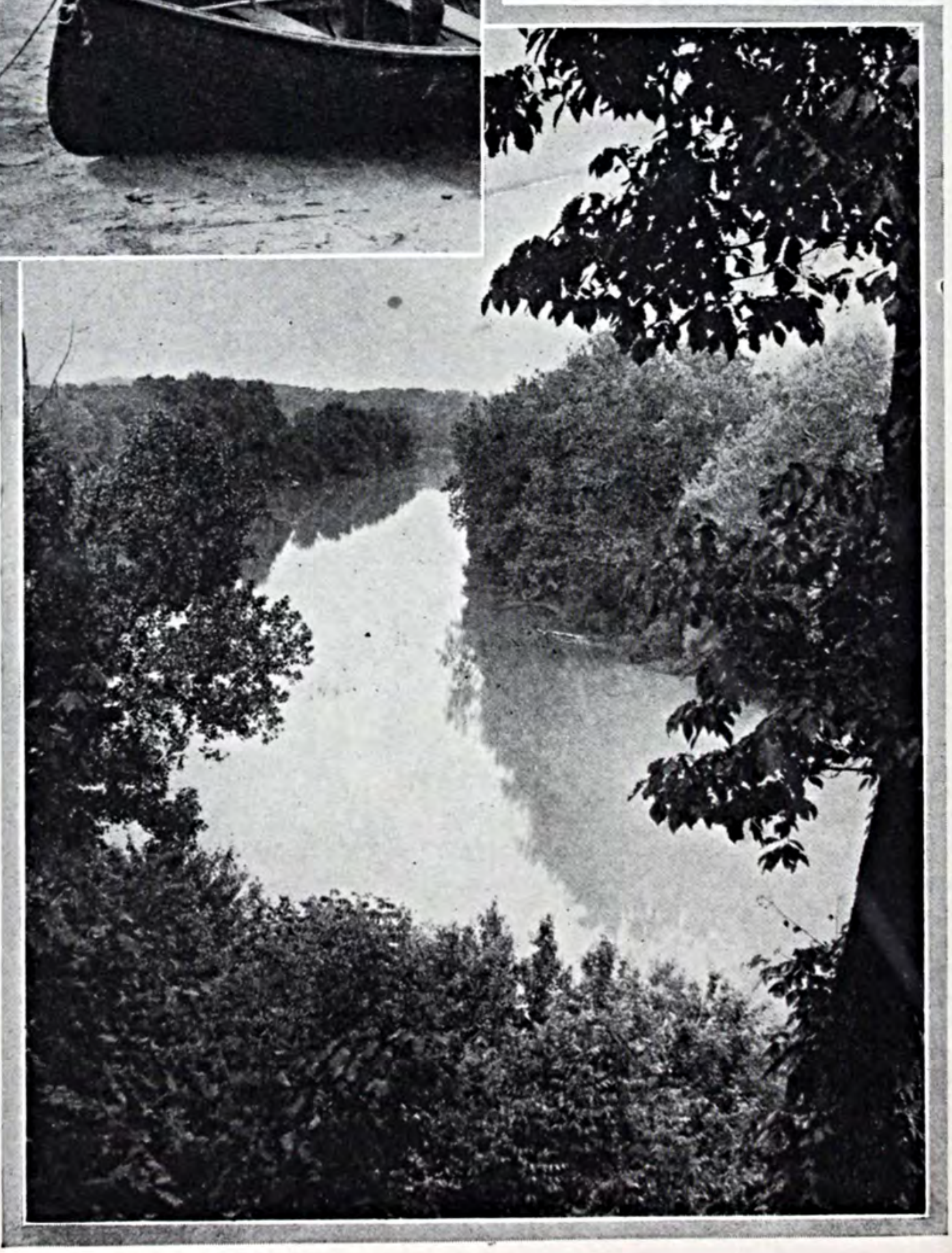


Above: Canning factories are now running "full blast." This is a fruit and vegetable cannery near York, Michigan.

Right: Beans are an important canning crop. Canners have come to realize that successful sales depend upon the quality, flavor, color, and tenderness of the products which go into the cans. These factors of quality all originate in the field during the planting and growing season. To that end careful preparation of seedbed, proper fertilization, and cultivation are important.

Left: "That big fish that got away from me was every bit of that long,"—an old, old story.

Below: This spot, which calls to the summer vacationist, is a quiet bend in the White river near Bedford, Indiana.



The Editors Talk

The Marketing Act

American agriculture at last has gotten its "relief." Culminating years of fervid debate, the act which was approved by Congress and the President on June 15 is of vital interest to the whole nation. It has its supporters; it has its enemies. It may bring the desired relief; it may not, but in all due fairness to the solons and other good minds who have given America's agricultural depression careful thought, the act deserves a fair trial and the interest of everyone concerned.

The bill provides for a Federal Farm Board to promote the effective merchandising of agricultural commodities in interstate and foreign commerce, and to place agriculture on a basis of economic equality with other industries. It is believed that such a Board can help to minimize speculation; prevent inefficient and wasteful methods of distribution; organize producers into effective associations or corporations for greater unity of marketing; and prevent and control surpluses in any agricultural commodity, through orderly production and distribution.

From the policy of the bill, it is plain that the emphasis is on marketing. This is as it should be, for as in other industries today, the crying needs is for a proper balance between production and utilization. When production outpaces utilization and it has in agriculture, there is bound to be trouble. Danish agriculture has sensed the necessity of this proper balance in industry, and farmer cooperatives not only process and manufacture, but also sell farm products in local and foreign markets. In the United States farmer cooperatives too generally have been confined to local activities. This bill will make it possible for cooperatives in the United States to develop along the lines that have been developed in Denmark.

The importance of cooperative marketing is further emphasized in the bill in the section dealing with the special powers of the Board, which is to be composed of eight members appointed by the President. These special powers include the promotion of education in the principles and practices of cooperative marketing of agricultural commodities and food products, and the encouragement of organization, improvement in methods, and development of effective cooperative associations.

One of the outstanding features of the bill is the appropriation of $500,000,000 for a revolving fund which can be used to make loans to cooperative associations.

The Board may appoint committees representing certain agricultural commodities. These committees may apply to the Board for a stabilization corporation for the commodity which it represents. The Board may authorize such a corporation if it finds that the marketing situation with respect to the agricultural commodity in question requires or may require the establishment of such a corporation in order to effectively carry out the general policy of the act.

One of the rather unusual features of this bill is the power of the Board to furnish insurance to cooperative associations against loss through price decline in the agricultural commodity which they handle, that is, provided similar insurance is not already provided for by existing agencies. Insurance against price decline is a new feature for agricultural commodities.

The chief cause of the agricultural depression was the inflation and deflation of prices during and immediately following the War. This inflation and deflation of prices caused a great disparity between farm prices and prices which consumers pay. The relatively high prices which farmers have to pay for the products which they purchase and the relatively low prices which they have received for the products which they sell have been the important factors in the agricultural unrest.

With an efficient system of marketing, which the bill intends, it is hoped that this situation will be relieved. The Federal Farm Board cannot accomplish this alone, a system of cooperatives cannot wholly solve the problem. The support and interest of every one concerned is needed to give the new Agricultural Marketing Act a fair trial.

Intensive Research

Announcement is made that the United States Department of Agriculture has created a committee on cotton research to be composed of eleven specialists representing its various bureaus. The purpose of this committee is to study and correlate the activities of the Department with a view to developing and rounding out a well-balanced program of research as profound and as extensive as the cotton problems with which this country is confronted.

In this announcement we see an important step toward improvement of American agriculture as a whole. What may be accomplished with the cotton crop will undoubtedly reflect in work upon other crops.

In appointing the committee, Dr. A. F. Woods, director of scientific work of the Department said: "There is a general feeling among growers, manufacturers and progressive leaders that the time is ripe for a general offensive against cotton problems." Dr. Woods suggested several fields for consideration by the committee. There is a need, he pointed out, for extended soil surveys in the cotton belt as the basis, both of research and practical improvement; for investigation of physical and chemical properties of cotton fibers as aid to cotton breeding and the determination of factors influencing the spinning quality of cotton; for reexamination of the principles of cotton breeding to the end that suitable varieties may be established for the several sections of the cotton belt; for intensive work on the problems resulting from insect pests of cotton and development of wholesale methods of prevention and control; for revision of cotton standards as rapidly as technological research justifies; profound study of the cotton markets—local, central, export, import, and future—and the price relationships in the market; and for studies of the utilization of cotton for clothing, household, and industrial purposes.

The Department's well-balanced program of cotton research should be so designed, says Dr. Woods, that it will provide our national extension organization, progressively, with more suitable and convincing material than has heretofore been available for presentation to the public and to growers through county agents and other channels of dissemination.

Cotton was chosen as the most suitable commodity upon which to begin this national program of research and service activities. There will be much interest in this new program of intensive research and helpful suggestions on the problems surrounding other important crops should be gained from this work.

Truth In the News

In spite of the many precautions taken by leading metropolitan newspapers to establish the reliability of information, occasionally incorrect or misleading statements find their way into their columns. The rarity of such occurrences is a high compliment to the able manner in which the tremendous task of accumulating and disseminating the daily news is handled.

Such newspapers are always eager to be the first to correct their own misstatements when these are brought to their attention. In a recent issue the New York *Times* said editorially:

"[Potash] Prices soared 100, 200, 300 and even 1,000 per cent before, during and after the war. Potash shipments received at New York amount to about $17,000,000 annually."

As a matter of fact potash has maintained a relatively low price for many years with the exception of the period when the War caused an abnormal condition in world commerce. The *Times* gladly gave equal prominence to a letter bringing this fact to its attention, which said, in part:

"For the five years preceding the war the average price of muriate of potash, delivered in bags at Atlantic and Gulf ports, was $37.69 a ton. Of course, during the war, when the European potash supply was cut off from this country by a blockade, the price of this commodity was extremely high. However, after the war, as soon as commerce resumed a normal condition, potash dropped in price and today can be purchased at a lower figure than before the war.

"Over the past five years the average price of muriate of potash has been $32.61 a ton delivered in bags at Atlantic and Gulf ports. This is approximately $5 less than the average of the five years preceding the war, despite the fact that wages in Europe, cost of mining supplies and inland and ocean freight rates have all advanced considerably.

"Your statement that New York imports $17,000,000 worth of potash annually is rather misleading in that this port is one of the smallest receivers of potash, and potash importations are distributed from Searsport, Me., to San Francisco, Cal., with some shipments going through the St. Lawrence River and the Great Lakes to Chicago. The figure of $17,000,000 is approximately correct for the United States as a whole."

To the Meeting

"If you want to keep young, if you want to live in a live, interesting community, if you want to make advancement in your chosen field of work, go to banquets, socials, meetings, and other gatherings, and take active part in them."

This is the advice of the New Hampshire Extension Family and it is sound advice. There is much to be gained in associating and exchanging ideas with people interested in the things you are interested in. Closed minds, like closed houses, are apt to become dull and gloomy. The New Hampshire advice points out that some people at thirty-five are old; they have closed and barred the doors of their minds against new ideas, and they have let life slump down to a low dead level of routine. Some gray-haired men and women of seventy-five are enthusiastic youngsters. The changing current of life gives them a great delight, and to be with them is like being in a thriving flower garden in June—beauty and surprise for every passing moment.

What do meetings have to do with this? The answer is obvious. Ideas are not so likely to become fixed when jostled about in free discussion, and the mind is not so likely to roam in futile speculation of past glory when challenged frequently by the marvelous discoveries of the present. The mental stimulation, the physical relaxation, the spiritual challenge of social contact help to keep us young.

We have all heard of dead communities and we think of them as places where people go about the dull routine of bread and butter existence, indifferent to the welfare of their neighbors and untouched by the surging currents of life outside. In the live community, the neighbors visit each other, change work when there are special demands, have socials to raise money or to celebrate birthdays, have concerts, lectures, banquets, and other social events. They observe holidays, take a sympathetic interest in schools. In the live community the people are quick to get the county extension agents working with them for a faster common development.

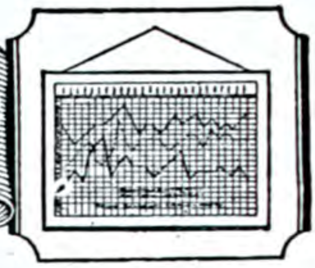
Some people call meetings time wasted. We have all heard the criticism, "He spends so much time going to meetings, he doesn't have time to do his work." Of course, meetings like other good things, can be overdone, but far more people suffer from lack of social, intellectual, and business contacts than from too much of them. The tendency to settle into a comfortable little routine within the farm boundaries is so great that many gifted individuals fall victims to it. Therefore meetings have an important place in the life of every community and in the program of every county agent.

Soil Improvement Contest

We regret that in an editorial regarding announcement made by the National Fertilizer Association of its contest of soil building programs, appearing in the June issue, we neglected to mention similar awards which will be granted six southern county agents. These awards will be made on a similar basis, namely, the presentation of outstanding county-wide programs of soil improvement for this year.

The winners are to be the guests of the Association at the Annual Meeting of the American Society of Agronomy in Chicago in November. The five members of the judging committee who will pick the winners are T. Roy Reid, assistant director of extension, Arkansas, chairman; C. P. Blackwell, dean and director of the Experiment Station, Oklahoma; J. N. Lipscomb, dean of the College of Agriculture, Mississippi; R. P. Bledsoe, agronomist, Georgia Experiment Station; C. B. Williams, head of the agronomy division, North Carolina Experiment Station.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

BOTHERED WITH BEES?

If bees persist in occupying quarters where they are not wanted, they can be trapped out. That sounds like the "neatest trick of the week," but it's simple and practicable. The Department of Agriculture recommends that a cone of wire cloth be placed over the entrance to the home of the bees' choice. Of course there is a hole at the apex of the cone just large enough for one average bee to squeeze through. Going out is a cinch, but on the way back the bees give up because of the sharp points of the fine wire. If a hive is placed near the entrance of the swarm's quarters those that come out will finally collect in it. The queen won't come out but a new queen can be given the bees in the hive. After four weeks the trap may be removed and the entrance to the old home enlarged, whereupon the bees will go in and carry the honey to the hive. One precaution: if there are more than one exit there must be just as many more traps.

SEPARATORS MAY SEPARATE FARMER FROM HIS CASH

Dairy farmers have been cautioned long and frequently to keep the cream separator so adjusted as to limit the loss of butterfat to the minimum. A machine that is used, as this one is, day after day throughout the year is bound to get some attention finally, especially when it is possible to test the skim-milk and find out definitely and easily how much profit is going to the pigs. The grain separator, on the other hand, comes around only once a year and is out of mind most of the time. According to a farm mechanics specialist of the University of Illinois, it should be kept in mind long enough to have it properly adjusted. He has found, after testing about 100 threshing machines during the last four years, that loses of grain in some of them run as high as 10 per cent, whereas in a well-adjusted machine the loss of grain should not be more than one per cent. The average loss in one group of 23 machines was reduced from 1.4 per cent to .7 per cent by adjustments or changes in the methods of operation. The first rule for good operation, says this investigator, is to get as much information as possible from the dealer or the manufacturer on the operation of the machine and follow instructions.

MORE MONEY FOR RESEARCH

Representatives of 26 national farm organizations and associations representing businesses closely allied to agriculture met recently with Secretary of Agriculture Hyde and discussed the need for more money for carrying on research. They made the surprising statement that several American industries annually invest more money for scientific investigations of their technical problems than is expended by all agencies for agricultural research. They reasserted their determination to work for increased appropriations for research work in the Department. Chester Gray, Washington representative of the American Farm Bureau Federation, said that since this group began two years ago to focus attention on the need for more research on the problems of the farmer, the Department's annual appropriations for research had been increased about \$3,500,000. These men said research is urgently needed in plant physiology, plant pathology, animal pathology, plant and animal genetics, nutrition of humans, animals and plants, utilization of plant and animal products, marketing and distribution, general economic problems including taxation, price trends, transportation and engineering, rural sociology, and publication of the results of research. The group will take their pleas to President Hoover and to the new Director of the Budget when he is appointed.

RETIRED, PERHAPS, BUT NOT TIRED

Retired farmers seldom completely retire, says Dr. Carle C. Zimmerman, sociologist of the Minnesota Agricultural Experiment Station, who obtained his facts from a study of incomes in 11 widely scattered Minnesota villages and towns. He found that they still earn 22 per cent of their total incomes in wages, while a larger share of the remainder is derived from town property than from farm property, the former being 32 per cent and the latter 28 per cent. Children of the retired farmers in these towns earned 6 per cent of the family income, but it is not shown whether any of this goes toward the family support. The wives of these retired farmers made 4 per cent of the income by keeping boarders and added another 1 per cent through wages earned. The average percentage of the income earned by the men of the families in these towns was 81, compared with the 22 earned by the retired farmers. It was found that some of the retired farmers return regularly to their farms and oversee or help their children. Others become tax collectors or assessors, or hold other various public positions. Some of them do common labor, often to keep busy and sometimes for the income. The investigator says unskilled laborers in these communities feel the competition of retired farmers.

FERTILIZE FOR ANAEMIA

We seldom find a more forceful commentary on the complexity of the age in which we live and the simplicity of the methods evolved by science than that of Dr. E. C. Brooks, president of the North Carolina State College of Agriculture, speaking before the recent meeting of the National Fertilizer Association at New London, Connecticut. He said that research into the cause and cure of pernicious anaemia carried on at his college and elsewhere shows that copper may be added to fertilizer and applied to the soil where plants absorb the element which when eaten by animals is concentrated in the liver. Then humans may eat the liver, which because of its copper content is one of the best-known dietetic amelioratives of pernicious anaemia. Dr. Brooks said the trend should be away from quantitative production of farm products and toward qualitative. Littler and better!

PRECEDENCE AGAIN

Dairy breed associations should open their herdbooks to many unregistered high-producing cows, O. E. Reed, Chief of the Bureau of Dairy Industry, told the recent annual convention of the Holstein-Friesian Cattle Breeders' Association in Philadelphia. This sort of thing, he said, might be considered by some as "rank heresy," but he reminded the breeders that all cattle now registered sprang from the common herd. Also he dared call attention to the slight differences existing between the production of unregistered and registered commercial herds today.

Foreign and International Agriculture

Canadian Soil Fertility

By H. E. Lefevre

Montreal, Canada

CANADIAN agriculture, with a few local exceptions only, has lived up to the present time mostly on the natural fertility of the soil. In many counties, however, he natural fertility is becoming so depleted that the use of chemical fertilizers is an absolute requisite for any attempt at farming. It becomes more and more difficult to secure crops of satisfactory quality, and sometimes to secure any crop at all that is in any way profitable, without adding nitrogen, phosphorus, and potash to the soil, to say nothing of other fundamental improvements such as drainage, the application of lime, etc.

That Canadian leaders are becoming aware of this fact is shown by many signs, but nothing is more significant than a report on "The Commercial Fertilizer Industry in Canada," recently published by the Natural Resources Intelligence Service of the Department of the Interior at Ottawa. The report takes into account the latest developments of the fertilizer industry in Europe as well as in America and is very up-to-date in its exposition of modern theories relative to fertilizers, both economic and technical. It is well worth the consideration of all agricultural leaders, whether fertilizer specialists or not, whether Canadian or not.

The preface states clearly that "The aims in view are:

1) "to put before the Canadian public the latest view of experts in world economics, namely that commercial fertilizer must be produced in ever-increasing amount to maintain the present yield and sustain a multiplying population on the limited habitable area of this planet.
2) "to show the amount of commercial fertilizer which Canada is using, might use, and may contribute to the world demand.
3) "to give a summary of the legislation and tariffs that concern the Canadian industry."

That fertilizers are becoming more and more important in a well-balanced agricultural program is a well known fact.

> "Agriculture—the basic industry of mankind—depends more and more on fertilizer."

The limitations of farmyard manure are not overlooked:

> "The barnyard manure available is limited by the number of cows, horses, and sheep, and such manure, however rich in nitrogen and humus and desirable for the proper cultivation of a farm or garden, is generally deficient in the mineral elements carrying phosphorus or potash. It is also too bulky for economic distribution on larger areas

than the neighbourhood of farm buildings and stockyards."

Great stress is laid on the importance of nitrogen, both as a fertilizer in time of peace and as a source of explosives in time of war. A study of results obtained at recent European Conferences is presented. The opinions expressed by such distinguished authorities as Lord Melchett, Sir John Russell, and Sir Daniel Hall are carefully analyzed and long quotations of their speeches inserted. Industry and Science agree that farmers should use more fertilizers.

Having discussed the fertilizer question from a world-wide point of view the report then applies the general principles to Canada.

"Fertilizing, however, like charity, begins at home. The manufacturer who reads some of the following pages cannot fail to see that his home market also has boundless scope, that fertilizer applied in Canada in accordance with expert advice would enormously increase the profits of Canadian agriculture, and that what he at present supplies is a drop in the bucket compared with the need."

It is well to recognize the need of fertilizers, but how to carry the good word to the farmers?

"An industry to be flourishing, however, depends on a demand for its products. In the case of many manufactured articles a demand is artificially stimulated by advertising, display and appeal to the 'herd instinct,' and may have no definite bearing on the national well-being, but for no country is it easy to imagine a point of saturation in the case of fertilizer. In this case the national interest requires an increasing demand; depending, as it must, not on fashion or visible merit, but on experience and scientific knowledge of farm economics, the demand has to be fostered and stimulated by the slow process of education".

"It is, therefore, clear that to promote a growing demand for this national necessity there are two requisites, first, an educational campaign and trustworthy advertising; secondly, manufacturing foresight content to offer first rate goods at the least possible margin of profit."

Canada could do much to improve its fertilizer policy and its fertilizer industry even under present conditions. It is not impossible to think of a Canadian nitrogen industry. A careful compilation of figures shows that the "production and distribution of nitrogen has a boundless field."

Canada, more perhaps than any country, today has to build for the future and to think in terms of a few years ahead. It is proper therefore that an estimate should be made of what could be used by the Dominion in the way of fertilizing elements if more intensive, which is often the same as more economic, methods of production were generalized. For the eastern provinces alone, where today fertility is depleted, the figures arrived at are fairly astonishing. They are 148,747 tons for nitrogen, 221,761 tons for phosphoric acid, and 192,813 tons for potash. The report, however, goes further and considers not only the oldest part of Canada but the whole of the Dominion. The amounts arrived at may seem startling. They reach 375,000 tons for nitrogen, 570,000 tons for phosphoric acid, and 550,000 tons for potash. This, of course, is for the distant future, but the mere fact that it is possible to mention such figures and not be considered as utterly unreasonable shows that a radical change is happening in the Canadian conception of fertilization. In fact the report goes as far as to say "though this expenditure is at first sight appalling, consideration suggests that after all such an expenditure, when the time is ripe, might be profitable. . . . There is no end in sight to the amount of commercial fertilizer that the agricul-

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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 Arkansas State Department of Conservation and Inspection, Little Rock, Ark., has published a bulletin giving complete details of the new fertilizer and cottonseed meal law. Every precaution has been taken to see that methods for analyzing, sampling, and branding of fertilizers be in accord with generally accepted views of the fertilizer industry and state control officials. Anyone interested in the study of the present tendency toward standardization of methods in the fertilizer control work will do well to secure a copy of this bulletin.

Soils

In Circular No. 55 of the U. S. Department of Agriculture is to be found a most interesting discussion of "Soil Factors Influencing Crop Production in the Arkansas Valley of Colorado." Of particular interest is the detailed study of alkali soils which are found in many sections of the western states. Dr. A. T. Sweet, Associate Soil Scientist, author of the bulletin, ably presents the results of an extensive survey of the region. He discusses at some length the importance of a better understanding of soil conditions and the need for more careful utilization of water. He also emphasizes the importance of proper use of well-balanced commercial fertilizers adjusted to the needs of various crops and soil types. Well-balanced rotations, he points out, are equally as important as well-balanced fertilizers. This circular should prove of interest to many agricultural workers in the western states where similar climatic and soil conditions obtain.

"Soil Survey of the Valier Irrigation Project," Agr. Exp. Sta., Bozeman, Mont., Bul. 217, Dec., 1928, William DeYoung.

"Soils of Willamett Series and Their Utilization," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 240, Dec., 1928, W. L. Powers, C. V. Ruzek, R. E. Stephenson.

Crops

One of the most recent contributions to our knowledge of the factors involved in the care and management of permanent pastures is Bulletin No. 155, Storrs Agricultural Experiment Station, Connecticut, by B. A. Brown and W. L. Slate. In this bulletin they have reviewed some of the outstanding literature on pastures. They have discussed in considerable detail the Hohenheim system, experimental work that has been for some years in progress at Cockle Park, England; also similar work in Pennsylvania, Rhode Island, Virginia, West Virginia, Ohio, New York, and Massachusetts. It is clearly pointed out that the proper use of fertilizers is an economic necessity if pastures, the most neglected phase of American agriculture, are to be regarded as a national asset. Of significance are the conclusions of the authors on the results of the Connecticut pasture experiment, based on the average corrected thermal production: superphosphate alone increased the pasturage 64 per cent; superphosphate with limestone 120 per cent; superphosphate and potash 86 per cent; superphosphate, limestone, and potash 128 per cent; superphosphate, potash, and nitrate of soda (the latter applied annually) 103 per cent. The original treatments of the Connecticut plots included limestone at the rate of 2,000 pounds per acre, superphosphate (16%) 500 pounds, muriate of potash 100 pounds, and nitrate of soda 150 pounds.

One of the most interesting of the crop bulletins that have come in during the past month is the 28-page Extension Leaflet 49 of the Massachusetts Agricultural College. "Asparagus and Its Culture" is the title, and the authors are V. A. Tiedjens, W. D. Whitcomb, and R. M. Koon. Coming from a section where asparagus is a valuable crop and is grown intensively, this publication assumes importance to anyone interested in asparagus. With particular reference to the plant food necessary for profitable production, the authors state, "When we consider that a 125-box crop of asparagus takes from the soil approximately 160 pounds of nitrogen, 80 pounds of phosphorus, and 200 pounds of potash, it is a simple matter to figure out how much of a given fertilizer must be used. Some additional should be applied for leaching and the variable quantity taken out by weeds." The plant food requirements of the crop have been carefully studied and the fertilizer recommendations made in the publication are for average conditions, based on general practices in this and foreign countries, thus making the information of more than local value.

"Oat Varieties in California," Agr. Exp. Sta., Berkeley, Cal., Bul. 467, Apr., 1929, W. W. Mackie.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVIII, No. 4, Apr., 1929.

"Forty-first Annual Report," Agr. Exp. Sta., Fort Collins, Colo., C. P. Gillette.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XI, No. 4, May, 1929.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., Vol. VI, No. 5, May, 1929.

"Thirty-sixth Annual Report," Agr. Exp. Sta., University Farm, St. Paul, Minn.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, No. 138, May-June, 1929.

"The Mineral Content of Grains," Agr. Exp. Sta., Logan, Utah, Bul. 210, May, 1929, J. E. Greaves and C. T. Hirst.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 258, June, 1929.

"Crop Plant Stimulation with Paper Mulch," U. S. D. A., Washington, D. C., Tech. Bul. 75, May, 1928, L. H. Flint.

"Peppermint and Spearmint as Farm Crops," U. S. D. A., Washington, D. C., Farmers' Bul. 1555, Feb., 1929, Arthur F. Sievers.

"Legume Hays for Milk Production," U. S. D. A., Washington, D. C., Farmers' Bul. 1573, Oct., 1928, J. R. Dawson.

"Mushroom Culture for Amateurs," U. S. D. A., Washington, D. C., Farmers' Bul. 1587, Mch., 1929, Vera K. Charles.

"The Farm Timberlot," Agr. Exp. Sta., Madison, Wis., Bul. 407, Mch., 1929, F. G. Wilson.

Economics

"To learn in detail the various ways in which the farmers in the upland sections of Arkansas have combined the elements of the farm business, and to consider the effect of their methods of management and enterprise operation upon the financial returns" is the purpose of Arkansas' new Bulletin 235. To accomplish this, Mr. J. A. Dickey, the author, secured records from more than a thousand farmers. He calls the bulletin, "Farm Organization and Management in Typical Upland Sections of Arkansas." The most important factor affecting the labor income on these farms was the size of the farm business. The larger farms had the larger labor incomes. According to the author, there are two principal reasons for the larger farms having larger labor incomes. First, is the type of farm organization, and second, is the effectiveness of enterprise operations and details of farm practice. The larger farms permit of a better utilization of land, greater labor efficiency, and a better balanced business. A very complete and thorough analysis is made of the farm management problems in this study.

The agricultural depression has been accompanied by important changes in the value of farm real estate. The general trend of real estate values in the various states and sections of the country are given in U. S. D. A. Circular 60, "The Farm Real Estate Situation 1927-28," by E. H. Wiecking. Even though there has been a recovery in farm income since 1920, prices in farm real estate continue to decline. This bulletin will prove very interesting to everyone interested in land values.

"When Shall We Sell Our Corn?" Agr. Exp. Sta., Ames, Iowa, Cir. 113, Jan., 1929, G. S. Shepherd.

"The McIntosh Apple Industry in Western Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 218, Jan., 1929, Sherman E. Johnson.

"New Jersey Prices of Hired Farm Labor, Feedstuffs and Fertilizer Materials and Their Index Numbers, 1910-1927," Dept. of Agr., Trenton, N. J., Cir. 155, Feb., 1929, Dimitry T. Pitt.

"Prices of Fertilizer Materials, and Factors Affecting the Fertilizer Tonnage," Agr. Exp. Sta., Ithaca, N. Y., Memoir 119, Dec., 1928, Edmund Ellsworth Vial.

"Attitudes of Oklahoma Farmers Toward the Oklahoma Cotton Growers' Association," Agr. Exp. Sta., Stillwater, Okla., Bul. 178, W. W. Fetrow.

"Commercial Orchards in Pennsylvania," Penn. Dept. of Agr., Harrisburg, Pa., 1929, L. H. Wible.

"Planning and Conducting Extension Campaigns," U. S. D. A., Washington, D. C., Cir. 58, Dec., 1928, H. W. Hochbaum

"Respiration of Sorghum Grains," U. S. D. A., Washington, D. C., Tech. Bul. 100, Nov., 1928, D. A. Coleman, B. E. Rothgeb, H. C. Fellowss

"Training Teachers of Vocational Agriculture in Service," Federal Board for Vocational Education, Washington, D. C., Bul. 135, Agr. Serv. 36, Feb., 1929.

"Preparing Johnson Hay for Market in the Black Prairie Belt of Alabama and Mississippi," U. S. D. A., Washington, D. C., Farmers' Bul. 1574, M. A. Crosby

"Marketing Late-Crop Potatoes," U. S. D. A., Washington, D. C., Farmers' Bul. 1578, Feb., 1929, Wells A. Sherman, George B. Fiske, and J. W. Park.

"A History of Agricultural Extension Work in the United States 1785-1923," U. S. D. A., Washington, D. C., Misc. Pub. 15, Oct, 1928, Alfred Charles True.

Insects

As a result of recent investigations, the European corn borer, although primarily a corn insect, has been found on more than 200 different kinds of plants. This is an important new angle in the fight to control this insect which has loomed up as a great menace to American agriculture. "The Host Plants of the European Corn Borer in New England" is the title of a new U. S. D. A. Technical Bul. 77 by Benjamin E. Hodgson of the Bureau of Entomology, Washington, D. C., which gives detailed information on this line of investigation.

"Control of Pocket Gophers and Moles in California," Agr. Ext. Serv., Berkeley, Cal., Cir. 29, Mch., 1929, Joseph Dixon.

"Montana Insect Pests for 1927 and 1928," Agr. Exp. Sta., Bozeman, Mont., Bul. 216, Dec., 1928, J. R. Parker and W. B. Mabee.

"The Japanese Beetle in Pennsylvania," Penn. Dept. of Agr., Harrisburg, Pa., Vol. 12, No. 4, Apr. 1, 1929, T. L. Guyton.

"The Oriental Fruit Moth in Pennsylvania," Penn. Dept. of Agr., Harrisburg, Pa., Vol. 12, No. 8, June 1, 1929, J. R. Stear.

"The Maize Billbug in South Carolina," Agr. Exp. Sta., Clemson College, S. C., Bul. 257, May, 1929, Oscar L. Cartwright.

"Imported Parasites of the European Corn Borer in America," U. S. D. A., Washington, D. C., Tech. Bul. 98, Jan., 1929, D. W. Jones.

Diseases

"Apple Rust and Its Control," Penn. Dept. of Agr., Harrisburg, Pa., Vol. 12, No. 3, Mch. 1, 1929, W. A. McCubbin.

"White-Pine Blister Rust: A Comparison of European with North American Conditions," U. S. D. A., Tech. Bul. 87, Feb., 1929, Perley Spaulding.

Canadian Soil Fertility

(*From page* 44)

turist in Canada could profitably use."

Statistics that give an idea of the present consumption of fertilizers in Canada have been compiled. "Viewing the table as a whole, the most striking feature is the very small volume of fertilizer production and use of fertilizer products, whether domestic or imported." It is indeed "a drop in the bucket compared with the need."

An intensive study is made of the

price of fertilizers in Canada and of the part to be played by concentrated fertilizers. The last part of the report deals with legislation. The present status of Canadian legislation with respect to fertilizers is reviewed in detail and an idea is given of the fertilizer legislation in various countries open to possible Canadian fertilizer exports. A map is enclosed with the report.

No quotation perhaps is more characteristic of the spirit in which the whole work has been done than is the following:

> "The domestic demand, to say nothing of the foreign, will inevitably increase as population grows and the fertility of the soil is depleted, but its increase should not be left to the slow pressure of natural law. The less distant hope both for the benefit of agriculture and of the fertilizer industry lies in the rapid dissemination of a scientific knowledge of agriculture among farmers, orchardists, and truck growers of Canada and in a vigorous publicity campaign to demonstrate that the proper use of nitrogen, phosphorus, potash, and lime swells a bank account."

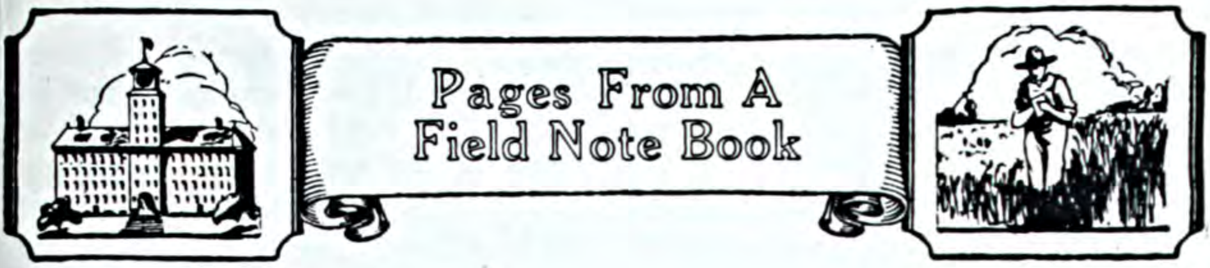
This analysis of the report necessarily is very incomplete. Copies of the report, however, can be secured through application to The Natural Resources Intelligence Service, Department of the Interior, Ottawa, Ont.

Notes from England

In discussing methods of improving fruit growing, quoting actual figures, Director R. G. Hatton of the East Malling Horticultural Research Station, England, stated that in an apple experiment where nitrogen, phosphoric acid, and potash were used, the trees produced $224.80 worth of fruit per acre, over a 3-year period; where potash was omitted, using only nitrogen and phosphoric acid, the trees produced only $132.10 worth of fruit over a like period. On another experiment the complete fertilizer produced $273.60 worth of fruit, while the fertilizer lacking potash produced only $196.80 worth of fruit. On a third experiment, the nitrogen, phosphoric acid, and potash fertilizer produced $446.40 worth of fruit, while the fertilizer lacking potash produced only $225.60 worth of fruit. These experiments ran contemporaneously for three years, and each was a different variety of apple.

The improvements noted in each case were brought about by four annual applications of sulphate of potash at the rate of 400 pounds per acre, costing about $12. Director Hatton further went on to say that fertilizers affect both the color and the maturity of the fruit, though the exact degree of either cannot be foretold in individual cases. During the past season, the improvement in color of the fruit of certain varieties was very obvious in the East Malling orchards when the fruit was still on the trees.—*Jour. Ministry of Agriculture, Jan., 1929.*

Potatoes fertilized with a well-balanced, complete fertilizer have better cooking qualities than unfertilized potatoes. Moderate amounts of nitrogen were satisfactory, but excessive amounts lowered the quality. Superphosphate in the fertilizer was also quite necessary for high quality. The absence of potash was reflected in poor quality tubers which turned black on cooking. The potatoes were better without lime than with it. These interesting and important facts were recorded by W. N. Findley and noted by H. V. Garner of the Rothamsted Experimental Station in the *Journal of the Ministry of Agriculture*, January, 1929.



Fertilizing *the* "Prairie"

By H. H. Halderman

Wabash, Indiana

ALTHOUGH Wabash county for the most part is clay loam, there is one section in the central part of the county containing three or four square miles that is known as "the prairie." This area at one time was a lake but is now a low, level plain that is so rich in humus that the dirt drifts in dry seasons. For years this prairie has grown nothing but corn with an occasional field of rye. Corn yields will average around 75 bushels. The corn growers in this prairie never have used fertilizer as it was not thought necessary.

In 1927, a number of the boys of 4-H club age who were the sons of prairie farmers entered the Rotary Corn Club. Purebred seed and sufficient fertilizer for an acre of corn were furnished by the Rotary Club. When the question of the kind of fertilizer desired was asked, the common answer was, "We don't need fertilizer in the prairie to raise corn." However, here was an opportunity to get fertilizer free-of-charge, so upon the recommendation of the county agent, an 0-10-10 was tried.

Shucking time came and in every case, the fertilized acres showed very noticeable differences in quality and in yield. It was found that the use of a high-potash fertilizer was very profitable on this type of soil. In 1928 and also in 1929, a large number of these prairie farmers fertilized their entire acreage. Levi Ridenour, one of the largest corn growers in the prairie, who started fertilizing his corn in 1928 as a result of the boys' corn club work, states that he considers the additional qualities of his corn alone is worth the cost of the fertilizer.

Complete Fertilizers for Apples

THE diet of the famous apples from the Northwest must contain plenty of potash, judging from the fertilizer used by prominent growers of this great fruit-producing region. Seventeen packed boxes of prime fruit per tree, or 850 boxes from 50 such trees per acre, are a yield which will arouse the interest of any fruit grower. That is the yield which Frank Maxey of Opportunity, Washington, secured from an orchard which he fertilized with 1,000 lbs. per acre of a 5-8-10.

George McCollom near Spokane, Washington, has secured a similar production per tree. Mr. McCollom is using a 5-10-10 fertilizer and began the treatment seven years ago with an annual application of 10 lbs. per tree. No cover crops have been grown or any manure applied during this seven-year period. Outside of the leaves going back into the ground, nothing has been returned to maintain or increase its humus content. This orchard today is considered to be the best Jonathan apple orchard in the district.

Other fruit growers in this section are using 0-10-10, 3-10-10, and 5-10-10 mixtures. From the trees and fruit examined there is no question of the benefit derived from the use of these preparations.

Mr. McCollom is firm in the belief that his fertilizer practice has saved his orchard from severe winter injury. Both 1923 and 1924 were hard years on the apple trees in this section, many being either completely killed or rendered unproductive the following summer. Injury to fertilized trees was negligible, it being quite apparent that the vitality gained from the fertilizer enabled the treated trees to winter well and produce the next year.

Mr. McCollom also attributes to the fertilizer which he is using the better keeping and better coloring qualities and the tastiness of his apples.

Profits in Sweet Potatoes

IN 1928 Dr. D. D. Salley of Orangeburg, South Carolina, planted several acres of sweet potatoes as a part of his diversified system of farming. Although he plants more than 100 acres of cotton, Dr. Salley takes advantage of the fine opportunities which the soils of Orangeburg county offer, and grows such crops as small grain, soybeans, sweet potatoes, and some other truck which are suitable to that territory.

Last year Dr. Salley planted about 11 acres of sweet potatoes on a piece of gently sloping well-drained land. He planted four acres during the last of April and early part of May. The remainder were planted in June, and these potatoes did not do as well as those of the early planting.

Just before planting the four acres of potatoes, Dr. Salley applied all of his fertilizer, which was 750 pounds of a complete fertilizer analyzing a 4-9-9 (NPK). The four acres produced 1,100 crates, 1,000 crates of which were No. 1's and 100 crates of culls. He cured and regraded the potatoes before turning them over to the Carolina Sweet Potato Association for sale. After the regrading process was over, he found that there were 750 crates of No. 1 sweet potatoes.

The total cost of producing the sweet potatoes including cost of land rent, plants, fertilizer, mule labor, crates, handling, etc. amounted to $260.00. Dr. Salley received approximately $1,050.00 for his potatoes, thus making a net profit of $790.00 on the four acres.

CROSS plowing cotton to avoid the expensive hand labor item of thinning the stand by chopping has become a general practice in Nueces county, Texas, as a result of two years of demonstrations by F. W. Hoepfner, county agent. Cross plowing using two-row cultivators equipped with 8-inch sweeps is figured to cost 10 cents per acre, while hand chopping the crop runs to about 60 cents per acre. Twenty-five thousand acres were thus thinned in three communities of the county in 1927 and last year the practice had become widespread in 10 communities. It should be added that the land is nearly level.—*W. H. Darrow, Extension Editor, A. and M. College of Texas.*

Albert Tarr's Methods

(*From page* 30)

did not receive the side-dressing and according to both Mr. and Mrs. Tarr these rows did not yield more than a third as much corn as rows receiving the side-dressing. The corn from the rows receiving no side-dressing was slower to cure, there were more nubbins, and more rots than on the other rows.

Soybeans and Holstein cattle are Mr. Tarr's ammonia producers and with these aids he does not buy any commercial nitrogen. Figuring that a mature animal will furnish at least 10 tons of manure per year and that each ton will contain about 6 to 8 pounds of nitrogen, Mr. Tarr feels that his herd of Holsteins, plus legumes grown on the land regularly, will furnish sufficient nitrogen.

When speaking of his cattle, Mr. Tarr became very much enthused and with just cause, for several of the animals are producing five gallons of milk per day. This is about 40 pounds of milk daily or over 12,000 pounds annually. And in addition the herd is composed of individuals that show so much type that in the show ring they stand out prominently.

Although Mr. Tarr is known as a premier corn grower and exhibitor, he has other attributes that deserve attention. In 1928 he produced more cantaloupes per acre than any other grower in his section. He uses the same analysis fertilizer on this crop that he uses on corn with the addition of manure.

Southern Dewberries

(*From page* 26)

throughout the summer in order that the young vines may be assured of going into the dormant season in a strong, healthy, vigorous condition and free from these diseases.

In the spring, just before the blossoms open, another application of bordeaux should be given and still another one immediately after the blossoms fall. If the season is a rainy and damp one, a third spring spray should be given 10 days to two weeks after the second. Usually, however, with two to three sprayings with bordeaux in the summer and two in the spring, when given along with the sanitary precautions mentioned above, almost complete control of these two diseases is secured.

Growers now realize more fully than ever before that liberal fertilization with high-grade fertilizer goes a long way towards holding these diseases in check. In fact, fertilizer is just as important if not more important than the spraying, because the fertilizer helps the plants to throw off these pests and never let them get a start.

POINTING IT OUT

Agent—"No lady, this train goes to Baltimore, Boston and points east."

Just Graduated—"Well, I want a train to Cleveland and I don't care which way it points.—*V. M. I. Sniper.*

Doubling the Yield

(*From page* 29)

the three acres or 89 lbs. per acre.

Thus in five years Mr. Hering has more than doubled his yield of wormseed oil by increasing the amount of fertilizer used and the potash content of his mixtures.

A neighbor, Benjamin Gist, used a similar analysis high in potash this year and produced a much higher yield of oil. For three years Mr. Hering has made more oil, load for load, than his neighbor, even though Mr. Gist had a larger herb, grown with 500 lbs. of chicken manure and 200 lbs. of nitrate of soda. A well-balanced fertilizer for wormseed has paid both of these men.

The rotation by which Mr. Hering has built up the fertility of his soil is corn, wormseed, wheat, and alfalfa. The alfalfa sod is manured for corn. On this manor type of gravel soil, alfalfa is easier and cheaper to grow than red clover. The heavy fertilization of the wormseed crop is partly responsible for Mr. Hering's success with alfalfa. Last year he set a field to alfalfa. Part of this field had been in wormseed the year before. To the very row the growth of alfalfa was heavier on the wormseed ground.

What use has this farmer made of the land made available? More and better home grown feed for the herd of fine Guernseys on the farm is grown. For roughage he is feeding alfalfa hay and silage made from two loads of corn to one of soybeans. He has found it necessary to reduce his concentrated feed to 13 per cent protein, otherwise his cows will not eat the leaves of his alfalfa hay. Fertilizers are paying big dividends on his wormseed crop and saving money on his feed bill.

Good Potato Yields

(*From page* 28)

pounds of ammonium phosphate (13-48), 400 pounds of precipitated bone, 100 pounds of Calurea—total 1,800 pounds. Several new fertilizing materials will be found in this formula and perhaps would be questioned by a great many men raising potatoes, but just remember that Mr. Bermant is first a tobacco raiser and second a potato raiser.

Mr. Bermant was extremely careful of his soil preparation. He plowed his land in the spring with horses, averaging at least seven inches in depth. He did not, however, harrow this land with horses but used a tractor and tried to harrow as deep as the strip was plowed. Just before planting the rows were marked out, a three-row marker being used, and planting followed immediately after. The fields were not touched until the sprouts began to show, then a harrow was run over the entire acreage, followed by a weeder and then weekly cultivation, at least seven times and sometimes more before the season was over. Mr. Bermant did not use a riding cultivator, but used a one-horse cultivator of the seven-tooth variety. Just before the vines spread all over the ground, a two-horse hiller was used and low broad hills were made. This helped to cover the potatoes and prevent sunburn.

During the time of cultivating, of course, spraying took place. In fact, spraying is a mighty important factor in raising potatoes on the Bermant farm or elsewhere in Connecticut. For success it is almost necessary but is not more necessary than good fertilizer, good soil preparation, good seed, and many of the other factors.

Mr. Bermant purchased a new four-row, three-nozzle per row sprayer. In addition he had a power duster. He was thus amply provided with machinery for pest control. Nine sprays and three dustings were given to every acre. His system of spraying was outlined by the writer and followed very closely. It was necessary for Mr. Bermant to haul water in tanks on a truck to the field, the water being pumped into his sprayer through the aid of his high-powered sprayer engine. Barrels containing stock solutions of lime and copper sulphate were placed at different points in the field, thus speeding up the work. At first 150 to 200 gallons of bordeaux per acre were used. During the months of August and early September up to 300 gallons per acre were used. The formula was practically the same throughout, being approximately 8 pounds of copper sulphate, 10 pounds of lime, and 100 gallons of water. This material was thrown out under very high pressure, 300 pounds being constantly maintained with this machine. It can be readily seen that spraying the way Mr. Bermant did using 3 nozzles per row and getting complete coverage of the foliage, the foliage did not die due to blight. Much of it was killed by frost in the middle and latter part of October.

Mr. Bermant had ample help and assistance of machines to harvest the crop and from the field it was hauled to his newly constructed storehouse. He was then in a position to orderly market his crop.

Babying Soils

(*From page* 20)

before planting, then 200 pounds of a 2-12-4 or similar mixture at planting time. There was not enough extra yield to justify the extra time and expense, so now we use only the 200 pounds of complete fertilizer at planting time. We use 200 pounds of superphosphate on the oats, except in special soils as already mentioned, and no fertilizer on the meadows.

Volusia soils seem to have an unlimited appetite for lime. I have used all forms with good results, but have about settled on ground limestone which we can get near here at $3 to $3.50 per ton. We have found that an easy way of applying is to put it on top of the loads of manure at the rate you want it. We usually put it on new seedings of clover with fine results.

Volusia pastures are usually the poorest part of the farm. My own was no exception. When we bought our farm I had a notion to buy an adjoining one that could be gotten cheaply, before I got the idea in my head of trying first to improve what we already had. At first the 35 acres would hardly pasture 15 cows through the summer. We have increased the acreage to 50 acres by clearing. At first we limed, fertilized, and manured just the worst spots, and for two years clipped the weeds. Now we try to cover every part of the pasture once in four years with lime and manure. Thus far we have been using only superphosphate, but our county agent tells me of good results with the addition of potash, so we will try it. Now our pasture has little cinquefoil, moss, or weeds. Last summer it pastured in good shape 35 head of cattle and three horses.

Diversification Wins!

(*From page* 11)

ward the establishment of more legume crops in the county. This campaign resulted in the planting of 200 demonstration plots on farms that had not grown cowpeas before. These cooperators kept accurate check of the yield of the crops that followed, and the results obtained from this demonstration were remarkable. One demonstrator reported an increased yield of 351 pounds of seed cotton without fertilizer over a similar area that had no cowpeas plowed under.

County Agent W. L. Hall.

Laredo soybeans were also introduced in the county in 1925 through the establishment of 100 one-acre plots in every secduced in the county in 1925 though the establishment of 100 one-acre plots in every section. As a result of these demonstrations, the county planted more than 3,500 acres in 1926. Similar demonstrations were located in the county the following year and the program was continued also in 1928.

To increase the yield of corn, demonstrations in fertilization were established in various s ections of the county. One farmer using 600 pounds of 8-4-4 fertilizer made 48 bushels on his acre plot, while an adjoining unfertilized plot yielded only 8 bushels per acre. In addition to these demonstrations farmers were urged to plant corn in wide rows with a legume of some kind in the middles. W. R. McHenry, a demonstrator living near Conway, states that he can grow 30 bushels of corn to the acre in wide rows and have a legume crop in the middle to pasture his hogs on. Without this system McHenry says that he could not make 20 bushels.

In the last few years Faulkner county has taken the lead in its section of the state in the production of the county's principal crop—cotton. This production has been made possible only through the use of large amounts of fertilizer of a high-grade character. This county consumes more fertilizer than any other county in the state, according to Hall. This did not just happen, but it is the result of continual recommendations of the Agricultural Extension Service of the University of Arkansas College of Agriculture and the cooperation of the banks and business interests of the county. In 1928 the crop amounted to more than 30,000 bales of cotton, and the consumption of commercial high-grade fertilizer reached the 12,000,000-pound mark. Business men now do not hesitate in making loans for the purchase of good fertilizer. They have found that it is downright good business.

There were forty 4-H Club boys completing the one-acre cotton growing contest this year. The average of the yields was 572 pounds of lint cotton or more than one bale per acre as compared with the county average of 155 pounds of lint cotton per acre in 1927.

Hall's soil erosion program included terracing demonstrations and schools on more than 200 hundred farms, representing every township in the county.

In order to encourage the growing of more dairy cattle, Hall secured the cooperation of the Conway Rotary Club, which organized and sponsored financially the importation of 26 purebred Jersey heifer calves in 1927. These calves were placed with 4-H Club boys and girls in different parts of the county. This shipment has been the nucleus for the building of the county's future Jersey herds. Five years ago there were 10 purebred Jersey bulls in Faulkner county and today there are 96. Early in 1928, the county Dairy Herd Improvement Association was organized in cooperation with the farmers in Pulaski, the adjoining county. As a result of this move more than 250 Faulkner county cows have been regularly tested for milk and butterfat production during the past year. Plans are now under way for the organization of a "testing-cows-by-mail plan" which will bring this service to every farmer in the county at a nominal cost.

The conservation and proper utilization of farm manure is being urged as the most practical way to increase the organic content of the soil. A number of demonstrations were established over the county. One demonstrator reported that corn on very poor land was made to yield 40 bushels per acre by the application of chicken manure.

Thus County Agent Hall has built a soil improving and soil conserving program around his county's principal crop—cotton, a program that is rapidly changing Faulkner county farming and one that points to a more profitable and successful agriculture. Because of this extensive soil improvement program, which is by no means ended, Hall won the honor of being one of the six outstanding Southern county agents promoting soil improvement programs named by the Soil Improvement Committee of the National Fertilizer Association in cooperation with agricultural extension services of Southern states.

Agriculture Today

(*From page* 15)

the destruction of more than $5,000,000 worth of livestock had these killers remained at large.

"The birds that eat insect pests of farm crops and those that eat the crops," Mr. Redington says, "are not always distinguished, the one from the other, by farmers. To aid growers in recognizing friends and allies, and to tell farmers the real truth regarding species sometimes held under ban is one of the jobs of the Survey. The nature of the food and the feeding habits of birds are such that it is impossible to learn them definitely by direct observation, but examination of the contents of stomachs under the microscope gives information that is exact and indisputable. Reports on the food of more than 200 species of North American birds have thus far been published by the Survey, and some description given of the economic status of approximately 500 species.

"Related studies are being made of how to encourage the presence of beneficial species and what steps should be taken to control individuals or flocks that become injurious. Comparatively few kinds of birds are in the latter class, and most of them, in getting their own living, are working for the benefit of the farmer. They are active everywhere; some get their prey on the ground, and may then be accused wrongly of destroying planted or sprouting seeds; others work on the trunks and branches of trees; some scan the leaves or probe the flowers; others sweep their prey from the air.

Nearly 4,000,000 coyotes have been killed since 1915.

"The number of insects thus gathered is enormous. Not only do orchards benefit by the service of the birds, but gardens, berry patches, and plowed and newly sown fields as well. All crops are helped to some extent, and practically every farm pest has its bird enemies. The majority of birds are beneficial, and in learning their habits, making them more widely known, and encouraging measures for their increase about homes, on farms, and in orchards, I believe the Biological Survey is performing a valuable educational service."

On the Threshold

(*From page* 18)

P. G. Holden, agricultural leader known throughout the United States, made this prediction: "Land in Iowa will increase in value in the next 10 years. It is no more a prophecy to say that than it is to say that Iowa will have trunk lines of concrete roads extending entirely across the state within the next 10 years, both north and south, east and west. Nothing less than an earthquake or an upheaval which would turn Iowa into mountains or a desert could possibly prevent it. I do not believe that there will be anything comparable to a war-time boom. People will continue for another year or so to be rather conservative and in some places pessimistic in regard to buying land anywhere.

"Manufacturing and all other industries have attracted people for a number of years. Hundreds of thousands have left the farms, quit producing, and have become consumers in our cities. Before the expiration of 10 years, we will likely hear the cry for greater production in order to meet the demands at home in the United States."

These statements must be interpreted in the light of present land values. They have reference to the general upward trend in agriculture, and allowance must be made for periodic price declines. Neither of these men see wild, speculative, upward trends. They believe that agriculture is basically sound and that taken as a whole it is becoming more prosperous.

Reason for Optimism

The statement of Eugene Meyer, Jr., Farm Loan Commissioner of the Federal Farm Loan Board, after he had visited several places in the corn belt, is, perhaps, a more accurate summary of the views just expressed: "I see the reflection of the improvement that has taken place during the past year. There is more building going on. There is more life. There is more activity. There is more of the spirit of 'going ahead.'

"There is, in my opinion, every reason for optimism. I don't believe in blind optimism. But I think that sound optimism is fully justified by the inherent economic facts in the situation, and by the prospects for the future. Our world markets for agricultural products are more stable as the result of stabilization of foreign currencies, which were so demoralized in the years succeeding the war. Foreign currency fluctuations had much to do with agricultural depression.

"As I see it, many of the problems inherent in post-war conditions are now things of the past, and there has been a material improvement in this section of the country. The steady progress upward will continue, I am confident, in the future."

Before we proceed to examine the facts which may throw some light on our future, let us analyze our present situation. Political speakers have been telling us that our agricultural property has fallen in value $20,000,000,000 since the war; and that figure is correct so far as it goes. In the war-time period of 1910-20, we became intoxicated with high prices and went out on a spree of wild speculation. During this time the number of farms increased 1.3 per cent, and the land in these farms slightly more. The value attached to farm property increased from $40,900,000,000 to $77,900,000,000. The increase in value during this time was twice the amount of the loss which was sustained since the war.

And again. If we make a comparison from stable conditions before the war to the bottom of the deflation after the war, say 1910 to 1925, the number of farms and the land in farms increased scarcely five per cent, but the value of farm property increased more than 40 per cent, or from $40,900,000,000 to $57,000,000,000. That is a gain of $16,000,000,000. Since 1910 we have made a gain of $37,000,000,000. The deflation of agriculture after the war, comparatively, has been too great, but it is altogether too much to expect that we should hold all the gain made during the boom period of the war.

What does it mean when we say that the population of the United States has increased 25 per cent during the last 15 years now ending, while crop production has decreased 8 per cent per 100 people and feed crops have declined 7 per cent of the population? Expert figures show that grain and stock exports have shrunken to prewar figures.

It is recognized that our greatest after-the-war problem was the disposition of our exportable surplus. Our surplus is now rapidly becoming a minor factor. In 1910 we had 60,000,000 cattle and 76,000,000 people. During the early 90's we got 3 and 4 cents per pound for our beef and 15 to 16 cents for our butter. In 1925 we had about the same number of cattle on our farms, but an increase of 40,000,000 people had to be supplied with meat, milk and dairy products, and leather. With about the same number of cattle at the present time, we receive three times as much for beef and butterfat—9 to 12 cents per pound for beef and 45 to 50 cents per pound for butter.

As long ago as 1900 we had 17,000,000 dairy cows. There are no more at the present time although the population has increased 50 per cent. We are at this time milking about 4,000,000 beef cattle to help supply milk and other dairy products, and with our present high prices cannot produce all we consume at home. We are compelled to import relatively large quantities of dairy products.

We have at the present time about 32,000,000 ewes in the United States. That number is about the same that we had in 1900 and in 1910. Yet we are now importing hundreds of millions of dollars' worth of wool annually, and whereas we received about three dollars per head for sheep, we now receive about three times that much. For wool that sold for 12 to 15 cents, we now get 36 to 45 cents. We get a better price for a greater number of hogs.

Agriculture on Up-grade

So much for our grain and livestock. How have these increasing prices affected the declining prices of land? During the 12 months ending March 1, 1928, farm real estate values averaged for the United States as a whole, showed the smallest decline since the high time of 1920 when prices were 70 per cent above normal. The average decline last year was two per cent. In some places land values have already reached a steady level. The present price of land, for the United States, is 17 per cent above prewar, or 1917.

The situation indicates, according to Government surveys, that land prices are becoming firmer. There may still be some declines in farm values in certain localities or sections, but the number of farms that will have to be forced upon the market is rapidly becoming less, and when once the farms that will have to be sold get into firmer hands, one of the most important factors in depressing land prices will be removed. A factor of much importance at the present time in holding down the price of land is the lack of confidence. There is plenty of money piling up throughout the country. It will presently be seeking places of safe investment. Perhaps when the present wild speculative movement in stocks has reached its limit, more money will be invested in land.

While most economists and students of the agricultural problem agree that agriculture is on the up-grade, we must still recognize the fact that our condition is still below prewar levels as to income and purchasing power. All of our troubles have not been cured. So far, we have largely helped ourselves, and there is here, likely, our greatest hope, for our troubles are at best largely economic. The attitude of the Government in the matter of adjusting taxation, levying tariffs, building inland waterways, and establishing better systems of marketing and credit, will assist in securing agricultural equality.

When all of our opinions have been expressed, the fact still remains that we are only guessers of the future. The immediate forerunners of agricultural prosperity will be increasing prices for our products and greater purchasing power of our income. While long continued national prosperity must finally depend upon our farms, we should also keep in mind that the prosperity of agriculture is influenced by the general prosperity of the nation. It is the consensus of opinion that we have passed our worst years. The future will likely hold its ups and downs, bright spots and discouragements, but if the present trend should continue, as we believe it will, better times are just ahead. We have faith in the ability of agriculture to fully recover and become prosperous.

New Mexico

(*From page* 10)

Great flocks of sheep utilize the range country in New Mexico.

depth of 50 to 100 feet, there was formerly a temptation to try to raise such crops as alfalfa and corn by pump irrigation from such wells. Many of the early efforts failed, the returns not being sufficiently large to justify the expense, though in recent years success often has been attained, especially with cotton and beans, which have a comparatively low water requirement and high market value.

Hiram Hadley, the first president of the New Mexico Agricultural College and director of the Experiment Station, was one of the pioneer educators of the Southwest. He was followed, as director, by S. P. McCrea, C. T. Jourdan, F. W. Sanders, Luther Foster, and Fabian Garcia; Dr. Garcia having held the position of director and horticulturist during the past 16 years. It has been during his incumbency that much of the most effective work of the station has been accomplished. There are now 28 persons on the station staff.

Cotton

(*From page* 16)

in the United States and holding fourth place in acreage. In value it is exceeded only by corn and in acreage by corn, hay and wheat. It is the leading, commercial crop in the nation and in recent years more than half of our production usually has been exported. Last year's crop acreage for the United States is estimated at 45,326,000 acres with a production of 14,373,000 bales and a farm value of more than $1,-290,000,000.

The United States has always been the leading cotton producing country and Texas has become the most important state. Formerly a very much larger portion of the cotton acreage was grown east of the Mississippi river, but in recent years a marked expansion has occurred in the states west of the Mississippi river, notably Texas, Oklahoma, and Arkansas. As shown by the map, the cotton distribution is very largely confined to the southern tier of states from Texas east, with a few important ones just north of this tier.

Likes Hot Weather

The crop should have at least six months of frost-free weather to mature, it being a plant of tropical origin. It seems to do best in regions with considerable rainfall and much bright sunny weather during the growing season. A dry, cool autumn seems best for maturing. Fertile silt and clay loams seem to be best suited to its production, and because of the fact that it is very frequently grown in a one-crop system, it is an outstanding consumer of commercial fertilizers, especially in the older cotton areas where it is cultivated on the same soils continuously for a long time.

About 1892 the Mexican boll-weevil appeared in the cotton belt of the United States. This insect has spread through virtually the entire American cotton area and reduced the acreage in some states, thus stimulating a more diversified agriculture.

While cotton can be grown in a number of countries, the United States has long been the leader, with over 60 per cent of the world's production, followed by India, China, and Egypt. The American exports go very largely to Europe; the United Kingdom and Germany together take about half of the total. Other important export markets for American cotton growers are France, Italy, and Japan.

In addition to the production of the cotton lint, the production of seed is an important by-product. In 1928 the United States cottonseed production was estimated to exceed 6,000,000 tons with a farm value of more than $230,000,000. This seed has various uses in commerce; among the most important being for oil, feed, fertilizers, and chemicals.

"Kool Krisp" Lettuce

(*From page 6*)

ready to cut, they will be tip-burned, which means a browning of the edges of the leaves inside the head. Such heads cannot be shipped as they will develop slime rot before they reach their destination.

Market Is a Gamble

For a week or so following such a spell there may be a shortage on the market, and the trade will wire for more lettuce, offering high prices. Then it is that the heart is filled with woe—an acre of wonderful looking heads, but only here and there one fit to ship—perhaps only 15 or 25 hampers from the entire acre.

But the story may be reversed in a short time. In growing lettuce it is well to have a part of the crop maturing every five to seven days. At Phillips a planting is made about every five days from May 20 until about July 1.

It may happen that a period of cool, cloudy weather sets in, and the heads will form crisp and solid. Perhaps in other distant growing sections the weather has been unfavorable, which is often the case in August. Then the market will be strong, prices high, and there will be plenty of lettuce ready for shipment. When one has from 50 to 100 hampers daily to ship out at good prices, he forgets all about the woes of a short time before.

For head lettuce a complete fertilizer is used. A 2-8-5 or even a 2-8-16 mixture is applied just previous to planting, and nitrate of soda spread along the rows twice during the growing period at the rate of 100 lbs. per acre.

Reports came from the New York Experiment Station that potash increased the tendency of head lettuce to tip-burn or "sun-scald." This was not found to be a problem on this farm. Experiments of putting applications of muriate of potash along the row in different sections of the field gave no increase in this trouble. The tip-burn was partly overcome when a somewhat resistant strain of seed was found.

A green-leafed Big Boston or "Unrivalled" type was found to be superior to any other tried out, although the New York or Los Angeles variety called "Iceberg" on the market gave very good results in years when the weather was cool during the growing period. Although in past years there has been some discrimination against the Big Boston type on the market, the "Kool Krisp" brand, as the lettuce produced by Carl Niebauer is known, has met with favor in the larger city markets. Practically the entire crop is shipped to Milwaukee, Minneapolis, and other nearby markets, by express.

Due to the heat during the month of August there is usually a shortage of good lettuce reaching these markets. This is the season of the year when the Phillips lettuce is at its best. Cool weather conditions and a cool muck soil are the factors necessary to produce quality head lettuce in Wisconsin.

During the past few years some of the most exclusive fruit and vegetable stores in the larger cities have been handling the "Kool Krisp" brand of lettuce and paying a premium for it, although at first but few dealers would handle it because of competition with the western "Iceberg" lettuce.

It is peculiar that no large competitors have sprung up in the head lettuce business in Wisconsin. A few have tried it but failed to produce good quality heads, and so Carl Niebauer is practically alone in the State today as a large commercial grower. He grows from five to six acres every year as well as about 15 acres of other truck crops, and expects to increase his acreage of lettuce this year. As he is now only 21 years old he can well be considered Wisconsin's largest and youngest grower of head lettuce.

Patriotism

(*From page* 4)

siderable anxiety to me. I am almost willing to start another war some time just to set going a fresh stock of hero stories.

Mencken, Ford, and Woolworth can write lucidly and demonstrate to us that we are a nation of standardized sardines all packed in the same can and trading at the same counters. Mencken gibes us for being so commonplace in our thinking, and Ford and Woolworth encourage us in it because it exactly suits mass production.

We may have taken our patriotism in some such synthetic doses and not even as frequently as we imbibe our religion. We have three or four national holidays against fifty-two Sundays, which gives us less time to sleep under the flag than to snore under the sermon.

American patriotism is just about as easy to define and card index as religion. Folks have gone through all sorts of tortures for religion, from burning at the stake to speaking pieces in Sunday School—and yet, after 2,000 years of debate and rivalry, the question is never settled until the sexton shows us that spades are trumps. If the fervid spellbinders of our youth could not entirely clarify the subject, no matter how loudly the eagle squawked, is it going to be feasible for us to think it out calmly at the current cost of liquid inspiration and the hazards attendant thereto?

I seriously doubt whether the august Supreme Court itself could give us an inclusive definition that would depict the glory, the suffering, and the grimy grins which are the threads in our national tapestry of triumph. In fact, they might have a worse time than Sherman had in paraphrasing war, and not make it so brief either.

Opinion on patriotism here is as varied as a kaleidoscope, colored by the individual's own acquired or inherited reactions. To some it signifies visions of the cherry-tree-can't-tell-a-lie my country right or wrong! To others it means *Mayflower* ancestors, antique furniture, baked beans, liberty and equality, one and inseparable. Some folks look in the glass darkly and see brotherhood - of - man communism, plenty spaghetti, and swift justice. There are some who explain it by wisecracks, and a few earnest ones like ourselves in this corner who try to fit inherited principles to befuddling modern conditions. In America we are probably all correct about it, because this country doesn't care what your opinions are if you don't get too careless with your firearms.

PATRIOTISM is also like religion because it always adapts itself to the user. Americanism to the tolerant means tolerance; to the intolerant it means the reverse; to heroic patriots it means sacrifice and glory; to traitors it means a mask. It means liberty to the oppressed and license to the oppressor; it means extermination to the Indian and a welcome sign on the mat for the black-hander; it means hope for the big business booster and one lick and a promise for the farmer.

Fireside and village forum patriotism which tinged our childhood has had to give ground before the advance of industrialism and internationalism.

You remember Bill Smith, who once had time to chat with you over the backyard fence when you were both growing your own tomatoes? In those days before his industrial success enrolled him among the corporation nabobs, his heart was afire with ardent patriotism. How proud he was of those few withered plums on his family tree? How he dilated over the deeds of his grandsires at Lexington and Valley Forge, and waxed oratorical over the part his father played in the Bloody Angle at Gettysburg! Keeping up national ideals was his hobby, but he hadn't started clipping coupons then.

We depended upon Smith to finish off a lull in the Masonic party with the "Commemoration Ode" or "Washington's Farewell." He criticized the mayor when they forgot to display old glory over the battered city hall on holidays. He was always reminding the teachers of their national duty.

But Smith's attitude toward public affairs has changed. His politics have become policies. He doesn't journey to the "fair city on the Potomac to worship at the nation's shrine." He simply "hits the rattler for Washington to jack up the committee." When he says a Representative "speaks our common language" Smith isn't thinking of Stephen Decatur or Patrick Henry any longer, but of J. P. Morgan & Company.

No doubt I should not make any radical raid upon him for this. Is he not the captain of our mighty Host of Hustlers, the General of the Grabbers, and the Inspiration for our Initiative? Were I to assail him for his many accumulations, I should be put down with those who regard all big things as dangerous and all wealth as wicked. Yet I think our stock of patriotism rises within us a trifle when such fellows spend a few months' time in jail—for taking just one trip too many to Washington.

Reverence for the "totems" of our

government often causes less comment than the knocking down of a filthy voodoo fetish. Respect for the courts and the laws of the land suffer because we have too few courts to keep up with our many laws and their constant violations. Busy-body government paternalism has also turned choruses into curses.

Industrialism has built many concrete pillars in our national temple, but some spots in their job indicate the willful use of a pretty "weak mix." They post signs out in front telling young visitors to keep off the grass and wipe their feet on the threshold, but the dollar-a-day patriots have stabled their contented cows in the hall of fame and mowed the hay on the back lawn three inches below the frost line!

INTERNATIONALISM is another factor in patriotic thinking, along with oil wells and ne'er-do-wells. Once upon a time prior to the World War, I had a roadside argument with a parlor socialist. As both of us were out of our native elements, we fared badly one to another and vice versa. When we got through with the controversy one of us was still a Nihilist and the other was almost annihilated. He insisted upon waving only one vivid flag for all nations, but I knew the habits of Holstein bulls and wanted to add a little white and blue to make the color scheme safe and sane. My folks had been cattle men ever since the U. S. Yards opened at Chicago, and I didn't propose to get on the horns of any dilemma.

Then the war came and proved us both wrong! We Yankees fought for self-determination and then quit thinking just when the determination business began. The flair for internationalism flickered out and the new crop of fourth-class nations soon made the map of Europe look like Russian whiskers.

It's a fact, there are now more patriots abroad than was ever dreamt of in the philosophy of Giuseppe Garibaldi or Simon Bolivar. That's why I believe in squirting a little refreshment on our own parched collection of nationalists.

However, I don't wish to lean too far the other way. Aloofness is not becoming either to our patriotism or our welfare. Take my own case and yours. I enjoy my independent family life among my lares, penates, and the mortgage, and I would not care to move them all over to a common boarding-house. At the same time its nice to go out and gossip of an evening with the neighbors on the next porch, always knowing that when Jones gets to telling his fish stories, I can find some nice excuse to dodge indoors. That's my own sketchy idea of "hands across the sea" and it's about as far as my Americanism will stretch.

But I am glad we don't all wear our national pride like frat pins or lodge buttons. You must not judge a brother by what's in his coat lapel. When Iago said that it is not best to wear one's heart exposed on the sleeve he broke one of Bill Shakespeare's best records.

The Pullman car is a great proving ground of American character in a casual way. In the smoker one day I watched the soggy expressions of our every-day travelers who reflected the imprint of barter and trade on human countenances. Could any of these men be idealists? Their small chatter concerned the vagaries of government, the incompetence of officials, and the decay of democracy. Was there any instinct of patriotism hidden behind those blustering faces?

It was November Eleventh. The next station was to be reached shortly before eleven o'clock. Suddenly the burly conductor pulled the signal cord and the long train rumbled to a stop. The whistle shrieked and someone cried "Armistice."

Every man was on his feet, each trying to find the East in order to face it. Silence for one long solemn minute, and then a tremendous spell of coughing, throat clearing, and nose blowing. The spirit call from "over there" had broken through their hard-boiled shells, and I knew at once that I was not the only patriot in the Pullman.

In the days when the Colonials found themselves the actual governors of a country so vast as ours, they were as scared as we are over paying our taxes. They were so used to having a king that they didn't know how to act without one.

THE first fifty years of American independence were spent in weaning the nation from Royalty and getting its members acquainted with Loyalty. Some of the tests remain unfinished. There are some folks left in America who would behave better under a steam roller than in a limousine. There are some who think this is the land of the spree and the home of the knave, but exceptions never prove the rule.

Lip-service loyalty and hysteria do not represent the real brand of American patriotism. When we humbly perform our private obligations and stretch our stipends to pay honest debts before we ape the habits of "royalty," we are surely learning the lesson of loyalty. When we try to live like dukes on somebody else's ducats; when we stand up at the Star Spangled Banner and lay down on law observance—what sort of a tradition are we leaving by which mankind will judge our country.

I like to think that I myself am helping to make history. So do you. Had there been no ordinary chaps like us to play the obscure parts in the chorus, no dramas would have been enacted on American soil. We may not have any speaking parts to perform in the pageant of progress which the United States is presenting to the world. The "stars" in the cast may not suit us, and we may think the lines are not well composed. However, let's do our stuff nobly and be thankful not to be in the limelight within handy reach of the unedible eggs.

Hence if you start thinking how much love of country your boy is missing because he can't make whoopee so generally as we did on those famous Fourths, just take him for a walk and show him what an inspired and intelligent patriot his father can be. Lest you be embarrassed and outclassed, be sure you know the difference between Bunker Hill and the first "tee party."

Go out in the midsummer woods and sit down with him in close proximity to flora and fauna, of course avoiding the bee and the poison ivy. Measure off a yard in each direction. Then tell the boy that it will take both of you the rest of your days to classify and intensely study the living objects within that narrow zone. Tell him that despite changes in political platforms and styles in hair-cuts the modus operandi of these same natural phenomena will go on forever undisturbed. Tell him that these organisms were functioning before the American Indian acquired his Yankee citizenship, and that these were among the things discovered by Columbus and ruled by Herbert Hoover. Each is living its life as nature ordained, and the chief law is the survival of the fittest. Yet they are all as truly American institutions as we are and often more worthy of study. I take it for granted, however, that the boy will receive the true picture, one of complexity and independence on the one hand and of interchangeable benefits on the other.

That's how we who live in America should regard our patriotism. It is something priceless and complex, something independent and personal, and yet methinks it may be shared in the faith that all who become naturalized will desire as we do—to make this a haven for something besides expediency and explosives.

GETTING IT RIGHT

Otto Liebers and "Mutt" Lawritson were attending a concert in Omaha given by a noted band. They got into an argument as to whether one of the numbers was "Tales of Hoffman" or "Poet and Peasant Overture." Finally "Mutt" agreed to slip around to what he thought was the announcement stand to find out. Soon he returned and disgustedly remarked, "Otto, we are both wrong. It is the 'Refrain From Spitting'."

A father took his little boy, Billy, to the park, and there the youngster saw a stork among other interesting exhibits. The boy seemed to be greatly interested in the stork, and looked at him as long as he could. Then, turning to his father, he said disappointedly:

"Gee, Daddy, he never recognized me!"

"Rastus, I'm sure sorry to hear you buried your wife."

"Boss, Ah jes' had to. She died."

"So you asked Geraldine to marry you?" asked one man of the other.

"Yes, but I didn't have any luck," replied his friend. "She asked me if I had any prospects."

"Why didn't you tell her about your rich uncle?"

"I did, hang it all! Geraldine's my aunt now."

ROMANCE STILL LIVES

Wanted by a bachelor of middle age, to correspond with lady or widow of same age, with idea in mind of entering poultry business.—*Ad in a Montana paper.*

We argued for an hour, I guess,
But, really, men are too absurd;
For all throughout the argument
He wouldn't say a single word!

George: "Why don't you advertise?"

Town Storekeeper: "No, siree, I did once and it pretty near ruined me."

George: "How's that?"

Town Storekeeper: "Why, people came in and bought dern near all the stock I had."

A West Virginia darky, a blacksmith, recently announced a change in his business as follows:

"Notice: De Copardnership heretofore resisting between me and Mose Skinner is hereby resolved. Dem what owes de firm will settle with me, and what de firm owes will settle with Mose."—*The Outlook.*

NOTHING DOING

An Irish policeman was taking an examination for promotion. In answer to the question, "What is rabies, and what do you do about it?" his paper gave this enlightening explanation:

Rabies is Jewish priests, and you don't do nothing about it."

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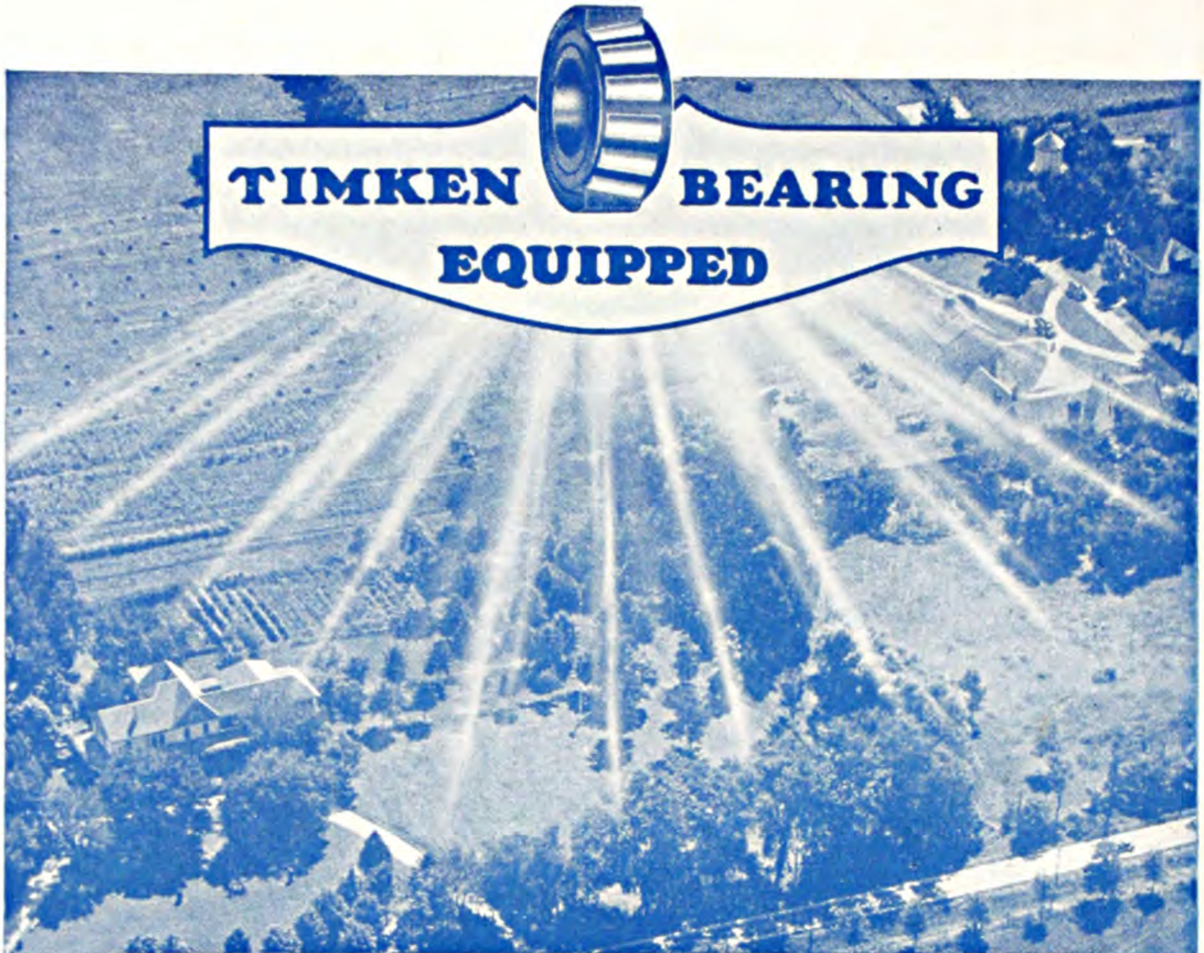
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The Whole Truth—Not Selected Truth

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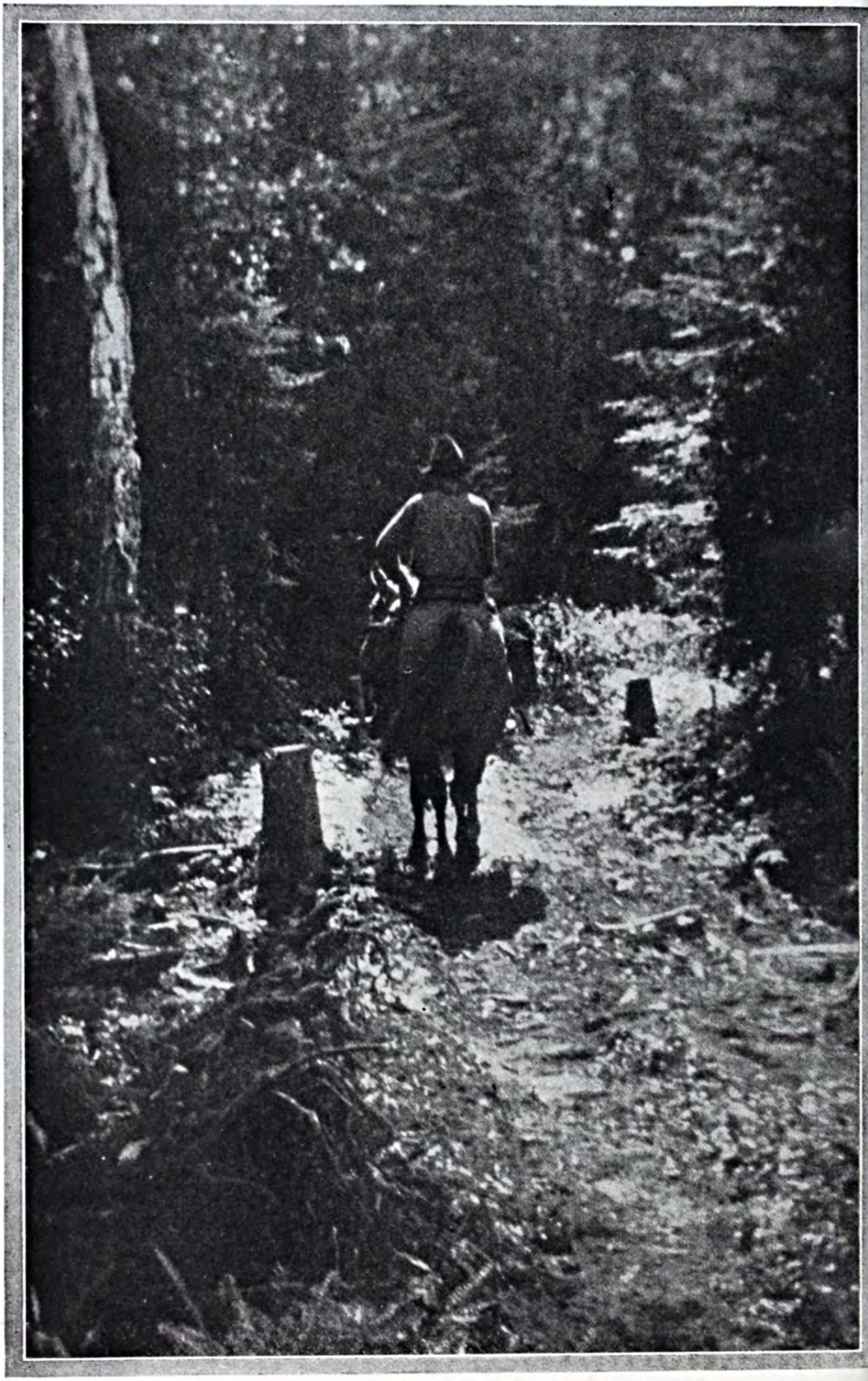

In the Canadian Big Woods

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Here is Jeff's "Scotch" story—

Economics

By Jeff McDermid

E CONOMICS is one of those excessively plural nouns that take a singular verb. There are more branches of economics than there are people who nderstand them.

Economics means one thing to a Scotchman and something else to a China-an. The acquisitive seminars in economics appeal to the former, while the y-as-you-enter classes are attracting the Orientals.

When the economic "drug store" st opened for business on the college rner, the farmers bought out the en-e stock of pioneer panaceas, fore-ost on the shelf being the flagon arked "cost of production plus." ney didn't read the prescription di-ctions in some cases and got too uch plus, but after shaking well it ted as a sedative for a few years.

Next they demanded some of the tent commodity contract porous asters which were heralded widely a vehement pseudo-economist who didn't have a license to operate a dispensary. After being vicariously drenched, dipped, and flushed with the antidote, they couldn't tell poison from pickled pigs' feet, and in order to administer it scientifically, the patient had to be roped and hog-tied. Albeit, some of the patient survivors have managed to find ways of using the remedy to stop growing pains and reduce over-expansion at the belt line.

Should you now ask what brand of economic medicine agriculture wants most, go through the hefty economic materia medica and ask which is safest —equalization fees, domestic allotments with transferable rights, excise fees and bonuses, export debentures, or a night raid on the country bank.

A well-known engineer has tried the slide rule on it, but he may abandon that for the pitchfork.

Savants in the realm of economics wear bone-rimmed specs and weary-river expressions, instead of spattered laboratory aprons. Their test tubes are adding machines and comptometers. Like their other brethren in the fussy fields of research, they are trying to classify, clarify, isolate, and inoculate.

They have discovered a number of things which they are not ready to announce, but they have announced more things that they haven't discovered. Long ago they learned that money makes the mare go, but they have been unable to supplement the ration with some synthetic fodder that keeps up the required speed without interfering with digestion.

Economists have been responsible for some of the world's clearest deductions and the world's most dismal delusions. If you were an economist, of course, you would be in the former group and all the others would be in the latter.

ECONOMISTS have been responsible physicians who prescribe and treat ailments collectively. There must be a virulent epidemic in the body politic before they are summoned, often too late. One sick horse or a potato with rhizoctonia will arouse the ardor of the homeopathic scientists, but it requires a nation suffering from the law of diminishing returns to make the economist grab his stethoscope. Then they come down in such swarms that the hospital resembles a veterinary clinic. They disagree on everything from antidotes to anesthetics, but patients with lots of faith, hope, and charity usually pull through.

There are at least three kinds of economists—the public economist, the private economist, and the domesti economist. I profess to belong to th latter group with no other qualifica tions than a small salary, Scotch an cestors on the off-side, and a wife wh can make a beef roast both edible an versatile.

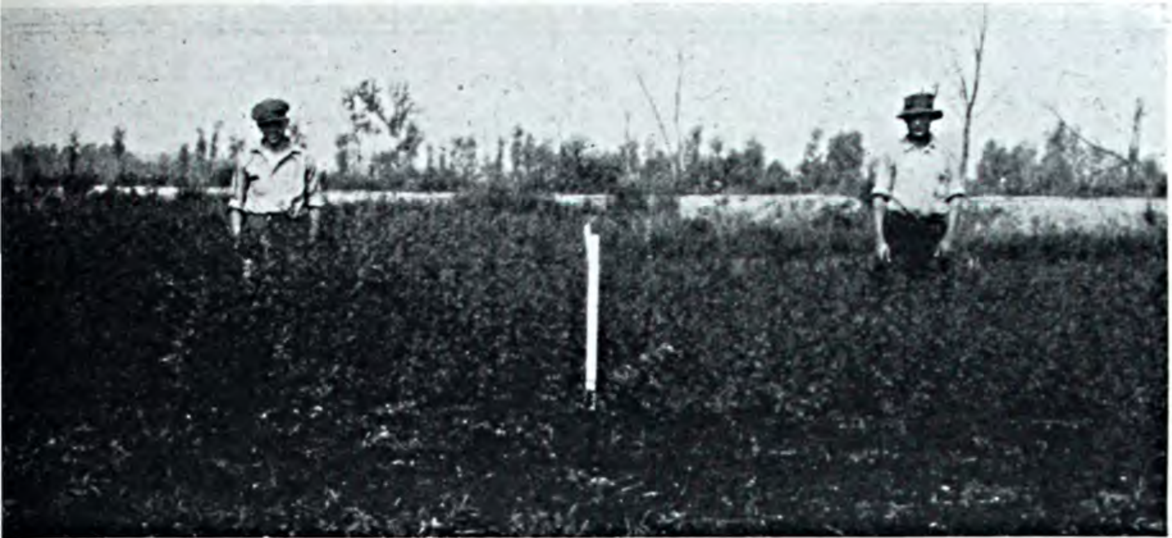
PUBLIC economists either write o teach or commit both crimes si multaneously. When you have finishe reading the weather reports and th baseball news, you turn for a momen to the "cash or calamity" colum edited by the specialist in grafts an graphs. As a rule these men are no college professors because the college employ men who are reminiscen rather than omniscient. Furthermore the college man is perforce more o a domestic economist and dislike gambling in futures.

I shall not follow with any discus sion on the batting average of th newspaper economist. The reason is a obvious as my income ought to be One cannot get water from a dry well But I have a neighbor who clipped an pasted, and finally invested on th strength of such literature. Yesterda I loaned him fifty cents after learned he had stopped his subscrip tion.

Private economists are a blend o efficiency experts and back seat driv ers. Big business in need of gas fee and a brake, headlights and bumper will not go out on a strange highwa to meet other highwaymen withou these social safety devices. Lawyer are not enough for this purpose, ex pensive as they may be. The lawye deals in torts and retorts, but th economist takes a socket wrench an goes after the transmission or what ever ails you the most.

Agriculture is probably the only or ganized business which has had a pub lic economist work for it as a privat economist. Therefore, farmers are get ting along much better than ever a domestic economists. They simpl

(*Turn to page* 61)



'he sweet clover, left of stake, received 100 lbs. per A. of muriate of potash and yielded 2 T. of ured hay; that at the right received no potash and yielded only 1.2 T. (Deep muck, Ingham county, Michigan)

Making Mucks Pay

By Dr. Paul M. Harmer

Muck Soil Specialist, Michigan State College of Agriculture

[N the days of pioneer farming, the L marsh or swamp was considered s waste land having little or no alue. With the comparatively recent evelopment of better methods of ıuck land farming, especially in the roduction of special crops, conditions ave so changed that it is not uncomnon to find muck soils valued more ighly than the surrounding clay or andy soils.

The composition of these muck and eat soils is very different from that f clays, loams, and sandy loams, with hich most farmers are familiar, ierefore, the methods of producing ood crop yields on them must be decidedly different from those used on ıe clay and sandy soils. Generally ıese muck and peat soils are naturly very infertile. When reclaimed ıd properly fertilized, however, very ood yields of practically all crops can e produced on them.

Muck and peat soils may be classied into three groups according to their adaptability for crop production:

1. Low-lime, very strongly acid soils, generally raw and fibrous.
2. High-lime, not acid to strongly acid soils, well decomposed to raw in structure.
3. Very-high-lime, alkaline soils, generally well decomposed.

The first group is a fairly small one which is characterized by its need for lime. The requirements for satisfactory crop production may vary from two to ten or more tons of ground limestone per acre. Reclamation of the more extremely acid of this group should be undertaken with caution because of the possibility of incurring great expense with rather poor crops for several years after liming. This type of muck can frequently be recognized by its native vegetation, a good growth of cranberries, swamp blueberries, sphagnum moss, dwarf tamarack, or dwarf black spruce being an indication of a low-lime muck soil.

CROP (In those columns in which two fertilizer recommendations are given, the first formula is generally preferred)	TYPE OF MUCK				Range in annual broadcast application Pounds per ac (If only muriate of potash is needed, one-half to two-thirds o these recommenda tions should be applied)
	High-lime Muck			Low-lime Muck	
	Deep and Medium Muck		Shallow Muck	Very strongly acid in reaction (Limestone or marl should be applied preceding fertilization)	
	Mucks requiring both potash and phosphate	Mucks showing little or no benefit from phosphate in mixture	Manure or green manure recommended in rotation		
Oats, barley, rye, with or without seeding	0-8-24 or 0-8-32	Muriate of Potash	0-20-20 or 0-8-24	2-8-16	250-400
Timothy and alsike, sweet clover, Hungarian millet, permanent pasture	0-8-32 or 0-8-24	Muriate of Potash	0-8-24	0-8-24 or 2-8-16	Meadow 200-350 Pasture 100-200
Field corn, sweet corn, sunflowers, potatoes	0-8-24 or 0-8-32	0-8-32 or Muriate of Potash	0-8-24	0-8-24 or 2-8-16	Corn, sunflowers 250-500 Potatoes 400-800
Sugar beets	0-8-32 or 0-8-24	Muriate of Potash	0-8-24	Crop not adapted	400-600
Onions, cabbage	4-8-16 or 3-9-18	4-8-28 or 3-8-24	3-12-12	4-8-16 or 3-12-12	Onions 800-1,200 Cabbage 500-800
Celery	4-8-28, 0-8-24 or 4-8-16	4-8-28, 0-8-32 or 4-8-16	4-8-16, 3-9-18 or 3-12-12	4-8-28, 3-8-24 or 4-8-16	1,200-2,500
Mint	2-8-16 or 3-9-18	4-8-28 or 0-8-24	3-12-12	Crop not adapted	250-500
Turnips, carrots, rutabagas	0-8-32 or 0-8-24	Muriate of Potash	0-8-24	0-8-24 or 3-9-18	250-600

This plot of sunflowers and corn received no fertilizer and yielded, sunflowers—11.2 T., corn—13.8 bu. (See picture below.)

It is fortunate that a large majority of our muck and peat soils fall into the second group. When properly managed, these soils are very productive. They do not require an application of lime, in fact, lime is likely to decrease the yields of certain crops on them.

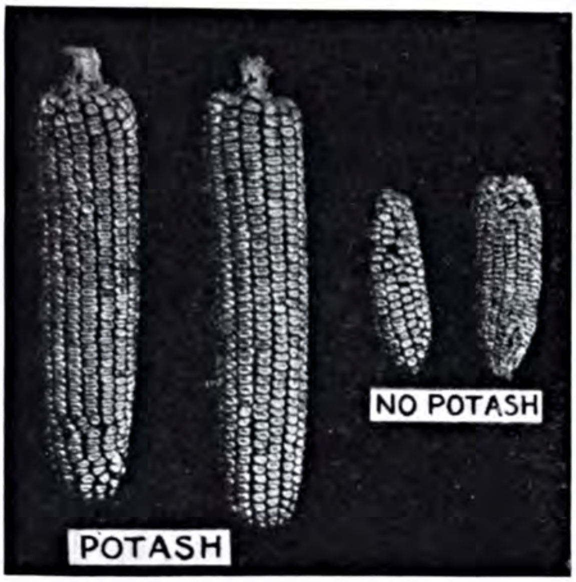
The third group, which includes the alkaline muck soils, has generally resulted from a burning-over of the muck to a considerable depth or to the fact that the soil is underlain by marl within a short distance below the surface. This group is a very small one, but does not produce satisfactory crops unless carefully handled. Plowing under of heavy applications of manure or crops of green manure tends to correct the alkaline condition, while the application of a fertilizer mixture high in potash content generally gives good yields.

In addition to these three groups of muck and peat soils, mention should also be made of two closely related soil types, namely, the black sands and the peaty loams. Many of these areas were at one time covered with a shallow layer of muck which has decomposed and become incorporated with the underlying soil. Under these conditions the fertilizer requirement of these soils remains more nearly like that of the original muck soil than like that of the ordinary (mineral) soils.

Fertilizing Mucks

In the early days of muck and peat land farming in the United States,

This plot received 200 lbs. of muriate of potash per A. and yielded, sunflowers—25.4 T., corn—60.2 bu. (Deep muck, Berrien county, Michigan)



fertilization was accomplished by the application of manure. Due to the fact that the nitrogen in the manure is its most valuable constituent, whereas potash is most lacking and nitrogen most abundant in the muck and peat soils, it is evident that manure is not a balanced fertilizer material for these soils.

Experiment stations throughout the world have shown that potash is the most important plant food element in the fertilization of muck and peat soils, with the single exception of a small group of peat soils in northwestern Minnesota. On a majority of our soils phosphate is also needed, the need for phosphate being greater with some crops than with others. While muck soils contain sufficient nitrogen to supply the needs of most crops, a few special crops, such as celery, onions, mint, cabbage, lettuce, and spinach, generally give increased yields when some nitrogen is included in the mixture.

The Effects of Potash

In addition to greatly increasing the the yields, potash has other very beneficial effects when applied to crops on muck soils. It improves the vigor of the crops and makes them more resistant to disease. When applied on pasture and meadow, it improves the succulency and palatability of the grass and hay. It tends to strengthen the stalk and to give plumper kernels of corn and grain. It increases the sugar content of sugar beets, table beets, and carrots. It improves the palatability and flavor of potatoes, parsnips, celery, and onions.

Potash is also of vital importance from a marketing standpoint, since practically all vegetable crops have much better keeping qualities when they have been fertilized with a mixture high in potash than when a low-potash mixture or manure has been applied. This improvement in keeping quality is evident both in storage and when on display in the market.

Fertilizer Recommendations

Fertilizer recommendations for several different crops to be grown on muck land are given in the accompanying table, together with the range in amount of fertilizer which should be applied broadcast annually. Following application, the broadcast fertilizer should be worked well into the soil. With some crops the row application will give better yields than the broadcast application. Because of possible injury to the seed, the row application should be kept at least two inches away from and preferably below the seed. Not more than one-

(*Turn to page 56*)

Onions on deep muck, Huron county, Michigan. Left to right—no fertilizer, potash, and potash and phosphate. Yields—115, 412, and 734 bu. per A., respectively.

The Loan Value *of* Farm Property

By Edwy B. Reid

Washington, D. C.

"WELL, what is the appraised value of my house, anyway? I have a curiosity to know how the experts would get at such a matter. I used to read the Department of Agriculture's bulletins when they tried to figure out a farmer's income from the cash transactions and then they would add sort of parenthetical 'this is in addition to the house rent, food, and fuel.' I guess they called house rent 'shelter,' now that I come to think about it.

"It always seemed to me that the 'wise-acres' who got these figures together had not lived on a farm, for they frequently got the cart before the horse. You know a fellow who has good shelter, meaning a good home, plenty of firewood, and plenty to eat isn't so bad off after all! There is many a city man who doesn't provide any more than this for his family, and he feels mighty lucky if he gets through the year, taking care of the doctor bills and all, without being in the hole.

"For that matter, I don't suppose a whole lot of farmers break any better, but anyway that's how the Department and a lot of agricultural colleges used to figure farmers' income. I used to smile at the 'averages' of incomes of a whole group of farmers when they left out these important items of food, fuel, and shelter, and I don't know that they have improved their processes much in recent years."

These were the opening remarks between Herkimer Smith, an outstanding farmer in his community, and Peter Jones, the secretary of the local National Farm Loan Association. They had gotten together to discuss Smith's need to re-finance his short-term first farm mortgage, and Smith was surprised to learn that the Federal Farm Loan Act, although it permits the lending up to 50 per cent of the appraised value of farm land for agricultural purposes, places the loan limit on permanent, insured buildings at 20 per cent of their appraised value. This amount seemed particularly small, in view of the fact that building and loan associations lending on city or town property, which operate to some extent in a similar way to the local National Farm Loan Associations, lend up to about 60 per cent of the value of the house and lot.

Long-term Loans

"You probably have the idea that we can lend as high as can a city building and loan association," said Secretary Jones. "You know there is really quite a lot of difference between lending on city property and on farms. In the first place the loans in the city are usually paid out in 10 or 12 years. That means in half that time the borrower has made a substantial reduction on the principal of the loan. The home-owner is fairly likely to live in his home 10 years. We lend on farms for as long as 36 years. The farmer who takes out the loan is very likely not to be the one who is farming the land when the loan is completely paid off.

"If you will look around this community you will see that the turn-over of farm property is rather rapid, and I believe this is typical. We lend on a farm factory which includes the home. I mean by this that the farmer makes a living on the farm and lives there. The city man merely dwells in his home and has a separate business. There are two distinct units and each can be sold and handled as such. If the business goes bad it doesn't reflect upon the value of his home. That isn't true of a farm, as you know. A farm could have a palace on it and if the soil were not productive it probably would not be worth very much unless it could be used for summer resort purposes.

"There is a certain relationship between the soil and the farm buildings," continued the Secretary. "You have probably noticed in driving through the country that on good soil you will find prosperous looking homes, painted buildings, and well-kept up fences—everything in ship-shape condition. The opposite is true regarding poor soils. I don't mean to say by this that some good soils are not over-burdened with too expensive or too extensive buildings. However, they are not so likely to be as poor soils are.

Depreciation Is Rapid

"But you ask how a farm house is appraised. Well, it is appraised for loaning purposes in connection with a loan through the Federal Farm Loan System, on a little different basis than for any other purpose. As I have already pointed out to you, these loans run for such a long time that we have to watch our step. If for any reason a farm should be handed over to us rather than operated and the installments paid promptly by the borrower, the buildings have a way of deteriorating rather rapidly. You have seen it. A farm that isn't occupied runs down hill even more rapidly than city property for the small boys are soon out with their sling-shots and stones and soon register a bull's-eye in every pane of glass on the property.

"The depreciation in the buildings, of course, is obvious to anyone, but the washing and wasting of soil on farms that are not taken care of, especially where the land is particularly susceptible to erosion, causes tremendous and disheartening loss. In some states more than half of the farms would be benefited by terracing. When the farms are actually in operation by careful owners or tenants, much erosion is stopped without terracing, but when the farm becomes vacant, washing and erosion set in in earnest. As someone has put it, loans are made on the first six inches of soil and when that washes away most of the value of the farm goes with it.

"We try to think of what is necessary in the way of buildings on the particular farm which we are appraising, keeping in mind the probable earning power of the land over a period of years. If the buildings exceed such requirements, we don't propose to lend on the excess.

"There is another angle to this which you may not have considered," further explained Secretary Jones. "A special dairy barn, a battery of silos, or a large or fancy poultry house on the ordinary farm are not considered as increasing the value of the farm to a great extent from a lending standpoint. You see we have to figure that the next person to own this farm may not be a dairyman or a poultry fancier. If that's true those buildings would not be a very great asset to him. And if they are not used and kept up, you know how quickly they would deteriorate."

"All that you say may be true," interjected farmer Smith, "but what would it cost us farmers to rebuild our homes, barns, and other outbuildings? Why it seems absurd to

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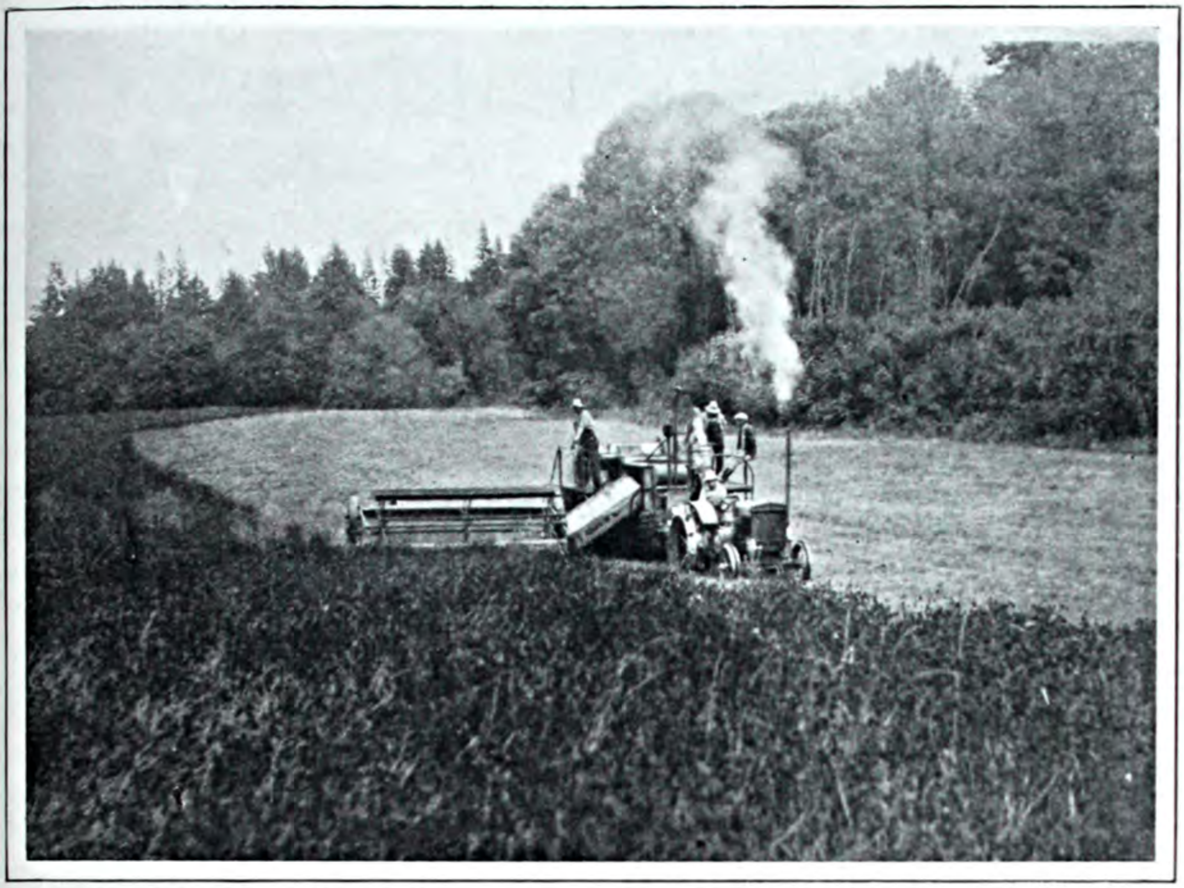

Alfred Abraham, Albany, Oregon, used a combine to harvest his red clover seed crop.

Combines *for* Clover

By E. N. Bressman

Farm Crops Specialist, Oregon Agricultural College

THE past season saw the use of the combine in harvesting the red clover seed crop in western Oregon. Many fields were successfully handled in this way, and several good yields of 3 to 5 bushels per acre were obtained.

Alfred Abraham of Albany, Oregon, harvested 130 acres of red clover seed with his 12-foot combine during the past season. One day with the help of one hired hand he cut and threshed 102 bushels of red clover seed. Ordinarily it would cost $2.50 per bushel to haul the clover seed alone, or $250 for their day's labor. Mr. Abraham is very enthusiastic about the use of the combine for clover seed, and looks for a large number of combines to be used next year.

In one trip along the highway, the writer saw five combines harvesting clover seed in western Oregon. Until this past season, combining of clover was practically unheard of and only done by a few growers. The combine makes it not only easier and cheaper in handling clover seed, but also insures getting the crop harvested before rain or bad weather conditions interfere with the harvest. It will allow the red clover seed grower to expand his acreage greatly, for he will be able to take care of a larger crop.

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These are some of the variety and fertilizer plots at the Ohio Agricultural Experiment Station.

OHIO

¶ The fortieth story of our Experiment Station Series

By W. K. Greenbank

Editor, Ohio Agricultural Experiment Station

THE fifth member of the great family of State Agricultural Experiment Stations was "born April 17, 1882, and dedicated to the interests of practical and scientific agriculture and to the vast agricultural resources of the State of Ohio."

"The location, control, general management, and oversight of the experiments and research of the Ohio Station were committed to a board of control consisting of three members appointed by the Governor of the State, the Governor, and a Director elected by the board." W. R. Lazenby, professor of horticulture in the Ohio State University, was elected first director, giving part time to the Station in addition to teaching.

The Station at first was located on the University campus at Columbus, where it was to have the use of a field of 17 acres and the privilege of conducting a few experiments in the fruit and vegetable gardens. The University also promised the use of a team and such of its farm implements and tools as might be needed, in exchange for the Station's surplus crops. The first annual appropriations were $3,000.

The receipt of the Hatch fund and larger appropriations by the State Assembly made it possible to reorganize the Station in 1888, and Charles E. Thorne was elected full-time director.

The New Home

It was soon decided to choose a new home for the Station on land better adapted to field experiments and typical of a large area of the State. A decade of experimenting on the rich second bottom land of the Olentangy River, within the city limits, had proved the location not well suited for field experiments, especially in the use of fertilizers.

Three adjacent farms, one mile south of Wooster, on the rolling upland Wooster silt loam soil, were purchased in 1892 as the new home. Perhaps no better site could be found in the State. Two of the farms had been under cultivation for nearly a century. On one of these, the West farm, good management, including the liberal use of manure and fertilizers and the rotation of crops, had maintained fertility at a high level. The East farm, which for 25 years had been rented to new tenants every year or two, was in a low state of fertility. The South farm was newer land, a part of it still in virgin forest. The owner had fed and pastured livestock on this farm, and it was in a high state of fertility. Adjoining farms were purchased later, increasing the tract to 1,123 acres..

The Main Farm

The administration building, laboratories, greenhouses, and several other buildings are located on the West farm nearest the city of Wooster. The more uniform parts of this farm were reserved for field experiments—50 acres for the cereal variety tests in a four-year rotation of corn, oats, wheat, and clover; other areas for the "lime and floats," "grain vs. livestock farming," plant breeding, and lawn grass experiments.

The East farm contains the "five-year rotation," "barnyard manure," and "continuous corn, oats, and wheat" fertilizer experiments; the poultry plant; hog barn and lots; beef cattle feeding sheds; and the forest arboretum of some 300 species.

On the South farm are the potato—wheat—clover fertility experiment, the orchards, vineyard, vegetable and flower gardens, and one of the three forest nurseries.

The farms acquired since the original purchase contain supplementary fertilizer and lime experiments, 40 rotation experiments, numerous other experiments, and pastures.

Outlying Farms

The need of duplicating experiments on other soil types was early recognized. District farms were purchased at Strongsville, Carpenter, and Germantown and leased at Findlay in the four quarters of the State. Later nine county experiment farms were added. These farms include the principal soils in Ohio.

The first results reported by the

Former Director C. E. Thorne (left) and Director C. G. Williams (right).

Station were those of a "carefully planned and well-executed experiment in wheat culture," started three years before, 1879, by the Ohio State University at Columbus. This experiment indicates in a remarkable way the intimate association of the four directors of the Station and the continuity of its work. It was conducted by N. S. Townshend, second director, assisted by C. E. Thorne, third director and present consulting chief in agronomy; reported and interpreted by Professor Lazenby, first director; and was the genesis of the variety and plant breeding work of C. G. Williams, the present director.

The Famous Fultz Wheat

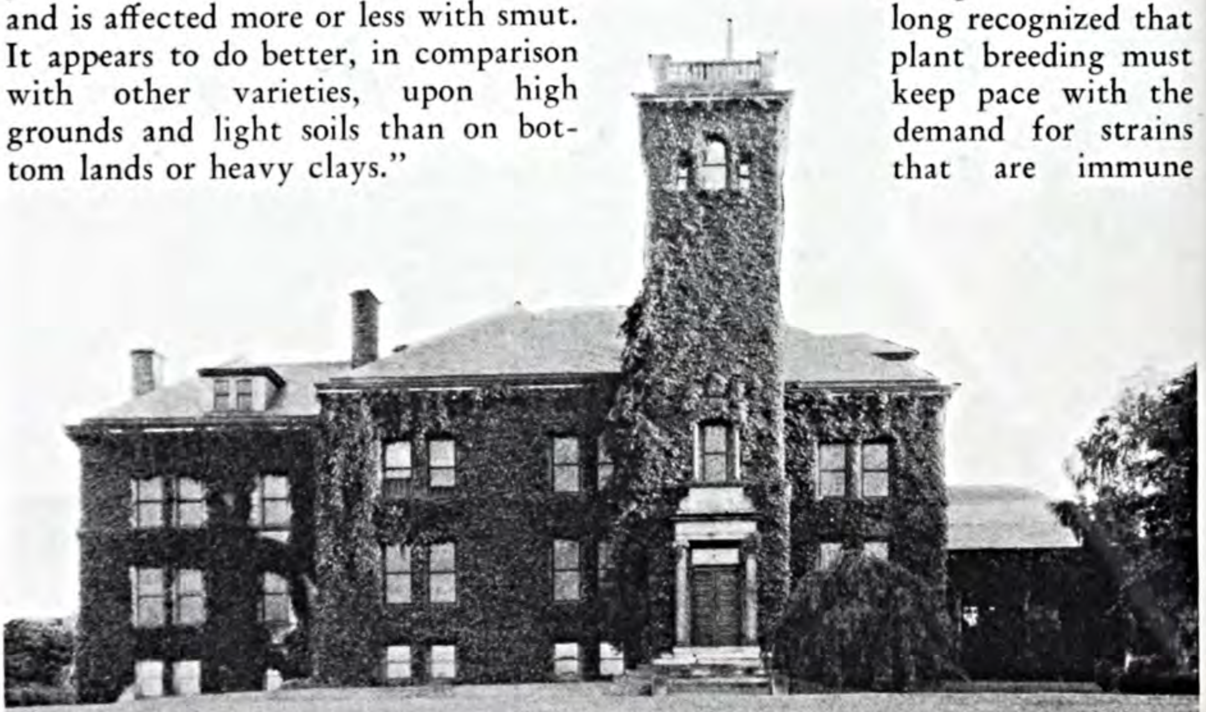
Director Lazenby's report shows the habit of growth, time of ripening, strength of straw, size of head and berry, yields, and quality of grain of 80 varieties of winter wheat. Forty-seven years ago he wrote, "Fultz wheat is the leading variety in many parts of the State. Few sorts cultivated in Ohio have given better results; it is early, has large heads, and strong straw of medium height. For the past three years it has shown a tendency to rust and is affected more or less with smut. It appears to do better, in comparison with other varieties, upon high grounds and light soils than on bottom lands or heavy clays."

Thousands of heads selected from this standard old variety have been propagated in the hope of isolating a strain with all the good qualities of the Fultz and with none of its weaknesses. Trumbull, one of these selections made in 1906, is now grown on more than half the wheat acreage in the State. It is a soft red winter wheat of excellent milling and baking qualities, such as command a premium over all other wheats; is earlier, hardier, and more productive than the parent variety; has short stiff straw; and is almost wholly immune to disease. All 80 varieties reported by Professor Lazenby, except Clawson, Fultz, Mediterranean, and Velvet Chaff, have been dropped by the Station and by Ohio farmers.

Increase Average Yield

Then the 10-year average yield of wheat in the State was 13.0 bushels per acre; now, thanks to Station varieties, better methods of culture, and the efficient use of fertilizers, the 10-year average is 16.9 bushels per acre, a definite increase of 30 per cent.

Agronomists have long recognized that plant breeding must keep pace with the demand for strains that are immune



The Administration Building, Ohio Agricultural Experiment Station.


Eighteen state experiment station directors about to inspect the Ohio Station's work.

to disease, that are winter hardy, of high quality, prolific, and strong enough to carry to full maturity heavier loads of grain. Yields of 50 bushels of wheat and of 100 of corn and oats in Ohio are not only possible but they are practical. In the Station variety field of 100 tenth-acre plots six of the old varieties—Fultz, Gypsy, Poole, Fulcaster, Nigger, and Fultzo-Mediterranean—in 1926 averaged 53 bushels per acre. Trumbull, used as a check on 24 plots, averaged 56.3 bushels, and 17 newer Station strains averaged 59.1 bushels, one of them yielding 65.9 bushels. The Station's work has added two to four million bushels to Ohio's annual wheat crop, to say nothing of its quality and of other crops.

Long-time Fertilizer Tests

Director Thorne, in starting the work at Wooster, recognized the importance of planning field experiments to continue indefinitely and to answer fundamental problems. For more than a third of a century the "Five-year Rotation" has been revealing valuable information, and the end is not yet. In this experiment the three fertilizer elements are still used separately in the four possible combinations and in different carriers as started on 150 tenth-acre plots in 1893.

A single rotation showed phosphorus to be the first limiting element on the Wooster soil. After 25 years potash became of first importance for corn, but not for the other grain crops.

The need of lime was soon apparent, and beginning in 1900 the west half of each section has been limed as it came into corn. Lime on the 50 unfertilized check plots has increased the yield of corn, oats, wheat, clover, and timothy hay 43, 60, 60, 80, and 90 per cent, respectively.

Superphosphate used alone or in combinations has not hardened the soil nor increased acidity. Five plots have received no other treatment than superphosphate, carrying 56 pounds of phosphoric acid per acre per rotation. The average yield of wheat on these plots for the first 10 years was 15.5 bushels and for the last 10 years 19.7 bushels.

Humus other than that furnished by the crop residue is not yet an important factor on this thin, well-drained silt loam soil. The average yields of plots that have received stable manure and others that have received equivalent amounts of plant food in a mixture of nitrate of soda, superphosphate, and muriate of potash with no added humus for 35 years have favored the commercial fertilizer.

Steamed bone as a carrier of phosphoric acid in comparison with superphosphate in complete fertilizers of the same analyses has fallen farther and farther behind in the race, especially on the limed plots. The last 10-year average yields of wheat on the bone plots were 22.19 and 24.28 bushels, respectively, on limed and unlimed plots; that of the superphosphate plots, 32.71 and 24.55 bushels on limed and unlimed ends. The relative yields on the five sections for the five years were consistent. Why the big drop for the bone and lime combined? Soil biologists and chemists are seeking the answer.

Potash alone, except on corn and potatoes, has seldom returned a profit; with an adequate balance of phosphoric acid, it has seldom failed to return a good profit.

Nitrogen used with the other elements has returned fair profits over its cost. On the Wooster soil, where manure is applied or legumes grown, additional nitrogen is of doubtful value for field crops. For orchard crops nitrogen has proved of first importance.

Floats in 35 years' use at Wooster have not proved economical in comparison with superphosphate. During the same period on the Trumbull heavy clay soil at Strongsville, they have given good crop increases and have proved more profitable than lime.

Lime may be applied at any time in the rotation with about equal results after the first rotation, the proper amount depending on the degree of soil acidity. It is possible to apply more than is profitable. Eight tons per acre once in four years, after the third application, reduced the yield of corn but not of oats, wheat, and clover in the rotation.

In the supplementary experiments the equivalent of 500 pounds of a 4-16-4 fertilizer per rotation all applied on wheat gave a net increase of corn, oats, wheat, and clover of $34.13. One-third of this fertilizer applied on each of the grain crops gave $34.08; one-half on corn and one-half on wheat gave $33.72; and all on clover gave the least net profit, $26.25.

For corn 100 to 200 pounds of a high-grade complete fertilizer in the hill, applied with a drill attachment so as not to come in contact with the

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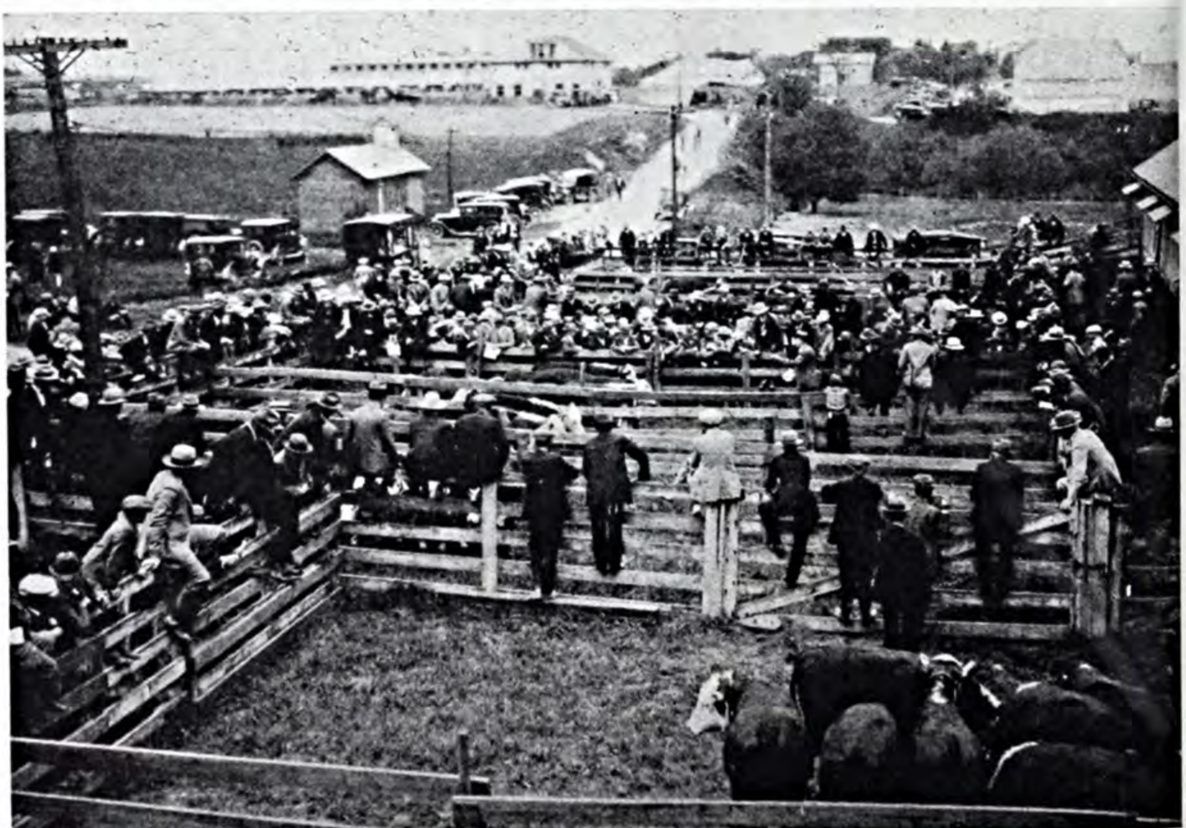

This picture was taken early in the morning of Livestock Day at the Ohio Station.

The Last Battle

By Robert Stewart

Dean, Nevada College of Agriculture

THE bacterial race in ancient times and during the middle ages nearly conquered the human race. The plagues of those times were the results of bacterial warfare against the human race. It is estimated, for example, that the Great Plague of the Orient in the sixth century killed 100,000,000 human beings. The Black Death of the fourteenth century killed nearly three-fourths of the human population of Europe. Each of these battles between the bacterial race and the human race were more disastrous than any battle between different groups of the human race recorded in history. And the egotistical human race did not even know who their enemy was or how to combat him.

The scientist has developed modern methods of sanitation whereby a reoccurrence of these near disasters for the human race is an impossibility. The bacterial race is now in subjection from which it cannot escape to do any real damage. But, while the bacterial race is in subjection, the insect race is not, and there is now being carried on a contest between the insect race and the human race that may be far more disastrous to humanity than the plagues of olden times.

The Insect Army

The outcome of this warfare is problematic. As in the recent Great War, food is the vital factor. The race which controls the food supply will win the war. The insect race at the present time is competing with the human race quite successfully for the food supply of the world. In spite of all the developments of modern science by the human race, the insect race occupies many positions of advantage in the warfare.

The insect race propagates much more rapidly than the human race and reaches the active stage of warfare in a much shorter time. The Ohio Experiment Station for example has studied the rapidity of multiplication of plant lice. A single aphid was caged on an uninfested plant. At the end of 12 days her progeny, daughters and granddaughters, totaled 76, five of whom were already producing young aphids. The rapidity of the increase from this time on can be left to the imagination or to the mathematician. One mathematician has estimated that if there were no fatalities and sufficient food were available the progeny of a single plant aphid, at the end of a single year, would produce a ball of matter the size of the earth! In the insect world, also, only the fittest reproduce and reproduce most frequently. The weak and inefficient are ruthlessly eliminated. In the human race it is just the opposite. The efficient restrict reproduction while the inefficient reproduce without restraint, and organized human society protects the offspring and regards it as a marvelous achievement of modern civilization!

The insect race is better organized for warfare than the human race and its warfare is carried on without graft. The ants are more ancient than the humans. The ants were on earth long before man. Beautiful specimens of ants are preserved in the amber of the lower Oligocene probably dating back to 20,000,000 B.C. Probably the ants will still be on earth long after man has passed away. The ants are better organized for warfare than is man. The ant individual differs from man not only in its activity but also in its structure. As a result the ant has solved many of its social problems. The necessary work to be done is allocated to the several groups. There is no question as to who shall work, who shall fight, and who shall bear children. This is all determined before birth. The fighters are organized into squads, companies, regiments, and battalions efficiently officered. The attack is carried on in a definite, systematic, and effective manner.

The European Corn Borer

There are some dozen crops which produce the great bulk of the food supply of man. The corn crop is vital to the welfare of humanity. It produces many articles of direct use as food and furnishes a large part of the feed of livestock. The insect world is putting up a vigorous fight for the control of the corn crop.

There are many insects that use corn as food. The most insistent and vigorous of these is probably the European corn borer. The corn borer invaded this country nine years ago and came to us from Hungary. The yellow-winged moths, mothers of the borers, lay their eggs on the under side of the corn plant leaves. The eggs hatch out and borers are produced in quantity. In one infested cornfield 75 corn plants were selected at random. In one stalk alone there were 117 borers. The whole 75 stalks averaged 46 borers to the stalk. This gives one a vivid conception of the rapidity of the development of the borer and the destructiveness of its work on the corn-stalk.

The corn borer is not only diligent but is extremely hardy and resistent to efforts to destroy him. Corn-stalks covered with the brown worms have been put in a burlap sack, the whole weighted with stones and cast into an ice-cold brook. At the end of a month 81 of the 166 borers to take the ice-cold bath came out alive!

The moth mothers lay the eggs not only on the under side of the corn leaves but in the grass headlands and fence rows, any place where the eggs are protected from the direct rays of the sun. The moth mother frequently lays as many as 1,000 eggs in two weeks' time. The mother moth is extremely active and travels great distances. She is the Lindbergh of the insect world and has been known to travel more than 25 miles entirely over the water.

The borers themselves are only one-sixteenth of an inch long, but they are very active, hungry, and persistent. For three months, from July to October, they feed on the corn plant without stopping and are 16 times their original size within two months' time.

Man's Defense

The rapidity of distribution and continuous reproduction of these borers makes ordinary methods of control impossible. Spraying with arsenic is futile. The difficulty of eliminating the pest by attacks on the moth or the worm itself led to the discovery of the pest's weakest spot in its armor of defense and that is the egg stage. Efforts are now being concentrated on the destruction of the pest by destroying all places where the eggs are laid or may be laid. The result is clean culture everywhere by farmers. Old corn-stalks are destroyed. The three steps being carried on in this fight with the corn borer are: (1) Feed all corn-stalks; (2) Plough all corn stubble clean; (3) Burn all corn remnants before June 1 of each year. By following these methods of clean culture humanity has dug in for a fight with the corn borer. The advance has been checked but the fight is stalemate. The borer is still with us and is here to stay and at any time may secure the advantage in spite of our best efforts and the use of all the weapons of science.

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Two hundred pounds of muriate of potash per acre made this difference in growth and a difference in yield of 416 pounds of seed cotton per acre.

Hungry Cotton

By L. Cothern

County Agent, Morrilton, Arkansas

FRANK McNUTT, Springfield, Arkansas, has been planting cotton he past several years on a piece of and on which the cotton rusts very badly. The land is upland of the Hanceville sandy loan series. In talking the problem over with me last pring, I advised him that "rust is potsh hunger" and suggested he try 100 pounds of muriate of potash as a sideressing in addition to the 350 pounds er acre of the 10-5-4 mixture that he vas planning on putting under his otton.

"Well, you are a demonstrator, how bout a demonstration," he replied. We will put 200 pounds of that potsh on an acre. If rust is potash huner, the cotton won't starve on that cre. Come out and measure up two cres and we will see about that potash starvation."

We measured up two acres on very uniform land and to both plots we applied 350 pounds of the 10-5-4 mixture, and on one acre Mr. McNutt applied 200 pounds of muriate of potash at chopping time as a side-dressing. It was not long before a decided difference in the vigor and general health of the cotton on this acre over the cotton where potash was not applied could be seen. The picture tells the story.

The plot on the right received only 350 pounds of the 10-5-4 mixture per acre and yielded 637 pounds of seed cotton. The plot on the left received 350 pounds of the 10-5-4 mixture and the 200 pounds of muriate of potash per acre. It yielded 1,053 pounds of

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Agriculture Today

IX. The Weather

By Frank George

RECENT studies of the relation of the weather to crop yields promise a new means of forecasting production in some areas. It has been learned that much more accurate forecasts of potato production in the New England States can be made on August 1 from weather indications than is possible from crop condition reports. The probable yield of wheat in Maryland was forecast from weather factors on May 1 last year, and forecasts of potatoes and wheat have been made in Michigan based on a study of weather conditions.

A balloon and theodolite are used in making upper air soundings from which the wind direction and velocity aloft are computed.

Many State agricultural statisticians are now studying these relationships, and wherever it is found that more accurate forecasts can be made based on weather than from crop condition reports, the Federal Crop Reporting Board is planning to shift to that basis or at least to use the information as a check on forecasts made from condition reports. In some States it has as yet been found impossible to discover much relationship between weather and yield, the production being controlled apparently by other undetermined factors.

This type of research is being made possible through an accumulation of weather data running back nearly 60 years—Government weather reporting services were established in the United States in 1870—and the improvements which have been made in weather reporting and forecasting technique during the last 10 years. Ten years ago farmers received their weather information by mail, telegraph, rural telephone, and in the daily press. Today, nearly 150 radio stations over the country broadcast the weather forecasts, cold wave and other warnings, practically as soon as they are issued.

by the Weather Bureau. Special hook-ups are arranged for broadcasting harvest weather forecasts, fruit spraying schedules, and marketing advice. The issuance of four reports at six-hour intervals each day instead of two reports at twelve-hour intervals is now being planned.

Heaters are lighted in orchards when advices of impending cold waves are received from the Weather Bureau.

Studies of the effect of weather on crop growth have shown that most crops have a comparatively short critical period when favorable weather will cause a large yield, and unfavorable weather a small yield, largely without regard to earlier or later conditions. Rainfall, for example, is the meteorological factor of greatest importance in varying the yield of corn, and the critical period of growth is at about the time of blossoming.

In Ohio, over a period of 60 years, the records show that an average increase of one-fourth inch in rain in July, at the critical rainfall period, caused an average increase in the yield of corn of 6,000,000 bushels, while a one-half inch increase in rain made an average increase in the yield of over 15,000,000 bushels. It was learned that the most important 30 days from a rainfall point of view in Ohio are from July 15 to August 15, while the most critical 10 days are from August 1 to 10.

On the other hand, temperature has a greater influence than rainfall in varying the yield of potatoes in Ohio. July is the critical calendar month, and it must be cool for best results. In a period of 54 years, with each average decrease of 1.6 degrees in the mean temperature for the month of July the yield of potatoes increased 6.3 bushels per acre on the average, or a total of 1,096,200 bushels.

In New Jersey, during a period of 33 years, the yield of potatoes averaged 25 bushels an acre greater when July was appreciably cooler than when it was considerably warmer than the average, a variation of over 2,000,000 bushels in yield for the State. The yield of spring wheat in North Dakota is influenced largely by the rainfall in May and June, but in general the most critical period for small grains is when the berry is in the milk or dough stage. Hot and dry weather at this time will reduce the yield of high-class seed very materially. A heavy snowfall in March is detrimental to winter wheat in northwestern Ohio, contrary to the usual opinion of the beneficial effect of a late snowfall on winter wheat.

Special Reports

The issuance of special daily and weekly reports in the cotton and grain regions during the growing season is considered by Dr. Charles F. Marvin, chief of the United States Weather Bureau, of value in counteracting the many circulated stories and rumors of weather conditions that frequently affect prices. These official reports are intended to keep farmers and others posted on prevailing weather conditions and their effect on the growth of crops in different sections of the country. Observations are made each morning by special meteorological observers at about 400 stations in the principal agricultural regions, and the data telegraphed to central Weather Bureau stations designated district centers. Daily bulletins are published at 36 central stations, each containing weather information for the nearby substations.

In the weekly service the officials in charge of designated central Weather Bureau stations in each State collect information from many special and cooperative meteorological observers and from a large number of weather and crop correspondents in their respective States relative to prevailing weather conditions and their effect on the agricultural situation. These officials make weekly telegraphic reports to the central Weather Bureau office at Washington, where the information is tabulated and summarized and a synopsis issued for the entire country. This is released each Wednesday at 10 a.m. In addition there is published a local weather and crop summary at each State center, containing information in more detail as to conditions prevailing in the respective States.

Discussing the issuance of seasonal weather forecasts, Dr. Marvin declares that such reports will be issued as soon as scientifically accurate technique for making the forecasts is developed. Several scientific agencies, including Carnegie Institution, Smithsonian Institution, and the University of California, are at work on the problem, and some promising results have been reported, but these agencies are agreed that as yet only tentative forecasts can be made. These forecasts are being made only for checking and correcting basic data.

The New System

A new system for the interchange of daily weather reports among the 200 official observation stations in the United States was established recently by the Weather Bureau whereby commercial telegraph wires are used at any time of day instead of at fixed hours. Under the new arrangement, regular morning and evening observations from every observation station authorized to telegraph reports are sent to two main collection stations at Chicago and New York. A special organization is provided by the telegraph company at these points to receive the reports as they come in and redistribute them, by a system of rapid duplication, to such local stations as have requested the information.

Each Weather Bureau office, under the new arrangement, can be furnished with the reports best adapted to local requirements without the necessity for adjustments to the needs of other stations. For example, the report from the Abilene, Texas, station goes to 140 other stations. There are 140 blanks, already addressed, in the Abilene pigeonhole at the Chicago collection center. As soon as the report is received from Abilene, it is passed, with these blanks, to duplicators who make a stencil of the coded words and print them on the blanks. Operators of the wires connecting the Chicago office with the points of destination dispatch the messages as indicated on the blanks.

Within six minutes of the time a report is received at Chicago, the necessary duplications have been made and the messages have been dispatched to all points of delivery. Ten or more duplicators and a group of sorters and messengers are trained for and exclusively engaged on the work. Reports from nearly 200 stations can be handled at the centers in 35 minutes. This plan supersedes the so-called circuit system in effect since the establishment of the Weather Bureau in 1870.

The Weather Bureau for many years has maintained a system of cooperative weather observations whereby individuals interested in establishing an authentic history of the weather of their localities volunteer to take regular observations according to an adopted

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Hoosier farmers have community stations for treating seed wheat with hot water.

Smut-free Areas

By C. T. Gregory

Pathologist, Purdue University

THERE is no question that the hot water treatment of wheat and of barley will kill the loose smut. There is, however, considerable question as to whether it will control the stinking smut of wheat. Indeed, I am prepared to say that the hot water treatment will not control "bunt" under all conditions. So certain am I of failure that I have ceased to recommend it for this purpose. The hot water will not penetrate to the center of the greasy spore mass of the smut balls. Subsequent rough handling will break these smut balls, heavily inoculating the seed. I have seen 12 per cent of stinking smut in properly hot water treated wheat. I say properly because the loose smut was eradicated.

Keeping loose smut out of wheat is a far different question than killing the smut. Ten years of experience in Indiana has shown us the grave difficulties that stand in the way of this ideal,—controlling loose smut. The serious drawback is the blowing of the smut spores. We have no definite proof of the exact distance the spores are commonly spread by the wind, but we have good evidence that a loose smut contaminated field a mile away from a clean field will cause reinfection.

We were brought face to face with this problem in our certification of wheat. Our tolerance of loose smut in Indiana is only a half per cent and no seed gets by if it has more. Naturally one would expect that such seed ought to produce a relatively smut-free crop next year. Ordinarily, our expectations are fulfilled, but in a few cases there has been more smut in fields planted with certified seed than in the home-grown wheat. And the farmers wanted to know "How come?" We traced some of this certified wheat back to its source. There was no question that at the time of its inspection it had less than one-half per cent of smut in it. The grower was not crooked; he had not sold poor seed wheat for certified. What we found was that the offending seed had been grown in a locality where loose smut was serious and where no concerted community effort was made to eradicate the disease. The spores had blown in from neighboring fields and had contaminated our certified wheat.

That is the problem. What can be done to prevent reinfection of the treated and clean wheat? As a matter of fact, that is just the question that many Indiana wheat growers have been asking us for the past several years. They are absolutely convinced that the hot water treatment will control the loose smut. But said they, "We can't treat enough seed for our entire acreage each year. If our neighbors do not treat their wheat, the smut will blow from their fields to mine."

Community Stations

What is the answer? Is it community treating stations? Perhaps so, but we have had as many as 20 such stations in operation in Indiana at one time. We have had over a thousand farmers treating anywhere from 10 to 50 bushels each, but still it did not work to our complete satisfaction. We made it easy to treat the wheat, cutting down the labor to minimum. Large tanks of water heated by steam were used, and by the way, this is the easiest means of maintaining the temperature of the water. We eliminated any predipping in water at 120° F., but we could not eliminate the presoaking of four hours. This, the farmers did, bringing the wheat to the station already soaked and ready to treat. With eight men treating their seed at one time around the tank, we could treat from 30 to 40 bushels an hour.

Just a few tips on this method may help others. In the first place, never let a farmer put more than a half bushel of wheat in a sack. It will swell to the volume of a bushel. Do not use anything but burlap or at least, loosely woven bags. Grain sacks are not satisfactory. Let the farmer presoak the wheat and bring it to the treating station. It will do no harm to soak the wheat early in the morning and then treat it late in the afternoon. But do not let the wheat remain wet in the sack over night, since it will sprout and will be more easily injured. It is not necessary to heat the water at exactly 129° F. We usually hold the temperature at 130° during the treatment. A temperature of 135° for 10 minutes will do no harm. After the first minute of thoroughly shaking the sacks of wheat in the water, it is not necessary to move them. Once the hot water has heated the center of the half bushel of wheat, the temperature will not fall.

But to get back to my story of keeping loose smut out of wheat. After every method failed, we have at last hit upon a method that looks successful. It consists in establishing smut-free areas. It cannot be accomplished in all regions, perhaps, since the first requisite is a more or less isolated area. This may mean a hilly region such as is found in Dubois county, Indiana. Here the wheat areas are in valleys shut off from other areas by high hills. I have found that wheat treated eight years ago in this region is still free from loose smut, a natural smut-free area. Another type of area is like the one established last year around Hillisburg in Clinton county. Here the country is flat, but there is an area of about four square miles where wheat is grown intensively but for at least a mile on all sides little is grown.

In this area, eight farmers cooperated three years ago in treating seed for a seed plot and then each of them used the wheat from this plot. They

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Crop Associations

By P. H. Stewart

Secretary, International Crop Improvement Association, Lincoln, Nebraska

STATE crop improvement associations which are now in operation in nearly 30 states and in a number of Canadian provinces are doing much to improve cropping practices. These associations act as a connecting link between agricultural colleges and individual farmers. Probably their greatest work is in the certification and distribution of pure seed of improved crop varieties developed and recommended by agricultural experiment stations. Without these associations the distribution of new and desirable varieties of crops would be indeed a slow and uncertain process.

The general plan under which crop improvement associations function is about like this: experiment stations from time to time are finding by careful tests varieties of crops which are superior to those commonly grown. These new varieties may be the results of crosses, of selections from common varieties, or newly imported ones which in trials have proven their unquestioned superiority. This superiority may be due to better yields, greater hardiness, better straw as to lodging, disease resistance, quality, or other important qualifications.

Experiment stations for the most part do not have facilities for producing large amounts of foundation seed stocks for general distribution to farmers. However, through cooperation with crop improvement associations a supply of pure reliable seed may be quickly built. This is accomplished by the crop improvement association putting foundation seed stock from agricultural colleges into the hands of a few proven growers whose inclination and ability to produce pure seed have been proven. The crop grown by these careful farmers is then inspected rigidly before harvest and again when threshed and if satisfactory is certified and offered to the public at a fair price. By a simple yet efficient system of inspections, records, and reports, the seed supply is followed from farmer to farmer in such a way that soon good pure seed of the crop is available in all parts of the state where it is adapted.

Good Crops Spread

In Kansas, for instance, Kanota oats a variety yielding from 5 to 10 bushels per acre more than commonly grown varieties is now the leading oat variety occupying some 1,500,000 acres in 1927. This is a remarkable acreage when one considers that it was first distributed to a few farmers by the Kansas Agricultural College in 1921. In 1921 the Kansas Crop Improvement Association certified 10,000 bushels of Kanota oats; in 1922, 56,000 bushels; in 1923, 166,000 bushels; in 1924, 106,000; and in 1925, 100,000 bushels. In 1924 census figures showed 42 per cent of the Kansas oat acreage to be in Kanota oats. The availability of seed in all parts of the state through seed certification work was largely responsible for the rapid spread of this good variety.

In Nebraska in 1927 Comfort barley was first distributed to Nebraska farmers, by the Nebraska Agricultural College. Comfort barley is a bearded variety having the general appearance of common six-rowed barley but the beards are smooth, that is, they do not have the rough saw-toothed edges or barbs which make ordinary barley so unpleasant and unpopular to handle. The acreage of barley in corn belt states has to quite an extent been held down because farmers dislike to handle the high-yielding but rough bearded varieties of this crop. Barley, however, compared to oats as a feed crop on the farm which is the main use of the two crops, makes a higher yield per acre of hull-free grain and it seems that more should be grown in place of oats. Comfort and other smooth varieties promise to bring about an increased barley acreage. In Nebraska in 1927 a total of 440 bushels of Comfort barley was certified by the Nebraska Crop Growers' Association. In 1928, 7,925 bushels were listed on the certified list and in 1929 it is expected that pure, good quality, true-to-name Comfort barley can be bought in most barley growing communities of the state.

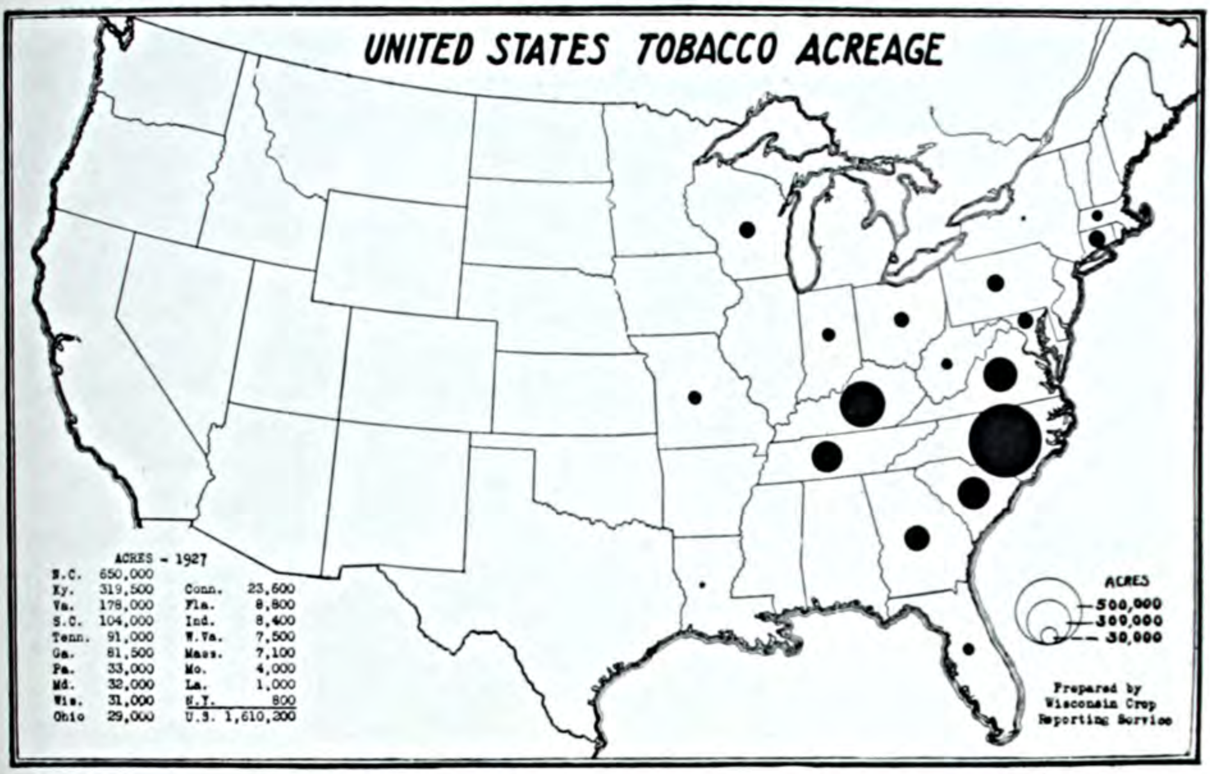
In Michigan, which is an important bean growing state, a similar rapid distribution of Robust beans has been brought about through crop improvement work. In 1918 the first seed stock of Robust beans, a disease resistant white navy variety was distributed by the Michigan Agricultural College. In 1928, just 10 years later 60 per cent of Michigan's bean acreage was planted to the Robust variety.

Check Poor Varieties

Because of the close cooperation between crop improvement associations and agricultural colleges it is possible to discourage the use and spread of undesirable but often much over advertised varieties and specialties. Before any certain crop variety is certified, it must be recommended by agricultural college workers, one or more of whom is usually on the committee to decide what varieties are to be certified. This tends to reduce the number of varieties grown in a state and brings about crop standardization. This is a very valuable thing as most communities would be benefited by a reduction in the number of crop varieties grown. Mixing, marketing, and milling problems would be simplified if fewer varieties and types of crops were produced.

Probably alfalfa has felt the influence of crop improvement association activities more than any other single crop. This is particularly true in the northern alfalfa growing sections where a hardy type of alfalfa is essential. Grimm alfalfa particularly is desired by northern farmers. A few years ago the buyer of Grimm alfalfa was gambling when he bought seed. It might or might not be true Grimm. Now, however, due to the activities of crop improvement associations in tracing the history of fields, in inspecting sealing, and otherwise checking on seed as to variety, quality, and origin, the Grimm seed buyer can feel quite sure that seed carrying a crop improvement association tag is the real Grimm. Northern seedsmen recognize the value of certified Grimm and for the most part handle it for their customers. The availability of reliable seed supplies of Grimm has done much to greatly increase the alfalfa acreage in such states as Minnesota, Wisconsin, Michigan, and others. Seed certification work removed the doubt as to genuineness of variety.

Other activities of crop improvement associations are the conducting of yield contests, the fostering of the international grain and hay show and general educational work on good farm practices in crop production. "Good seed is the foundation of a good crop" has been preached. But more productive of results than mere preaching has been the certification work in making available to the average farmer, at prices he could afford to pay, good seed of the highest yielding standard varieties as recommended by state and federal experiment stations.



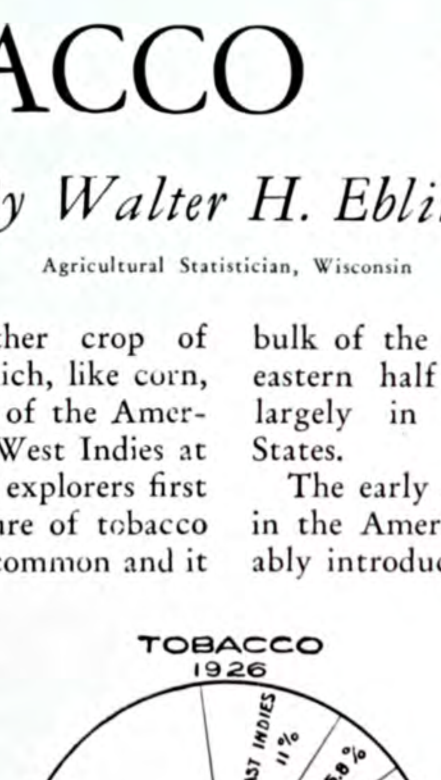
TOBACCO

¶ *Ninth of this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

TOBACCO is another crop of American origin which, like corn, was used by the natives of the American continent and the West Indies at the time when the early explorers first visited them. The culture of tobacco among the Indians was common and it was from them that the white men learned it. The crop became commercially important at the Jamestown Colony where it was an important article of export as early as 1612. It has continued to be an important agricultural cash crop in the United States for the United States is the world's largest tobacco grower and the bulk of the acreage is located in the eastern half of the country, quite largely in the Atlantic Seaboard States.



The early strains of tobacco grown in the American Colonies were probably introduced from the West Indies or South America, and these as well as the ones commonly grown by the native Indians were later introduced into the Oriental countries, Europe, the interior of North America, and elsewhere. The crop now is grown to some extent in nearly all parts of the world, though the United States has always led

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Miss Mary G. Lacy, Librarian, Bureau of Agricultural Economics, United States Department of Agriculture.

Keeping-up *with* Facts

By C. B. Sherman

United States Department of Agriculture, Washington, D. C.

DEMAND for economic information is more pressing among agricultural workers today than ever before. As the task of disposing of a good crop profitably after it is produced becomes more perplexing than the raising of a bumper crop, farmers and their leaders are increasingly interested in records of past crops, records of past prices, reasons for variations, disposal of surpluses, and all those kindred subjects now so much to the fore. To the experienced student records of the past, with interpretations, constitute a valuable indication of agricultural trends of the future, and farmers and their leaders are now thinking more and more in terms of the future.

The leader of today is fully alive to the fact that a wealth of such data is being made available, but the very abundance of it causes him confusion. He wants to know how to get a line on it now and how to keep a line on it as the months go by.

The librarian of the Bureau of Agricultural Economics, Miss Mary G Lacy, is seeking to provide just such clues, not only to the workers of the Bureau but to agricultural workers everywhere. Having served in two State agricultural libraries as well as in the library of the Department of Agriculture, and as secretary of the Agricultural Libraries Section of the

American Library Association, she knows local and Extension needs and keeps them constantly in mind.

As a result, her library staff has made available our most comprehensive and valuable reading lists on the crucial economic problems of the day. Control of agricultural production, government control of export and import in foreign countries, bounties on agricultural products, and price fixing by governments, 424 B. C.—1926 A. D., form a group of extensive timely bibliographies that have been in demand not only here but in many foreign countries. Each includes many hundreds of titles and every publication represented has been personally examined to determine its fitness for entry. Another very timely list is on taxation and the farmer. An earlier extensive bibliography on marketing farm products is probably the best known and most widely used. Other less extensive lists cover such concrete subjects as the peach industry, the apple industry, the poultry industry; and such abstract subjects as price spreads and factors affecting prices. And any of these lists may be had by any worker who shows a need for them.

A county agent receives "Agricultural Economics Literature."

Another type of work which is being conducted with the cooperation of the States involved is the indexing of the State official sources of agricultural statistics. Such indexes have been finished for Alabama and Oklahoma and the one for California is almost completed. These indexes bring together the statistical information needed as a base for a sound, long-time plan for the agriculture of a given State, and have a multitude of lesser, short-time uses.

Once a man has used one of the extensive bibliographies as a guide in his study or reading on a certain problem, and has thus informed himself as to the best that has been written on the subject, how is he to keep up to date thereafter? Miss

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Oklahoma Needs Alfalfa

By H. F. Murphy

Soils Specialist, Oklahoma Agricultural Experiment Station

OKLAHOMA is growing only a small acreage of legume crops. There are several reasons for this and many reasons why the acreage should be increased.

In the first place, the soils are relatively new and have been fairly productive of crops that bring a good cash income. The last five years show that the average field crop valuation has been more than $290,000,000 annually. The outstanding crop in value has been cotton which has contributed as an average more than $120,000,000 each year. It is the principal crop in the southern half of the State and is forging its way well into the northern half. Wheat is second crop of importance. Revenue from this crop brings to the farmers of the western half of the State approximately $59,000,000 each year. Corn ranks third in importance bringing in a little less than does wheat. The sorghums are a poor fourth, yet where they are grown they are a vital factor in the agriculture of the section. Their average annual value for the last five years has been approximately $15,500,000. With such crops as these and with the relatively new soils, farmers have not considered legume crops to a great extent.

Time for Legumes

The time is at hand, however, when legume crops are to be more seriously considered. The soils of the State are no longer virgin, and have declined in yield since first being put under cultivation. Considerable agitation is now in progress tending to increase the legume acreage. Better soils conferences are being held in a large number of counties, and one of the objects of these conferences is the stimulation of a larger legume acreage. Soybeans, cowpeas, mung beans, sweet clover, alfalfa, and some legumes of minor importance are being considered.

Alfalfa offers the best chance of any of the legumes to show an immediate cash return. It has been grown profitably on the better lands, especially the rich bottom soils, but not a great deal on the medium to better uplands. Where untreated uplands have been devoted to alfalfa, the yield has not been considered very successful as measured by the returns from the cash crops of the community.

There is a large acreage of uplands in this State, however, that so far as moisture is concerned, are suitable for the growing of this crop, but yet due to the lack of plant food, alfalfa does not do as well on them as it should. Fertilizer tests are now being conducted on some of these soils and some of the fertilized areas are showing up exceptionally well. In most places, farm manure reinforced with superphosphate is giving excellent returns.

Of course, not enough farm manure is available for the needs of the average farmer and so it is necessary to resort to commercial fertilizers. For the last two years, a 200-pound yearly application of a 12-2-6 (PNK) fertilizer increased the yield of alfalfa on the experiment station farm at Stillwater 2,537 pounds per acre annually. After deducting the cost of the fertilizer and calculating the alfalfa hay at $15 per ton, the yearly net gain for the treatment was $15.02 per acre.

1871 Robert Kunze 1929

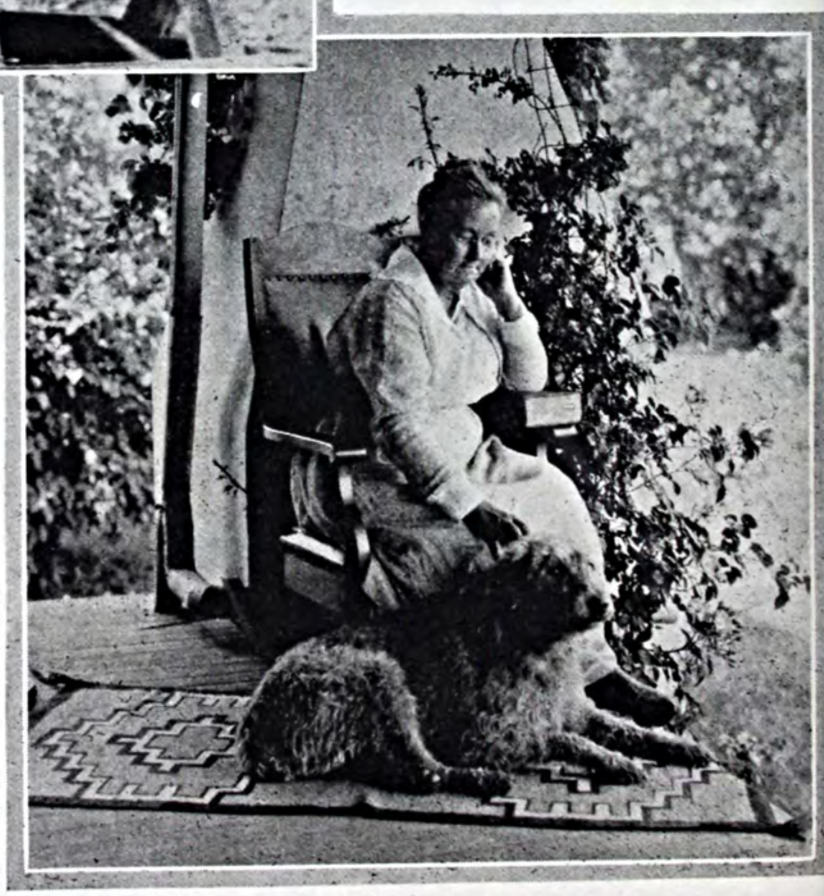
THE sudden death of Robert Kunze on July 29, 1929, at Bad Reichenhall, Germany, has taken from the agricultural industry a man widely known and respected for his untiring zeal and integrity. For more than thirty years actively identified with the European potash interests, Mr. Kunze's valuable experience and clear vision played an important part in the growth and stabilization of the production and world distribution of potash, so essential to agriculture.

Mr. Kunze was born in Saxony, August 31, 1871. He received his early commercial training in London with a large importing and exporting house, after which he became associated with the textile industry in Saxony. In the late nineties he became allied with the German potash industry, which was then in its infancy. Later as a director, he saw this industry grow to world-wide proportions, and he was a distinct factor in its post-war development.

In March, 1927, Mr. Kunze became associated with the N. V. Potash Export My. of Amsterdam, Holland, as co-manager of its New York office. He sailed from New York on June 18 on business and in the interest of his health which had become impaired in the unselfish giving of his strength and energy to the demands of his position.

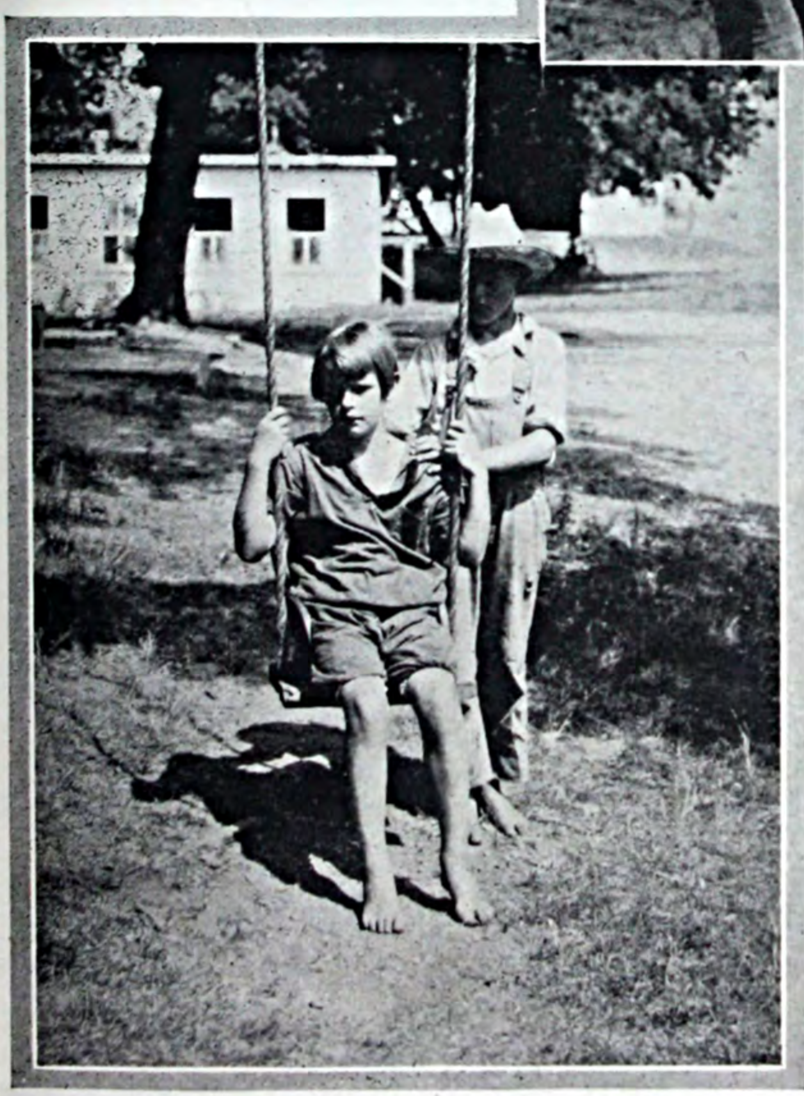
Mr. Kunze's wide circle of friends and associates mourn the loss of a personality whose charm and ever-ready kindliness had endeared him to all who knew him. Even in the press of his duties, he never lost touch with the humanistic side of life, a trait which makes his memory so greatly beloved and respected.

Left: "The Pioneer's Golf." Going out after supper and bucking-up a little wood for the breakfast fire was good exercise and helped keep many a man fit for a good old age.



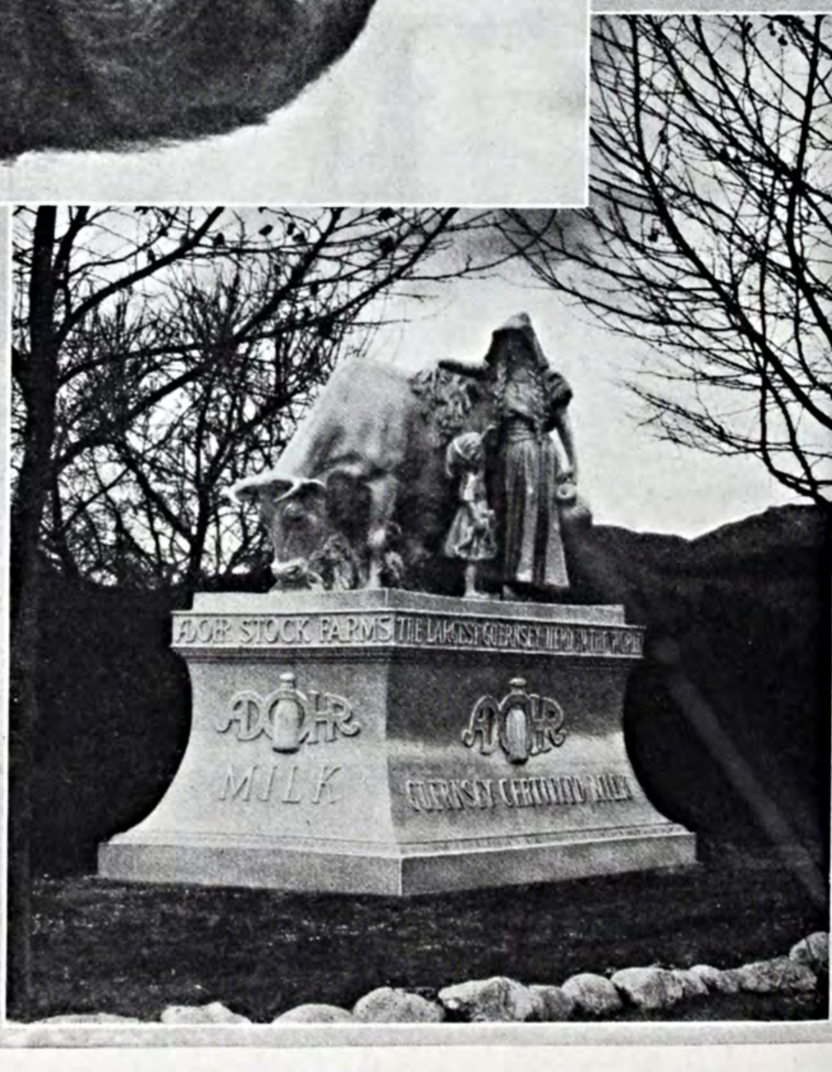
Right: The afternoon "sit-a-while," with old Towser for company.

Right: "There are no tummy-aches in this hat," said Charles Jeter Glenn, after picking these fine, ripe apples from the orchard of his uncle, J. B. Douthit, Jr., of Pendleton, South Carolina.



Left: No farm is complete without a good swing of this type for the boys and girls.

Left: A porcine king ready to defend his laurels on the fall show circuit.



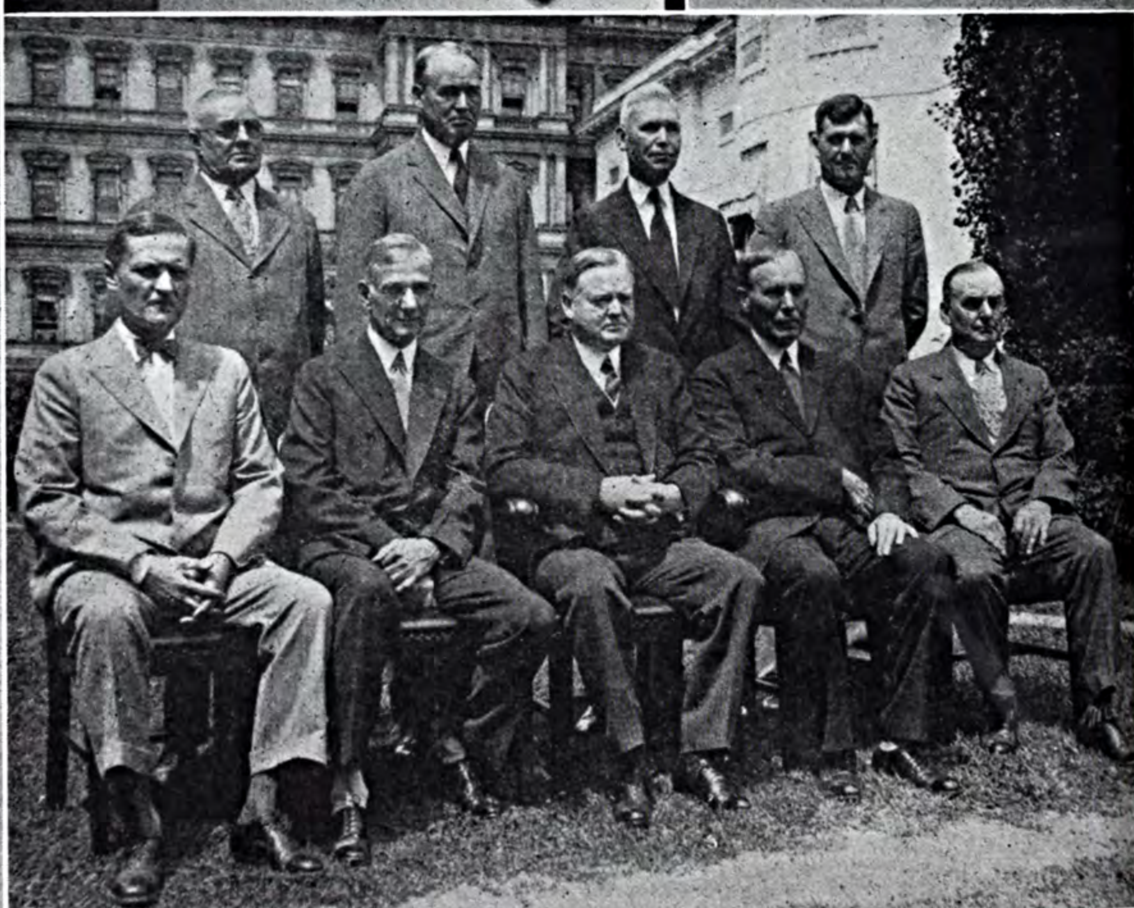
Right: This piece of statuary near Los Angeles is a unique way used by a producer in calling the public's attention to his quality product.

Right: Helping Daddy shock wheat is hot work, wherein the jug comes in handy.

Left: This pig seems to be enjoying the bath which his youthful owner is giving him in preparation for his entry in a 4-H pig show.

Left: A photograph of an enlarge cigarette butt used in an exhibi by the United States Departmen of Agriculture to emphasize th danger of fires from this source

Below: President Hoover and th Farm Board. Top row, left t right: William Frank Schilling Charles Scoon Wilson, Carl Wil liams, Cuthbert B. Denman. Low er row, left to right: James Clin ton Stone, Secretary of Agricul ture Arthur M. Hyde, Presiden Hoover, Alexander Legge, an Charles C. Teague.



The Editors Talk

Standardizing Experiments

One of the most outstanding needs of the American farmer today is more definite information concerning the plant food requirements of his crops. There are plenty of recommendations, and it is this very fact that lends confusion to the farmer in deciding which is the best for his particular farming conditions.

This being true, the most important work that can be done by the experiment stations which play so large a part in solving our many soil problems is the testing of the various soil types of the nation to determine their exact requirements for added plant food. Experience has proved that such tests are the only means of getting this information, and it is remarkable the extent to which farmers have recently adopted the recommendations of experiment stations where such recommendations are based on tests thus made.

Not many years ago, each experiment station was a unit unto itself in making such tests, the result being that the farmers and the fertilizer men were more confused than otherwise in attempting to follow them. There was no uniformity in the work done, and no comparisons possible over even a single state. Recently the tendency, at least in certain states, has been to have simple or uniform tests conducted by each station doing work on the main soil types, not only at the stations themselves but on similar soils scattered widely over each formation.

In a single state these uniform tests varying one element at a time with the other two supplied in ample quantity have resulted in such definite information that the problem of getting the farmers to adopt the recommendations and the manufacturers to prepare the mixtures has been a simple matter.

There is no more important problem today than that of having our experiment stations over the country as a whole, and particularly over the South, adopt some uniform plan of conducting these fertilizer tests, so that when the results are obtained they may be easily compared. At least such uniform tests should be conducted with the standard crops on the main soil divisions of the country as a whole. For instance, it would be worth an untold amount for the cotton farmers from North Carolina to Texas to be able to know how much fertilizer and what analysis would likely prove most profitable under their peculiar soil and climatic conditions, and to be able to compare the effects of the same analyses used in the same way over this wide stretch of cotton country.

The farmers are entitled to such information for they already are spending millions upon millions of dollars annually for fertilizers that in the main are being used in a most haphazard way. More definite information would be a boon not only to these farmers and to the consumers, but to the manufacturers and dealers in fertilizers.

A movement to bring about this uniformity of fertilizer tests already has been started in several states. It cannot be brought about too soon.

"Do We Need More Farm Land?

The recent publication of an address by Dr. O. E. Baker, Senior Agricultural Economist, Division of Land Economics, United States Department of Agriculture, given at an Agricultural Extension Conference at the University of Minnesota, contains some facts and conclusions which are of exceptional interest. We who have been wondering about agricultural production, consumption, population, and other factors which will determine the future of our agricultural industry, will find that Dr. Baker has as keen an insight, on what is to happen in the next ten years at least, as can be found anywhere.

In considering the changes in agricultural production since The World War, as a basis of what to expect, Dr. Baker compared the five-year period 1917-1921 with the period 1922-1926. He found an aggregate increase in agricultural production of 13.5 per cent, that is, population increased from 100 to 108, agricultural production from 100 to 113.5. The increase in production per capita was, therefore, about 5 per cent.

During the Twentieth Century the important changes in consumption have been a decrease in the per capita consumption of cereal foods and an increase in sugar, vegetables, and pork. In general this shift is toward those foods which can be produced in large quantities per acre.

Dr. Baker brings out the fact that the prospects are for a stationary population by the year 2000.

From these facts—the increase in production, change in food habits, and the prospects for a stationary population—it is concluded that the probability of a necessary increase in the acreage of farm lands is limited.

In addition during the next ten years the shift from the use of horses and mules to tractors will continue, releasing more farm land for food crops. The application of science and invention to agriculture appears to be advancing at an accelerating rate, according to Dr. Baker. Nearly all of these improvements promote agricultural production. During the past decade they have provided more food and better food for the increasing population without any increase in crop acreage.

We will not need more land, but what we will need, Dr. Baker says, is a finer classification and utilization of the agricultural acreage which we now have.

The City Farmers

America's largest city is to have its own agricultural fair. The American Institute of the City of New York is announcing its second Children's Fair to be held in October at the American Museum of Natural History.

It is worthy of note that the active interest in agriculture on the part of the children of New York is such that a real agricultural fair can be held. Prizes totaling more than $3,000 will be offered by the Institute for the best displays of work in agriculture, gardening, nature study, conservation, astronomy, geology, physics, and chemistry. All school children 18 years old or under residing in any of the five boroughs of New York City are eligible to enter exhibits.

Last year's fair attracted 3,000 exhibitors, of whom more than 1,000 entered displays of their work in agriculture. The judges considered some of the exhibits better than many to be found at state fairs. Nearly 37,000 people attended the exposition, and a much larger attendance is expected this fall.

The fair, according to L. W. Hutchins, director of the Institute, is designed to focus attention on the sciences and to foster a scientific interest in agriculture, gardening, nature study, and conservation.

Regarding Tourists

We are in the midst of the big tourist season. Just what this means to the different sections of the country is difficult to estimate. From time to time, we see published figures which are startling in their import. Canada has just issued a statement to the effect that tourists from the United States and other countries spent more than 250 million dollars in Canada last year. Various checks are being kept in the United States and some of these figures when published will seem almost unbelievable.

The tourist trade which has developed with the automobile has assumed a great industrial importance. Added to the monetary benefits derived in entertaining visitors, there has sprung up in communities a natural pride in making most attractive the points of interest which they can offer. Evidence of the realization of the value of the tourist trade is seen everywhere in large sums spent on highways, camps, and in advertising.

While we may feel that we are not directly benefited, it does not take much speculation to see the effect of this increasing number of visitors upon our community. We cannot be blind to a feeling of pride that outsiders are interested in our surroundings. This is a healthy stimulation to our social and economic life which should be welcomed generally. Let us do what we can to encourage tourist trade.

The Farm Board on the Air

Secretary of Agriculture Arthur M. Hyde has inaugurated a new farm radio hour. We are pleased to note that among other important subjects which will go to make up this program, the actions of the new Farm Board will be given.

Interest in every move of the Board is rife and all "agricultural eyes" are turned on it. Now it will be possible for all ears to be opened to listen for advices and decisions from this group of experienced men who have undertaken the solving of agriculture's difficulty.

"We aim to give you in these daily broadcasts the day-to-day agricultural facts with only such interpretation as will make them of the most practical value," said Secretary Hyde. "The problems that confront agriculture are real problems—taxation, land policy, farm credit, freight rates, roads, waterway development, cooperative marketing, and agricultural surpluses. They can be solved only on the real basis and in harmony with the economic laws which control prices.

The American people are now embarking upon a new enterprise—the organization of agriculture for self-help. For its success, every individual, whether farmer or not, must know why the action of the new Farm Board is taken. Therefore, the department will try to keep the public, both urban and rural, informed. A clear understanding of the problems of farming is vital in showing the national necessity for solving them."

Secretary Hyde concluded his remarks by saying, "The Department of Agriculture does not intend to try to run your business. We intend merely to place the facts before you for your reasoned decision."

When Cows Walk—

Back in the days of '49, a 1,200 mile westward trek of a little milch cow trailing along behind a covered wagon would have occasioned no comment. But in this, the motor age, the "hike" of two Ayrshire cows from Brandon, Vermont, to the National Dairy Exposition to be held in St. Louis, Missouri, on October 12, is giving rise to more publicity than even the directors of the breed association anticipated.

Tomboy and Alice, the two pedigreed red-and-whites, are patiently doing about twelve miles a day, catching their cuds along the roadside, and filling the pails at milking time, to make probably the first "long-distance" record in the dairy world. They already have passed through many New York State towns where they were the center of admiring and wondering groups. They are being directed by two attendants in white suits, who are using a motor "chuck" house as their dairy, advertising office, and headquarters.

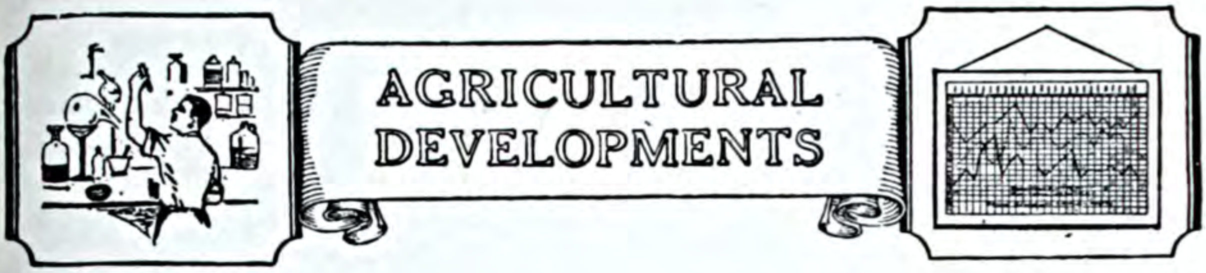
The cows are on official test. It is probable that whatever record they make will help to further prove the hardiness and stamina of the Ayrshire. We hope the cows do well, and that they won't have to walk home.

Alumni Picnics

The agricultural alumni of Purdue University, Lafayette, Indiana, have a novel way of keeping in touch with one another. This summer a series of eight picnics were planned in as many districts throughout the State, to which invitations were extended not only to the agricultural alumni and former students in the vicinity, but to the general alumni faculty, and students of the entire university.

Enjoyable programs were worked out by the committee, and each picnic was designed to be a gala reunion for Purdue alumni, with a fried-chicken basket dinner the big feature of the day. Prizes were provided for competitions, which included baseball, swimming, fishing, horseshoe pitching, along with many impromptu stunts. Dean J. H. Skinner of the Purdue School of Agriculture and director of the Agricultural Experiment Station, as well as many other prominent members of the faculty, attended several of the picnics.

Such get-togethers ably serve to promote a common interest in a community and are a big help in fostering the germ of cooperation. Other agricultural colleges might well consider the regional alumni picnic.



By P. M. Farmer

CUT CEDARS THREE MILES FROM APPLES

Apple trees will not remain free of rust if grown less than three miles from cedar trees. This has been shown through experiments by Dr. M. J. Giddings of the College of Agriculture, University of West Virginia. The rust gradually dies out after the elimination of the cedars. In check regions nearby the disease remained highly prevalent. The distance the rust spores are carried depends to a considerable extent upon prevailing winds and upon the number of cedar trees. Spores are carried farther from trees on hills. Apple trees are most susceptible to rust infection during a lull in a rain or immediately after a rain when the temperature is between 60 and 70 degrees.

MINERALS FOR STEERS

Minerals have long been recommended for hogs, and now comes John M. Evvard, well-known experimentalist of Iowa State College, Ames, with the assertion that he and his associates have found steers getting minerals do much better than those without. A mixture of bonemeal, limestone, and potassium iodide has increased the price from four to five dollars per steer in every instance, even though each steer received only an ounce of the mineral mixture daily. This addition to the ration has paid even when the ration was exceptionally good. Legume hay was fed in all cases, but even good alfalfa as the sole roughage did not remove all the advantage of mineral feeding. This year the work was varied somewhat and in one case bonemeal alone was added, in another bonemeal and limestone, and another bonemeal and limestone with potassium iodide. Also, in one lot baking soda was added to the three-part mixture fed; in another iron oxide or common rust was added; and in another copper-carrying compounds; and in still another kelp or seaweed. Reports to date show that the steers getting the iron oxide in their ration look exceptionally good.

FARM LIKE FACTORY

American agriculture is rapidly going onto an industrial basis and is now undergoing a revolution as important in its way as the industrial revolution in America, said Dr. Henry G. Knight, chief of the Bureau of Chemistry and Soils, before the Institute of Public Affairs and Foreign Relations, in session recently at the University of Georgia. He spoke of painful adjustments in agriculture, but predicted an inevitable trend toward a brighter future for the American farmer. Speaking of soils, he said: Soil erosion is chief among liabilities of Georgia farmers. He outlined the nation-wide program of soil erosion prevention for which Congress has appropriated \$160,000 and pointed out that the decrease of 5,000,000 acres in Georgia's cultivated farm land since 1910 and the increase from \$71 to \$100 per farm expended for fertilizer since that time are due in part to the loss of the fertile topsoil and the exposure of vast areas of subsoil. The time has come to select special soils for special crops and to recognize the fact that Georgia and other states of the Southeast cannot compete on an equal basis in cotton production with the newer level lands and farm machinery of the Southwest, except by growing higher grade, long staple cotton and that only upon those types of soil to which cotton is best adapted.

ROUGE FOR TOMATOES

Tomatoes are not blushing so well as formerly, or at least they are not blushing well enough to suit the market. But Dr. R. H. Harvey, agricultural botanist of University Farm, St. Paul, Minnesota, has come to the rescue with a process on which he has been granted a patent. He uses ethylene gas. All that is needed is a suitable room and a tank of the gas equipped with a simple flow meter. The gas treatment amounts to about 40 cents to $1.00 a carload. Ethylene gas is inflammable in high concentrations, but there is no danger if fire is kept away from the tank while the gas is being liberated in the room. The dilution in which it is used on tomatoes is many times beyond the combustion point.

IMITATION CHINESE

The Caucasian may now easily and quickly acquire an Oriental complexion. All that is necessary is to keep up a strong appetite for carrots. The American Medical Association received a report of a person thought suffering from jaundice who was found to have eaten a large bowl of carrots every day for three months. The coloration is said to be harmless and the carotinemia disappears rapidly when carotin-containing foods are removed from the diet.

Perhaps a strong ration of carrots and almonds would turn out a good imitation Chinese.

AXE INSTEAD OF WORM

Illinois poultry flocks are suffering from the axe, says the poultry extension specialist of the College of Agriculture. The spring cockerels that grow the fastest, he says, are usually the ones that are sold. They are killed as broilers because they are the first ones in marketable condition. This is a bad practice, says the specialist, because these vigorous birds should be kept for breeding purposes. The slower developers literally save their necks by being some distance back from the head.

HOLD IT!

Nowadays everyone is looking for new ideas to use in carrying on the fight against soil erosion. The importance of the problem is getting, at least in a measure, the attention it deserves. Suggestions are coming from all directions, and the result will be less mud in the Mississippi and all other streams. Oklahoma brings up Bermuda grass as the best for permanent erosion control in that state, and no doubt the same applies in many other parts of the South. The agronomist at the A. & M. college says that Johnson grass is not to be recommended as a rule as it is generally limited to the more fertile soils and classed as a noxious weed. It will control erosion, he says, but it is adapted to soils which have no particular need of such control. Orchard grass does well in the eastern part of the state and on more fertile soils but does not yield well on thin land. Redtop has given good results in northeastern Oklahoma but is adapted to low, wet, soils. Timothy, tall oat grass, Kentucky bluegrass, meadow fescue, perennial and Italian rye, Dallis grass, and rescue grass are not so valuable where erosion is a serious factor. The native grasses which aid in combatting erosion are often abused by overgrazing. Native grass seed germinates poorly, says the agronomist, and is hard to establish on soil that has been under cultivation.

Foreign and International Agriculture

Bulgarian Agriculture

By Edwin Losey

Ames, Iowa

WITH the strongest Agricultural Party in Europe and with more than 75 per cent of her 5,500,000 people engaged in agriculture, Bulgaria has an agricultural problem that is almost equal to that of the American farmer. The Bulgarian peasant, like the American farmer, is having difficulty in securing a fair profit from the sale of his products. While Bulgaria's export of grain nowhere equals that of the United States, there is the problem of the disposition of a surplus, especially of wheat, yet in many ways the Bulgarian peasant is making greater strides than the American farmer toward relief.

Emerging from the strife and turmoil of the World War the Agricultural Party, according to Matey Alexieff,* Bulgarian student at Iowa State College, rapidly assumed the leading political force in the economic development of the state. While not disposing of the king, the party ignored him and proceeded to establish farm relief measures that bid fair to rival any plan adopted for the American farmer.

Agricultural syndicates were established all over the country to handle the peasants' grain. These syndicates correspond to our cooperative systems and carry on their business in practically the same way. The grain is brought into wholesale and storage houses at concentration points and held until the economists who are the leaders in the country consider the export price sufficient to allow a legitimate profit. These syndicates also serve as purchasing agents for the peasants, buying the machinery and materials needed on the farms.

Unlike the American farmers, the peasants are more extreme in their cooperation measures. Since most of the farms are small and the operators live

This typical Bulgarian peasant has paused to rest his oxen.

in villages and operate the land outside, all machinery is more or less common property. No one peasant being able to purchase the needed equipment, the syndicates place enough machines in a village to insure use by everyone. These machines are usually binders and threshing rigs. The threshing rig is used extensively, since wheat is the principal crop. Binders are not numerous, and most of the cutting is done by the old family cradle. The seed is still broadcast. The plowing and tilling are done with oxen or the Bulgarian buffalo and with crude wooden or small modern plows. Also unlike the farmers of America, the peasants rely upon their own families to do the work. Everyone above seven years of age works—men, women, and children. Grandfather, grandmother, and youngest grandson take their place in the fields.

Extension work is still in its infancy in America, and in Bulgaria it could hardly be called that, although it has progressed in greater strides than in America considering the length of time in use. The Agricultural Party greatly increased the establishment of agricultural schools throughout the country and was aided by the government when that body established a Minister of Agriculture.

The Bulgarian schools, like the agricultural schools of America, have their experimental farms and stations, and by bulletins and demonstrations, fairs and exhibitions carry on extensive extension work throughout the rural communities.

The Agricultural Party also took over the banking system that the government had started in the National Agricultural Banks and extended the credit supply to the needy peasants. These banks are located in the principal cities and through the agricultural syndicates finance the peasants in their agricultural operations. It is from these banks that the syndicates secure their money to purchase and place the machinery in the villages.

Like the early development of schools and agricultural colleges and work in America, the Bulgarians have devoted little time or money toward education of their farm women and concentrate upon the agricultural development of the farming communities.

The Value of a Toad

From the Porto Rico Agricultural Experiment Station

Throughout the realm of animal life we live upon each other. One kind keeps another in check by preying upon it. When an animal increases to an extent to hinder the development of another, certain checks operate to curb it and limit its numbers. The greater in size or stronger may attack the lesser or weaker and we call it preying, or it may be the other way around and the weaker attack the stronger living upon it and sometimes carrying a disease to weaken or destroy it.

In keeping down insects that might destroy us or our food crops, we introduce fungus or parasitic diseases or another insect or animal that will devour them outright. If these insects work at night, we should seek those to prey upon them that find their food in the darkness.

(*Turn to page 53*)

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 problem of fertilizing cotton is of great importance in all of the cotton states, especially those east of the Mississippi river, and this subject is receiving very careful consideration. Circular No. 83 by C. B. Anders, recently published by the Mississippi Experiment Station, takes up some of the most important questions that arise and answers them from results obtained in practical tests conducted by several experiment station workers in the state. The question and answer method of making fertilizer recommendations easily understood is a novel way of putting over this information. Farmers and agricultural workers should be interested in studying this publication.

The Maryland Experiment Station in Bulletin No. 300, by L. B. Broughton, H. L. Marshall, and N. C. Thornton, presents results of a three-year intensive study of potash from Industrial Alcohol (vegetable potash) as compared with the ordinary commercial sources of potash under both greenhouse and field conditions with tomatoes, Irish potatoes, sweet potatoes, tobacco, and wheat. The experiments show the vegetable potash to be superior for all of these crops, except wheat where little or no increase in yield or quality was recorded. Vegetable potash contains approximately 35 per cent of water soluble potash, 40 per cent of which is in the form of sulphate, 40 per cent in the form of muriate, and from 10 to 20 per cent in the form of carbonate. The alkaline reaction of this material frequently results in the reversion of the phosphoric acid in a fertilizer mixture. Experiments show that the best results are obtained when the alkaline content of the fertilizer mixture is kept low. To accomplish this, it is necessary to secure from ½ to ¾ of the potash from muriate, the remainder from vegetable potash. One important observation in this study is that the use of tankage for supplying about 1/3 of the required ammonia apparently overcomes the tendency of the vegetable potash to cause phosphoric acid reversion.

"Fertilizer Experiments with Cotton," Agr. Exp. Sta., Auburn, Ala., Bul. 228, Feb. 1929, J. T. Williamson.

"Fertilizer Experiments with Truck Crops in Southern Illinois," Agr. Exp. Sta., Urbana, Ill., Bul. 319, Feb., 1929, J. W. Lloyd.

"Analyses of Commercial Fertilizers and Ground Bone; Analyses of Agricultural Lime, 1928," Agr. Exp. Sta., New Brunswick, N. J., Bul. 481, Dec., 1928, Chas. S. Cathcart.

"Fertilizer Registrations for 1929," Agr. Exp. Sta., New Brunswick, N. J., Bul. 482, Jan., 1929, Chas. S. Cathcart.

Soils

In Circular No. 342 of the Illinois Experiment Station, the authors, L. H. Smith and F. C. Bauer discuss in a most interesting manner "Caring for the Fertility of Illinois Soils." The Illinois system of soil fertility, according to the authors, involves provision for a permanent as well as a profitable agriculture. This calls for a program of soil management which recognizes the necessity of maintaining good physical condition, favorable biological activity, suitable soil reaction, and an adequate supply of available plant food elements throughout the growing season. It emphasizes particularly the law of the minimum, that is, that no benefit can result from the application of a given plant food element unless the need for that element is a limiting factor in plant growth.

Realizing that few reliable data are at hand upon which to base recommendations for the use of fertilizer, the Experiment Station is making an effort to procure more information. Experiments during the past year have been considerably expanded so that they include not only work on most of the old established soil fields, but are supplemented by a series of cooperative experiments with farmers. Of particular interest is the appeal to farmers to determine their individual fertilizer needs by actual trial.

"Soil Reaction and Liming as Factors in Tobacco Production in Connecticut," Agr. Exp. Sta., New Haven, Conn., Bul. 306, Apr., 1929, M. F. Morgan, P. J. Anderson, and Henry Dorsey.

"Crop Yields from Illinois Soil Experiment Fields in 1928, Agr. Exp. Sta., Urbana, Ill., Bul. 327, May, 1929, F. C. Bauer.

"Soil Survey Bishop Area, California," U. S. D. A., Washington, D. C., No. 3, Series 1924, E. B. Watson and R. Earl Storie.

"Soil Survey the Hollister Area, California," U. S. D. A., Washington, No. 20, Series 1923, Stanley W. Cosby and E. B. Watson.

"Soil Survey of Minidoka Area, Idaho," U. S. D. A., Washington, D. C., F. O. Youngs, Mark Baldwin, A. J. Kern, and G. R. McDole.

"Soil Survey of Lawrence County, Indiana," U. S. D. A., Washington, D. C., W. E. Tharp, T. M. Bushnell, J. E. Adams, A. T. Wiancko, and S. D. Conner.

"Soil Survey of Monroe County, Indiana," U. S. D. A., Washington, D. C., T. M. Bushnell, Earl D. Fowler, A. T. Wiancko, and S. D. Connor.

"Soil Survey of Iowa Harrison County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Report No. 55, W. H. Stevenson, P. E. Brown, T. H. Benton, L. W. Forman, and H. R. Meldrum.

"Soil Survey of Iowa Plymouth County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Report No. 54. W. H. Stevenson, P. E. Brown, D. S. Gray, L. W. Forman, and H. R. Meldrum.

"Soil Survey Worcester County, Maryland," U. S. D. A., Washington, D. C., No. 11, Series 1924, S. O. Perkins and S. R. Bacon.

"Soil Survey Hillsdale County, Michigan," U. S. D. A., Washington, D. C., No. 10, Series 1924, J. O. Veatch, James Tyson, P. R. Biebesheimer, and J. W. Moon.

"Soil Survey of Macomb County, Michigan," U. S. D. A., Washington, D. C., Robert Wildermuth, J. W. Stack, and J. O. Veatch.

"Soil Survey of Ogemaw County, Michigan," U. S. D. A., Washington, D. C., J. O. Veatch, L. R. Schoenmann, G. L. Fuller.

"Soil Survey of Jackson County, Minnesota," U. S. D. A., Washington, D. C., M. W. Beck, J. Ambrose Elwell, J. S. Hall, and G. B. Bodman.

"Soil Survey Harrison County, Mississippi," U. S. D. A., Washington, D. C., No. 7, Series 1924, Robt. Wildermuth, J. Ambrose Elwell, B. H. Williams, A. L. Gray, J. A. Kerr, M. J. Edwards.

"Soil Survey of Perry County, Mississippi," U. S. D. A., Washington, D. C., E. Malcolm Jones, J. A. Kerr, S. B. Cole, and E. P. Lowe.

"Soil Survey Lawrence County, Mississippi," U. S. D. A., Washington, D. C., No. 34, Series 1923, A. T. Sweet, Howard V. Jordan.

"Soil Survey Buffalo County, Nebraska," U. S. D. A., Washington, D. C., No. 12, Series 1924, F. A. Hayes, A. N. Huddleston, M. H. Layton.

"Soil Survey of the Moapa Valley Area, Nevada," U. S. D. A., Washington, D. C., F. O. Youngs and E. J. Carpenter.

"Soil Survey of Green County, North Carolina," U. S. D. A., Washington, D. S., S. O. Perkins and H. G. Lewis.

"Soil Survey of Clermont County, Ohio," U. S. D. A., Washington, D. C., Arthur E. Taylor, Ivan Hodson, G. W. Conrey, William Craig, B. D. Morgan.

"Soil Survey of Fulton County, Ohio," U. S. D. A., Washington, D. C., Arthur T. Taylor, R. A. Winston, G. L. Fuller, and G. W. Conrey.

"Soil Survey of Polk County, Oregon," U. S. D. A., Washington, D. C., E. F. Torgerson, Chas. Hartmann, Jr., E. J. Carpenter, and W. G. Harper.

"Soil Survey Walworth County, South Dakota," U. S. D. A., Washington, D. C., No. 33, Series 1923, J. A. Machlis and G. A. Larson.

"Soil Survey of Harris County, Texas," U. S. D. A., Washington, D. C., H. V. Geib, T. M. Bushnell, and A. H. Bauer.

"Soil Survey (Reconnaissance) of West-Central Texas," U. S. D. A., Washington, D. C., W. T. Carter, M. W. Beck, W. W. Strike, B. H. Hendrickson, R. E. Devereux, H. W. Hawker, and H. V. Geib.

"Soil Survey of Green Lake County, Wisconsin," U. S. D. A., Washington, D. C., W. J. Geib, A. C. Anderson, E. H. Bailey, M. J. Edwards, Homer Chapman, Oscar Magistad, F. J. O'Connell, T. J. Dunnewald, and Kenneth Whitson.

"Soil Survey of Green County, Wisconsin," U. S. D. A., Washington, D. C., W. J. Geib, A. C. Anderson, F. J. O'Connell, T. J. Dunnewald, M. J. Edwards, Walter Vosquil, and Kenneth Whitson.

Crops

The June issue of the Journal of the American Society of Agronomy is devoted entirely to the subject of pasture management research. Farm management specialists, economists, animal nutrition specialists, agronomists, and others interested in the big problem of pasture research met December 28, 1928, at Columbia University to discuss this important problem. The papers presented at that time resulted in bringing together in most interesting form a vast amount of data which should prove most helpful to students and investigators interested in better utilization of our pasture lands.

Also among the new publications to be listed under this section will be found several reports of experiment stations which give concise summaries of the important work. It is well worth the time of agricultural scientists to carefully look over these reports.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVIII, No. 5, May, 1929.

"Report of the Director for the Year Ending October 31, 1928," Agr. Exp. Sta., New Haven, Conn., Bul., 298, Dec., 1928, Wm. L. Slate.

"Cotton Variety Test, 1928," Agr. Exp. Sta., Experiment, Ga., Cir. 83, Jan., 1929, H. P. Stuckey.

"Strawberry Club Manual," Agr. Exp. Sta. Urbana, Ill., Cir. 339, May, 1929, A. S. Colby.

"The Forty-first Annual Report of the University of Maryland," Agr. Exp. Sta., College Park, Md., H. J. Patterson.

"Physiological Shrinkage of Potatoes in Storage," Agr. Exp. Sta., College Park, Md., Bul. 308, Dec., 1928, C. O. Appleman, W. D. Kimbrough, and C. L. Smith.

"Artificial Ripening of Fruits and Vegetables," Agr. Exp. Sta., University Farm, St. Paul, Minn., Bul. 247, Oct., 1928, R. B. Harvey.

"Reed Canary Grass," Agr. Exp. Sta., University Farm, St. Paul, Minn., Minn. Bul. 252, March, 1929, A. C. Arny, M. C. Hansen, R. E. Hodgson, and G. H. Nesom.

"Regional and Seasonal Distribution of Moisture, Carbohydrates, Nitrogen, and Ash in 2-3 Year Portions of Apple Twigs," Agr. Exp. Sta., University Farm, St. Paul, Minn., Hamilton Paul Traub.

"Corn Seed Treatment Experiments," Agr. Exp. Sta., A. & M. College, Miss., Cir. 81, Dec., 1928, H. H. Wedgworth, E. B. Ferris, H. F. Wallace, and H. A. York.

"Cotton Varieties," Agr. Exp. Sta., A. & M. College, Miss., Cir. 82, Dec., 1928, J. F. O'Kelly and W. W. Hull.

"Report of Raymond Branch Experiment Station, 1928," Agr. Exp. Sta., A. & M. College, Miss., Bul. 262, Dec., 1928, H. F. Wallace and J. L. Cooley, Jr.

"Report of Holly Springs Branch Experiment Station, 1928," Agr. Exp. Sta., A. & M. College, Miss., Bul. 264, Dec., 1928, C. T. Ames and Otis B. Casanova.

"Growing Satsuma Oranges in South Mississippi," Agr. Exp. Sta., A. & M. College, Miss., Bul. 265, Dec., 1928, W. S. Anderson.

"Report of the South Mississippi Branch Experiment Station for 1928," Agr. Exp. Sta., A. & M. College, Miss., Bul. 266, Dec., 1928, W. R. Perkins, W. S. Anderson, and W. W. Welborne.

"Spring Grains in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Bul. 473, Oct., 1928, H. B. Sprague and E. E. Evaul.

"A Device for Determining the Texture of Peach Fruits for Shipping and Marketing," Agr. Exp. Sta., New Brunswick, N. J., Cir. 212, Feb. 1929, M. A. Blake.

"A Standard for Estimating the Twig Growth of One-Year-Old Peach Trees," Agr. Exp. Sta., New Brunswick, N. J., Bul. 475, Dec., 1928, M. A. Blake and G. W. Hervey.

"Nitrate Assimilation by Asparagus in the Absence of Light," Agr. Exp. Sta., New Brunswick, N. J., Bul. 476, Dec., 1928, G. T. Nightingale and L. G. Schermerhorn.

"Seedling Fruit Stocks," Agr. Exp. Sta., Geneva, N. Y., Bul. 569, Apr., 1929, H. B. Tukey.

"Fifty-first Annual Report of the North Carolina Agricultural Experiment Station," State College Station, Raleigh, N. C., R. Y. Winters.

"Williston Substation Report," Agr. Exp. Sta., Fargo, No. Dak., Bul. 227, May, 1929, E. G. Schollander.

"Wheat Growing in Ohio," Agr. Col. Ext. Serv., Columbus, Ohio, Bul. 81, 1928-29, Earl Jones.

"Fruit Varieties in Ohio, IV—Crab Apples," Agr. Exp. Sta., Wooster, Ohio, Bul. 434, Apr., 1929, C. W. Ellenwood.

"Investigations Relating to the Handling of Sweet Cherries," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 247, May, 1929, Henry Hartman and D. E. Bullis.

"Tests of Small Spring Grains," Agr. Exp. Sta., State College, Pa., Bul. 234, Nov., 1928, Chas. F. Noll and C. J. Irvin.

"Sudan Grass for Hay, Seed, and Pasture," Agr. Exp. Sta., College Station, Tex., Bul. 396, Apr., 1929, R. E. Karper, J. R. Quinby, and D. L. Jones.

"Annual Report of the Virginia Polytechnic

Institute," Agr. Exp. Sta., Blacksburg, Va., A. W. Drinkard, Jr.

Economics

With the increased commercialization and specialization of agriculture, credit has become of greater importance in farming operations. Technical Bulletin 55, "The Agricultural Situation in Minnesota," by B. M. Gile and J. D. Black, of the Minnesota Agricultural Experiment Station, is a study of the credit situation in this state. The recent failures in banks in rural areas emphasize the importance of special studies of rural credit.

"An Economic Study of 93 Apple Farms in Oxford County, Maine, 1924-27," is the title of a new bulletin No. 347, by the Maine Experiment Station. Charles H. Merchant, the author, among other things in his study, shows that for the three years the average inome was $553. When interest on the average investment of $7,592 at 5 per cent ($380) was deducted, the average labor income was about $173. The apple receipts per farm averaged $725 or 27 per cent of the total receipts.

"Facts and Problems of Farm Credit in Craighead County, Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 233, June, 1929, Arthur N. Moore and C. O. Brannen.

"The Watermelon Industry of Georgia," Ext. Div., Col. of Agr., Athens, Ga., Bul. 369, J. William Firor.

"The Taxation System of Kansas," Agr. Exp. Sta., Manhattan, Kans., Cir. 144, Mch., 1929, Harold Howe.

"The Manufacture and Distribution of Tomatoes, Sweet Corn, and Peas in Maryland," Agr. Exp. Sta., College Park, Md., Bul. 301, W. J. Hart.

"An Economic Study of the Production of Tomatoes in Maryland," Agr. Exp. Sta., College Park, Md., Bul. 304, Mch., 1929, Wm. Paul Walker.

"What Does it Cost to Grow a Bushel of Apples?" Agr. Exp. Sta., Wooster, Ohio, Bul. 435, May, 1929, F. H. Ballou.

"Cost and Efficiency in Producing Alfalfa Hay in Oregon," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 241, Dec., 1928, H. E. Selby.

"Profitable Farming Systems on Dark Tobacco Farms," Va. A. & M. College, Blacksburg, Va., Bul. 112, Mch., 1929, A. P. Brodell, C. C. Taylor, and H. E. McSwain.

Insects

"The Relation of Woolly Apple Aphis to Perrenial Canker Infection with Other Notes on the Diseases," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 243, May, 1929, Leroy Childs.

"Spraying Experiments for Codling Moth Control," Agr. Exp. Sta., Pullman, Wash., Bul. 232, Mch., 1929, Anthony Spuler.

Diseases

Testifying to the importance which mosaic is assuming as a major crop disease, we find it discussed in five of the bulletins on diseases which have come to hand this month. Agricultural workers and growers who are interested in learning more about mosaic will find these bulletins of value.

"Cotton Wilt Studies—II. Preliminary Studies on Wilt Resistance and on the Effect of Certain Soil Factors on the Development of Cotton Wilt," Agr. Exp. Sta., Fayetteville, Ark., Bul. 234, May, 1929, V. H. Young, J. O. Ware, and George Janssen.

"Effect of the Mosaic Disease on Yield and Quality of Tobacco, With Suggestions for Control," Agr. Exp. Sta., College Park, Md., Bul. 302, Dec., 1928, J. E. McMurtrey, Jr.

"Degeneration Diseases of the Irish Potato in Mississippi," Agr. Exp. Sta., A. & M. College, Miss., Bul. 258, Sept., 1928, H. H. Wedgworth.

"Investigations on Diseases of Vegetable and Ornamental Plants," Agr. Exp. Sta., A. & M., College, Miss., Bul. 261, Nov., 1928, H. H. Wedgworth.

"The Occurrence and Prevention of Calyx Injury to Apples from the Hood River Valley," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 242, May, 1929, Henry Hartman, Leroy Childs, and R. H. Robinson.

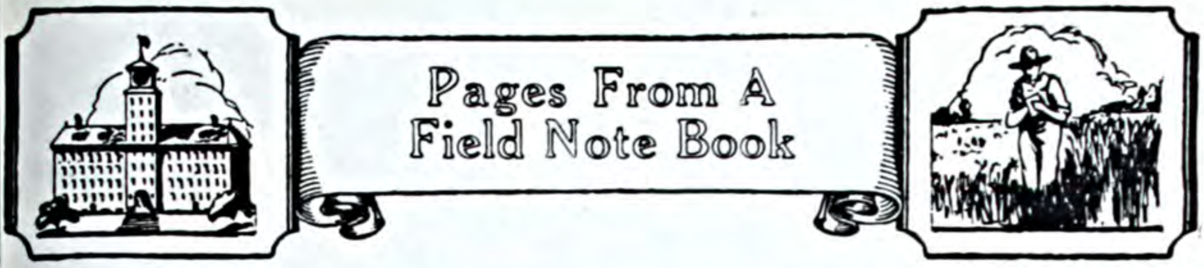
"Four Major Tobacco Diseases in Virginia and Their Control," Va. A. & M. College, Blacksburg, Va., Ext. Bul. 110, Dec., 1928, James Godkin.

"Calcium Sulphide for the Control of Apple and Peach Diseases," Agr. Exp. Sta., Blacksburg, Va., Tech. Bul. 36, Feb., 1929, R. H. Hurt and F. J. Schneiderhan.

"The Classification of Certain Virus Diseases of the Potato," Agr. Exp. Sta., Madison, Wis., Research Bul. 87, Jan., 1929, James Johnson.

Father—"I never kissed a girl until I married your mother. Will you be able to say the same to your son when you become a married man?"

Son—"Not with such a straight face as you can, father."



Orchard Cover Crops

By Wm. L. Teutsch

Assistant County Agent Leader, Oregon Agricultural College

ORCHARD cover crop demonstration tests conducted by county agents in four western Oregon fruit growing counties this year point the way to rebuilding fertility of old orchard soils. In each instance vetch and oats were used as the cover crop, and applications of superphosphate, ammonium sulphate, ammonium sulphate and superphosphate in combination, nitrate of soda, ground limestone, and a complete 5-7-8 were made. Each of these fertilizers was applied at the same dollar's worth per acre, the applications ranging from 150 pounds per acre of the ammonium sulphate to 300 pounds per acre of superphosphate.

In April just before the cover crops were plowed down, the cover crop growth on the various plots was carefully measured. Results were fairly uniform. In three of the four counties sulphate of ammonia gave the largest increase ranging from 235 per cent to 375 per cent over the check which received no treatment. In one county superphosphate and sulphate of ammonia in combination gave the best results with an increase of 335 per cent over the check as compared with sulphate of ammonia alone with a 255 per cent increase. In all demonstrations, however, these two applications gave the best increases.

In many old orchards due to the lack of fertility and low organic matter content it is impossible to grow a cover crop of sufficient size by the time it should be plowed down in the spring to conserve moisture to make it profitable. The use of commercial fertilizer stimulates the growth and after a few years of continued application the fertility is built up to a point where satisfactory cover crops can be grown without the use of the fertilizer.

Top-dressing Cotton

By Charles Kilpatrick

Fort Smith, Arkansas

DECLINING yield in all major farm crops is the one big problem confronting the Oklahoma farmer today. The landowners are becoming vitally interested because farms no longer pay interest and taxes. The tenant is concerned, because it is becoming difficult for him to provide a decent living for his family, educate his children, and lay by a sufficient amount for old age.

The decrease in the productivity of the farms is not because the farmers of today are not as well skilled in farming as they were a few years ago, but in many cases low yields have been due to soil erosion and loss of fertility. The soil has been allowed to wash away, carrying with it organic matter and available plant food. The one-crop system has also played its part.

Jim Littlefield, Braden, Oklahoma, who is president of the Le Flore County Agricultural Advisory Committee, while discussing the problem with Carl West, county agent, last summer, was asked to conduct a demonstration with top-dressing cotton with muriate of potash. Little is known about fertilizers in Oklahoma, but the farmers do know that cotton rust cuts their yield materially. Mr. Littlefield had never used commercial fertilizer, but he agreed to conduct the demonstration.

Mr. West measured off two equal size plots on very uniform land, and to one plot 100 pounds of muriate of potash were applied as a top-dresser at chopping time. On the other plot nothing was applied. Both plots were picked three times, and it was found that the potash increased the yield from 1,164 pounds seed cotton where no fertilizer was applied to 1,372 pounds seed cotton on the fertilized plot, giving him an increase of 208 pounds per acre. Figuring seed cotton at seven cents per pound and the cost of the potash at $2.50 per hundred this gave Mr. Littlefield an increase of $12.06 per acre.

In reporting his observations to Mr. West, Mr. Littlefield said, "Carl I have decided that a farmer must feed his soil before it will feed him." Mr. Littlefield also noticed that the cotton where the potash was applied was healthier, had larger bolls, and was much easier to pick.

The demonstration told the story, yet Mr. Littlefield had supposed that because he had rich bottom land, he did not need to apply any fertilizer.

Better Fibre Flax

By F. L. Ballard

County Agent Leader, Oregon Agricultural College

THERE is an increasing acreage of fibre flax being grown in Oregon. The State Penitentiary has been handling flax for some years, and within the past five years two manufacturing companies have turned to linen production. Farmers in the Willamette Valley are finding fibre flax a fairly satisfactory crop.

Like all other crops newly introduced, it has been somewhat overboomed by promoters with the result that unsuitable lands have been planted and the proper cultural methods have been slighted. When properly grown the crop makes a return somewhat greater than from spring grains which are extensively grown in the Valley.

The secret underlying profits is, of course, length of fibre, and to grow the tallest flax possible is the aim of every well-informed farmer who raises this crop.

Experiments throughout the Willamette Valley bring out clearly that the use of potash increases the length, strengthens the fibre and, therefore, the value of the flax. Even where long fibre is produced naturally as on ıe muck and peat soils, the quality ıd fibre content are low unless potːh is applied. Compared with unːrtilized flax more than three times ; much fibre has been produced by lants grown on these muck soils here potash was used.

Flax responds to long periods of ıylight and good supplemental irrigaon. Early spring planting will usılly bring the period of greatest ːowth within the longest days of the ason.

Clover-sod land, free from weeds, or a good loam soil well supplied with organic matter are most desirable for flax. Full returns from potash fertilizers are realized only when a fair amount of nitrate is present or is artifically supplied. Clover sod most satisfactorily supplies this condition.

For two seasons irrigation was found to increase the length of fibre flax, making the yield 50 per cent greater than on unirrigated plots.

Potash-fed Dahlias

By J. M. Graham

Mt. Holly, New Jersey

WARREN W. MAYTROTT, owner and manager of Dahliaːl Nurseries at Vineland, N. J., says ıat "potash-fed dahlias" is not a ːcret or just a trade name, but a modːn method of growing dahlias, so that ıey are literally alive with energy, aking failure well-nigh impossible. ı fact, Mr. Maytrott believes potash necessary to successful dahlia growːg that he uses the words "Grow Potːh-fed Dahlias" in his trade mark.

He attributes to nitrogen sturdy ːowth above the ground, the production of large bushes and flowers, but states that if nitrogen is used to excess, the vitality of the tubers is lowered and the flowers will be soft, wilting easily.

Phosphorus increases root development and aids in strengthening plant and tuber growth.

Potash balances the other two, gives color to the flower and foliage, and vigor and tone to the plant in general. It aids in the development and maturing of well-nourished tubers.

Hungry Cotton

(*From page* 19)

ed cotton, or an increase of 416 ɔunds of seed cotton per acre.

Figuring seed cotton at seven cents ːr pound and the retail price of potːh at $2.50 per hundred gave Mr. McːNutt an increase of $24.12 per acre.

Mr. McNutt, in submitting this report summed up his demonstration as follows: Cothern, that potash paid better than $5.00 for $1. The bolls were larger and the cotton did not shed so bad. The cotton where I put the potash grew faster and headed the boll-weevils off, and it was easier to pick, too."

Keeping-up With Facts

(*From page* 29)

Lacy has answered this query by providing a monthly mimeographed publication called Agricultural Economics Literature which reviews all important new books on any phase of agricultural economics, gives descriptive notes of all other new books on the subject, mentions all new bibliographies made available by the library, mentions all important articles on agricultural economics chosen criti cally from 103 domestic and 147 fo eign periodicals, and lists the new ec nomic publications issued by any Sta agricultural institution or the Unit States Department of Agricultur She believes in making facts a vit part in the thinking of rural leade and in the action of working farmer

Smut-free Areas

(*From page* 24)

produced about 8,000 bushels of wheat that had less than one per cent of smut. This seed will not be badly smutted because there were no sources of infection. This statement is not based on theory but on actual demonstrations of the use of such wheat in this area. The success of a smut-free area depends on the hearty cooperation of all farmers within it. A single smutted field may ruin the entire project.

In barley smuts, hot water treatment is highly successful. It is possible in this case to eradicate the smut in large areas in two years. By community seed treating in Harrison county, we eradicated practically all smut from barley in the entire count in two years. The loose smut of ba ley does not spread as easily as do the loose smut of wheat. Our exper ences in Indiana show that in close adjacent fields the smut will not spre perceptibly.

A question that is often asked is there is danger of causing smut b spreading infested straw on the fiel meaning, of course, straw that is co ered with smut spores. There is n danger in either wheat or barley fro this procedure, because the smut spor cannot effectually infect the plan after they emerge from the groun After the seedling attains a length about two inches it is immune fro the attack of smut.

Agriculture Today

(*From page* 22)

schedule and for a considerable period of time. The Weather Bureau furnishes the necessary recording instruments with forms upon which to enter the data, and agrees to summarize the daily information into convenient form for conversion into monthly and yearly values, and then into oth forms to show the normal characteri tics of the weather for the particul point of observation.

This force of cooperative and oth observers numbers more than 5,00 persons, the summarized observatio

hese horses and mules took refuge on this mound at Arcola, Mississippi, from the Mississippi flood.

ɩeing distributed for the immediate ɩse of persons interested in the relaion of agricultural production to current weather conditions, and later inorporated into climatic tables for tudy of the possibilities of successful gricultural operations in any part of he country.

"These data," Dr. Marvin says, "can e used successfully by farmers in nany ways. They are valuable in tudying the adaptability of localities o the production of new crops that he experience of other farmers has nown may be grown successfully uner certain known weather conditions. Vith knowledge of the average conitions of a locality, farmers may vary ne time of planting to adjust the eriod of important crop development o the average period in which the eather elements prove most favorable.

"If it is found after a long series of observations that a certain locality shows prevailing early frosts in autumn, farmers may develop quick maturing crops to overcome this condition; on the other hand, should a section show frequent recurring droughts at certain periods of the growing season, farmers may resort to earlier planting dates, or by later planting secure a more favorable period for the important or critical development stages. Similar data for other localities are valuable to farmers who may desire to transfer their operations to other sections of the country by providing the climatic factors necessary to meet the requirements of the crops to be cultivated, or by indicating the possibilities of taking up new lines of farming."

The Value of a Toad

(*From page* 44)

There are four night-feeding incts that are especially destructive in orto Rico: the May bettle (Lachnoerna) and its white grub, the slug snail, the changa or mole cricket, nd the cockroach. These are not so estructive in some other tropical nds as here. The May beetle and the hanga are not considered pests in uba as we find them to be with us. There is some enemy that keeps them in check. I believe it is the toad or frog.

In 1920 we introduced from Barbados the Surinam toad (*Bufo agua*), releasing them at this station. They have increased and spread rapidly so that the western end of the island is well populated with them. They are now being shipped out to other sections of the island. Just how far they have extended naturally it is impossible to say. Planters report greatly decreased depredations of the changa and white grub in this section.

Toads are nocturnal in their habits and burrow in the ground during the day. They are more frequently seen on the roads at night as shown by the lights of passing automobiles and are crushed by the passing cars.

The *Bufo agua* is the largest of the toads and is good for food. It is sometimes called mountain chicken in the Leeward Islands. While promising to be of great benefit to us in keeping in check some of the most destructive insects known in our agriculture, it will also add to our foo supply.

In some countries toads are sold gardeners and greenhouse owners f keeping injurious insects in chec They are long-lived creatures. The is record of one living to the age 36 years. It has been estimated (N ture Library: Frogs—page 84) fro the examination of the stomach co tents that 88 per cent of its food insect pests; that in three months single toad will eat 9,936 injurio insects. Counting the injury to plan prevented by the destruction of th number of insects, the value of a toa is placed at $19.88 per year.

Tobacco

(*From page 27*)

in its production.

Tobacco is cultivated on a wide range of soils, but soil types have an important bearing upon the quality of the tobacco leaf and determine to a large extent its value and use in commerce. While it can be grown almost anywhere in the temperate zones, it tends to be largely localized and it is usually an important cash crop in the areas where it is produced. It prefers a soil of fairly high fertility, and for that reason it is an important consumer of commercial fertilizers which more and more are being employed in its culture.

There are many types of tobacco with varying qualities, but those grown in the United States can be classified under three main heads, the cigar type, manufacturing types, and export types. The cigar type of leaf tobacco is quite largely grown in the northern states, particularly the Connecticut valley, Pennsylvania, Ohio, and Wisconsin. A less extensive production of cigar leaf tobacco also is found in Florida. There are three main types of cigar leaf tobacco, the wrap per type which is grown mostly in th Connecticut valley and in Florida, th binder type which is grown largely i Wisconsin and New York, and th filler type which is grown most ex tensively in Pennsylvania, Ohio, In diana, and Wisconsin.

The manufacturing types vary con siderably, among the best known bein the Burley which centers in the Blue grass region of Kentucky and is grow to some extent also in surrounding ter ritory. Burley is used largely for th manufacture of smoking and chewin tobacco. The Flue-cured type is grow quite extensively in the old seaboar tobacco states of Virginia and th Carolinas. The Flue-cured type is use very largely for cigarette manufactur ing. The Export or Fire-cured type o tobacco is grown largely in Tennesse Kentucky, Maryland, and adjoinin states. This tobacco is very dark i color and for the most part is exporte

As a cash crop, tobacco is of con siderable importance, especially in th eastern states. In 1928 it is estimated that 1,912,000 acres were grown in the United States with an average yield of 964 pounds per acre and a total production of slightly over 1,373,000,000 pounds. The value of the crop last year was estimated at about $254,000,000,000. Normally between 35 and 40 per cent of the tobacco grown in the United States is exported, a very large part of it going to the United Kingdom, Northern Europe, and the Orient, particularly China. North Carolina leads in acreage with 650,000 acres for last year, followed by Kentucky, Virginia, and South Carolina.

Outside of the United States there are a number of tobacco centers, but from the standpoint of total production these are much less important. The leading foreign areas are the East Indies which produce about 11 per cent of the world's total, Russia, Greece, and the Philippine Islands. The total production of these countries and the United States usually aggregates about three-fourths of the world's output, the remainder being scattered widely. Special types of tobacco are produced in a number of minor areas throughout the world and some of these are imported for American manufacture. Probably the best known of these import types are the Cuban leaf tobacco and the Turkish cigarette types.

The Loan Value of Farm Property

(*From page* 10)

lend only 20 per cent on the valuation that you are talking about!"

"But when you stop to consider that in some parts of the country you can find farms with buildings costing from $20,000 to $30,000 to reproduce, and yet which can't be sold—land and buildings—for more than $5,000 to $10,000, you can easily see why we can't lend money on those buildings on the basis of their replacement value," continued Mr. Jones. "Farmers seem to have been caught between a depression in the selling price of the land and an increase in the cost of reproduction of the buildings. And that brings up a point which ought to be considered more carefully nowadays.

"You know we find a lot of farmers who don't think any too much about insurance. Suppose their barns or their houses were to be destroyed by fire and they had no insurance. I can tell you what would happen. The buildings would not be rebuilt, the farms would stand idle or some of the land would be rented out on shares to the neighbors, and the family, if it had escaped an awful death by fire, moved to town.

"Every farmer who borrows money on a mortgage, of course, has to take out some insurance. And it is a mighty good thing they do, for I don't figure that they can afford to carry their own fire hazard. The Federal Land Banks are the greatest repositories of farm insurance policies, along with the mortgages on farms upon which they loan, of any institutions in the world.

"If the farmers only realized that a farm family of 10 persons is burned to death each day of the year and that the total amount of farm fire losses is approximately $150,000,000 each year, they would take all reasonable precaution to prevent fires and think twice before they failed to carry adequate coverage or let their policies lapse through carelessness.

"You know, the Federal Land Banks require that the buildings be covered with insurance to the extent of at least 60 per cent of their appraised value.

"But I'm wandering away from

your original question, or possibly I have answered you by this time," continued the Secretary. "Your land is good enough so that I should think we can lend 50 per cent of its value from an agricultural production standpoint. That would give enough to take up that three-year mortgage of yours that's coming due, and once you have that accomplished you don't need to worry your brain about whether the Department of Agriculture's scientists or statisticians give farmers credit for their food, fuel and shelter in terms of a monetary return or whether they just grant them, so to speak, a good living in addition to their cash returns."

Making Mucks Pay

(*From page* 8)

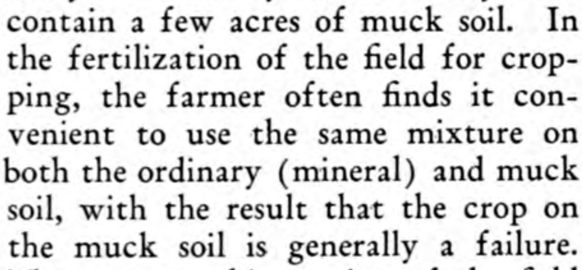
half as much fertilizer can be applied safely in the row as can be applied broadcast.

Adding Potash

The distribution of muck land in the north central states is such that many fields of clay loam or sandy loam contain a few acres of muck soil. In the fertilization of the field for cropping, the farmer often finds it convenient to use the same mixture on both the ordinary (mineral) and muck soil, with the result that the crop on the muck soil is generally a failure. The crop on this portion of the field can be greatly improved by the addition of some potash to make the fertilizer a balanced one for muck soil.

The Ten Commandments for Muck

1. Select a type of muck which is adapted to the crop that you wish to grow.
2. Drain the muck so that the water level during the summer will remain uniformly at a depth best suited to your crop.
3. Keep the soil compact in order to minimize danger from drought and frost.
4. Control the weeds by shallow cultivation while the weeds are small.
5. Protect your crop from possible destruction from windstorms by the planting of windbreaks and strips of grain and by the construction of barriers to break the force of the wind.
6. Do not apply lime in any form unless the muck is low in lime content, as indicated by its very strongly acid reaction.
7. Control disease and insect pests which may otherwise injure and destroy your crops.
8. For good yields and high-quality crops, use a fertilizer high in potash content.
9. To produce a good yield, make an application each year of sufficient fertilizer for the crop to be grown, working the fertilizer into the soil with disc or spring tooth harrow, or placing part of it in the row at least two inches away from the seed.
10. Consult your Agricultural College for the best methods of muck land management for your muck and your crop.



Yields Per Acre
8,232.2 lbs. 4,545.5 lbs. 10,247.0 lbs.

EFFECT OF APPLICATION OF POTASH ON YIELD OF CROPS AS DETERMINED BY THE MICHIGAN STATE EXPERIMENT STATION

Year of test	Location and soil	Crop	Fertilizer formula and pounds per acre	Yield per acre	Increase due to potash	Cost of producing each unit of increased yield*
4-year average 1922-1925	Eaton Co., Michigan Deep muck	Potatoes	0-0-25 @ 600 No fertilizer 0-8-25 @ 600 0-8-0 @ 600	232 bu. 95 bu. 342 bu. 82 bu.	137 bu. 260 bu.	10.9 cents per bu. 5.8 cents per bu.
3-year average 1925-1927	Ingham Co., Michigan Deep muck	Onions	0-0-25 @ 1,000 No fertilizer 0-12-25 @ 1,000 0-12-0 @ 1,000	131 bu. 53 bu. 482 bu. 103 bu.	78 bu. 379 bu.	16.0 cents per bu. 3.3 cents per bu.
1921	Berrien Co., Michigan Deep muck	Stock carrots	0-0-50 @ 200 No fertilizer	22.5 tons 6.1 tons	16.4 tons	30.5 cents per ton
1924	Ingham Co., Michigan Deep muck	Sugar beets	0-0-50 @ 300 No fertilizer	10.0 tons 3.6 tons	6.4 tons	$1.17 per ton
2-year average 1923-1924	Ingham Co., Michigan Deep muck	Timothy and alsike clover	0-0-50 @ 300 No fertilizer	2.3 tons 1.0 tons	1.3 tons	$5.77 per ton
1921	Lapeer Co., Michigan Deep muck	Corn	0-0-50 @ 200 No fertilizer	77.0 bu. 9.7 bu.	67.3 bu.	7.4 cents per bu.

* Calculated on basis of $50.00 per ton for muriate of potash.

Ohio

(*From page* 16)

eed, in addition to the usual broadcast application of manure or fertilizer, is proving highly profitable in hastening maturity and increasing yields. Fertilizer drilled separately in advance of the wheat has not given as large yields as the same amount drilled in with the seed in the ordinary way.

The order of the crops in rotation has affected the crop yields as shown by the 13-year average of 40 different rotations. Wheat, for instance, has invariably given the largest yields after potatoes, followed in order by wheat after red clover, oats, corn, and soybeans.

The Station maintains an experimental herd of about 90 purebred Holsteins and Jerseys, a herd of 70 Aberdeen Angus, and feeds 100 or more western range calves each year. Fifty to sixty Duroc-Jersey brood cows at the Station, and as many more on the county experiment farms, with their annual and semi-annual litters are used in the experiments in pork production. About 1,500 sheep, mostly purebred Merinos, are kept for breeding, feeding, wool-production, and parasite experiments.

Experimental lots of White Leghorns are maintained on several of the farms to supplement extensive work at the Station poultry plant. The interest in the Station work is shown by the fact that the poultry division alone answered more than 6,000 inquiries in 1928.

From the beginning, work in disease and insect control has kept pace with other activities of the Station. In 1889 the Agricultural Scientist stated that the idea of combining insecticides and fungicides probably originated with the entomologists and Botanists of the Ohio Station. Be that as it may, they have had some share in the control of Hessian fly, San Jose scale, smuts of wheat and oats, apple scab, and many other enemies.

The Station has always been quick to meet new enemies in the field. The European corn borer, for instance, had no sooner entered the State than the best available trained specialists were sent into the infested areas with well equipped laboratories and ample means to study the pest and investigate possible methods of control. A farm near Toledo, in what has since become the most heavily infested area of the State was leased for experimental purposes. In February, 1929, the Station published a monograph bulletin of 19 pages on the "European Corn Borer and Its Environment," embodying the results of the work of 16 entomologists, agronomists, botanists, soil specialists, and agricultural engineers who are cooperating in the investigation.

The Horticultural and Forestry departments have done work as creditable and important as any mentioned. Three new departments—Rural Economics, Home Economics, and Agricultural Engineering—were organized as a result of the Purnell Act. By arrangement with the State University the heads of these departments in the University became chiefs of the Experiment Station departments and give part time to directing the research and experimental work. In all, the 10 departments maintain a scientific staff of 125 members.

The Last Battle

(*From page* 18)

The possibility of using all corn stalks for making wall board may be further developed and thus give to the man the advantage in the fight by completely removing from all fields the last possible refuge of the borer.

The potato crop furnishes a large supply of human food. There are at least 16 different groups of insects that compete with man for this article of food. These combined enemies of man take an enormous toll from the potato crop valued at many millions of dollars annually. Much of the toll also is taken by insects which are difficult or impossible to control, such as flea beetles, aphids, leaf-hoppers, tuber moths, and the eel-worms. The insect enemies that attack the potato which are capable of control cause man a considerable loss in the defensive warfare he must constantly wage. In some cases spraying with arsenic compounds is effective, but during certain years the grower is forced to spray at least 16 times during a single season to protect his crop!

The flea beetle is a small, black

jumping beetle about one-sixteenth of an inch in length. The mature beetle eats small holes in the potato leaf, working from the under side. It thus is extremely difficult to control by the use of sprays of any kind. The eggs of the beetle are laid in the rubbish of the field and when hatched the larvae feed upon the underground portion of the plant including the tubes. Again man has dug in for a prolonged fight with this small insect. By using clean methods of cultivation and various devices for trapping the insect, a small measure of control is obtained.

The leaf-hopper has been known since 1853. It is a small, pale green insect about one-eighth of an inch long, with wings which fold over the back. It is very active and will jump and fly away on the slightest disturbance. It attacks the leaf of the potato plant causing shriveling and burning, thus reducing the yield of tubers. In many cases it destroys 50 per cent of the potato crop. On account of its active nature and the rapidity of reproduction, it is extremely difficult to control.

The eel-worm, while not strictly speaking an insect, is a very close ally. It attacks other members of the vegetable kingdom as well as the potato. It is widely distributed in the potato growing areas of America and does enormous damage every year. It attacks the roots and tubes, causing enlargements on the roots and making the tuber unsightly and of poor quality. Man is practically helpless against this enemy. He must give up growing potatoes where the eel-worm is present and attempt to grow other crops which it will not attack! Clean culture and rotation are helpful but no other remedial measures are of any value.

Sugar is an important article of human diet. It is produced mainly from the sugar cane and sugar beet. The insect race is competing with man for these two crops. In India the white ant has been successful in defeating man and the Indian farmer has been forced to give up the growing of ordinary sugar cane and has attempted to substitute Japanese sugar cane which has a repellent effect on the white ant. Whether this device will long be successful is an open question.

In the United States sugar is largely produced from the sugar beet which is grown almost exclusively in western America. In this region the beet leaf-hopper attacks the beet causing a disease known as curly leaf. When beets are attacked by the hopper, the leaves shrivel up, the growth ceases, and the crop is ruined. The beet leaf hopper has successfully ruined the sugar beet industry in many regions of the West. Idle factories and sugar beet lands given over to other crops are mute evidence of the success of the insect race in competing with man for the sugar beet crop. In Fallon, Nevada; Grand Junction, Colorado; in Utah and California, sugar beet factories are now idle largely because of this small insect. Man is helpless in the face of its efforts. No known methods are available for its control. Spraying, trapping, clean culture, rotation of crops, and all the ordinary methods usually used to combat the effects of insects are futile in case of the beet leaf-hopper. Nothing is being done about the matter and apparently nothing can be done. At present human efforts are being directed along the lines of finding some parasite in Mexico, the original home of the hopper, which will help man in his extremity.

Hay's Enemies

Hay is to agriculture what steel is to industry. Every type of forage crop used for hay has a large group of insect pests which compete with man for the crop. One of the most important forage crops is alfalfa. Alfalfa is really the basis of successful agriculture in western America. The alfalfa weevil has practically eliminated this crop in many regions of the Far West.

It was accidentally introduced into this country from Europe about 1904. A small field became infested near Salt Lake City, Utah, but it has now spread to all the surrounding states. It is a small insect which punctures the alfalfa stems as they begin to grow in early spring. The eggs are deposited in the wounds and the grubs hatch and feed upon the tender leaves until they are fully mature. And after transformation takes place, the adult beetle continues this destruction of the alfalfa crop until the field looks like an intense fire had swept it. Methods of control have been worked out, but it is a continuous war between the races to keep the weevil in check, let alone destroying him.

Cotton is vital to the welfare of man. It is essential as a source of fabric for clothing and also as means of the manufacture of a large group of other compounds useful in industry. The cotton plant is subject to attacks from the insects and probably none does as much damage as the small brown beetle known as the Mexican cotton boll-weevil. Both larvae and the adult weevil attack the cotton plant with vigor and destructiveness. They attack especially the squares and bolls and thus injure or destroy the fibre. With an unfavorable year for the weevil and by practicing clean methods of culture, whereby the crop residues such as dead stalks, dead bolls, and weeds are all destroyed by burning or burying, a certain measure of control of the weevil is secured. Spraying and dusting with lead arsenate also is used effectively in some areas. Even the aeroplane has been called into service in the fight against this destrutive insect and many thousands of acres are dusted with arsenic by this method. Even so the boll-weevil has forced a drastic readjustment of the agricultural practice in many areas. It may still be victorious over man.

In the warfare against the insects, the farmers constitute the shock troops of human civilization. They are bearing the brunt of the battle. Sometimes they are successful in the contest, but often they are not. The warfare goes on. Public attention is called to the progress of the war only when some dramatic events take place such as a marked invasion of locusts, grasshoppers, caterpillars, cutworms, or aphids which serve to draw the layman's attention to this terriffic struggle between the races. But the farmer is always face to face with the problem of insect control. The cost of carrying on the fight adds materially to the cost of producing food for human consumption and is a vital factor in creating the ever-present farm problem.

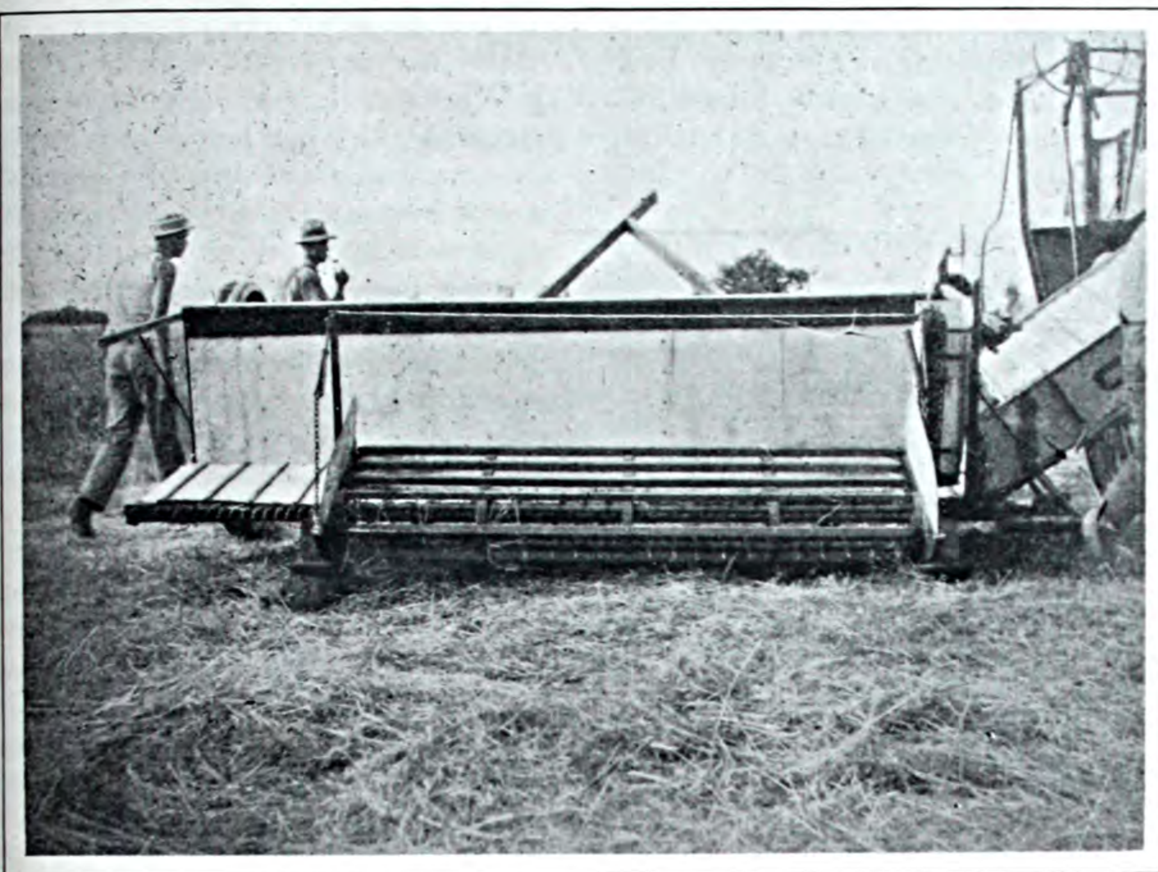
Will the last great battle for humanity occur when the stern competition for food between the races reduces the amount of food available and man himself will go down before the ravages of the carnivorous insects?

Combines for Clover

(*From page* 11)

During the past season there was a rather large acreage of red clover harvested for seed in western Oregon, but in general the yield was not up to standard. Many growers, however, report from 3 to 5 bushels per acre, which is a very satisfactory yield, especially when seed prices are running anywhere from 25 to 30 cents per pound.

The combines are being used in many ways now that the smaller ones are being manufactured. Many of the smaller farms are now using combines to handle grain crops, particularly



The "pick up" was put on this combine to work in rye grass.

wheat. Some growers have been using the combine to harvest rye grass. Combined rye grass, however, has heated and injured the germination of the seed. The growers, therefore, have resorted to the "pick-up." In general the pick-up has not been very satisfactory because rye grass shatters readily. The device gets the grass and puts it through the machine, but because of shattering the turn-out of seed is very small. There is no doubt that the pick-up would be satisfactory on crops that do not shatter.

Economics

(*From page* 4)

took home a little of the skimmilk doctrine and tried it on themselves.

Farmers once thought that the old sock and the twenty-hour day were the open roads to economy. Thoughtful economists must be credited with changing that, even as the safety razor has swept the facial forests of rural America.

Wealth is not always welfare nor is welfare a matter of wealth. Yet formal economists of the original kind had a conception that the value of human desire could usually be expressed in money. Out of this have arisen the proverbs, "money talks" and "every man has his price."

Economics is partly responsible for putting the "m" in m-art, which has made a market place of the picture gallery and a barter goal out of the musician's talent. They have tried to cover the flowers of life in a dust of logic based on our need for three square meals and a place to roost.

Income and happiness mean the same to the confirmed economist who sticks to the ledger and keeps his red ink bottle well filled. I know well that the weekly stipend is the staff of life on which we lean while we enjoy the wonders of the neighbor's radio and do our own gardening and washing; but I was healthier and equally happy as a lad when a dime meant a bursting exchequer.

YET as the average boy grows up he gets the national thrill over lucre and leisure, and he regards the size of the check as a true index of the desirable in life and the measure of man's success. By and by, as he grows mellow and middle-aged, he may find that the task he is doing (if he likes it) is dearer to him than the monetary value somebody else puts on it. Separation from "the job" at this juncture may divorce the family from duds and doughnuts for awhile, but it has a deeper twinge in nowise measured by ordinary economic rules.

By this I simply mean that the way I spend my spare hours fortunately has had no direct bearing on my income, and the enjoyment of my working hours likewise has not been a matter of anticipating the so-called compensation. Like many other simple Americans who are the under-dogs in radical cartoons, I have not added expensive pleasures to my hours of ease—not from thrift, but from choice.

Like you also, I have gone blithely forth in a three-year-old suit and happy hopes to do a part of the world's work quite without envy of the oil man or the bond salesman.

But, of course, all this is beyond the ken of the economic savant, who is concerned only with *laissez-faire* and its surface consequences. That word appealed to me for a long time, although I never learned to spell it without Webster or pronounce it without an apology.

Laissez-faire, they say, means "let well enough alone" and "quit kicking against the system." It is deeply dyed conservatism and arrogant individualism, whose dominant force is catching the coin. But is that philosophy final?

Take health. My ability to maintain pep and ginger on my job possibly increases my output to a point where the chief is willing to fork out another reluctant raise; but I find he is gouty and nervous himself and all his wealth cannot buy back the glands and the gladness of physical welfare. If I am starving, economists can point the way to a healthier state through funds for food. If I am ailing, the economists may hint that a physician's fee determines the outcome, which it doesn't. But when I pass out entirely the economist has me helpless, for the greatest votary of laissez-faire is the unctuous undertaker. Ergo, you can be healthy as Hercules without money, but you can't die without financing a funeral!

Next take art. Are you aesthetic, or only asthmatic? Are you a connoisseur, a creator, or just a customer? Long hair, smudgy frocks, flowing ties, Bohemia and small beer, easels and auctions, attics and ateliers, antiques and ambitions! All these have no place in a study of economics nor can the richest bootlegger buy appreciation with his "resurrected Raphael." I used to think that Pharoah's Horses on the Guardian Life calendar was an honorable masterpiece until I spent a "free day" in the Chicago art institute. My art education didn't cost me a penny, and so I frequently return for more.

WORK itself I have already mentioned—as one long familiar with the subject in all its jaded phases. I want to introduce a little piece here by Thomas Huxley, who needs no formal references to this crowd. This man's opinion matches mine in regard to work and welfare. He said, "What men of science want is only a fair day's wages for more than a fair day's work." He was not making them out as self-sacrificing heroes, but as ordinary folks who were fortunate in having the means of making themselves useful to their generation and whose ives were enriched by the sense of welare which comes from good work for high purpose.

If you and I can only kid ourselves nto thinking our work is really essenial no economist can give us the eebie-jeebies. Our everyday doings nd our plans for the future in the rdinary humdrum walks of life as we read them not only relate to our own ersonal well-being, but they conribute in toto to the wealth of naions. Even if we are only life inurance agents or soliciting magazine ubscriptions, somebody may welcome s and find our wares worth more han the bother of our company.

After all, it is your wants and my esires that make the wheels of inustry turn like chain lightning and ives the statisticians a chance to revel digits galore. Humble as we are, nd helpless as we find ourselves as ogs in a vast intricate mechanism, e know that what we crave and what e save make up the sum total of merican prosperity. And this same rosperity is what the economists point with pride on the one hand and hide the world for not having enough .

N days gone by the fanatics prided themselves on their humility and e dearth of their actual desires. hat they could get along without as their greatest goal. Now things pear at variance with the elder eme, and humanity strives to attract tention, to express its individuality d its property value, all of which ay be found in books on economics -if you have time to read them.

Our ancestors not so remote as to legendary were able to wiggle along ithout economics as we know it toy. Those were the times when eather was a most potent subject of all talk, chiefly because it meant mething more than a good golf game sight. The breaks of the seasons, us their own toil thrown in for good measure, determined their entire income and welfare. Luck played a larger part in economics then than it does today.

Then came the din and rumble of the machine age. Gradually the old fogies back in the sticks woke up to its complete conquest of rural America, and when they did so their demands outran the best bids of the city slickers. The man who said you cannot teach an old dog new tricks doesn't know his economics. Time-honored tasks that once kept the women folks busy while Uncle Ike played his fiddle were relegated to the realm of big business. Bread making, soft soap boiling, maple syrup making, shoe cobbling, sock knitting, meat curing—these and kindred jobs for the thrifty settler were once and for all removed from his ken.

Then we began to worry over the tariff and berate all the small statesmen who cannot see why Schedule K is unfair to consumers and why Section II is giving more profit to marmalade makers than the traffic will bear. In the spare time left to Uncle Ike since the machine age came, he has been able to buy more implements than he can pay for unless he gets more land to mortgage. Regardless of whether he totally surrendered and joined the Kiwanis, or whether he continued to chew tobacco and swear at autos, he found that he had to be classed as a real business atom in the cycle of commerce. He bravely threatened to keep books, and actually sold "cash crops" instead of bartered goods.

There is no exact date in history when all this fuss began, nor is there any chance of telling when it will end. Nobody planned the rejuvenation of Uncle Ike, or got Congress to pass any relief measures to that end. Like Topsy, he just growed into it and can't stop growing. The inventors had a hand in it; the scientists played a part; the bankers had to move fast to keep up; while the only ones who profess to know what it's all about are those who know the least.

WE who tasted the joys of the nickel cigar and the ten-cent movie need not waste a moment pining for the good old golden days of yore. The haughty abandon of a hickory shirt, one suspender, and a hound dog belong to the simple life one jump beyond Adam's apple. Yearn as we may for the simple and thrifty times we once enjoyed, they are now merely a record in the Doomesday Book. The penchant of the hour in glorified business economics is for us to be *envious* and *discriminating*. Both processes develop trade and give men enough work to do on a seven-hour day at union wages. Remember the idea and don't get out of step! He who so forgets himself as to read Henry George will not only find single tacks, but double tacks, strewn all around his parking place.

Yet whoever thinks that economics is dull because his head professor looked that way is off on the wrong track. Botany and astronomy treat of most wonderful things, compelling to the imagination and a challenge to the intellect. Yet many a teacher of both subjects spends so much time on rules and theories that his pupils never get the gleam of truth and the beauty of the vision seen in flowers and stars.

Economics deals with the everyday lives of humble men as well as the gigantic mergers and combinations that issue thunder to the financial world. Of late there has grown up a brand of economics that is of a social aspect, suffering neglect and a cold shoulder in some quarters where the empiric hand of money welfare holds sway. It is trying to teach us smaller fellows how to adjust our lives as best we may to meet the wave of industrial expansion and super-power.

The world stands at the threshold of constant change, with whispers of unknown forces and unreleased energies clamoring for service to mankind. My father used to fret about the wor supply of coal when he bought his fi tons annually. You wonder how lon the oil and gas wells will keep flowin and maybe take a chance on son stock against the day of scarcity. Th march of science and inventio steadily removes such whims and fear and gives us all a new conception o the field of economics. As fast as th wants of men increase and they hav money to buy them, somebody wi have the answer.

ADJUSTMENTS must procee along with invention, how ever. Our whole organization mu make the most of our newly di covered resources and industri achievements. In this age we a often apt to quit trying to thin it all out because of the weary com plexity of life. Yet I believe that th salvation of various groups of wag earners and producers lies in thinkin things out. Running to Congress fo relief or a sop of safety first is no going to solve the problem. When th groups have trained their leaders think things out, then the groups ma join forces and see what adjustmen can be made for the entire populatio

Of late some industrial groups hav sought a superman who would by son legerdemain find the solution to a their economic troubles. There is n high priest of economics. Even th professors tell us that. Take a fling the problem yourself from your ow corner.

It may be a "hard life" and "dreary grind." If we are servants economics, we are masters of our ow souls anyhow—as long as we are wil ing to think. And laying aside a levity, the best contributors to ec nomic thought have probably been useful and helpful to us in doing decent day's work as any preach strived to be.

Lastly, if you shy at the word "ec nomics," call it "human welfare" an do something to make it real.

NO DROWNING REPORTED

Rastus, out in a boat with his best girl, Mandy, had been teasing for a kiss, but she refused again and again. Finally he became desperate.

"Mandy," he threatened, "effen you don't lemme kiss yo' I'se gwine to upset dis here boat."

Getting home, Mandy told her mother all about it.

"An' did you let de genman kiss you?" her mother asked.

"Well, did you all see anything in de paper dis mawnin' about two niggahs drownin'?"

Near-sighted old lady: "Look, there's a dear, old-fashioned girl. Her dress buttons all the way up the back."

Her daughter: "Nonsense, mother. That's her backbone."

A widow who had listened to a sermon over her dead husband, whispered to her son as the preacher sat down—

"Johnny, step to the coffin and see if that *really* is your father."

Young Harold was late for Sunday school, and the minister inquired the cause. "I was going fishing, but father wouldn't let me," announced the lad.

"That's the right kind of a father to have," replied the reverend gentleman. "Did he explain the reason why he would not let you go?"

"Yes, sir. He said there wasn't bait enough for two."—*Fulham Chronicle.*

WORTH ABOUT A DOLLAR

He: "I'm going to buy myself a harem."

It: "What do you mean? You can't buy a harem, can you?"

He: "Sure. I saw a sign at a gas station that said: 'Six gals. for a dollar.' "

Young Rastus had been very attentive to a colored girl friend for several months and finally his father Mose began to suspect that they were secretly married. In order to satisfy his curiosity he finally subjected Rastus to a severe questioning. After considerable evasion Rastus gave the unsatisfactory answer, "Well, I ain't sayin' I ain't."

"I ain't askin' ye is ye ain't," stormed Mose, "I'se askin' ye ain't ye is?"

LEFT TO ITS FATE

"I went to the dentist yesterday."

"Does the tooth still ache?"

"I don't know; he kept it."

Dear Old Soul (visiting her very sick brother): "I've a very nice letter from Emily. She says she's so sorry she ain't able to come and see you, but she hopes to be able to come to the funeral."

When the cat's away the mice will play—but maybe the cat's not having such a rotten time either.—*Life.*

"I caught three in my corn-field"

"AWAY DOWN
AWAY DOWN YONDER—"

THREE thieves may be in your cornfield today! No song has ever been written about them. They steal millions of bushels, growing bolder and taking more corn each year. They come in broad daylight and leave unmistakable signs.

These thieves are nitrogen, phosphorus, and potash STARVATION. Starved corn plants with vitality stolen away by a lack of available plant foods cannot make a good crop. They are robbed of their chance before they start.

Track the Thieves!

Go out into your cornfield today and watch for the symptoms left by the three hunger-thieves on the leaves and stalks of your corn. If you find them, STARVATION is stealing your profits.

Potash starvation is recognized by a firing of the margins of the leaves. Usually these symptoms appear first on the lower leaves, later they spread to the upper leaves. Plants may be yellow in appearance. Examine joint tissues—when cut open they contain large quantities of brownish iron accumulations.

Nitrogen starvation is indicated by yellowish green to yellow leaves. Lack of phosphoric acid results in stunted growth and a purpling of leaves and stalks. These symptoms occur most often in soil strongly acid in reaction.

Study Your Corn!

With these signs your corn tells you about its plant-food needs. By examining your present crop you can figure out the fertilizer your next crop will require.

In any case make sure that your corn fertilizer contains plenty of potash. Potash makes healthy plants and fills out ears to the tip, giving a good yield of prime corn. Potash controls corn root rot. Plan to use liberal applications of a balanced fertilizer, high in potash, and drive the hunger-thieves out of your cornfield!

Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY.

of Amsterdam, Holland

McCormick Bldg., CHICAGO, ILL.

Better Crops WITH PLANT FOOD

Sept. 1929 10 C

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 XIII Number Three

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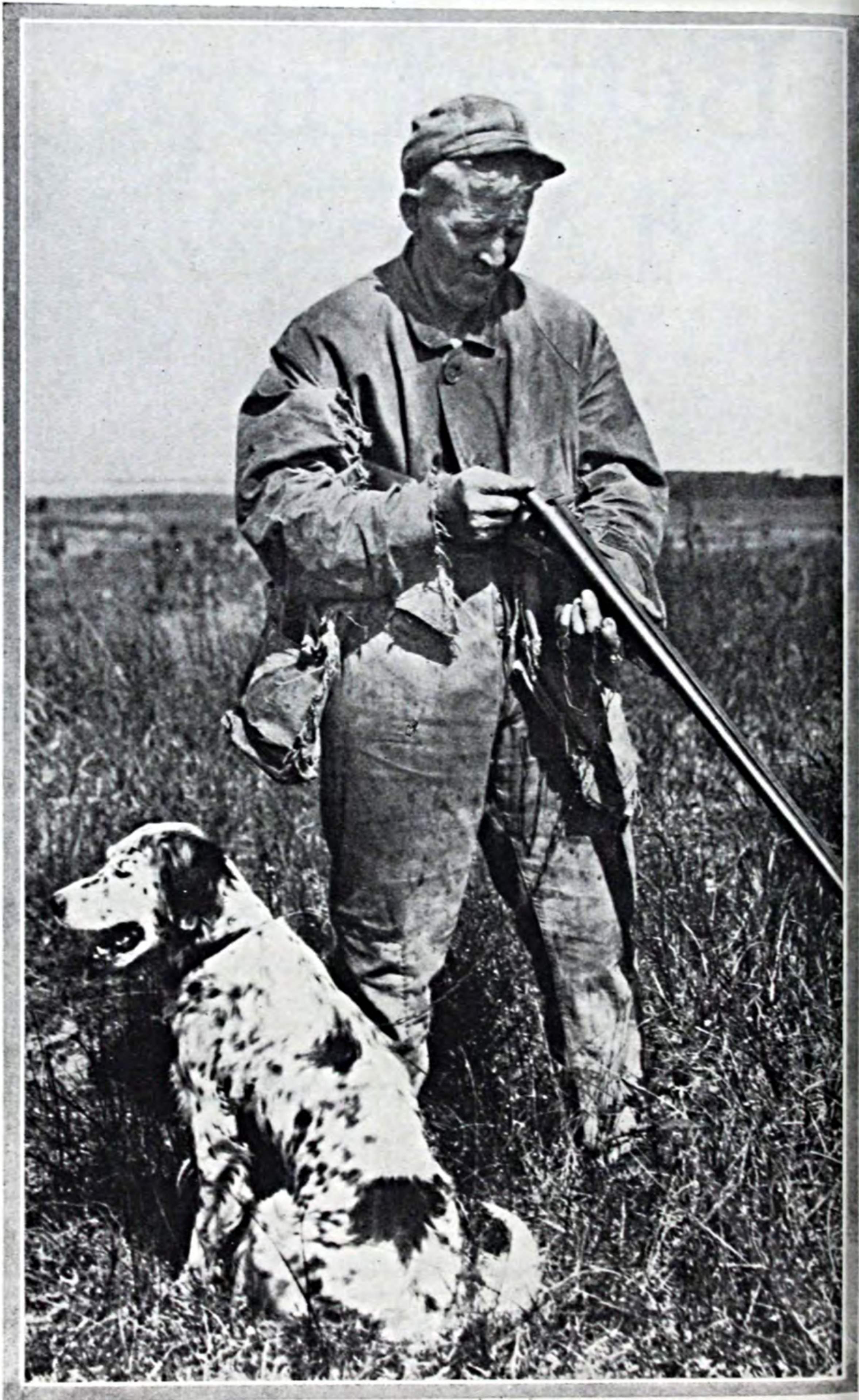

One of the "Days of Real Sport"

Better Crops with PLANT FOOD

PUBLISHED MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION, 19 WEST 44TH STREET, NEW YORK. SUBSCRIPTION, $1.00 PER YEAR; 10C PER COPY.

VOL. XIII NEW YORK, SEPTEMBER, 1929 No. 3

In this story Jeff defends—

White Collars

By Jeff McDermid

TWO Producers had cornered the Authority On Everything. The Horny-handed Boys were trying to make the A. O. E. admit that he was a parasite because he carried a brief case instead of a tin lunch box.

Laying aside stage talk and dramatis personnae, do you think I let them bluff me so easily? Of course, I know appearances were temporarily against me. My noble countenance was fairly clean, there wasn't *much* dirt under my nails, and I had really shifted shirts oftener than once a week come Sunday. Worse and more of it, I had been reading a book of poems when they charged me with the crime of being one of the "indefensible intelligentsia"—you know, one of those who "ought to be doing some practical work" where a grunt is the sign of achievement.

I won't burden you with the old familiar debate, which is as old as the squabble between Cain and Abel—and sometimes almost as provocative of murder. No, I didn't convince them and did not hope to. They had the moral support of their labor union and the sentiment of the walking delegate, plus a little of the inborn prejudice of rural muscle against urban mind. When I left them, they sauntered into a convenient pool hall while your scribe hustled home to mow the lawn until dark and pore over office papers until midnight.

As you know, the only real difference between us was that they used the clock to quit by and I used it to catch up with. They left their tools and their troubles on the job, while I toted mine home and kept them with me during most of my conscious hours.

My old uncle, who was both a farmer and a millwright, stuck tenaciously to the economic definitions of Adam Smith in reference to the production of the world's goods and the division of the world's workers. Many a time while I was stooping over a text-book he would sneer at me and feel my muscle, remarking that there were two great sections of society worth noting—capital and labor. He would further insinuate that it looked as though I would join neither. You, too, have had similar uncles and aunts who belonged to the old school of thought which meant either "save or shovel." If you couldn't be thrifty or pitch hay with the best of the brawny boys, it simply signified that you were a fifth wheel to the ox-cart.

BECAUSE he was an artisan and a farmer, my uncle like others similarly situated, felt that he embodied both capital and labor in one important bundle. What was there left? Only idlers and drifters. He subscribed to no trade papers for his mill, received no farm journal for his estate, and never went to a convention. Of course he never reckoned on the fact that chemists and inventors had played a part sometime somewhere in changing his millstones to attrition machinery or giving him a grain separator in place of a flail. The part that mere *ideas* and *ideals* played in his scheme of living were obscured to him in a world of toil and tolls. He arose at four o'clock in the morning and mistook mere physical activity and tangible results for the end of a "perfect day." Would that he and the hosts who scoffed at Darius Green might visit one of our airports today!

But the discouraging part of it is that in this age of wonder we still have with us those who still think the world holds but two classes of importance among producers—those who work in a bank of gold and those who labor in a bank of sand. If you adhere to that doctrine, desist from further perusal.

Just why the laundry should be called into the controversy by dubbing intellectual toilers "white collar gents" is beyond my ken. Personally, I do not connect the argument with sanitation to any extent. Furthermore, residents of Chicago or Pittsburgh end up the day's tasks with more sediment than a whole train load of milk from Wisconsin. And again, I resent the oft repeated title "dirt farmer," in which there is neither flattery nor wisdom. All these grubbing definitions seem to infer that the measure of a man's contribution to welfare lies in covering himself with more gumbo than glory. Even a pig can make pork without going near a wallow.

The rapid increase of bath tubs and safety razors in rural homes is proof positive that most of this specious argument and unworthy innuendo comes from the professional organizers. All of which plainly tells us that neither physical exertion, tangible material output, nor dirty faces possess real weight in helping Sherlock Holmes find out who are doing nothing. Nay, we must perforce seek further than muscle, materials, or soap-suds before we determine who are entitled to three square meals and a shake-down.

IF you are hired by some capitalist to do routine work and the things you make are measured or numbered, or if you sow and reap the pumpkins from the vine, it is very easy to err in believing that those who sell pure thought (schemes, plans, hopes, ideals, campaigns, and programs) are rendering no visible push to the impetus which sends us all up-hill. Yet the intellectual scene shifters who set the stage for the grand entrance of Capital and Labor are rightly entitled to

(*Turn to page* 60)

"Potato" Bill Meyers

By E. R. Lancashire

Extension Specialist, Ohio State University

BILL MEYERS might be a man of fiction, but the last time I saw him he had just completed the job of digging 11,000 bushels of White Rural late potatoes from 20 acres of muck soil near Waterloo, Indiana. Meyers was a short, little man who knew how to grow potatoes. He has the right to claim the potato grower's crown for the state of Indiana if there is such a thing.

Bill stepped off a train some 30 years back, a stranger in the region. The particular station is no longer in existence. It was located then not far from his present home. A young man then, he and his wife had just moved westward from the muck soils of northern Ohio. Seems like a short trip now, but in those days it was a long jump.

The muck swamps near Waterloo looked good to Bill. He returned to Ohio with a proposition to put up to his dad and his wife's dad. For $200 cash he could secure a 40-acre muck swamp. The balance, then as now, could be paid in easy installments. Strangely enough he put the deal over, and three years later he paid off all but a few of his current expenses. This was made possible by a certain amount of good luck and a much larger amount of hard work.

His specialties were potatoes and onions. These crops are two that require more hand labor than most men can see over. Conditions improved, and machine labor came to his aid. Last year he and his sons had out more than 100 acres of potatoes. He has established a yield record for 20-acre fields that will be hard to beat or even equal, especially in the corn belt.

To hear Bill Meyers talk potatoes is a real treat. More than 100 potato growers met on his farm for a field day. He illustrated his ideas concerning the spraying of the potato crop as follows:

Bill Meyers (left) discussing potatoes with E. R. Lancashire.

"Do you see that field of potatoes?" he asked, pointing to a nearby field.

We nodded.

"Well, it yielded 150 bushels per acre and was never sprayed. This field you are standing on was sprayed and it yielded 547 bushels per acre."

We were naturally impressed. At least many of us thought we should investigate the matter in connection with our own potato plantings.

Someone asked him how much seed he planted per acre, and how it was cut. He stated that he preferred square, chunky seed pieces of about an ounce in weight. He noted too that the cut surface of the seed piece should be a quarter of an inch away from the eye wherever possible because he had observed that weak plants were often produced by seed pieces which had eyes right at the cut surface. There is something in the heart of every tuber which potato specialists find should be in every seed piece and so Meyers added that to his requirements of cutting seed. At least 24 bushels of potatoes were needed to plant each acre as he found it profitable to space his hills 9 x 30 inches.

Careful Planning

Considerable planning is needed to successfully handle a 100-acre potato crop. Meyers is successful at it, to say the least. Not long ago he and one of his sons drove home with $2,000 worth of live foxes in the back end of a Ford. He will never miss the money if they die, but just the same the son was prepared for the new job by first spending a year on a fox ranch. Bill applies system to everything.

He has always employed a balance between seed cutting and planting and in spite of numerous stories to the effect that cut seed can be safely stored if it is sprinkled with sulfur dust, he sticks to the much more reliable practice of sticking all cut potato seed immediately into the moist ground.

This ground is full of organic matter, but he keeps building it up and adding more. Cover crops of rye are a hobby of his. He finds it more profitable to use commercial fertilizers where the soil is full of organic matter.

Bill had considerable to say concerning potato fertilizers. He has come through the time when muckland potatoes had a bad reputation for quality. His observations made over a period of time back up the recent findings of science. He noted that muckland potatoes grown in the early days before balanced fertilizers were used were always poor cookers. Where the grower failed to use enough high-grade potash the potatoes often turned black during the process of cooking. A 3-9-18 is the fertilizer which best meets the conditions of Bill's farm. today. A quick start is possible because there is sufficient available nitrogen in the 3-9-18. Bill likes to have this nitrogen in the ammonium sulfate form because of the acid effect of such goods. Bill knows that acid kills potato scab in his soil as do green manure crops.

As to the amount used, he finds it profitable to drill from 800 to 1,200 pounds per acre in the row at the time of planting. His modern planter mixes this 3-9-18 with the soil just before the seed is dropped.

Crisp, golden-brown French-fried potatoes can be prepared from the muckland potatoes grown on Meyer's farms. The inferior quality of the early days is gone and in its place there is a much higher yielding potato of the highest quality. The quality of the properly fertilized potatoes is so good that the consumers are willing to pay a premium for them.

Deep plowing and thorough preparation of the seed bed are rigidly enforced by Meyers. Level shallow cultivations are his method of weed control. The first time over he sets the cultivator deep and close. After that

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English Blue Grass

By M. D. Butler

County Agent, Marion, Indiana

ENGLISH blue grass (meadow fescue as a seed crop is relatively an uncommon source of farm income, although in a few cases very good profits have been derived from the crop. Its advantages in a pasture mixture are appreciated in some localities. However it is not grown to the extent that it probably will be grown in the next few seasons.

In order to appreciate the advantages of the crop in a pasture mixture, one should know that it has characteristics of growth and yield similar to Kentucky blue grass. In addition it does not dry out as much in the middle of the summer, and observation indicates that it is the most palatable of any grass commonly grown in this locality.

The accompanying illustration shows the seed crop grown by Mr. Plamer Edgerton of Grant county, Ind., during the year 1928. This crop of 550 bu. was produced from 37 acres and was sold for $1,200 through a co-operative organization of growers. Following the harvesting of the crop Mr. Edgerton pastured 26 head of steers on the aftermath until December,

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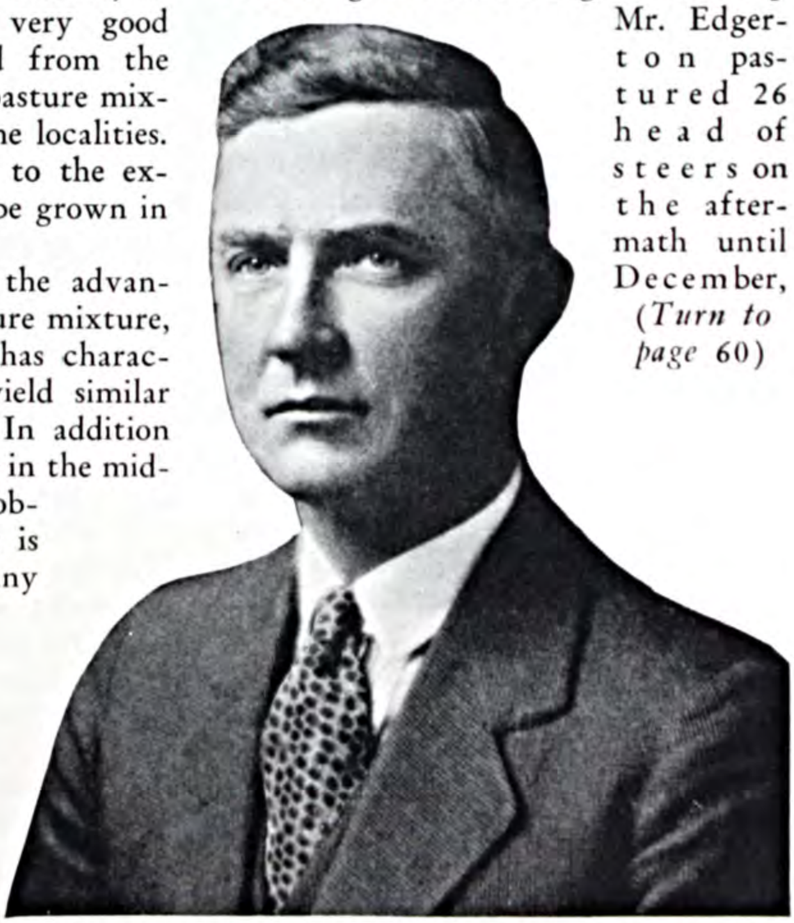

Mr. Plamer Edgerton is a leader, and likes to try new things.

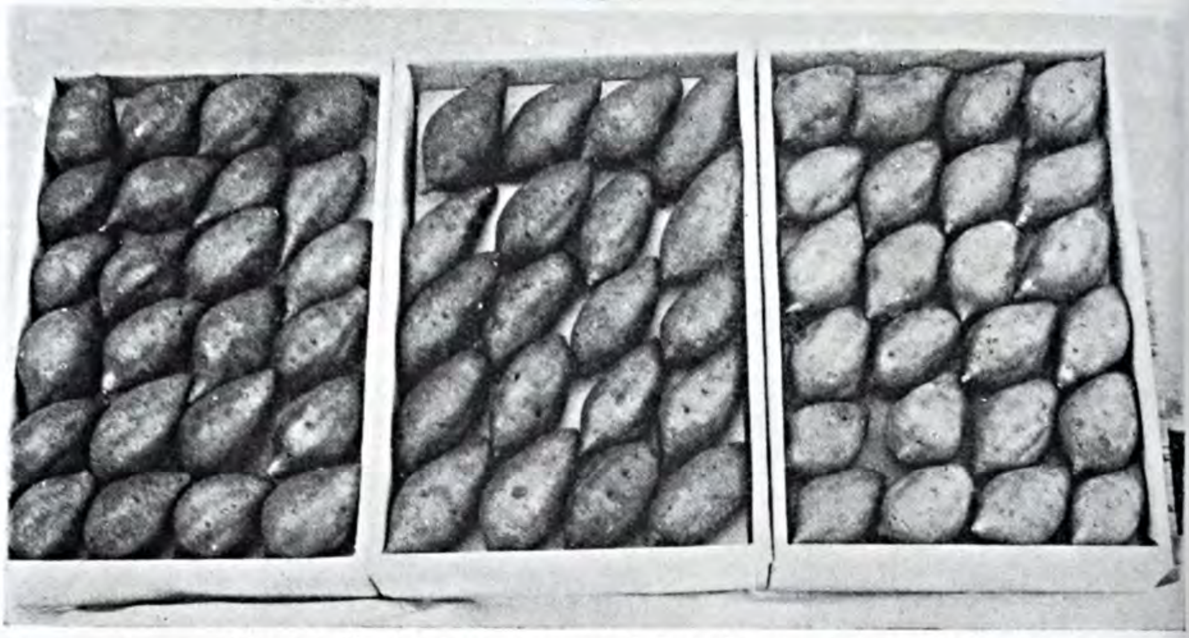

Fig. 1. Chunky Sweet Potatoes of Desirable Shape for Market.

How Potassium Affects Sweet Potatoes

Peculiar Relationship of Potassium to the Shape of Sweet Potatoes Proved by Horticultural Staff of New Jersey Experiment Station

Reprinted from New Jersey Agriculture, June, 1929

THE people in eastern United States relish sweet potatoes but they prefer them short and fat and not long and lean like a Pittsburgh stogie. Just imagine the reception a waiter would receive from a guest at an exclusive hotel if he served the latter with a sweet potato approximately 1½ inches in diameter and 10 inches long. The eastern public wants a short, chunky, somewhat egg-shaped potato that cooks dry and mealy. New Jersey grown "sweets" of such shape and quality bring top prices in eastern markets, whereas long, thin potatoes are undesirable. New Jersey annually plants more than 15,000 acres of sweet potatoes and obtains an annual crop exceeding 2,500,000 bushels, valued at over $3,000,000.

How to produce large crops of chunky sweet potatoes consistently is no small economic problem in New Jersey.

Professor L. G. Schermerhorn first attacked this problem by means of extensive field experiments with fertilizers. Several New Jersey sweet potato growers, including G. L. Purzner of Germania, George Newman of Tom's River, and Charles Underhill and Edward Voorhees of Lakewood, cooperated by furnishing the land and assisting in the cultural operations.

These experiments proved that good yields of chunky Yellow Jersey "sweets" (Fig. 1) could not be obtained consistently on the light sandy soils of southern New Jersey unless there was applied to the soil a fertilizer containing a considerable amount of potassium in relation to the nitrogen. If potassium was low in relation to nitrogen the potatoes were long and thin.

At the conclusion of five years of field experiments, Schermerhorn was in a position to advise the sweet potato growers of the state to apply about 1,000 to 1,500 pounds of a 3-8-8 fertilizer mixture per acre, the formula and the amount of fertilizer to be varied according to the type and fertility of the soil.

The field experiments demonstrated that applications of certain proportions of potassium and nitrogen in the fertilizer mixture would enable growers to obtain the maximum possible yields of chunky sweet potatoes —an excellent practical result of field experiments. But they did not show why potassium produced this effect. At least one western research worker was hesitant in accepting the conclusions of Schermerhorn and maintained that chunky sweet potatoes are the result of a stiff, impervious soil.

Merely to know how to obtain a certain result may be satisfactory for a time, but sooner or later it becomes important to know why this result is obtained. It is usually difficult to discover or prove a new law or principle of plant growth by means of field fertilizer experiments alone, because of the numerous variables, such as soil type, fertility, moisture supply, and temperature.

During the period of 1926-1928 sweet potato plants, all propagated from the same mother root, were grown in pots of white quartz sand in the greenhouse. This sand furnished a plant growing medium entirely free from nutrients, except for those artificially supplied. Moisture and temperature factors also were within the control of the investigators. Dr. W. Rei Robbins was in charge of this phase of the work.

The sand culture experiments soon revealed that the so-called chunkiness in form of sweet potatoes is directly associated with a high percentage of protein* in the roots and a high nitrate nutrient treatment, whereas long thin potatoes higher in percentage of carbohydrates and much lower in protein were developed on plants receiving a low nitrate supply. At first thought this might seem to be contrary to the field results of Schermerhorn, but let us follow the investigation further.

During the first year under glass

*The term "protein" as employed in this article is synonomous with total nitrate- and ammonia-free nitrogen. Analysis of this fraction shows it to be made up of true proteins, and simple and complex amino acids. The detailed analytical and experimental results will be published soon in the form of a research bulletin from this experiment station.

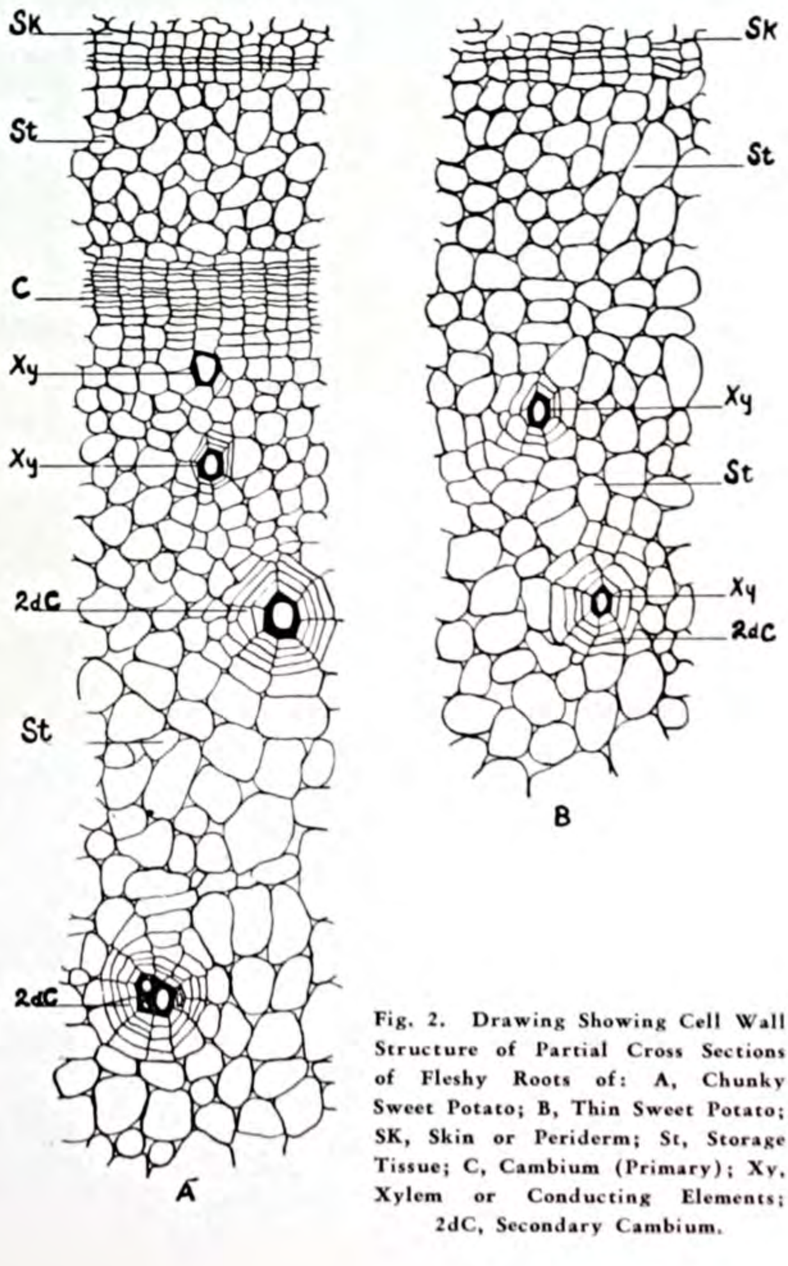

Fig. 2. Drawing Showing Cell Wall Structure of Partial Cross Sections of Fleshy Roots of: A, Chunky Sweet Potato; B, Thin Sweet Potato; SK, Skin or Periderm; St, Storage Tissue; C, Cambium (Primary); Xy, Xylem or Conducting Elements; 2dC, Secondary Cambium.

Fig. 3. Thin Sweet Potato, Undesirable for Market.

no controlled experiments with potassium were undertaken but during the following two years sweet potato plants were grown with an abundant nitrate supply but with potassium limited in some cases. It was found that the rate of vegetative growth of the tops was relatively slow with low potassium treatment even though abundant nitrates were present in the nutrient solution. The size of leaves, length of petioles, and growth of stems were not as great as occurred on plants receiving an abundant potassium supply.

Plants Looked Healthy

The low potassium plants did not exhibit any apparent sign of injury. The leaves were green and showed no apparent lack of chlorophyll; in fact, the type of growth of the low potassium plants was apparently the same as that of other sweet potato plants receiving a relatively low nitrate supply. Those which were grown with a limited potassium but abundant nitrate nutrient treatment accumulated carbohydrates in the roots and formed potatoes much earlier than the plants which were not limited with respect to potassium.

Chemical analyses for nitrogenous and carbohydrate fractions by Dr. G. T. Nightingale and Dr. Robbins revealed that limiting the supply of potassium apparently decreased the rate of protein synthesis; that is, the change of carbohydrates and nitrates to protein. Because protein formed slowly, through lack of abundant potassium, carbohydrates necessarily accumulated in the storage roots, accompanying which there was an early development of potatoes.

Apparently the potassium supply available to the plants was not so limited under these experimental conditions as to greatly restrict carbohydrate manufacture. Photographic records of form and yields of potatoes obtained in each treatment were obtained by Prof. M. A. Blake.

How a Chunky Sweet Potato Develops

But just how does this explain the development of a chunky sweet potato?

Schermerhorn has found that an ideal commercial chunky sweet potato should be approximately 4.5 inches long by 2.5 inches thick. It is therefore apparent that to obtain this form the storage root must increase relatively rapidly in diameter in proportion to length. This is brought about by the development of many new storage cells (fig. 2, St.) which originate, in large part, from the primary cambium.

Growth Structure Studied

The third phase of the "why" of the chunky vs. the long thin sweet potato was a study of the cell structure of the two types of roots.

The chunky potatoes possessed a big active primary cambium region, illustrated at *C* in figure 2A, whereas the long thin potatoes were practically without a primary cambium, as may be seen in figure 2B. In other words, the relatively large diameter of the chunky sweet potato is directly due to the rapid formation of the new cells produced by the primary cambium. Cambium tissue is composed in large part of protein, and, as has already been shown, protein formation does not occur rapidly without an abundance of potassium.

An adequate supply of potassium is therefore essential in order that the sweet potato may form protein of a

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Good Celery

By A. E. Wilkinson

Vegetable Specialist, Connecticut Agricultural College

WHEN one speaks of good celery in Connecticut, those who know turn towards Louis R. Peckham of Norwich, Connecticut. To say that Mr. Peckham is the best celery raiser in the state is putting it rather mildly. Just glance at any one of the illustrations and see the celery that he raises and one wonders who competes with him. In his own native city and nearby places the answer is no one. If he grew product enough to take it elsewhere it would be the same answer.

Just what does Mr. Peckham do to grow such excellent celery, and when I say excellent I not only mean large size but a tender, crisp quality and excellent flavor. A study of his methods may throw light on how he is able to produce the best. He has settled finally on one variety—Golden Plume. I say settled on one because he has tried almost every variety that he could obtain before he had settled on this as the best one for him. Not only has he tried different varieties, but he has tried a number of the best strains. Any strain that seemed to stand out above its neighbor he has compared with the one that he was growing at that time. In many of these strains he has been very much disappointed. In some others he has found improvement. Even today he is looking constantly for greater improvement in production.

As the amount of celery that Mr. Peckham raises is limited, only approximately 30,000 plants, he sows most of his seed March 1. Within 10 days another small quantity is planted, and this continues until approximately May 15. The seedlings when exceedingly small are picked out into other flats and given proper spacing so that they can develop into strong individuals. Of course this early starting means inside a greenhouse. In fact the seedlings are kept inside the greenhouse until hardening-off time approaches. They are then placed in frames and from there are set in the field. By this method he has a succession in planting and transplanting which results in a succession in selling.

Part of the soil Mr. Peckham uses

L. R. Peckham (right) uses a wheelbarrow sprayer on his celery.

for raising this crop is a very black soil. It is not muck but right on the edge of muck. There was a depression in his small farm and he dug a ditch through this depression and from the ditch ran out almost 800 feet of drain tile. This soil has been made neutral by heavy applications of lime. Application of lime took place almost yearly. Mr. Peckham tests his soil for lime content and therefore knows how much is needed. He does not apply lime unless the test indicates a need. His soil is plowed with a tractor as near ten inches deep as possible and thoroughly fined.

Plenty of Plant Food

Many growers of celery broadcast the fertilizer and work it in. Mr. Peckham does not feel that this method on his soil will give the best results. He has a very unique way of fertilizing, a method which I believe would be of interest to a great many users of artificial fertilizers. In spite of all experimental evidence he does not use stable manures. In fact he does not keep animals of any nature nor does he buy stable manure for field use. After planting the crop in the field the plants are allowed to show some new growth. As soon as this shows at all, nitrate of soda at the rate of 300 pounds per acre is applied close to the plants. The idea in this is to get the nitrate dissolved and into the soil by the time the roots are developed enough to take it up and to give a push to the plants. Mr. Peckham has tried both sulphate of ammonia and calcium nitrate in comparison with nitrate of soda but so far nitrate of soda has given best what he desires.

The noticeable new growth immediately indicates to Mr. Peckham that the plant is now ready for more fertilizer and in his language he gives it a "shot" of 5-8-7. This is applied each side of the row and cultivated in. In about two or three weeks another "shot" of 5-8-7 is given and if the growth is not exactly to Mr. Peckham's satisfaction another "shot" of nitrate of soda is applied and worked in. Three weeks later, or if growth indicates a need, still more of the 5-8-7 and nitrate of soda are applied both sides of the row and worked in. It is readily seen by this that Mr. Peckham is feeding his plants fertilizer throughout the season. Just how much fertilizer he uses per acre is a big question. I know some years as high as 1,000 pounds an acre of nitrate of soda are used and more than 3,000

Mr. Peckham explains his methods of blanching a good crop of celery.

pounds of 5-8-7. It is not the amount of fertilizer according to Mr. Peckham, but it is whether or not the plants keep growing; or as he told me sometime ago, "I mean to have enough plant food for the plants at all times."

The shape of the land that he uses for raising celery necessitates much hand labor. This will be brought out in some of the operations which he uses. In setting the celery in the field the land is marked off in rows 27 inches apart, and the plants are placed six inches apart in the row. Different distances have been tried out by Mr. Peckham, but this gives him the largest percentage of the best type of celery. If he wishes a larger plant, he has found that 8 inches between plants and the same distance between rows will give him what he is after. On transplanting to the field, the flats are soaked with water. The soil in the flat is blocked out, and a bunch of roots as well as a very well-developed, small plant is placed in the ground. The celery plant does not wilt at all but immediately sends out new roots and starts its growth. Mr. Peckham has tried the method of raising seedlings in rows, pulling them, and immediately transplanting to the field, and he has not met with the success that he has with the transplanted into flats method.

Hardly are the plants firmly established in the outside soil before cultivation begins. The soil is kept clean of weeds at all times.

About 10 days after the seedlings are placed in the soil, finger working of the soil takes place. It is a joy to watch Mr. Peckham and his assistant Mr. Rose do this work. They never stop. Kneeling at one end of the row and just walking on their knees to the other end with the two speedy hands of each man being worked just as rapidly as is possible, it does not take them long to run through 30,000 celery.

Spraying Is Important

As to spraying, Mr. Peckham uses

A bundle of a dozen bunches of jumbo celery.

a home-made Bordeaux consisting of five pounds of copper sulphate, five pounds of lime, and 50 gallons of water. He cannot use a horse-drawn sprayer on his land because of the very short rows, nearness to building, and the ditch. He uses a wheelbarrow sprayer and with this small equipment has been able to thoroughly control blight. It is largely due to the fact that he is so painstaking and has the under side, upper side, and all sides of the foliage completely covered with Bordeaux. He means to spray often enough to keep the foliage covered as fast as new growth develops, at least once in every ten days throughout the season. Occasionally when rains are very frequent spraying is more frequent.

When the growth is large enough and dense enough, causing the centers to take on a lighter tinge of color, Mr.

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LOUISIANA

Experiment Station

By Bentley B. Mackay

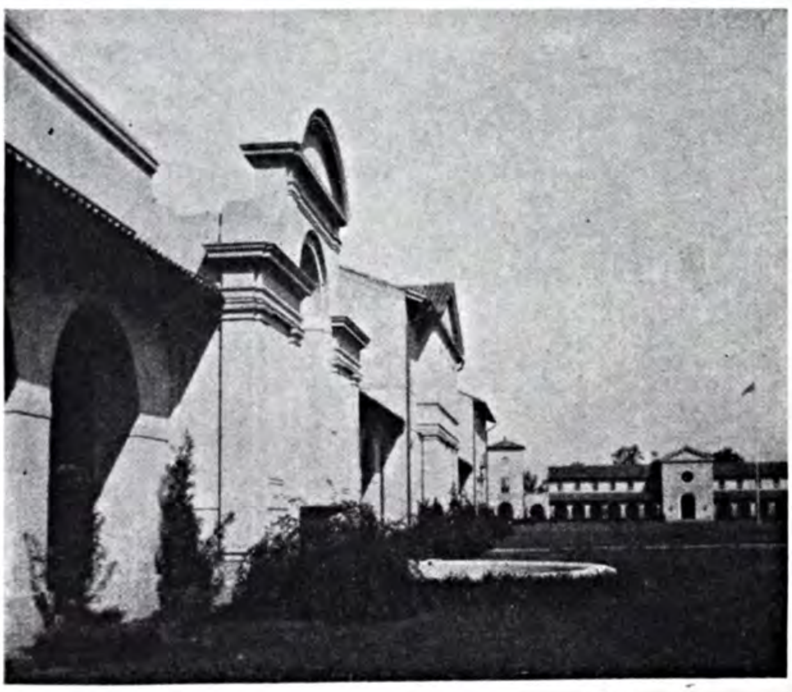
Agricultural Editor, Louisiana State University

WHEN a greater portion of our country, with the exception of the states bordering the Atlantic, was unknown and unexplored territory, Louisiana was being colonized and the rich alluvial lands cultivated. The halcyon days "of the Empire" were prior to the Civil War when the great sugar and cotton planters made fortunes, erected magnificent homes, and filled them with the choicest treasures that Europe afforded. Like the barons of old, every man's home was his castle and he directed his slaves and administered his estate as he saw fit. However, there were two things that a Southern "gentleman" must not be guilty of: He must never be discourteous to a guest, and he must never perform manual labor, the latter being reserved for slaves.

Came the Civil War. Fortunes were wiped out; plantation homes ruined; but those who came back fought bravely to rebuild their shattered fortunes and with land as rich as the valley of the Nile, Louisiana's "comeback" after the war was slow but sure.

Then various diseases showed up in the cane and cotton fields. Seemingly inexhaustible soils became depleted. It became apparent to the sugar planters, especially, that something must be done, and so in 1885, a number of the leading planters subscribed several thousand dollars and established the first "experiment station" near New Orleans. Dr. W. C. Stubbs, professor of chemistry, Auburn, Alabama, was elected to direct the work of importing new varieties of sugar cane, developing the use of sugar mills for grinding sorghum thus prolonging the period of activity for that industry, and learning methods of restoring soil fertility.

From the importation of new cane varieties came the D. 74, which, up until the introduction of root rot and mosaic disease in about 1920, proved to be worth millions of dollars to the growers.



Entrance to the agricultural buildings.

The campanile, or war memorial tower, at the new Louisiana State University.

The Louisiana sugar planters were just two years ahead of the United States government, for in 1887, the Hatch Act was passed by Congress. Louisiana established three stations under this act: one at Baton Rouge, the headquarters of the Louisiana State University; another at Kenner, later moved to Audubon Park, New Orleans; and one at Calhoun in the northern section of the state. The total sum of $15,000 was divided equally between these stations and with such magnificent funds, great achievements were expected. Small state and parish appropriations were also made. W. C. Stubbs, A.M., Ph.D., was made Director of the stations, with a limited staff under his supervision.

The Calhoun station, embracing about 300 acres, was devoted to experiments dealing with corn, cotton, tobacco, and miscellaneous crops grown in North Louisiana and with cattle, sheep, and hogs. One hundred and thirty acres at Audubon Park were used for sugar cane investigational work, both in the field and in the laboratory. Much work was done in improving methods of manipulating cane juices.

Three Directors

The station at the Louisiana State University contained 210 acres and was situated on the bluff lands of the Mississippi River, acting as the dividing line between the sugar and rice lands of South Louisiana and the cotton lands of the north. Various experiments with forage crops, cane, cotton, corn, truck crops, etc. were begun.

Louisiana was fortunate in retaining its experiment station director over a long period of years. Dr. W. C. Stubbs, the first director, remained in office from 1885 to 1905, when he retired to private life. Dr. W. R. Dodson, assistant director was made director and served in this capacity from 1905 to 1928, when he resigned to go with the United States Department of Agriculture. He was succeeded by Dr. C. T. Dowell, formerly of Oklahoma.

If the Louisiana State University Agricultural Experiment Station had done nothing but find uses for the byproducts of sugar cane, rice, and cotton, the returns from these items alone would pay a hundredfold every cent of money that has been spent on experimental work.

When Dr. Dodson and Dr. W. H. Dalrymple, veterinarian—one of the most outstanding in the United States—began experiments on the feed value of lespedeza hay, blackstrap molasses, rice by-products, and cottonseed meal, most of these valuable by-products were then considered worthless. Molasses from the sugar mills was pumped into the ditches and water was forced on it to wash it into the bayous and swamps, a costly operation. Rice polish, that important feed, was blown out onto the surface of the Mississippi River to be washed away. The feed value of cotton seed was just becoming known.

When the results obtained from feeding blackstrap, rice polish, and cottonseed meal as supplemental rations were published, the major industries were stimulated beyond their wildest dreams. It is impossible to even estimate the millions of dollars that have been brought into Louisiana by the utilization of blackstrap molasses alone. The value of rice polish and cottonseed meal, of course, needs no comment.

Investigate Cattle Tick

Realizing that the Texas Fever Tick was the main reason for the lack of cattle development in Louisiana, Dr. Dodson, Dr. Dalrymple, and Professor H. A. Morgan (now President of the University of Tennessee) studied the life history of the tick. This was in 1901, and even five years prior to this systematic study, the immunization of Northern-grown cattle by the injection of the blood of cattle immune to Texas fever was carried on with varying successes.

As late as 1890, ticks were not suspected as having any connection with Texas fever, and nothing definite was done by the Bureau of Animal Industry at Washington until Louisiana and other Southern state experiment station workers prevailed upon Dr. Cooper Curtice in charge of the Bureau to conduct investigations along this line. Believing that immunization of all cattle was not practicable, experiment station workers, began studying some means of eradicating the tick. Studies of the life history of the tick, symptoms of the disease, the response to medical treatment of animals suffering from the fever, and microscopic studies of the causative agent, serum treatment, etc. were made. Many methods were employed to kill ticks. The application of oils and arsenicals in solutions gave the first encouraging results, and although the Bureau of Animal Industry was the first to use the dipping vat method, the Louisiana station had used the arsenical solution as a spray.

Advocate Clean Pastures

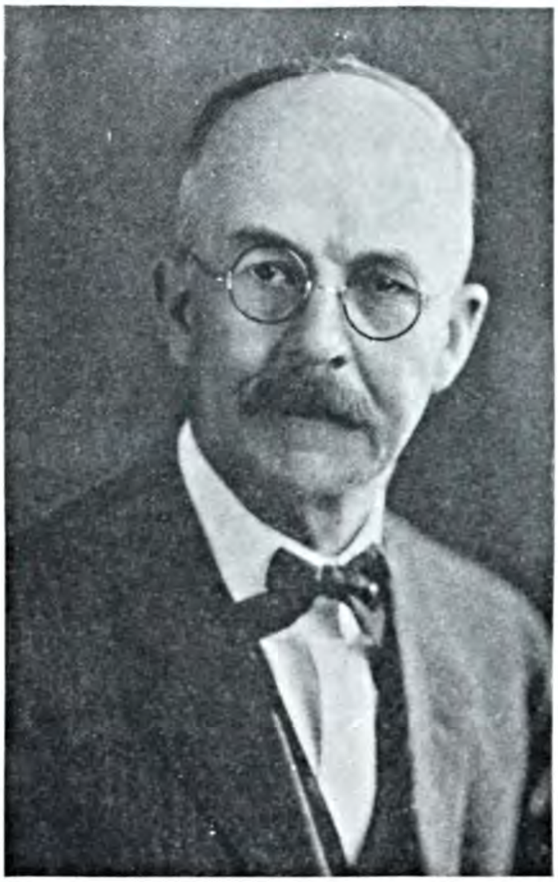
The workers were responsible for the advocation of clean pastures by keeping cattle away until the ticks died of starvation and then cleaning the cattle of ticks and putting them on tick-free pastures. This was tried out on a commercial scale from 1901 to 1904, when a carload of fine Angus beeves from north of the ticky area were brought to Baton Rouge, immunized, and afterward put on clean pastures. The station produced a car of cattle that topped the Chicago market on January 8, 1904.

Having proved that tick eradication was possible, efforts were made to secure government aid in eradicating this pest that has cost—and to a limited extent still is costing—the South millions of dollars annually.

It is one of life's little ironies, that it was the Louisiana Experiment Station which led the way in tick eradication work and that a Louisiana Congressman, now Senator Joseph E. Ransdell, fathered the first bill to secure federal funds for tick eradication, and despite this fact, Louisiana still ranks low in the number of Southern states now free or practically free of this scourge. However, indications are that within the next few years, the fever tick will be totally eradicated.

A great deal of time was devoted to the study of glanders, anthrax, blackleg, nodular disease of intestines of sheep, etc. Anthrax, or charbon, formerly one of the state's most deadly diseases in livestock, due to vaccination and sanitary measures is no longer a retarding factor.

Always an advocate of soil improvement, the experiment station, so far as records show, was the first one to differentiate the organism producing tubercles on the roots of cowpeas as being a separate group from those producing the tubercles on clovers. As a result of experimental work with velvet beans, soybeans—and recently with yellow sweet clover as a winter cover crop—thousands of acres of land in Louisiana are being restored to their former state of fertility. Great credit is due the Louisiana Agricultural Extension Division for conducting a campaign of education in regard to these crops.



W. R. Dodson, former dean of the agricultural college and director of the experiment station.

The New University

As the state grew in wealth, many citizens realized that the cramped quarters of the historic old Louisiana State University, of which General William Tecumseh Sherman was the first president, were inadequate. The erection of a greater agricultural and mechanical college on a new site was suggested. Every gubernatorial candidate was requested to support the greater agricultural college program. Day and night, members of the experiment station and extension staff went over the state explaining the need for greater agricultural expansion.

There was no greater advocate of this program than Governor John M. Parker. It was his dream to have erected one of the best equipped colleges in the country, where farm boys and girls as well as other students might come and work their way through school. It was his promise during 1920 that such a college would be built without additional cost to the taxpayers of the state. Governor Parker, for the first time, succeeded in having a two per cent severance tax placed on all natural resources. "Why should not those who take the oil, gas, salt, timber, and gas from our state be required to pay a small severance tax?"

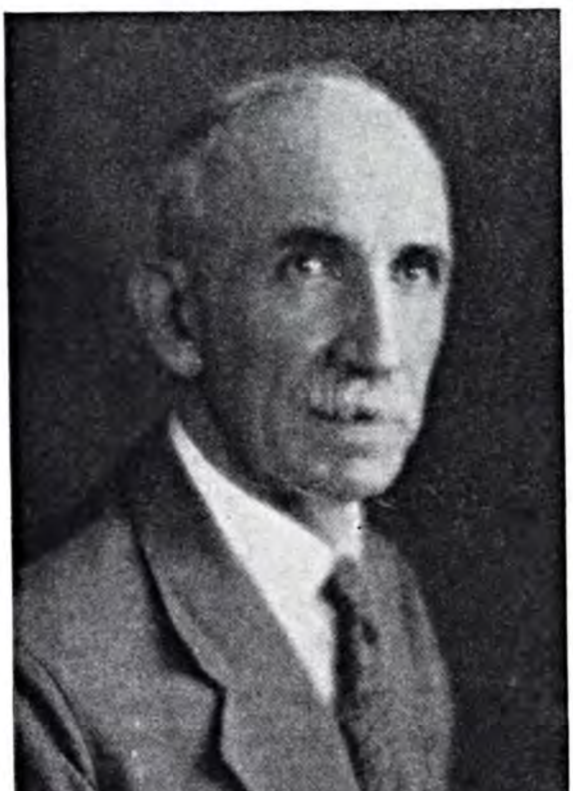
In September 1925, the Greater Louisiana State University was opened to the public. For the first time in the history of great state universities, a modern and well-equipped plant, embracing 2,000 acres of ground, and a cost of more than $4,000,000 was dedicated to agriculture and the sciences. The old plant, still beautiful, has since been converted into a school for the co-eds of Louisiana State University.

New Inspirations

The magnificent buildings are Italian Renaissance. Theodore C. Link, the world-famous architect who designed Leland Stanford, and was the builder of the Union Station in St. Louis, the Mississippi Agricultural and Mechanical College, the Mississippi State Capitol, and other buildings throughout the country, declared that the Louisiana State University was his masterpiece. With ample acreage and with soil representing practically all the types to be found in Louisiana, experimental work at the home station took on a new lease of life.

Since the Audubon station was closed and all of the sugar equipment and laboratory brought to Baton Rouge, the station is devoting a great deal of time to sugar cane experiments. The sugar planter seemed doomed to hard luck, for there came reports from the field that a leaf disease, known in the tropics, was causing havoc. The hardy varieties developed by the station had been able to make fair yields despite the ravages of root rot and the borer, but when mosaic was added, the future seemed dark indeed.

In 1922 the Louisiana Station received from the government station at



W. B. Mercier, director of agricultural extension.

Canal Point 3,500 varieties of seedling canes from which it was hoped to secure a variety resistant to root rot and tolerant to mosaic. Space does not permit details relating to the hundreds of variety tests, fertilizer tests, etc., that have been conducted. The American Sugar Cane League and other interested planters, together with the United States Department of Agriculture, cooperated.

The Java canes, P. O. J. 213, 234, 36, and others gave bright promise. As fast as these canes became available at the station, they were planted in test fields located in various parts of the "Sugar Bowl" in order that equal and rapid distribution might be made to all of the planters.

New Canes Yield Well

Science came again to the rescue, as statistical data compiled by the Bureau of Agricultural economics will show. During 1926, which was the last year in which Louisiana's sugar was made entirely from the old varieties, 127,916 acres of sugar cane gave a per acre yield of 6.7 tons per acre, and the total production of sugar was 47,166 short tons, the lowest in 50 years. In 1927, approximately one-fourth of the total acreage under cultivation was planted with the mosaic-tolerant varieties. From the total of 72,987 acres harvested the yield of cane was 13.4 tons per acre and 70,792 short tons of sugar.

In 1928 estimates are that more than three-fourths of the total acreage was planted to P. O. J. 213, 36, 234, and other Java canes. From 178,000 acres planted, of which it was estimated that the cane of 144,500 acres was used for sugar, a yield of 17.5 tons of cane per acre was harvested producing 171,000 short tons of sugar. During 1929 it is estimated that P. O. J. canes will have superseded all of the old varieties and with favorable weather production will reach between 5-600,000,000 pounds

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The Farmer Cuts Production Costs

By Arthur P. Chew

United States Department of Agriculture

IT is admittedly difficult to measure costs of production on the farm. Questionnaires addressed to farmers about their production costs may or may not bring entirely trustworthy replies. When men have a grievance they naturally like to make out a case for it. Distressed farmers therefore are not always unbiased reporters on the subject of agricultural costs of production. But even when reliable figures as to costs on different farms can be obtained, the question arises whether these costs are representative. Costs vary widely on different farms, sometimes because the farms differ in fertility and sometimes because they are managed differently. And of course average costs don't give one a real line on the relationship between outgo and income in agriculture. It is more important to know how the costs of individual farmers are distributed around the average—whether closely bunched or widely spread out.

Production Costs Decrease

Recent economic studies demonstrate, nevertheless, that farm costs of production have fallen sharply in recent years. These studies are of a two-fold character. In the first place they draw important conclusions from census data, from statistics of relative prices and from the quantitative output of agriculture. R. J. McFall, writing in the Annals of the American Academy of Political and Social Science, concludes from such data that the cost per unit of output in American agriculture must have decreased at least 17 per cent during the decade 1913-1923. Previous estimates of farm production costs for this decade, Mr. McFall points out, were based on the inaccurate assumption that the number of persons engaged in agriculture during that period remained constant. Recently published census data for 1925 showed that the number of persons engaged in agriculture from 1913 to 1923 declined. Former studies which did not allow for this fact gave a cost index that Mr. McFall now declares was too high.

Output Increases

Agricultural economists agree that the output of American agriculture has increased nearly 20 per cent in the last decade, though the acreage in farms has decreased slightly and the number of persons engaged in agriculture has fallen greatly. In this period farmers have invested heavily in power machinery. This combination of circumstances necessarily seems to indicate decreasing unit costs of production. Not all the statistical studies made on the subject have borne out that inference. Some estimates of operating costs in agriculture for recent years show increases approximately offsetting the accompanying increase in production during the same period. However, as Mr. McFall shows, these operating costs include considerable expense incurred for agricultural implements, which may be expected to have productive capacity for many years. Part of their purchase cost should therefore be transferred from operating to capital account. If this is done, the conclusion cannot be resisted that American agriculture since the war has increased the volume of its production while decreasing its total costs.

Machinery Largely Responsible

If we ask specifically how this has been accomplished, an impressive answer will be found in material reported by L. W. Wallace, Executive Secretary of the American Engineering Council. It must suffice to mention only a few of the proofs Mr. Wallace gives that agricultural costs are declining. This class of evidence, with most people, will be more convincing than that derived from price comparisons and index numbers. Modern corn binders, Mr. Wallace notes, will do as much work in four hours as can be done by hand in six. This tends to explain why some corn belt farms grow corn at a cost of less than 15 cents a bushel compared with a cost of more than 75 cents on nearby farms. Recent developments in wheat harvesting machinery have produced equally astonishing changes in production costs. In western Nebraska in 1927 it cost 32 cents to produce a bushel of wheat, compared with 86 cents in eastern Nebraska. Modern farm equipment combined with skillful management chiefly accounts for the success of the low-cost farms.

Machinery is important in dairying as well as in the production of field crops. Investigations made in Indiana, according to Mr. Wallace, showed that the time required to hand-milk each cow per day ranged from 13.5 to 17.6 man minutes, though the milker did not take care of the equipment he used. Milking each cow with a milking machine and providing also for the care of the machine, occupied only 8 to 9 man minutes per day. Such aids to dairying, accompanied by improved breeding and feeding, explain why the cost of producing butterfat on efficient farms is frequently as low as 29 cents a pound, compared with 71 cents on dairy farms not following the best modern methods. In a Minnesota study covering 25 farms the returns from cows ranged from a loss of $36 to a profit of $67 per cow per year.

Advances made in corn growing and wheat growing are well known. Four-row corn planters which will plant corn at the rate of 40 acres per day are in use on an increasing number of corn belt farms. Rotary hoes for tilling corn, and also soybeans, beets and other crops, have been developed. Corn binders that cut the plant at the ground level reduce the devastation of the corn borer. One man with improved tractor-drawn machinery, says Mr. Wallace, can cultivate 320 acres of wheat and work only from 100 to 152 days a year.

Tractor power and improved farm machinery are revolutionizing cotton growing. In the Corpus Christi area, the Texas Agricultural College found that one man planted on an average 37.5 acres with a four-row planter drawn by a tractor. One man with a four-row tractor-drawn outfit was able to cultivate 43.5 acres. Sledding cotton has greatly reduced harvesting costs, and promising cotton picking machines have been developed. Tractors with cotton duster or spraying attachments cover as much as 100 acres in 10 hours.

Fertilizers Important

These developments make the going hard for the man who can not keep up with the procession, but at the same time bring substantial profits to the pioneers. Moreover, data assembled by Dr. O. E. Baker of the U. S. Department of Agriculture, suggest that the adoption of improved methods is not by any means confined to a small minority of the farmers. It is general. No other conclusion can be

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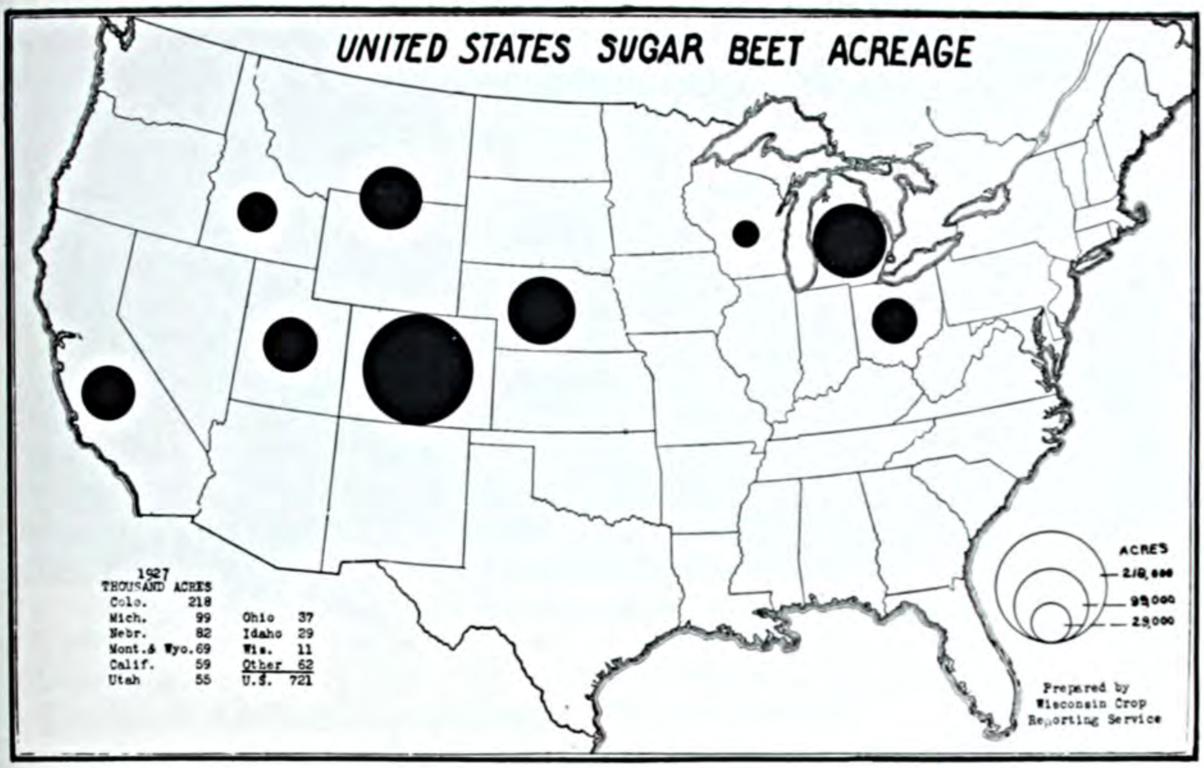


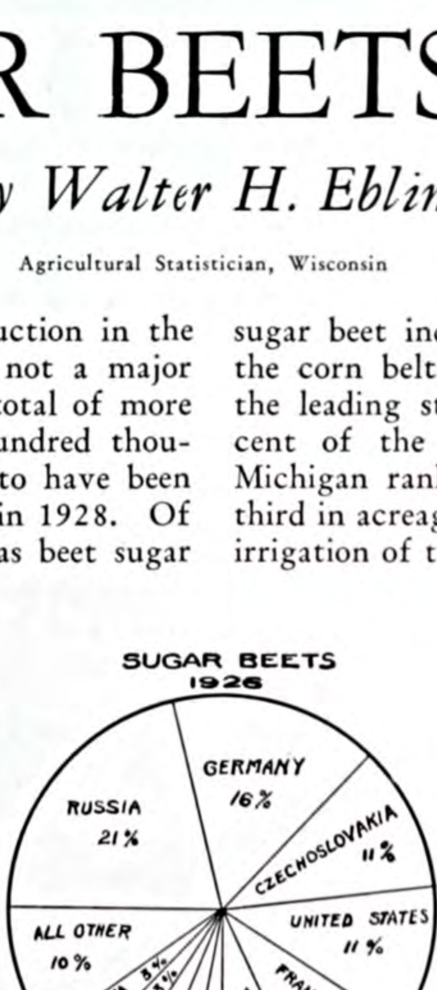
SUGAR BEETS ¶ *Tenth of this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

WHILE sugar production in the United States is not a major agricultural industry, a total of more than one million two hundred thousand tons are estimated to have been produced in the country in 1928. Of this over 85 per cent was beet sugar and the balance cane sugar.

In the United States sugar beet production is found in a group of states, largely outside of the corn belt. An eastern group of states consisting of Ohio, Michigan, and Wisconsin have a beet sugar industry on the northern edge of the corn belt. In the western states the sugar beet industry is found west of the corn belt proper, Colorado being the leading state, with about 30 per cent of the United States acreage. Michigan ranks second and Nebraska third in acreage. In the western states irrigation of the crop is common. For the most part the production is on relatively small fields and in crop rotations. Among the nations the United States ranks fourth in sugar beet acreage, Russia being first, Germany second, and Czecho-Slovakia third.



The sugar beet crop is an intertilled root crop with a rather high labor requirement and it is very

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In some parts of the South, peanuts still are harvested by hand.

The Useful Peanut

By U. V. Wilcox

Washington, D. C.

"DOUBLE - JOINTED jumbo peanuts, five a bag," cries the vendor at the baseball game, the circus, or the amusement park.

As the grown-ups and the young 'uns eat the gentle goober, little do they appreciate that this once despised peanut is becoming an important product as far as uses for the present civilization is concerned.

Peanuts are supposed to have originated in Brazil, but were taken in slave ships to Africa, Spain, and other countries at a very early date, and the types of peanuts known in this country were probably developed first in Spain and various parts of Africa. Now with modern labor-saving machinery perfected that makes cleaning and shelling easy and economical, the peanut has become one of the important crops of America. Aside from being the ideal food for elephants and the baseball fan, the peanut serves in at least 167 different ways.

Just as the Standard Oil Company found out that petroleum can be put to innumerable and almost incredible uses, just as the packers learned how to use up the odds and ends of their cattle under hundreds of ingenious disguises, so modern science has found that the shell of the peanut is a warehouse bursting with varied products never before suspected of being hidden away there.

When full advantage is taken of its versatility, the peanut will become a common household utility. You can take your bath in the morning with soap made from it. You can polish your shoes with one of its derivatives. You could enjoy a perfectly good breakfast, luncheon, or dinner and eat nothing that hasn't peanuts in it. And, finally, before you go to bed you can annoint your head with a lotion made from peanut kernels, which is an excellent foe of dandruff and harmless stimulant for discouraged hair.

Science now rubs the magic peanut as did Alladin his lamp, and behold a hundred and more things are produced. The modern machinery, the injury wrought by the cotton boll-weevil, and the fact that peanuts are hardy and rarely fail when given a long hot summer now have made them a favorite crop in the South.

There are several varieties of peanuts. The Virginia-type are large-podded and seem to grow best in soils of southeastern Virginia, northeastern North Carolina, and central Tennessee. Elsewhere in the peanut belt the small-podded Spanish is the preferred type, although many runners, with pods of medium size, are planted in Alabama and Florida.

Dried and Shelled

After the peanut plants are dug or pulled from the ground they are left in a stack or windrow to cure for a month. This lessens the tendency of the kernels to shrivel. Then the pods are picked from the vines by means of a mechanical picker or threshing machine and taken to the cleaning or shelling factory. Large storage houses at a number of the factory points provide a means for holding over peanuts from the time of harvest until they are needed later in the season.

Before peanuts in the shell are considered ready for bagging, they pass through a revolving reel, where sand and dirt drop out, through a machine for cutting off the little stems attached to the pods, past various fans to blow out the chaff, light stems and lightweight pods, through grading machines and even a polishing drum, which contains a white, dustlike powder in which the pods tumble around sufficiently to give them a fairly uniform color. Finally the pods pass along revolving, endless belts, along which workers are seated to remove discolored, misshapen pods and any remaining foreign material.

No such elaborate steps are taken with the peanuts which are to be shelled. The shelling is accomplished by forcing the pods between two cylinders, the inner one revolving while the outer is stationary. To the revolving cylinder are attached two steel "beaters," which strike and crack the hulls of the nuts.

Many Uses Developed

By grinding up the mealy kernels there is made peanut coffee which is as delicious as real coffee and tastes like it, but has no caffein. By shredding the shells ordinarily left to the tender mercies of the white wings and janitors there is secured two or three varieties of excellent and very nutritive breakfast foods. By squeezing the kernels there is drained off 32 different kinds of milk, many grades of which are richer and as healthful as cow's milk itself.

But that is not all. Sauces scarce-

This machine threshes the stacks and bags the peanuts.

ly distinguishable from Chili or Worcestershire can be made. Seven different stains for wood are secured from the gritty residue that remains after grinding and mashing. By taking the hearts of the little grains concealed between the halves, food for poultry is manufactured.

The uses of the peanut for medicine are innumerable. A tonic for invalids suffering from lung afflictions and another for tuberculosis sufferers are but two of the most promising. Cargoes of peanuts are shipped from this country to France and Italy to be pressed for oil.

Much of the crop in the South is pressed for oil, and people who live in the neighborhood of the factories buy the "cake" (the residue of the presses) and grind it to meal for making griddle cakes and biscuits. In many peanut sections of the nation this lowly fruit of the ground is utilized for cookery in ways unfamiliar to city dwellers. Appetizing soups are made of them, and when coarse-ground, dried, and bolted, they make palatable 'grits."

Scientists of the United States Department of Agriculture have discovered that the "hay" made from the peanut vines, which can be fed to stock after the peanuts have been harvested, contains more "fat formers" than any other hay except red clover.

It is easily possible to serve a five-course meal with peanuts. A rather thick, brownish consomme can be made of peanuts which have been steamed until the skins fell away, then boiled in salted water until they became very tender. A little beefsteak and a few grains of cayenne pepper may be added and the result is an appetizing soup.

Flaky rolls are made of ground-up peanuts mixed with melted butter, eggs, and flour.

Tender "chicken" can be made of peanuts which have been blanched and ground until they became an oily paste. This is stirred with well-beaten eggs and some rolled bread crumbs. The mixture is then spread thickly on sliced, boiled, sweet potatoes, then dipped in the white of an egg and fried to a "chicken brown."

The salad is made of roasted peanuts and apples chopped together.

Finally the coffee and cake are served. The "coffee" is not coffee at all, but a healthful and delicious beverage brewed from peanuts. The cake has also been made by using coarsely ground peanuts mixed with sugar, milk, corn starch, and butter.

Other uses of the peanut include shoe polish, baby food, face powder, and the end is still distant.

It is the Spanish and runner peanuts that are sold shelled. They are so uniform in shape that they are well adapted to the penny vending machines. Spanish peanuts are also sold to blend with the Virginia-type nuts in making peanut butter, and for peanut candy. The shelled peanuts of the

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Peanut vines are stacked on poles to dry.

Corn History

By E. N. Bressman

Plant Breeder, Oregon Agricultural College

CORN is one of the few important crops which originated in America. It is mentioned in tradition that the Norsemen found corn on this continent in 1002, when they touched this country. Of course, the crop became well known after the discovery of America in 1492 by Columbus and after the first settlers came.

There are two places which appear to be the most logical spots where corn was first grown. These are the highlands of Peru and southern Mexico. In 1914 an explorer found a fossil ear of corn in Peru. This ear of corn is without a doubt many thousands of years old. It is of interest to know that it is very similar to the small varieties that they are still growing in Peru, and rather similar to our ordinary rice popcorn. One outstanding authority thinks that corn originated in Mexico then moved north, reaching the Rio Grande about 700 A. D., and got as far north as Maine by the year 1000.

Of real support to the claim of Mexico as the first home of corn is the finding of two native grasses which are related to corn. These grasses are Teosinte and Gama grass. Teosinte is very similar to corn. It has a tassel like corn. The ear is enclosed in a husk, but there is no cob. The kernels are arranged end to end and number anywhere from 5 to 10. It is extremely easy to make crosses between Teosinte and corn. This shows that there is a close relationship between these crops.

It appears that the Indians grew at least three types of corn known as sweet, flint, and gourdseed. Dent corn, which is the corn of commerce and the ordinary field corn, is not mentioned by any of our earliest writers. It appears that this important type of corn was originated by both accidental and intentional crossing of the flint and the gourdseed types. Mr. H. A. Wallace, Editor of Wallace's Farmer, and the writer developed this theory.

As late as 1858 Iowa farmers were still speaking of yellow flint and gourdseed varieties and not about dent corn, which is now their common corn. Neither the flint or gourdseed varieties were satisfactory. The flint corn was too hard for best results in feeding. On the other hand, the gourdseed corn was too soft and light to have much feeding value. One grower stated that it took about a fourth more of the gourdseed corn to have the same feeding value as flint corn. As late as 1825 it was common to mix the flint and gourdseed varieties. One writer at this time says, "So prevalent are mixtures that I have never examined a field of corn which did not exhibit evident traces of all the corn in general use for field planting, with many others that are not used for this purpose."

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Agricultural news writers and editors at the United States Department of Agriculture keep farmers informed of the Department's research.

Agriculture Today

X. Cooperative Extension

By Frank George

AGRICULTURAL events of the last 10 years have produced a profound change in the type of information which county agents and other extension workers are carrying to farmers. Whereas emphasis was formerly placed upon production problems, the effort now is to accentuate the economic phases of agriculture.

"Each State," declares Dr. C. B. Smith, chief of the Office of Cooperative Extension Work in the United States Department of Agriculture, "is coming to see that it is easily possible to keep very busy with demonstration and other phases of extension relating to production, and still not make much progress forward unless the program of work is economically sound. Why plant and fertilize and cultivate more peach orchards if those we now have bear more fruit than the farmer can market profitably? Why place the emphasis on swine production in a region where corn yields are abnormally low?

"Farmers," he adds, "know the penalty of too many potatoes or too many pigs. Under these conditions they must sell their products at prices below cost of production. Extension forces see the need of helping farmers adjust their acreages to meet the normal demands of the country. The Bureau of Agricultural Economics is furnishing data which serve as a guide to farmers along these lines. The extension forces, through farm management demonstrators and others, are bringing this information to the attention of farmers before their crops are planted or their stock bred so that they may have some measure of control of their output and in a degree forestall disturbing surpluses."

The following three phases of work of the cooperative extension system, Dr. Smith says, are being increasingly emphasized:

1. Development of State-wide agricultural programs predicated on economic facts as a basis for sound State, county, and community extension programs;

2. Carrying to farmers and aiding them in the understanding and application of the "intentions-to-plant" and "intentions to breed" data of the Bureau of Agricultural Economics, in order that farmers may in some degree adjust production to consumption needs;

3. Helping farmers observe a standard of living comparable with that of the urban man with a like investment of capital and labor.

Serve Rural Homes

Discussing the third objective, Dr. Smith declares, "to build up a satisfying home and bring contentment in rural life is regarded as important in extension work as it is to obtain farmers an increased income. The two go hand in hand. To this end, the extension directors of the States are greatly strengthening their home demonstration staffs which specialize in these matters and are multiplying their work with rural boys and girls.

"Rural women are being brought together in clubs, camps, and short courses, and are taught not only technical matters of the home, but opportunity is provided for social intercourse, play, and participation in matters of community welfare. More than 620,000 boys and girls from 10 years to 18 years of age likewise are being brought in touch with the best things in agriculture and given vision as to its possibilities when pursued as a mode of living."

The passage of the Capper-Ketcham Act last year, authorizing an appropriation of $980,000 annually, of which $20,000 goes to each State and the Territory of Hawaii, has made possible a further substantial development and expansion of cooperative extension work. The act also authorized an additional $500,000 to become available for use on July 1, 1929, and annually thereafter. With these additional funds, emphasis in extension work during the current year is being laid on more fundamental extension programs, larger use of significant economic data, more home demonstration agents, and more boys' and girls' 4-H club work.

During the past year, county extension agents reported more than 4,500,000 instances in which improved agricultural practices were adopted by farmers, farm women, and farm boys and girls who were members of 4-H clubs. As a part of the educational program of the service, 772,185 practical demonstrations were carried on by farmers and farm women as object lessons to their neighbors. Boys and girls' 4-H club members completed 776,029 demonstrations.

"The extension service," Dr. Smith declares, "is anxious to extend and strengthen its service to cooperative marketing associations. Extension offi-

Making an agricultural movie for use in extension work.

cials cannot assume responsibility for the organization and direction of cooperative associations, but within this limitation there are many things which they can do to foster and promote the movement.

"Farm productivity per worker has increased greatly, due to improved methods which farmers have acquired through county agents and other agencies. Rendering service to increase yields and improve quality in farm products does not discharge the entire obligation of State and Federal agencies to farmers, as there remains the question of profitable marketing of this increased production and of readjustments which may become necessary, in the light of facts of the situation, between and within producing regions. The need for strong farmers' organizations to meet this broad problem is self-evident.

Assist in Cooperation

"Some of the ways in which county agents and extension marketing specialists can assist in furthering and strengthening the cooperative movement are: Advising and assisting farmers in surveys of the immediate needs of their community or State for agricultural products; discussing before meetings of cooperative associations the principles of cooperative marketing, marketing problems, and the results obtained in research studies which might be adapted by farmers to the particular needs of their market; conducting educational campaigns and meetings for the purpose of bringing to farmers information on the character of the needs of the market for their products; arranging for demonstrations in packing, processing, and standardizing products handled by cooperative marketing organizations, particularly those phases of this work for which farmers are responsible; and assisting in the promotion of cooperative marketing schools in cooperation with marketing associations, agricultural high schools, county farm bureaus, or other agencies."

There are today agricultural extension agents in 2,237 counties out of the 2,900 rural counties in the United States, home demonstration agents in 1,190 counties, and boys' and girls' club agents in 168 counties. The various States cooperating in this work have increased their expenditures so that they are now spending $1.64 of State and county funds for every dollar provided from Federal sources.

The practical value of intentions-to-plant reports as part of the cooperative extension program is indicated by a recent survey which showed that for most crops the reported intentions are an accurate indication of farmers' plans at the time they report. In 1926, for example, Maryland tobacco growers indicated an intention to increase their acreage 20 per cent. The danger of such an increase was pointed out to these growers with the result that the acreage was increased only 3 per cent and the favorable prices of 1925 were maintained through 1926.

The following year the tobacco growers in the Connecticut Valley indicated an intention to increase the acreage by 12 per cent. Reasons why so large an increase was inadvisable were explained and the acreage was increased only 8 per cent, resulting in slightly improved prices. In the same year, growers of cigar tobacco in the Miami Valley of Ohio and Indiana reported an intention to decrease the acreage 8 per cent. Their situation was such as to call for an even greater reduction, with the result that the acreage was reduced 27 per cent. A crop of high quality was produced and prices were nearly double those of the preceding year.

Gives Warnings

Potato growers were warned in January, 1928, that the indications were for a substantial increase in acreage and those who were planning to expand their acreage because of profits secured during the preceding three

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Local pride and community spirit built this fine community hall and school back in the hills of West Virginia. It is probably the only building of its kind in the State, and owes its existence to an excellent feeling of cooperation which exists throughout Cabell County.

Cabell Cooperates

By F. N. Darling

County Agent, Cabell County, West Virginia

COOPERATION is the keynote of agricultural activities in Cabell county, West Virginia.

Demonstrating the new possibilities of cooperation between local community organizations and district and county officials, Walnut Grove community, situated way back in the hills on a dirt road in Cabell county, recently dedicated its new community hall and two-room graded school building. This building, 28x60 feet, built at a cost of $4,000, stands as a monument to the efforts of the Walnut Grove community council, which under the leadership of its chairman, U. S. Williams, started a movement about two years ago for a new graded school. The council proposed to the Union District Board of Education that the building be constructed so that it would serve both as a school and a community house.

Impressed by the reasonableness of the proposal, the board followed the suggestion of the council, and today the building is a fulfillment of the dreams of the community leaders. Two folding partitions divide the building into two classrooms and a hallway, or permit it to be thrown together into one large community hall as needed. Probably no other building of the kind exists in the state at this time.

Three years ago, Walnut Grove school with a score of 29, ranked next to the lowest of all the rural schools in Cabell county. The new score of 87, just given it, puts the school at the top of the list. In the exercises dedicating the new building, James Reinhardt, professor of rural education in the Morris Harvey College contrasted the differences of yesterday with those of today, and pointed out that the community was building for the future. Morris Bailey, vice-chairman of the agricultural committee of the Huntington Chamber of Commerce, stressed the importance of closer cooperation between town and country groups, and pledged the cooperation of the Huntington business men in helping to bring this about.

Another Example

The community obtained the promise of the county court to grade the grounds and plans were made to have

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Lonoke County's Program

By John P. Bell

Assistant Agricultural Editor, University of Arkansas

A 600-POUND application of 8-6-8 fertilizer gave a yield of 1,821 pounds of seed cotton in Lonoke county, Arkansas, while an equal amount of 8-6-0 yielded only 1,191 pounds. This is the result of one of the numerous demonstrations established by J. E. Terry, county agricultural agent, in order to establish substantial, local evidence for the need of larger amounts of potash on soil subject to rust, which is one of several soil problems of the county.

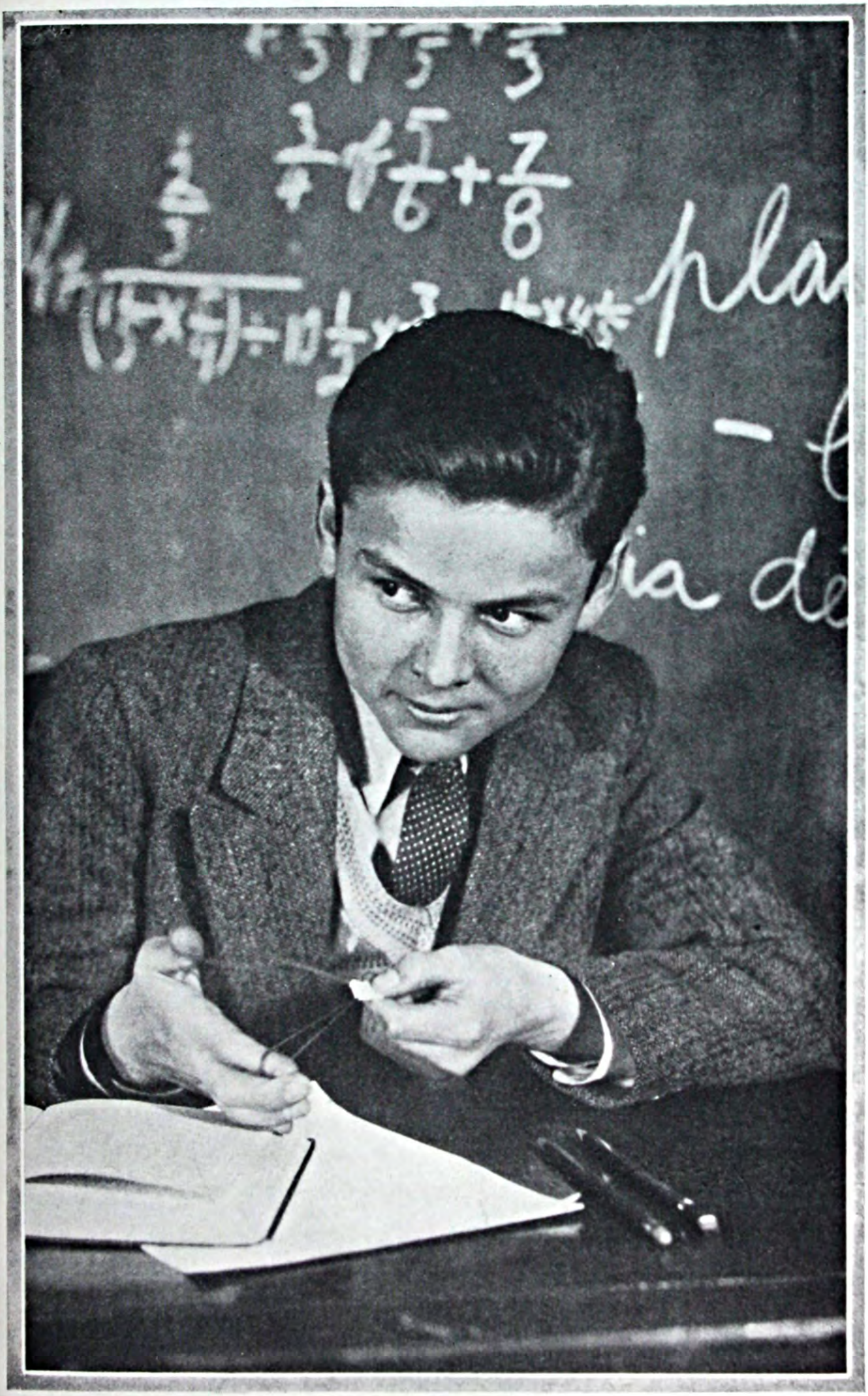
"There is an unusually large acreage in Lonoke county that is subject to rust, and a great many of our farmers have experienced low yields even when using complete commercial fertilizers. Our potash demonstrations have certainly brought out the importance of potash in offsetting the damaging effect of rust on cotton yield. The ready-mixed commercial fertilizers commonly used do not contain sufficient potash, and, consequently, it has been necessary for us to stress that sufficient potash be employed to stop the rust losses at the usual rate of application per acre.

"All of the work done with fertilizers has been done with the idea of establishing the use of better balanced fertilizers. On all our soil, excepting the heavy 'buck-shot' land, we must use a complete fertilizer and one with more nitrogen and potash than the rates used in the past. Where we brought in one car of kainit and one car of nitrate of soda a few years ago, we are bringing in three. This increase is directly traceable to the demonstrations that have been carried on during the last few years. This wiser use of fertilizers has brought about a decreased cotton acreage, an improved cotton yield, and more land in feed crops," Mr. Terry stated.

A demonstration with A. A. Cantrell, Sr., of England, using 200 pounds of nitrate of soda as a side-dressing, gave an increase of 550 pounds of seed cotton. In a demonstration on the Armstrong Plantation, of Kerr, Arkansas, 100 pounds of sulphate of ammonia were used as a side-dressing on cotton that had 400 pounds of 10-4-4 under it. The two acres that had only the 10-4-4 made 2,405 pounds of cotton and the two acres side-dressed with the ammonia made 2,803 pounds of seed cotton. The sulphate of ammonia was put on at the second chopping.

Another soil problem confronting Terry is the foulness and low productivity of the rice lands. The low production is caused by the repeated cropping of rice. Carelessness as to the source of seed and to cultural methods has brought about the foulness of fields with red rice, other grasses, and sedges. A program of control was started in 1925 by using soybeans in rotation, planting the beans in drill so as to allow cultivation. As a result the rice crop is of better quality and the yield improved 15 to 20 bushels. Soybean acreage has grown from 3 acres in 1924 to 3,000 in 1928.

But in this long-time program of soil building Terry has by no means overlooked developing legume growing and livestock. In summing up his work in soil improvement he has stressed first, good dairy cattle; second, legume growing for soil building and feed; and third, the intelligent use of high-grade fertilizers.



Back to Work

PICTORIAL

Left: The "helper" seems to be more worried about the securing, rather than the preserving quality, of the fruit she is "canning."

Right: The shores of Lake Mendota, Madison, Wisconsin, although frequented by thousands of students and tourists, maintain their natural beauty.

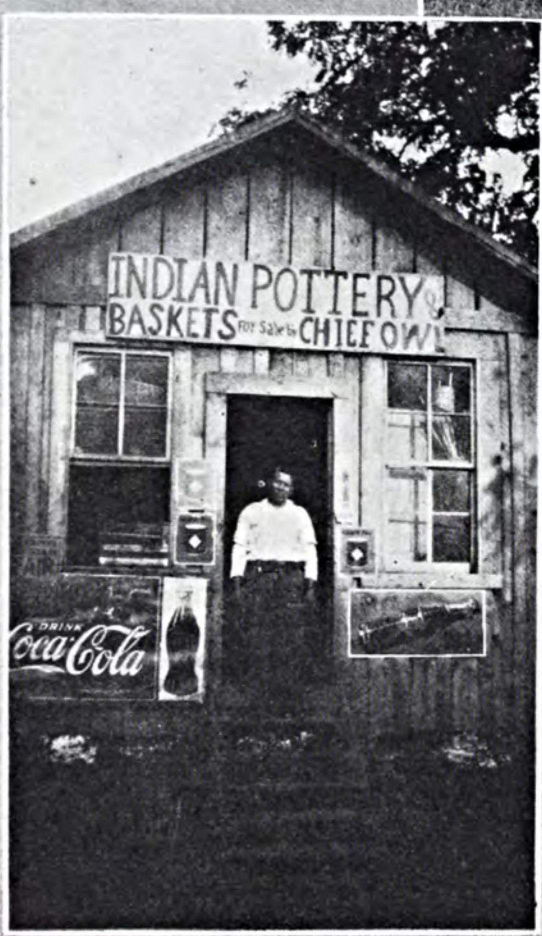
Right: Roadside marketing has become well recognized as an important phase of marketing agricultural produce.

Left: "Frozen." This one-year-old pup stood a wounded pheasant and never moved so much as his eye while the hunter took the picture and kicked out the bird.

Left: Many of this group of Cherokee Indian children have white blood in their veins, but they delight in the fact that they are Indians.

Right: Nestled in the Smoky Mountains of North Carolina, the Cherokee Indian School is modern in its equipment and teaching.

Below: A son-in-law of Chief Owl is standing in the door of this store on the Reservation.



The Cherokees living in the Smoky Mountains of North Carolina are a remnant of the tribe that hid in the mountains at the time the Government attempted to remove them to the Indian Territory. There were several hundred of them. Later the Government decided to leave them there and set aside a tract of land amounting to something like 80,000 acres for their use. These Indians now number more than 3,000.

They cultivate small plots of ground where it is not too steep and make baskets and trinkets for sale. The school at Cherokee, N. C., is a Government institution; their food, clothing, housing, books, in fact all expenses are met by the Government. The children are taught up to the ninth grade. Most of the instructors are Whites, although Indians hold a few minor positions.

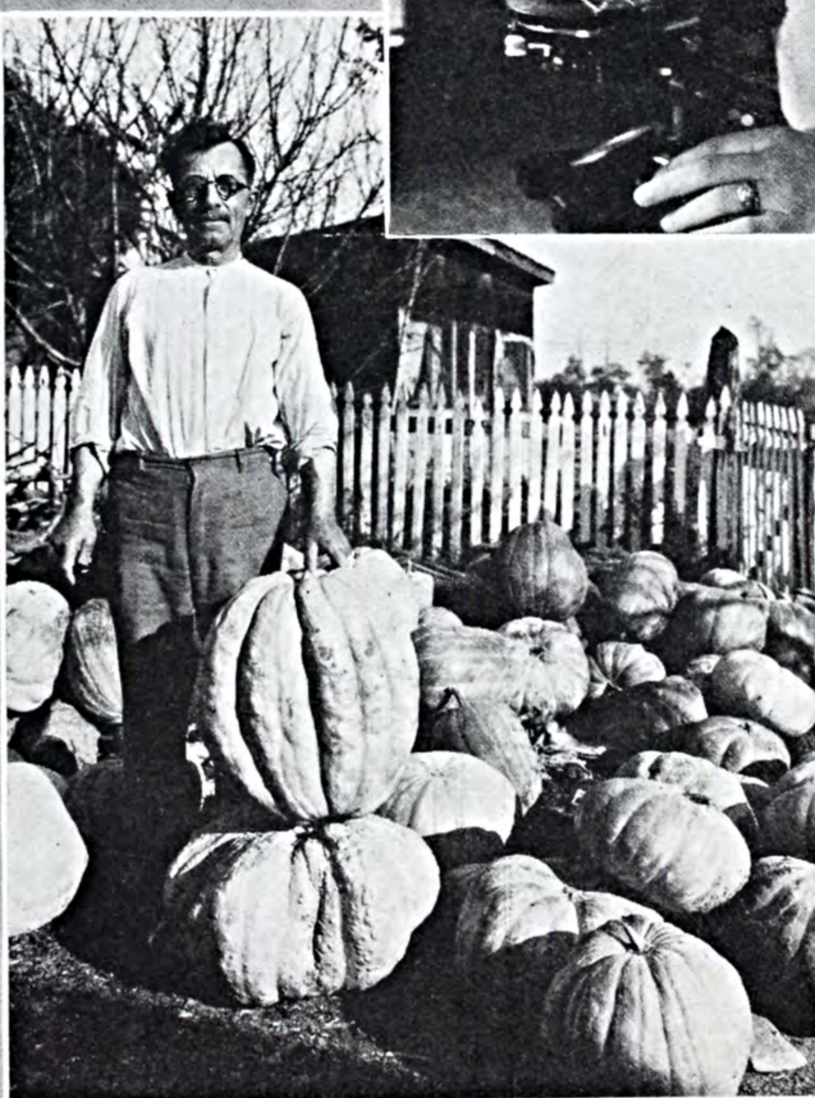
Right: Mount Vernon is the goal of the Mount Vernon Memorial Highway which the Government is to build along the Potomac from Washington, D. C., to Mount Vernon.

Left: In old Christ Church at Alexandria, Virginia, the Washington pew may still be seen. The Highway will pass through historical Alexandria.

Right: The old quarters of the volunteer fire company in Alexandria to which Washington belonged. Alexandria was George Washington's home town. It was his market place, his post-office, and his voting place. It was the meeting place of a lodge of Masons to which he belonged and the lodge hall is now the repository of a great many articles and paintings associated with him.

The Mount Vernon Memorial Highway is to be built in celebration of the 200th anniversary of the birth of Washington. Congress has authorized an appropriation of $4,500,000 for the road, which is to be completed in 1932 and will be 15.4 miles long.

Right: More and more, women are demonstrating that they are well adapted to many lines of scientific research work: Mrs. Ruth C. Starrett is an assistant cytologist in the office of sugar plants, Bureau of Plant Industry, United States Department of Agriculture. A cytologist knows about the constitution and functions of cells.



Left: Showing that a pumpkin has its own ideas on "physical culture." This great variety of shapes was assembled from one field by this Maryland farmer.

The Editors Talk

Our Changing Diet

We are indebted to Dr. O. E. Baker, Senior Agricultural Economist, Division of Land Economics, United States Department of Agriculture, for some exceedingly interesting data on the changes occurring in the diet of the American people. It will surprise many to know that in spite of the popular craze for slender figures, we are eating more sugar and more pork. Others will find it hard to believe that wheat, the "staff of life," and other cereals are losing ground to fruit and vegetables. And what will the harkers on the high cost of living say to the fact that the diet of the period 1922-1926 is much more expensive in character than in any previous period in the nation's history?

Mr. Baker cannot always give reasons for the changes, but he reports the facts. For instance, of wheat he says, "Whatever the cause, the fact remains that wheat bread, which to many, perhaps most, peoples of the world is a luxury, has occupied a place of lesser importance in the diet of the American people during and since the World War, while the per capital consumption of the more expensive foods has increased."

On the other hand he attributes the 60 per cent decrease in the use of corn for human food to a rising standard of living and the increasing use of wheat flour and other foods by both negroes and whites in the South, where corn has been used for human food more extensively than elsewhere, and to the increasing proportion of the people who live in the cities, where little corn bread is baked in homes and even less by bakers.

In summarizing the changes in the consumption of plant foodstuffs, Mr. Baker says that the per capita consumption of the cereals, except rice, has decreased during the past quarter of a century, especially during and since the World War. Comparing the periods 1897-1902 with 1922-1927, which are 25 years apart, the per capita consumption of wheat flour has decreased over 20 per cent, of corn for food over 60 per cent, of rye flour about 60 per cent, and of barley, used to manufacture beer and similar products, nearly 90 per cent. But the consumption of oatmeal, which is small, probably has remained about stationary. Similarly the consumption of potatoes per capita, excluding the first period, 1897-1902, has remained stationary, and the per capita consumption of fruits is now about the same as a quarter century ago. There has been, however, a notable shift from apples toward citrus fruits and grapes.

Only the vegetables and sugar among the major plant foodstuffs show an increase. The increase in consumption of vegetables is practically confined to the years since the World War, but the increase in consumption of sugar has been almost continuous for a century. However, the most rapid increase has occurred since the World War.

What are the people eating to make up for this decline in consumption of cereal foods?

Mr. Baker finds that we are eating more milk and pork and less mutton, including lamb, and beef, including veal.

The trend in per capita consumption of animal products was downward from the beginning of the century to the period just before the war (1912-1916) for beef and veal, considered jointly, and for milk, the trend was downward to the war and post-war years (1917-1919) for pork and chickens, and to 1922 for mutton and lamb. Since the war the trend for milk has been upward, for pork it was upward from1917 to 1924, for beef from 1921 to 1924, and for mutton and lamb from 1922-1926. At present the per capita consumption of beef and veal, considered jointly, and of eggs, is about the same as at the beginning of the century; the consumption of mutton and lamb, considered jointly, is much less, and of chickens also; whereas the consumption of pork is now about 10 per cent greater and of milk about 12 per cent greater. It is worth noting that the hog and the dairy cow among all farm animals produce the most human food per unit of feed consumed.

Applying the changes to the agricultural situation, Mr. Baker says that the importance of this more expensive diet in mitigating the agricultural depression will be better realized when it is noted that foodstuffs constitute about seven-eighths of the total consumption of agricultural products. If the prosperity of the non-farm people, who now constitute three-fourths of the nation's population, should decline, and the per capita consumption of agricultural commodities gradually return to the former proportions, that is, if a reverse trend toward less meat and milk and more cereal foods set in, the reaction on agriculture would become increasingly serious. It is certain that no change in diet would be of benefit to so large a proportion of the farmers of the United States as a further increase in the consumption of animal products.

Handful Proof

When we hear of a farmer who discredits the use of fertilizer because he tried some and it didn't do his crops any good, we are reminded of the tale of the old Indian chief and the feathers. It seems that the old chief was getting so stiff and rheumatic that he couldn't sleep. His friends told him that the paleface cure was to sleep on feathers, and so he collected a large handful of feathers, carefully put them on a long flat rock, and lay down to pleasant dreams. When he awoke in the morning, he rubbed his lame back and said, "White man say feathers soft; white men tell big lie!"

The chances are that the man who is "all through" with fertilizer is basing his opinions on handful proof. Perhaps he did apply enough, but not in accordance with the needs of his soil. Perhaps his soil didn't need it, but that doesn't mean that the recommendations of scientific agriculturists, which might apply to his neighbor's soil deficient in fertility, are lies.

In this day and age, we need more than handful proof for our recommendations and decisions. Fertilizer recommendations are based on years of careful study and experimentation. Careful checks are made, and experiments are run oftentimes for many years before definite information is given out. In the face of such evidence, the statement of a disgruntled farmer deserves no more attention than the old Indian chief's accusation against the paleface feathers.

The Greatest of Them All

For a long time we have held in our "treasure file" a clipping of a little editorial which appeared in the *Prairie Farmer* in 1925. We liked the thought of this bit of writing which called the farmer the greatest of all human creators.

To us who love the country, the picture of farm life is never more beautiful or complete than in the approaching season—Fall. The harvest is over, and as if to enhance the fulfillment of man's effort, Nature paints her foliage with a riot of color. We find it easiest then to tie up with the stern realities of the business side of farming the sheer beauty and satisfaction of country life.

THE GREATEST OF THEM ALL

> The noblest human art is the art of self expression. We are all creators, and within us is the urge to create something enduring and worth while. The world honors its great sculptors, who carve a granite block into a thing of beauty. It honors its great painters, who spread upon a canvas a painting so beautiful that it holds us spellbound.
>
> Yet no artist paints with the bold strokes of the farmer, whose canvas is a quarter section of land. On that he paints the dark green of the cornfields and the yellow of the wheat and oats. If the picture is well done, the yellow will be in the grain fields instead of in the corn, and there will be no weedy or unproductive corners to spoil the beauty of the whole.
>
> The farmer is the greatest of all human creators. His tools are life itself, which he molds to his own purpose—that of making his farm produce more bountifully to the feeding of the nation. In him is found the highest development of the art of self expression. The whole farm is an expression of his ambition and his life.

Some people can read character in faces. We can all read character in farms. The farm which is the expression of a well-rounded man tells its story in the fields, in the barns, and most of all in the home, for after all farming is a life rather than a business, and its best products are its boys and girls.—*Prairie Farmer.*

More Plant Food Per Ton

Recent data on mixed fertilizers sold in Ohio and Pennsylvania show that the average amount of plant food per ton of fertilizer in 1928 was higher than in any preceding year. Ohio farmers in 1928 bought approximately 20 per cent more plant food per ton than in 1922. In Pennsylvania farmers secured 28,281 tons more of plant food in 1927 than in 1925, even though the total fertilizer tonnage was 1,948 tons less. Available 1928 figures show a continuation of this trend.

Many of the items of cost in the retail price of mixed fertilizers to farmers are ton costs, i. e., freight, bagging, handling, and storage charges are so much per ton. This means that if a ton of fertilizer contains a large amount of plant food, the cost per unit is lower than in a grade of fertilizer which contains a comparatively smaller amount of plant food per ton. This difference in the cost of plant food has been one of the factors which has led farmers to buy high analysis fertilizers, as it enables the consumer to save on freight and handling costs.

With wages relatively high as compared with other commodities, it is probable that this trend toward high analysis will continue.

Luncheons for Alumni

Last month, on these pages, we commented upon alumni picnics. We are now in receipt of a nice letter from C. Hohn, Agricultural Agent of Washington county, Texas, advising us the method for getting together employed by alumni in that state.

"Being a college man," Mr. Hohn says, "I read with much interest the method that is being used by the alumni of Purdue University in keeping in touch with each other by their annual picnic.

"The ex-students and alumni of the A. & M. College of Texas have a rather novel plan of keeping in touch with each other. In eleven of the larger cities of Texas they have a weekly luncheon club where they meet every week for an hour and a half. In forty-two of the smaller towns they lunch at night once a month, and at each one of these places they hold their annual picnic on the Fourth of July each year.

"I feel that these luncheon clubs are worth a great deal to the school and to the betterment of education, because it gives the students and ex-students an opportunity to do some real beneficial educational work. It is certainly a pleasure to know that lots of colleges are following similar plans."

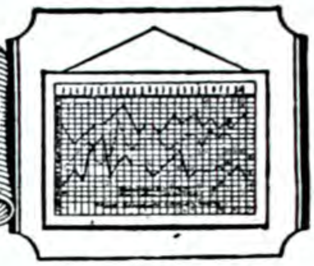
Perhaps there are other means employed by alumni in other sections of the country. If so, we would be glad to hear of them.

"Be patient with the boys. You are dealing with soul-stuff. Destiny waits just around the corner. Boys evolve into men, and men sometimes change boundary lines of states. They make political parties, they crown kings, and they put them to flight. They bring contention or they make peace. They may build or they may destroy.

"But boys misused, abused, betrayed, never forget and seldom forgive. It is a terrible thing to plant the germs of suspicion and hate in the mind of a child.

"The hope of the race lies with the boys. In a year or two we will be going to hear them preach from pulpits; we may go to them to borrow money; they may operate on us for appendicitis—aye, they may preach our funeral sermons. Nobody can prophesy the success to which a boy will attain. Difficulty, trial, hardship, these are the things that evolve boys into men. Boys can be led. They cannot be driven. Be patient with the the boys. You are dealing with soul-stuff. Destiny awaits around the corner."—ELBERT HUBBARD.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

THE LIFE OF A FARM MACHINE

The farm wagon lives the longest, and the spring-tooth harrow has the shortest life of all the farm machines. These facts are the result of a study by agricultural engineers of Iowa State College. They found that farm machines of all kinds on the average last 15 years. The wagons on the average last 24 years, while the spring-tooth harrow is in service 8 years. Grain binders varied in length of life from 5 to 33 years, with an average of 16. The average machine in the survey was used only 16 days a year, with variations from 4 days for the seeder to 80 days for the wagon and gasoline engine. A big factor in the cost of service was the number of days of use. The average cost of one day's service varied from 8 cents for a one-row cultivator to $10.11 for an ensilage cutter. It was found that failure to house the machinery did not appreciably shorten the life of the machines. Nevertheless, the engineers recommend housing machines. There are savings in time and gains in efficiency—and appearance counts.

FEED SHEAF OATS—SAVE MONEY

Many Illinois farmers and cattle feeders are cutting costs by feeding sheaf oats. E. T. Robbins of the College of Agriculture of that State says this is much more economical than feeding the threshed grain in the feed box and the straw in the manger. The College uses this once common method in feeding horses and colts. Cattlemen like the method, especially for stock cattle and calves and for starting cattle on feed. At the College they solve the rat and mouse problem by leaving a little space between the sheaf oats and the barn wall or any other straw or hay. They scatter hydrated lime on the sheaves as they are stored away. About 7 or 8 pounds of the lime is used for each ton of the sheaves. The lime shakes off during handling and does no harm to the stock.

NATION GETTING GULLY CONSCIOUS

It has taken a good deal of rain to call the country's attention to the need to fight soil erosion, but now finally the campaign against the gully washer is going with considerable momentum. S. H. McCrory, chief of the division of agricultural engineering of the U. S. Department of Agriculture, recently brought out that last year soil-saving terraces and dams were constructed on more than 45,000 farms, and that estimates show erosion was prevented on more than 1,349,000 acres. The cost was $5 to $10 an acre. Of the 31 States in which work was done to control erosion, Texas was in the lead with 574,000 acres terraced, Mississippi second with 155,000 acres protected, and Alabama third with 151,000 acres. McCrory says farmers in the northern and midwestern States are just beginning to realize the losses they are suffering from this cause. In one year an area equal to more than twice the area of Rhode Island has been fortified against this waste of soil, but Mr. McCrory says progress is not nearly fast enough in view of the hundreds of millions of acres in need of improvement.

COPPER FOR PIGS

Some time ago one of the experiment stations reported finding that one of the reasons a liver diet was effective in curing anaemia was that liver contains considerable copper. Now John Evvard, famous experimentalist on animal nutrition at Iowa State College, says that a little copper in the diet of the pig increased gains and kept him healthier—kept him from becoming anaemic. He fed the copper in the form of sulphate or bluestone. It is said that copper does not really become a part of the blood, but is a stimulator, a catalyst, which helps along chemical reactions in much the same way that a policeman, another sort of "copper," keeps traffic moving.

HUNTING HARDY FRUITS

A group of plant hunters are searching wild country about Hudson's Bay this summer for super-hardy fruits that may be useful in making fruits of our northern States more resistant to the hard winters. The object is to find wild raspberries, grapes, and other fruits that will provide this necessary element to be added to the quality of fruit already obtained by the plant breeders. In the group making the six-weeks trip are Dr. Knowles A. Ryerson, U. S. Department of Agriculture, Prof. W. H. Alderman, University of Minnesota, W. A. Leslie, Dominion Experimental Farm, Morden, Man., B. W. Jackson, Manitoba Agricultural College, and Dr. E. W. Montgomery, a physician of Winnipeg who has been much interested in developing hardy fruits for the north country. These men have promised themselves they will not be satisfied with any ordinary hardiness. They want plants that will hold a flower under Jack Frost's chin to see if he "likes butter."

TO A MOUSE

Wee, sleekit, cowrin' beastie,
Oh, what a panic's in thy breastie!

When Burns was inspired to write these lines to a meadow mouse, he was a farmer—but he was more poet than farmer. Also, at that time it is probable there were no available figures on what the mouse was doing to the income of the farm. Now there are figures, and the panic is probably in the breast of the farmer. Vernon Bailey of the U. S. Department of Agriculture says a meadow mouse eats a bit more than an ounce of green feed every day—23 pounds a year. Mr. Bailey says a hundred mice to an acre is not at all unusual, and in years particularly favorable to mice there may be as many as 1,000 to the acre. Well, just a hundred would eat a ton of green clover, and on a hundred acres that's a hundred tons, equal to about 50 tons of hay. Fortunately we have animals, birds, and parasites that help us keep the mice from taking the whole crop.

SIMPLE WHEAT HARVEST METHOD

Thomas Campbell of Hardin, Montana, famous for his large-scale grain farming and once prominently mentioned as a possibility for the Secretaryship of Agriculture in President Hoover's cabinet, is given credit for a short-cut method of harvesting wheat that is now being taken up in Nebraska. He used an arrangement of machines which windrowed the grain, then picked up the windrow and fed it into a threshing machine which poured the threshed grain into wagons.

Foreign and International Agriculture

Automobiles in India

By J. J. De Valois

Agricultural Missionary, Katpadi, South India

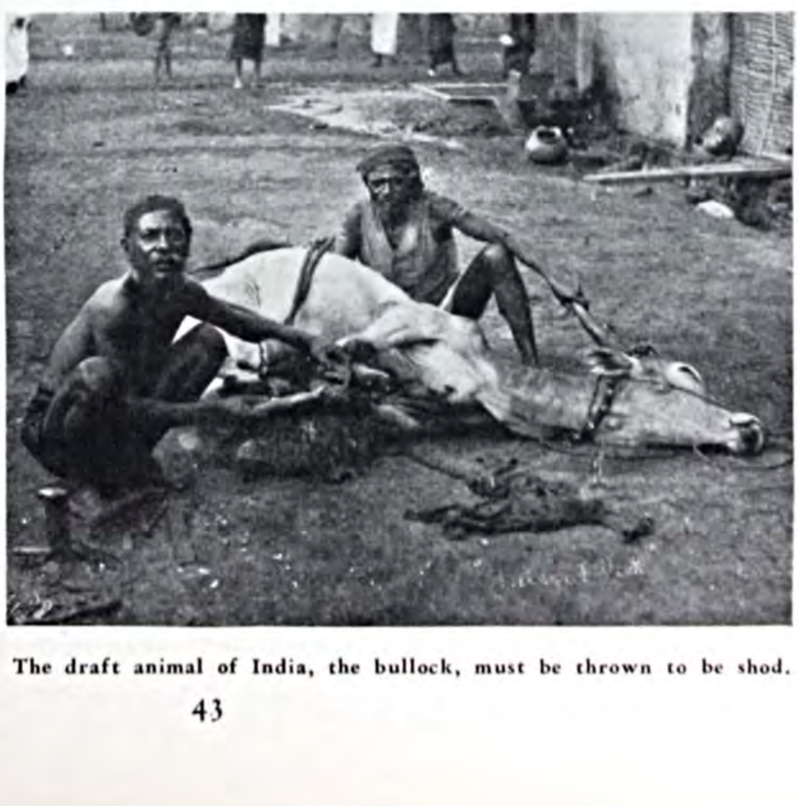
THE searchlight of the world has been turned on India during recent years. People in America have heard a great deal about India's poor economic position. Some critics seem to consider her position as quite hopeless.

There is another side to the story however, as evidenced by the growth in the automobile industry in this country within the last few years. The motor car and truck seem to be a fairly accurate means of judging the progress of any nation. Improved roads, better communication, less isolation, more adequate marketing facilities are only a few of the many advantages the automobile brings to rural people.

The Indian automobile trade has grown very rapidly during the last few years. The number of cars imported in 1926 was 12,757, as compared with only 2,895 in 1922.

In this connection, it is interesting to note that the cost of cars in India is about double the cost of the same make of cars in America. English cars are even more expensive than American or Indian cars. Gasoline, called petrol in India, sells for 40c an imperial gallon. The imperial gallon is slightly larger than the gallon measure used in America, but still the price is about double.

India and the tropical countries produce the world's rubber, consequently, tires should be cheap. This, however, is not true, because the raw rubber is exported for manufacture and a 15 per cent duty awaits the arrival of the rubber tire when it returns to serve its mother country. The intense heat seems to have a disintegrating effect on the life of tires, and tires run under the tropical sun soon become so hot that a person cannot hold his hand on them. Only 5,000 or 6,000 miles can be expected from tires. Guarantees and records of



The draft animal of India, the bullock, must be thrown to be shod.

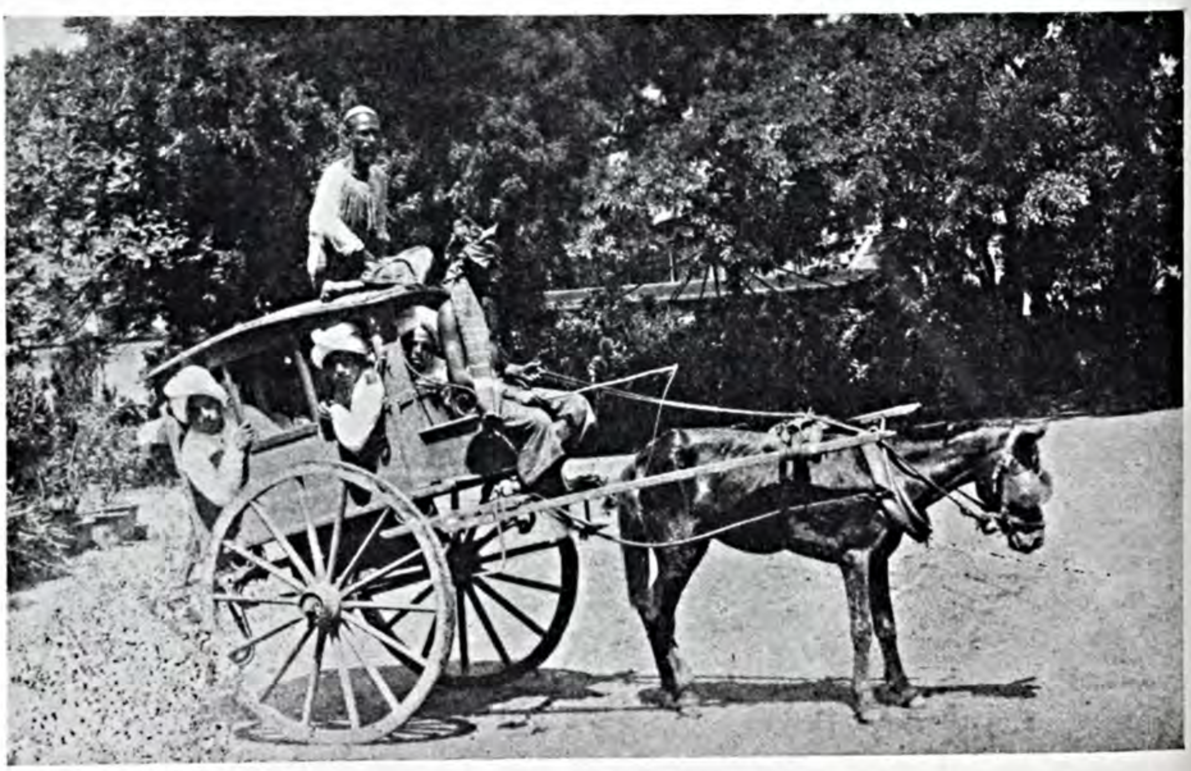
25,000 to 30,000 miles in America hold little consolation for the tropical tourist.

In spite of all these handicaps and difficulties, the motor trade is growing and developing rapidly. It doubled itself five times over in the last four years. The greatest increase is to be noted in motor buses and public conveyances. The large majority of people in India are not in a position to afford their own private cars, but do appreciate the advantages of the motor bus service. All over India today, the motor car conveyances are rapidly replacing the Indian jutka pony and two-wheeled cart, and the even more antique and slow-moving bullock cart. India is rapidly developing a network of connecting lines and buses between strategic railway centers. It is doing a great deal also to bring the isolated villages and smaller cities into closer touch with the outside world.

India, with its 320,000,000 people, has been recognized as a very important market for this modern form of conveyance. Railroads have not been as thoroughly developed as in many American and European countries and the chances are that they never will have to face the conditions that the railroad authorities are facing in America today, namely, a keen competition between the automobile and motor truck. The British government has introduced the trunk line in its railroad system, but the branch and connecting lines are not yet developed. This is one of the chief contributing factors in the rapid growth of the motor truck conveyance. Even the motor truck is taking an ever-increasing share of the freight that is carried from point to point. The bullock cart caravans are on the decrease, as India is moving forward so rapidly in her adoption of mechanical devices.

The announcement that certain motor car companies will commence active operation in assembling motor cars in their own factories in India was welcomed most heartily by Indian Nationalists and friends interested in the progress of this great peninsula. This new development will provide employment for several hundreds of Indian workmen at good wages. Many economists feel that the pressure of

(*Turn to page* 49)



The much abused and neglected jutka pony is rapidly being pushed off the main thoroughfare by the motor car and bus service.

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

Sources of nitrogen, phosphorus, and potash, as well as amounts per acre, are of greatest importance in the profitable production of tobacco. An exhaustive study of sources of the essential plant food elements for bright tobacco is to be found in Technical Bulletin No. 35 of the Virginia Agricultural Experiment Station. The authors, T. B. Hutcheson and T. L. Copley, briefly summarize their studies as follows: "A satisfactory fertilizer for bright tobacco may be made by obtaining three-fourths of its nitrogen from high-grade inorganic materials and one-fourth from high-grade organic materials; its phosphorus from superphosphate; and its potash, two per cent from muriate and the remainder from high-grade potash salts which contain no chlorine." The basic treatment in the studies recorded in this bulletin was 1,000 pounds per acre of a 3-8-3 analysis. Teachers, county agents, as well as tobacco growers, will find much interesting information in this bulletin.

An interesting discussion of concentrated fertilizers versus standard analyses is recorded in Bulletin 350 of the Maine Experiment Station. The title of the bulletin is "Concentrated Fertilizers for Potatoes in Aroostook County." The main conclusions of the authors, B. E. Brown, Biochemist, U. S. Department of Agriculture, and F. V. Owen, Maine Experiment Station, are that the concentrated mixtures offer important economic advantages where saving in shipping and handling are factors; uniformly good results were obtained with concentrated fertilizers when compared with ordinary strength fertilizers when fertilizers were properly applied; changes in fertilizer distribution may become necessary for effective distribution of the concentrated mixtures; physical condition of the concentrated mixtures at present constitutes one of the greatest hindrances to their use.

"New Fertilizer Materials and Their Uses" is the subject of a paper presented by J. J. Skinner, Biochemist, U. S. Department of Agriculture, at the Fertilizer Short Course, North Carolina Agricultural College and published as Agronomy Circular No. 22 of that station. The limitation of the use of concentrated mixtures is summarized as follows: It is believed that the highly concentrated salts adaptable to fertilizer usage will gradually be used more and more in conjunction with ordinary fertilizers so that each supplements the other. To assure mixtures of sufficient concentration, possessing good mechanical condition and which can be applied without injury to crops, precludes the possibility of having mixtures of very high concentration. There should be a practical compromise on mixtures not of extreme concentration, yet considerably more concentrated than the average commercial fertilizer.

"Fertilizer Ratio Experiments," Agr. Exp. Sta., Experiment, Ga., Bul. 151, Jan., 1929, R. P. Bledsoe and J. J. Skinner.

"Choosing a Commercial Fertilizer," Agr. Exp. Sta., Columbia, Mo., Cir. 221, March, 1929, M. F. Miller.

"Effects of Synthetic Nitrogen and Concentrated Fertilizers on Cotton and Sweet Potatoes," Agr. Exp. Sta., Raleigh, N. C., Bul. 266, May, 1929, J. J. Skinner, C. B. Williams, and H. B. Mann.

"The Quality and Yield of Cotton as Influenced by Fertilizers and Soil Type." Agr. Exp. Sta., Raleigh, N. C., Agron. Inf. Cir. 21, Jan., 1929, J. J. Skinner.

"The Use of the Standard Ratio Fertilizers for Field Crops on Ohio Soils," Agr. Exp. Sta., Columbus, Ohio.

"Fertilizers for Vegetable Crops on Ohio Soils," Agr. Ext. Service, Columbus, Ohio.

Soils

Corn, the King of Crops in the Midwest, has in the past received very little attention with regard to its fertilizer need. The Michigan State College in Extension Bulletin No. 70 comes to the rescue with practical information based on years of carefully conducted experimental work. The author, M. M. McCool, emphasizes particularly the importance of fertilizers as they affect yields, maturity, frost resistance, and profits. Still another important consideration mentioned is the tendency of potash deficiency to increase as the soils continue to be farmed. This bulletin has a place in the working library of every teacher and farmer.

"Plant and Soil Relations at and Below the Wilting Percentage," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 25, Feb. 1, 1929, O. C. Magistad and J. F. Breazeale.

"Magnesium and Calcium in Zeolitic Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 26, May 10, 1929, J. F. Breazeale.

"Soil Report No. 41—Henry County Soils," Agr. Exp. Sta., Urbana, Ill., Oct., 1928, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Soil Report No. 42—Morgan County Soils," Agr. Exp. Sta., Urbana, Ill., Feb., 1929, R. S. Smith, E. E. DeTurk, F. C. Bauer, and L. H. Smith.

"Organic Matter in Berrien County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 108, Jan., 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Ingham County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 109, Reprint May, 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Kalamazoo County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 110, Jan., 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Ottawa County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 111, Jan., 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Van Buren County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 112, Jan., 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Calhoun County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 113, Jan., 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Livingston County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 114, Jan., 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Hillsdale County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 115, Reprint May, 1929, M. M. McCool and J. O. Veatch.

"Organic Matter in Macomb County Soils," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 116, Jan., 1929, M. M. McCool and J. O. Veatch.

"Distribution of Acid Soils, Muskegon County," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 117, Jan., 1929, J. O. Veatch.

"Distribution of Acid Soils, Jackson County," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 118, Jan., 1929, J. O. Veatch.

"Distribution of Acid Soils, Hillsdale County," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 119, Reprint May, 1929, J. O. Veatch.

"Distribution of Acid Soils, Ingham County," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 120, Reprint May, 1929, J. O. Veatch.

"Distribution of Acid Soils, Kent County," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 121, Jan., 1929, J. O. Veatch.

"Distribution of Acid Soils, Tuscola County," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 122. Jan., 1929, J. O. Veatch.

"The Soils of Michigan—Grayling Sand," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 180, Jan., 1929, M. M. McCool and A. G. Weidemann.

"Meaning and Use of Willamette Soil Survey," Agr. Exp. Sta., Corvallis, Ore., Sta. Cir. 90, Dec., 1928, E. F. Torgerson and W. L. Powers.

"Methods for Determining the Hydrogen-ion Concentration of Soils," U. S. D. A. Washington, D. C., Cir. 56, Dec., 1928, E. F. Snyder.

Crops

In Circular 158, "The Culture of Onions in Indiana," issued by the Purdue Agricultural Experimental Station, H. D. Brown, the author, has considered all of the important factors in the production of this crop for which

Indiana is well known. Plant food is an important element in the realization of profit on this crop, and the author has discussed quite fully the better practices of fertlization used in the state.

Another bulletin well illustrated and very readable in its content is Special Bulletin 191, "Barley for Michigan Farms," recently published by the Michigan Agricultural Experiment Station. Some fine pointers on success with this grain will be found in the work done by this state as set forth in this publication by H. C. Rather, E. E. Down, H. M. Brown and F. H. Clark.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVIII, No. 6, June, 1929.

"Maturity Standards for Harvesting Bartlett Pears for Eastern Shipment," Agr. Exp. Sta., Berkeley, Cal., Bul. 470, July, 1929, F. W. Allen.

"The Use of Sulfur Dioxide in Shipping Grapes," Agr. Exp. Sta., Berkeley, Cal., Bul. 471, July, 1929, H. E. Jacob.

"The Colorado Experiment Station," Fort Collins, Colo., Press Bul. 67, March, 1929, D. W. Robertson, Alvin Kezer, and G. W. Deming.

"Carbon Disulfide for the Eradication of Perennial Weeds," Agr. Exp. Sta., Fort Collins, Colo., Bul. 347, May, 1929, Chas. F. Rogers and Ira Hatfield.

"Vetch and Austrian Peas for Soil Improvement," Agr. Ext. Div., Gainesville, Fla., Bul. 54, June, 1929, J. Lee Smith.

"Strawberries in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 204, May, 1929, A. N. Brooks, J. R. Watson, and Harold Mowry.

"Cooperative Extension Work in Agriculture and Home Economics," Agr. Ext. Div., Gainesville, Fla.

"Pimiento Peppers," Exp. Sta., Experiment, Ga., Bul. 150, Feb., 1929, J. G. Woodroof and J. E. Bailey.

"Forty-first Annual Report," Exp. Sta., Experiment, Ga.

"Inheritance of Kernel Arrangement in Sweet Corn," Agr. Exp. Sta., Urbana, Ill., Bul. 320, W. A. Huelsen and M. C. Gillis.

"Report of the Director for the Year Ending June 30, 1928," Agr. Exp. Sta., Lafayette, Ind., G. I. Christie.

"The Home Vegetable Garden," Ext. Div., Lexington, Ky., Cir. 67 (Revised), Jan., 1929, J. S. Gardner and A. J. Olney.

"Report of the Maryland State Horticultural Society," Baltimore, Md.

"Biennial Report," Agr. Exp. Sta., Amherst, Mass., Bul. 247, Feb., 1929.

"American Potato Journal," The Potato Assn. of America, East Lansing, Mich., Vol. VI, No. 6, June, 1929.

"Growing Lima Beans for the Canning Factory," Mich. State College, East Lansing, Mich., Ext. Bul. 81, March, 1929, Geo. E. Starr.

"Growing String Beans for the Canning Factory," Mich. State College, East Lansing, Mich., Ext. Bul. 82, March, 1929, Geo. E. Starr.

"Growing Peas for the Canning Factory," Mich. State College, East Lansing, Mich., Ext. Bul. 83, March, 1929, Geo. E. Starr.

"Pollination of Orchard Fruits in Michigan," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 188, Mch., 1929, Roy E. Marshall, Stanley Johnston, H. D. Hootman, and H. M. Wells.

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Autos in India

(*From page* 44)

75 per cent or more of the total population upon agriculture is too heavy to allow the necessary wage needed for a satisfactory living. Greater industrialization, as such a project offers, is quite necessary for greater national prosperity, both urban and rural.

India's economic and social status is not as satisfactory as it should be, of course. Ignorance and superstition are still keeping her people in bondage. The automobile, however, is cutting across castes and creeds. It is removing the barrier of isolation. More and better roads are being made every year. The Indian farmer is finding a wider market for his produce.

Ignorance and superstition cannot breed or long continue to exist in such an atmosphere. The motor car, bus, and truck are more than mere forms of rapid and satisfactory conveyance. They are revolutionary forces. As the automobile flourishes, the country will change. It will be a long time before the Indian people will have a motor car for every six or seven people. Nevertheless, let us watch India progress,

Agriculture Today

(*From page* 28)

years were asked to bear in mind the unfavorable returns during the three years 1922 to 1924. But the intentions-to-plant report showed an intention to increase the acreage 7 per cent over the preceding year. The warning was repeated, but the acreage was increased 9 per cent over the 1927 total, yields were unusually heavy, and the crop totaled 463,000,000 bushels—the largest potato crop ever grown. The average price of $1.04 per hundred pounds in Chicago during September, 1928, was the lowest September average in that market in 15 years.

Six years ago the Department of Agriculture began issuing outlook reports annually as an aid to farmers in adjusting their production. Simultaneously a system of reports was inaugurated, giving information as to the intentions of farmers to plant crops or to breed and feed animals.

Commercial agencies, department economists declare, often are able to supply themselves with information on supply and demand conditions affecting the prices of products handled by them, but individual farmers are unable to do so because of the complexity of the problem. Timely information of this character is regarded as essential to balanced production and orderly marketing, and helpful to both farmers and the general public.

Sugar Beets

(*From page* 21)

commonly grown on family-size farms. Its production is usually localized in the vicinity of established factories and in areas which are favorable from the standpoint of soil, temperature and rainfall. Generally the crop prefers a well-drained soil of fairly high fertility with an abundance of lime. Moderate temperatures and rainfall are necessary for best development. While the crop grows over a wide climatic range, its commercial production is confined to certain geographic areas which provide a favorable environment. Lack of rainfall is commonly corrected by irrigation, and fertilizers are frequently used to improve soil conditions. The seed used in growing the American crop is largely imported from Germany.

While the United States is not an important producer of sugar, the country is one of the leading consumers. Our sugar production is only about one-fifth of our consumption, and our net imports exceed 4,000,000 tons annually. The United States is the leading consumer of sugar and in recent years between 80 and 90 per cent of our imports came from Cuba in the form of cane sugar. It is estimated that in recent years American sugar consumption for all purposes has exceeded 114 pounds per capita—a new high record. This consumption per capita is about three times as great as it was 50 years ago. American sugar production has not changed much in the last 10 years, though the production of beet sugar has increased. Cane sugar in the United States has declined, however, so as to practically offset the increase in beet sugar. Our increased consumption has been made possible by larger imports.

Only about one-third of the world

sugar is beet sugar, most of the remainder being cane sugar. The United States, however, is not important as a producer of cane sugar, the only state where the growing of this crop is important being Louisiana, as favorable conditions are found in the lower and almost frostless delta region of the Mississippi River.

Cane sugar production is very largely a matter of tropical agriculture. Cuba is the leading producer with about 28 per cent of the world's total, followed by India, Java, Brazil, Hawaii, and Porto Rico. From the standpoint of total sugar production, the United States ranks sixth among the world's producers, Cuba first, India second, Java third, Germany fourth, and Czecho-Slovakia fifth.

Sugar and its by-products form important articles of commerce. The leading exporting nations are the tropical countries, which rank high as producers of cane sugar—Cuba leading. In addition to cane and beet sugar there are other sugars such as corn sugar, maple sugar, and others which are relatively unimportant in the world sugar trade.

The Useful Peanut

(*From page* 24)

Virginia type which are to be salted have the thick outer skin removed before being placed in the vegetable oil in which they are cooked. With salted Spanish peanuts, however, the thin red skin is left on.

Peanuts in the shell are roasted 15 minutes to an hour, depending upon the size of the roaster and the amount of heat used. Scorching is likely to result if the heating is too rapid. The machinery for roasting peanuts on a large scale is similar to that used in roasting coffee.

Within the past few years the consumption of peanuts in this country has increased by leaps and bounds. Now with the chemist providing new uses the elephants at the zoo and circus, not to mention the baseball fan, will have to be careful if they expect to get their usual supply.

Corn History

(*From page* 25)

The writer is of the opinion that the long shoe-peggy type of kernels that we commonly find in our dent or field corn is due to the gourdseed parent. Many tests have shown that these long, shoe-peggy kernels are of poor yielding ability. It is of interest to know that by inbreeding corn for several generations it is possible to obtain from dent varieties a pure flint, similar to the flint grown by our earliest settlers. On the other hand, it is not easy to get out a pure gourdseed type by inbreeding, because they are so extremely late and susceptible to disease.

All of this will show that our field corn today is in a very mixed condition and anything but pure. It is also true that this mixed condition has much to do with the yielding ability of our corn. Selection, therefore, in some cases may be of no value, as it may tend to concentrate some of the weaknesses of corn which are ordinarily covered up by its mixed or hybrid condition.

Corn quickly became the most important crop in this country. In 1609 it is stated that there were 30 acres planted. About 40 years later there were 600 bushels of corn exported and almost every year afterwards there has been an exportable surplus of corn. In 1800 there were more than 2,000,000 bushels of corn exported, showing the rapid increase in the corn acreage. In 1839 the leading corn states were Tennessee and Kentucky, and the entire crop of the United States was less than the crop in Iowa at this time. Twenty years later or in 1859 the corn growing area moved to the west and north. Illinois and Ohio became the leading corn states at this time. Ten years ago or in 1919 the corn growing area was still moving north and west. One authority states that in the 50-year period from 1849 to 1899 the center of corn production moved westward nearly 500 miles but northward only 5 miles, showing that the trend was to the west at that time.

From 1900 to the present date, the movement has been a little faster toward the north, because of the development of early varieties of corn, and the corn growing area has been spreading toward Minnesota, North and South Dakota, and Montana.

At this same time, corn was spreading over much of the old world. It did not spread with the same rapidity, however, that it did in this country and in no place did it become the dominating crop as it has here. As early as the 16th century, however, corn was being grown in practically the entire temperate and subtropical regions of the entire world.

Good Celery

(*From page* 13)

Peckham begins to set up his blanching paper. This paper is a special product manufactured for the express purpose of celery blanching. At this time it is almost impossible to walk through the celery rows. They meet and are heavy and large. Enough paper is available so that a constant supply of the finished product is ready for marketing, and as soon as one row is harvested, another row or rows are prepared. This is almost a continuous process from the 15th day of August until the end of the crop.

If freezing weather finds any papered celery, a trench is dug in the field, the location of this trench being where good drainage is available. This trench is deep enough to place the celery entirely under ground. After taking off the poor and broken stalks, the lifted plants are placed on their roots in the trench, being packed tightly enough to keep them in an upright position. Over the top of the celery, boards and soil, if necessary, are placed to prevent hard freezing. In lifting the plants a round pointed shovel is used to cut off the roots. Being an expert in this work Mr. Peckham or Mr. Rose can cut off the roots 2 inches below the ground, and it takes but a short time to lift an entire row and place the plants at one side in regular order.

In preparing the crop for marketing the plants are lifted with this shovel and trimmed reasonably in the field and the roots trimmed off to a point. The larger plants are sorted out and the second grade, if any, are placed in another pile, or in receptacles for carrying to the washroom. The celery is all washed by hand with a brush or cloth. The jumboes are tied with red tape, both top and bottom, in bunches of one dozen each. In order to tie them correctly, they are placed in a room and held tightly together by a strap which forms a loop and by foot pressure holds the celery against the upright forms into a very tight bundle. One of the tapes is then put on and the bundle is reversed and the other tape is put on. When the strap releases the bundle the tape holds the same very tight. The outside of the dozen is trimmed with a long bladed knife so that the sides are square. The top is squared off and the entire bunch represents a finished product.

The seconds are tied in bunches of two. They are tied with tape near the roots and also near the top and wrapped in parchment paper on which the name of the farm, a good symbol, a spearhead, and Mr. Peckham's name are printed. This printing is in attractive color. The wrapper is fastened with an elastic band. Of course the washing of the seconds is similar to the first and the product is in every way as attractive as it possibly can be.

Now remains nothing but the selling. This is done by carrying to customers whom Mr. Peckham has sold to for a number of years. They are only too glad to have his celery and to pay whatever price he asks for his product. He never sells his product at the price of his neighbors. It is always higher. If his neighbors are getting $1.25 for jumboes, he is getting $1.50, etc. The bulk of his crop is of the jumbo type.

In summarizing his work in his words Mr. Peckham says, "Any man who is not willing to give the crop all he has in the way of intelligent care in planting, cultivating, fertilizing, spraying, and the many other operations, would much better let it alone and devote his time and capital to some crop where such close attention is not as essential."

"Potato" Bill Meyers

(*From page 6*)

every working of the soil must be light and shallow. Weeders 12 feet wide on which the grower rides can clean up an acre of potatoes in 25 minutes. Bill's plan is to use the weeder whenever it will take hold of the soil. Cultivators are used at other times. He knows that the object of working the soil is that of weed control. Filling in soil cracks is another object of cultivation. He harrows the fields once or twice before the plants come through the ground. When the seed is planted three to four inches below the surface of the soil, there is little danger of dragging it to the surface.

Spraying the crop with Bill is a matter of first killing the flea beetle which makes so many potato leaves look like sieves. This little black beetle is waiting for the potatoes to come up and so Bill is ready too. He puts on a 4-6-50-2 bordeaux-arsenate. There are four pounds of copper sulfate, six pounds of special spray hydrated lime, and two pounds of calcium arsenate in each fifty gallons of this spray. He puts on 100 to 150 gallons per acre with a spray pressure of not less than 300 pounds. He explains that this amount of pressure is necessary to blow the leaves over and force the liquid past the leaf hairs and onto the real surface of the underside of the leaves. It is there that Bill finds the beetles and other insects like to eat best. So Bill goes after them where they are most likely to be damaged.

The first application is made as soon as the rows are visible and he sees to it that the ground around each plant is included in the territory hit by the spray. The second spray follows as soon as the plants have made new growth. If the beetles are still active, this second spray is made seven days after the first. A third spray for the beetles may be necessary.

Bill's next trouble is to control the leafhopper. As soon as the hopper appears, usually during early August, the sprayer becomes very active. An application of 4-6-50 bordeaux is put on every seven days until the crop is matured. During the heat of the summer Bill finds it practical to add a few pounds extra spray lime to the bordeaux. The shading effect of the spray materials is a great aid in helping the plants resist the heat. Some years the potato crop is sprayed 10 or 12 times. In no case does this number fall below eight.

Selling the crop is a real job on a potato farm like this. Protecting the potatoes from frost damage at night is another problem. He is so busy and has so many potatoes that he finds it best to pit them every night.

His machine diggers are of the type which collect the tubers in a drop bottom box. This is tripped by the driver every time it fills. The pickers then gather these bushel piles into 25-bushel piles. The yields are so even that the driver is usually able to trip his load at about the same places each time. The fields at digging time give one the impression of an Indian encampment so even and regular is the arrangement of these 25-bushel piles.

The last job at night is to cover these piles with straw. A good layer is placed on each one. In these northern muck regions frost comes early and often in the fall and this precaution is needed. As it gets colder a layer of soil is placed over the straw covered potatoes.

Bill Meyers has finished his job. He has set a record which is one worthy of any corn belt potato growers attempt to equal or better. It will be bettered some day, no doubt, but for the present his achievement makes him worthy of the title, "Indiana Potato King."

Notes—The 3-9-18 fertilizer referred to in this article contains 3 per cent nitrogen, 9 per cent superphosphate, and 18 per cent potash.

Potassium Affects Sweet Potatoes

(*From page* 10)

quantity and quality sufficient to bring about rapid development of cambium, the tissue of the sweet potato root responsible for increasing the number of cells and therefore the thickness or chunkiness.

The "how" and "why" involved in the production of the best market grade of chunky sweet potatoes were thus approached by investigations involving field fertilizer tests, sand culture experiments under controlled conditions in the greenhouse, chemical analysis of the plants, and study of their cell structure.

Any single phase of this investigation did not permit a complete interpretation of the problem, whereas, taken together, the several methods of attack yielded results in complete accord with one another and made possible an unusually satisfactory solution of an economic and scientific research project.

Louisiana

(*From page* 18)

of sugar worth approximately $40,000,000.00.

The cane borer has not yet completely been brought under control, but experiment station workers have him on the run. The life cycle of the borer has been studied, and by planting "catch" crops such as corn near the cane, borers can be trapped and the corn fed before a crop hatches out. Lights to catch the adult moths have been used with some success; egg parasites that feed on the eggs of the borer are being use; and this tiny wasp Trichogramma the natural enemy of the borer is being increased artifically at the experiment station and released in various cane fields. Poisoning the borer with sodium silicofluoride gave good results in some cases, but further experiments are being conducted.

However, one needs but read the report of the Bureau of Agricultural Economics to see what results have already been accomplished. The Sugar Bowl will be filled to overflowing again.

With the appointment of Dean C. T. Dowell in 1928 to succeed Dr. W. R. Dodson, many new phases of experimental work were added to the program.

"The management of an experiment station should recognize that there are two phases connected with all experiment station work," says Dr. Dowell. "One of these has to do with production and the other, we might say in a broad sense, has to do with consumption. This second phase begins in the study of human nutrition, household management, rural social conditions, and anything else affecting the life of farm people.

"It is the aim of the experiment station to develop a program that will meet all of these needs, both from the standpoint of economic production and the life of farm people. With the limited funds available, it is necessary to select for investigation those phases of farming and farm life that are thought to be most important in the state. Attempts are being made to build a program for the station that will in the end meet the major requirements of all the farming interests.

"The crop from which comes 50 per cent of the farmer's money in this state is cotton. The station started some three years ago a program of breeding cotton for the purposes of finding the varieties that will be best adapted to different sections of the cotton growing territory in Louisiana. Along with this breeding program it is necessary to carry field tests in various sections. Eight outfield tests with cotton, corn, soybeans, and oats are being carried on. Fertilizer tests are also being conducted."

Although sufficient data have not been secured upon which the station may base any specific recommendations, practically all fertilizer tests with cotton have been unusually successful. The Ouachita valley tests for 1927-28 showed that the use of 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 250 pounds of kainit per acre gave a profit per acre above cost of fertilizer of $41.

Potash was the most profitable and phosphoric acid the least profitable. An application of 250 pounds of kainit when used with the other two elements gave a gain of $19.62 at a cost of $1.80 for the fertilizer; 250 pounds of nitrate of soda gave a gain of $18.21 at a cost of $6.36; 600 pounds superphosphate produced a gain of $6.03 at a cost of $4.68.

Tests on the bluff lands show that the greatest profit was made where 300 pounds of superphosphate, 250 pounds of nitrate of soda, and 100 pounds of kainit were used. On hill land results were similar to the others.

Develop Potato Industry

Eight years ago, the early Irish potato industry of South Louisiana was practically destroyed by mosaic disease. The extension division and experiment station got in touch with Northern colleges that were making a study of seed potatoes for Southern planting that could be certified to as being practically free of mosaic, spindle tuber, and numerous other diseases. Experiments were conducted at the station and in the field. Farmers saw for themselves what results could be secured by the growing of potatoes from certified stock and by proper fertilization and cultural methods. From about a carload of seed brought into Louisiana in 1921, there were last season brought in for seed purposes more than 300 cars. The industry is flourishing as never before and the potato crop in Louisiana is now valued in the millions.

Dean Dowell announces that a study of grades, staples, and prices of cotton is being carried on in cooperation with the United States Department of Agriculture. Further investigations in the feeding of blackstrap molasses to beef cattle and in the feeding of grain to steers while on pasture were begun last year. Investigations along the line of dairy production, having particular reference to feeding of dairy cattle, will be begun next year. One breeding project and two projects in feeding rice by-products to poultry are now under way.

Work was begun in the fall of 1928 on a study of problems in connection with human nutrition. A study of agricultural finances is being made. Dr. J. C. Miller has been employed to begin investigations next year with vegetable crops. This crop amounts to about thirty millions of dollars per year and there is much need for investigational work.

Varieties, cultural methods, and diseases of strawberries, a study of varieties of beans, and fertilizer tests on beans, cucumbers, and peppers, constitute the major program of the substation at Hammond. Plans are being made to enlarge upon the program of the rice experiment station at Crowley. A study of farm management problems will be taken up next year by R. J. Saville, now of North Carolina State College.

It is well known that the funds available for experimental work are wholly inadequate and farmers who are just beginning to realize the worth of their college are beginning to bring pressure to bear upon the legislature to deal more leniently with those whose one aim is to better farm conditions.

The Farmer Cuts His Costs

(*From page* 20)

drawn from the widespread evidence of increased farm production with less land and less labor. Machinery of course is not the only cause of declining production costs in agriculture. Improved farm management and the use of high-yielding crops and livestock hold an important place.

In regard to the post-war increase in the output of animal products per unit of feed consumed, Doctor Baker cites evidence drawn from many parts of the country. Thus in New England the number of cows decreased nearly 7 per cent between January 1, 1920, and January 1, 1925, whereas milk production increased about 4 per cent. In Wisconsin an increase of 9 per cent in the number of dairy cows was accompanied by an increase of 23 per cent in whole milk production. In Missouri an increase of only 4 per cent in the number of cows and heifers kept for milk was accompanied by an increase of 20 per cent in milk production. Milk production increased per cow even in States where total milk production declined. Agricultural production in the United States since 1922 has increased much more rapidly than the population. The farmers as a whole and not just a small minority have played their part in this gain.

Another prominent factor in agriculture's growing efficiency is commercial fertilizer, the consumption of which increases rapidly. Our pioneer regions in the use of fertilizer were the intensive truck crop areas and the cotton States. These areas still lead. More than half the commercial fertilizer purchased in the United States goes onto the farms of eight cotton-growing States. The truck and fruit areas, though not using as much fertilizer in the aggregate as the cotton States, apply it more liberally. It is not uncommon for truck growers to put down as much as a ton per acre, whereas few cotton growers go above 500 pounds. But if the truck areas and the cotton States still show the way in fertilizer practice, they have not the lead they once had. Fertilizer sales mount in the corn belt and also in the wheat States, though the application per acre in the wheat States as yet is usually rather light.

Fertilizers Pay

Steadily the practice of restoring to the soil what the crops take from it treads upon the heels of exploitive farming, and replaces that system with one more conducive to soil maintenance and soil building. After declining in the first years of the post-war depression period, fertilizer consumption in the United States is now practically back to the peak reached in the war time boom. That peak was attained in an extraordinarily rapid ascent from 1915 to 1920. It is remarkable that the post-war depression did not prevent the previous high level in fertilizer consumption from being speedily reached again. The explanation, of course, is that fertilizer pays.

This has been demonstrated in a thousand investigations and experiments. It must suffice here to cite one example. In a study of farms in Sumter county, Georgia, the Georgia State College of Agriculture ascertained that the farms giving the largest yields of cotton per acre were those receiving the heaviest applications of fertilizer. Applications of less than 300 pounds of mixed fertilizer to the acre produced additional yields worth slightly more than the cost of the additional fertilizer. Heavier applications produced larger yields. With fertilizer at $28 a ton and cotton at 21 cents a pound, the value of the additional yields over and above the cost of the additional fertilizer used was $1 at 300 pounds of fertilizer per acre, $4.60 at 400 pounds, and $6.70 at 500 pounds.

Few of the farmers included in the survey applied more than 500 pounds of fertilizer per acre. It was consequently impossible for the investigators to determine the point at which increased applications would have ceased to be profitable. Farmers know by experience, and science has mathematically demonstrated, that returns from the use of fertilizer obey the law of diminishing returns. In other words, a point may be finally reached at which more fertilizer will not produce more crops. But the Georgia study indicated that this point was far distant in average fertilizer practice in Sumter county. Even on the farms using as much as 500 pounds to the acre, a margin for experiments with increased applications existed.

It is difficult to measure the effect of fertilizer on costs of production. Many factors modify its action. On fertile soil maintained in a good mechanical and biological condition, a given application of fertilizer may show a less conspicuous result than an equal application on soil poorer in quality and less competently handled. This may simply indicate a relatively smaller need for additional plant food on the better farm. It does not follow, however, that it has no need for additional plant food. It may be capable of utilizing more nitrogen, phosphorus, and potassium very efficiently, particularly if its soil is friable and well furnished with organic matter. The answer to the question how the use of fertilizer affects costs on the individual farm depends on the degree to which other means of soil improvement are employed, and on the skill with which the application of the fertilizer is adjusted to the pre-existing soil conditions.

Easier to answer is the question how fertilizer affects returns. Scientific investigation shows that, in general, each additional unit of fertilizer applied causes an increase in yield which is a certain percentage of the increase caused by the preceding unit. So reliable is this principle that the Department of Agriculture makes reports of fertilizer sales in the South an important factor in its annual studies of production prospects. Wherever fertilizer results have been statistically studied, the results is the same —a demonstration that more pounds of fertilizer per tilled acre usually mean larger yields of cotton, corn, wheat, potatoes, and other crops. That more and more farmers recognize this truth must necessarily be concluded from the steadily rising curve of fertilizer consumption. Though it may not be possible to assign the exact place of fertilizer in agriculture's recently increased productivity per man and per farm, that place is unquestionably a high one.

Set for Progress

In all probability the increase in farm efficiency since the war is one of the causes of the continuing disparity between the prices of farm products and the prices of non-agricultural goods. Industry too has increased its efficiency since the war. Its progress in this respect, however, has probably not been equal to that of agriculture. This would be hard to prove, but it may be reasonably inferred from the character of the changes that have been introduced into agricultural technique during the last decade. These changes, according to Dr. O. E. Baker, have brought about a jump in production per man equal to the extraordinary jump that took place after the Civil War, when the seed drill, the mower, and the reaper first came widely into use. Industrial production, though steadily gaining in efficiency, seems not to have made an equal jump ahead.

This difference has not been statistically measured, and may on examination prove to be less important than it may at first appear. On the other hand, statistical inquiry may verify the importance here attached to it. Such gains necessarily have important effects on the relationship between agricultural and industrial policies. They mean a more rapid drop in agricultural unit costs of production than in the corresponding industrial costs. That condition tends to be accompanied by abundant or excessive farm production. But at that the saving in costs usually exceeds the decline in price.

It is not at all a question whether agriculture is more efficient than industy or vice versa. It may be impossible ever to decide that, considering the great difference that exists between the two branches of production. The question is simply whether in a given period the rate of progress in agricultural efficiency has been greater than the corresponding rate on the industrial side of the fence. When we consider the astonishing recent advances in the mechanization of agriculture, and also the statistical evidence that its output has been increased with less labor and with no corresponding increase in the area in crops, and when we reflect that agriculture probably started the post-war readjustment period from a less advanced technical point than industry, the conclusion seems inevitable that its relative progress has been more rapid.

The farmer was hard hit by the post-war depression. But it now seems as if he was hit only just hard enough to make him show the stuff of which he is made. He reacted not by throwing up his hands in despair, but by scrapping his old machinery and getting new, by scrapping his old methods and adopting better methods, and by astonishing the country with a demonstration of economy in the use of land and labor. At the same time he accepted a drastic deflation of his capital values. It would seem that he is now all set for progress.

Cabell Cooperates

(From page 29)

a planting plan for grounds to contain one and one-half acres. Forty young walnut trees were to be transplanted to the school grounds as soon as the planting plan had been completed.

With fifty volumes presented to the school by the Huntington Kiwanis Club and an equal number purchased by the community, the school now has a library of 100 good books.

Another outstanding example of the cooperative idea in Cabell county was some commercial fertilizer tests made on the county farm last year by the county court of Cabell county, the county agent, the West Virginia College of Agriculture, and a fertilizer company. A number of different combinations of fertilizer elements and rates of application were tried out.

A fertilizer consisting of about 3½ per cent ammonia, 12 per cent phosphoric acid, and 7 per cent potash broadcast at the rate of 1,400 pounds per acre for potatoes, led the field with a yield of 379½ bushels per acre. The same fertilizer applied at the rate of 700 pounds per acre gave 32½ bushels less yield.

Fertilizing in the row did not yield so well as broadcasting in this test.

Another test in which potash was omitted showed conclusively that this element of plant food is essential for potato production on the sandy soils around Huntington. A test with 600 pounds per acre of a 3-8-6 gave 186 bushels of potatoes, whereas only 82 bushels per acre were obtained when the 6 per cent potash was omitted. The potatoes were dug and measured under the direction of Professor D. R. Dodd from the State College of Agriculture, assisted by the three county commissioners. The information thus made available according to Professor Dodd is worth at least $50 per acre to the potato growers of this section of the state.

The bags of potatoes on the left represent the portion of the field without potash; those on the right, where potash was included. The three men standing in the center are members of the County Court, who took a keen interest in the demonstration.

English Blue Grass

(*From page 7*)

when they were sold. The steers finished good and made a rapid gain, and the fescue furnished them an abundance of palatable roughage even after frost.

From the experience of Mr. Edgerton the grass has many advantages in a pasture mixture or when planted alone for pastures, and it is expected that its use will become more general in many localities. However, as a seed crop it interferes with the standard farming scheme in central Indiana. It being a perennial it is only profitable when left in meadow for several years. In this locality it has been known to produce five consecutive annual seed crops.

From a cash standpoint it could be substituted for wheat, but it does not easily follow corn like wheat does and will not permit seeding with a legume as does wheat or oats. The market for the seed at the present time is quite sensitive to overproduction because the merits of the grass are not generally appreciated. One contemplating growing the crop for seed therefore should find an outlet for the crop. Amboy, Indiana, is headquarters for the "pool" that sells the crop for growers in this section.

White Collars

(*From page 4*)

stipends for their sweat. In this era no job is secure or no invested dollar safe without there be hidden forces delving with the pickax of the mind.

Except in dangerous occupations, the physical worker may be distracted with personal cares and fears and yet produce at his usual pace and quality. Not so with the fellow depending on originality, fluency of thought, or concentration to earn his daily bread. Home worries and a thousand and one gloom bugs get between him and his job, nettle him, and reduce his nerves to a frayed edge. Maybe we fellows who think for a living are more like race-horses and greyhounds than drafters and bulldogs, but I am not going to apologize about it.

The distinction that lies between intellectual production and tangible output can best be illustrated to my notion by taking the case of my country friend, Brown, a muscular, able, and hard-working farmer, wealthy and secure. Brown's fields are a delight to behold, well tilled and fertilized; his crops and herds are outstanding in quality. Brown's only son disappointed him considerably. The lad worked well in the fields, but took to painting and sketching. Brown's performance has made a farm that is locally famous. The son studied art finally and produced a picture that hangs in a noted gallery. His best production likewise is a field, rich in the golden haze of harvest and arched with fleecy clouds in a cool sea of blue.

The oil colors cost less than Brown's plow, and the canvas itself isn't worth a pair of overalls. Yet the finished production is a masterpiece and sold for enough to buy another farm like Brown's. About three-fourths of Brown's production came from the neck down, while ninety-nine per cent of the son's achievement came from the neck up. That's all the difference in the world sometimes.

Yet I must smile a trifle here. The world doesn't always see it that way. I know janitors who drive better cars than college professors, not because they are so thrifty either. It often looks as though this world was made for plumbers!

My earliest gleam of the difference between goals men seek is akin to that old yarn about the two workers on the church. A ministers' conference was being held in our little town, and half a dozen of the preachers were quartered on us like the army in Flanders. One day they argued about their calling and mission. Finally one rasping old chap irritated the others and they fired the question at him, "Brother Jones, *what* are you preaching for?" Quickly he answered, "Just three hundred dollars a year." We took a dislike to him because of his mercenary stand. Probably he would have said the same on a Fifth Avenue salary.

Real intellectual workers strive more for expression and to perfect that which is imperfect than they do to count the change on Saturday night. Not so long ago an associate of mine was offered a job with thrice the salary and twice the sinecure. He rejected it for a reason that few men get credit for in these days—love of the job he had. The brisk boys would say he was in a rut, but Old John will outlive them all and be happier while doing it.

FUNNY isn't it that solid economic organization among workers succeeds best when the mass of those who are organized possess the least brains? One reason why farmers haven't stood so well in harness is because their work enables them to use *some* brain power at least; and when you get into the preacher, teacher, artist, and professional class the tie that binds is usually pretty weak and frayed out. Initiative and temperament play hob with the organization business, and so the most of us who are employed to think for someone else are not in much position to "lobby" or "log roll" for relief. Each has to face his destiny and bargain for his groceries alone.

Then, besides, we professionally trained chaps are compelled to stand the law of supply and demand like the wandering day laborer. With all the colleges beckoning to youth and all the trade schools dwindling in number, with the apprentice custom going out and the stab-at-it system coming in—what's a poor professional man to do if he is of a group not protected by state license? He is just a commodity that cannot rise above a certain dead level of supply in relation to going wage. He cannot strike because there is no union at his back, and he hopes some day that his wife may own a Spanish shawl like the butcher's frau.

FURTHERMORE, we fellows with "genius" know that half of it is sweat and the rest perspiration. The high cost of training for the "lady finger jobs" is often greater than the skill required by a train load of hunkies. Standard and working conditions in the higher brain-using crafts were set before we arrived, and it's our business to keep step and keep still. When one of us gets original and wants more pay, he at once turns into a liability instead of an asset, and the chief phones the classified-ad department.

The trouble is that we fellows with real genius are pestered by too many competitors with personality. Hitch that "personality" to a deferred-payment suit, a get-there grin, and a bundle of bluff and what chance has a talented man with more modesty than muscle? Here we find the disease at the root of the intelligentsia. We have too many imitators.

There are hundreds of colleges and universities shooting out squads of flat tires that would fit trucks better than limousines. They don't know the difference at the factory, and the users don't employ any standards to find out. It all results in an increased supply at the expense of the real article.

Intellectual work is divided thus into two groups—those protected by laws against the untrained, and the others where the bars are down to everything that takes a notion. There are no guarantees of fitness, however, in many of the professions protected by legal barriers. There are hosts of law shops and saw-bones schools turning out fledgeling lawyers and doctors who ought to be auctioneers and veterinarians. Mediocrity is handed a juicy plum in some of our state examinations and licenses.

I fear that some of this diploma-chasing spirit may enter the other group where sheer merit and natural inclination or ability has hitherto held sway. I know a couple of agricultural college professors whom the farmers like and who have won their spurs on native ability rather than academic routine. Yet it would be regarded as heretical if I should pick out an equally able youngster fresh from the farm and suggest that he be given a chance to teach at the same institution. No, the requirements are forged tighter today and a group of quizzing done must first decide whether a candidate may graze in the same pasture with the Sacred Cows. I suppose it's the same way in engineering, magnifying the form and the letter rather than the spirit and the heart. Are we of the intelligentsia becoming Pharisees?

I SURMISE that one reason the laborer often has a grudge against the white collar gentry is that the only reason common labor exists at all is lack of machinery enough to entirely replace it. Better mechanism comes only with brains, and most of the inventions that have reduced labor expenses are the result of intangible intellect. If this keeps up long enough, some folks will either have to be intellectual or move out. The real short cuts to achievement in farm and factory get their first start by mating intelligence with imagination. The folks without either may temporarily be as flashy as a bootlegger's bride, but they live on material rather than mental satisfactions.

I ONCE lived next door to a plumber, and I was very thankful to be renting instead of owning the premises. His virtue was honesty and hard work during routine hours, and his vice was in being too dumb to appreciate a good neighbor, even though I couldn't pack a faucet.

He had a house full of gaudy luxuries and all his work meant to him was a chance to keep square and pull off his shoes at seven o'clock each evening. He had one hundred and fifteen jazz records, a ten-tube radio set, and a library consisting of one volume on the theory and practice of sewage. I guess he worried a lot over my share in contributing to social values, and he let a few driblets leak out before I packed his joint for him one day.

He wasn't interested in quality or quantity of work, and the less he did the longer the job lasted. The shorter his memory and the fewer his tools, so much the greater did his pay become. He couldn't bring home any unfinished tasks and keep his parlor looking nice. He didn't lay awake planning the fittings for next day or conjuring up a noiseless syphon. While his white collar neighbor was working on essays at midnight, he was dreaming of shorter hours and longer pay.

Yet we wouldn't need plumbers without the application of intelligence to the control of physical environment. If he had been surrounded by self-sufficing neighbors like the Indians and pioneers no labor union would have helped him in the least. Personal intelligence in the problems of living and of comfort, of health and leisure, make possible the present civilization. And who enjoys it better or would miss it more than some of the critics who indulge in diatribes at the expense of dreamers and visionaries?

Your dull bread winning critic would doubt the "practical" value of astronomy, except as a pastime. Yet astronomy has evolved out of its mathematics and calculations all the foundations of weather forecasts, the science of navigation, and the making of accurate maps. Physicists and chemists seeking the intellectual satisfaction of natural laws gave us explosives, stronger metals and bridges, the detection of food adulteration, standards of weights and measure, the manufacture of dyes and colors, and kindred things of everyday routine. Geology would be laughed off by the critic, unless he met a geologist on a hike—and then his fraternity would be firmly established. At any rate, barring the degree of dirt accumulated by the geologist in his research, he has intellectually given us mineral resources, oil wells, safer structures, and a better agriculture. Yes, even the psychologists have done us a good turn by working out a rational and humane treatment of the feeble minded—although my plumber friend might not have heard of them.

As for my own humble profession, it's chief virtue lies in contributing to intellectual curiosity. As I am both intelligent and a curiosity, that proves it.

I HAVE lived through the period when all this criticism developed. When we were youngsters the local intelligentsia consisted of the preacher, the high school principal, the county judge, and the itinerant doctor behind his gray mare and behind in everything else. The preacher was "practical" because he was handy at sewing societies and could draw lurid mental visions of harps and harpoons. Teaching had not degenerated into a feminine profession in those days, and so a little learning was tolerated in the dignified principal. Besides, he was pretty good at pitching horse-shoes. The judge and his legal staff could chew tobacco and spoil good Latin at the same time. They were mighty handy when fists couldn't secure a moral victory. The doctor's cures arose through his conversational majesty as much as through his nostrums. It was a select little circle of accepted mental aristocracy, not broken into until the passion for higher education struck the sticks.

The tide of immigration had not then set in with a rush to fill our shores with alien protest and unrest. The rapid settlement of the nation by people who fawned at titles more than intelligence, plus the hurly-burly of feeding the college mill, led us into the present state of mind.

And yet, let them rave and revile the intellectuals. While they are doing it, they are catering to our craft. Not one of them would return to barbarism—not because of the lack of native talent for the part, but because it would be mighty inconvenient.

THE nurture of the spiritual and intellectual side of life is of as much economic concern as the nurture of the body. Developed and varied human wants and new refinements of civilization constantly encourage the man who wishes to follow intellectual pursuits. He is not usually a clock watcher and a time-server. He takes pride in achievement and gets his pay in personal expression. But he sweats just as hard as the coal heaver.

What little intellectual "capital" we possess is not going to be hoarded and figured up at compound interest in measly loans, but it will be generously offered to those who can use it, as a fleeting leaf to the wastebasket or a permanent record in the scrapbook. We are neither exploiters nor profiteers, and as such *rara avis* in this era of hawks, our band of thinkers-on-small-pay justify our existence.

In other words, I wouldn't trade places with the plumber!

A Few Whinnies

BE NATURAL

An American woman went to see her negro cook, who was in bed. She gave the cook's small son, Ephraim, a dollar with which to buy a chicken for his mother.

In leaving she overheard the cook say: "Gimme dat dollar, chile, an' go git dat chicken in de natchrul way." —*Tit Bits.*

Daughter: "Oh, papa, what is your birthstone?"

Father of Twelve: "My dear, I'm not sure, but I think it is a grindstone."

"Edwin, I hear the stork brought you a little baby sister."

"Aw, lay off that stork stuff! I was lookin' out the upstairs window and I seen the guy that brought it. He carried it in from his car in a little wee bit of a grip. Stork, thunder!"

"Is my face dirty or is it my imagination?"

"Your face isn't; I don't know about your imagination."—*Wisconsin Octopus.*

A TALE OF TAILS

Rastus: "Here am a telegram from de boss in Africa. He says he is sending us some lions' tails."

Circus Owner's Wife: "Lions' tails, Rastus? What are you talking about?"

Rastus: "Well, read it yourself. It say plain: 'Just captured two lions. Sending details by mail.' "

STRONG BAIT, STRONG STORY

One afternoon a Kentucky moonshiner came up to a fellow fishing, and said:

"Having any luck?"

"Mighty little," replied Sam.

"Here, put some of this on your bait," he said, pulling a bottle out of his pocket.

The worm was thrown back in the stream and very soon a great commotion was noticed. Pulling upon the line Sam discovered that the worm had a stranglehold on a big pike and was punching him in the eye with his tail.

"Sandy, I dinna like it—ya take every corner on two wheels!"

"Oo, aye, Jeanie, but dinna disturb ya-self—it cuts ma yearly tire bill about half."

Angry Motorist: "Some of you pedestrians walk along as if you owned the earth."

Irate Pedestrian: "Yes, and some of you motorists drive around as if you owned the car." (Ain't it the truth?)

SELLER AND BUYER

"Say, that guy Oscar was so lubricated last night that he sold the post office."

"Well, why so down in the mouth about it?"

"Because I bought it."

Better Crops with PLANT FOOD

October, 1929

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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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On an October Day

Better Crops
with PLANT FOOD

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It begins when you toddle and ends when you totter—

Education

By Jeff McDermid

EDUCATION resembles religion in a few respects. Everyone is supposed to have some, everyone is presumed to benefit by it, but the trouble comes, as with Uncle Zeb's porous plasters, in making the darn things "stick tight and draw like thunder."

If we accept as historic truth that the American Indian was the first victim of the white man's conquest in this hemisphere, so must we acknowledge that our vanishing red brothers were the original recipients of the white man's campaigns for education and religion on this continent. True, the aborigine had established certain schools and cults of his own prior to the invasion of eastern culture, but in order to be "finished" in modern style the savage had to accept our spellers and prayer books. That the degree of finish, almost amounting to polish, which the innocent Indians acquired as a result of our educational process has never been challenged (except in the Congo) is merely a review of history. In any event we are consoled by the reasonable belief that it is a demonstration of the "survival of the fittest" race. That is, the red brother was not able to withstand so much erudite punishment and still survive. It's pretty stiff to make a nature wanderer swallow the dictionary and the catechism all in one short generation.

As I scan the bibliography of education and see how many different ideas there are as to what education is or ought to be, I am of the opinion that the vanished tribesmen are happier in their free hunting grounds than some of us are in our academies. They have at least passed the danger zone of being made objects of experiment.

On the other hand I am not so sure but that King Phillip, Rain-in-the-Face, Sitting Bull, and Geronimo might not thoroughly enjoy the radical tendencies seen in many of the wild-eyed centers of pedagogical theorizing. Indeed the cafeteria style of education and the free-lance system of learning would have many things in common with the scalp dance and the fiery ordeal. Furthermore, it would at once relieve the student of all concern as to personal appearances and niceties of deportment. Neither would he have to bother overmuch with spiritual strictures. He would delight in seeing that modern experimental education is more concerned with *mores* than *morals*. I am almost sorry that some of our dons and deans were not on the job back in the bush days in place of Jonathan Edwards and Roger Williams. But it's too late for a trade!

SOME of my friends aver that the greatest portion of the nation's wealth is equally divided between gas stations, beauty parlors, speakeasies, and schools. In my state, for illustration, they have a legislature that leaves questions of gas taxes and education to the last thing. Whether this proves it one way or the other I do not know. But the faculty of the University, which had run out of gas, were obliged to spend their vacations on the front porch until the budget crossed the goal line. I understand that in a neighboring state the educational finances are securely out of the trenches before Christmas, which is an ideal we should strive for in our good old commonwealth. Maybe if we arranged to hold our classes in a stadium and appointed skillful cheer leaders to root for research, the alumni would elect better senators for us.

I have no quarrel with the percentage of taxes and earning power spent on good roads and good schools, for they help us to get somewhere, with less wear and tear. But it is getting so evident that neither local scenery nor local learning is enough to suit the growing generation. Through roads and through education are what they squawk for nowadays. When an old friend of mine introduced a bill in the assembly to promote more advanced courses in district schools, the state supervisors sat down on him. No, it isn't stylish to stay at home and get smart nowadays. You have to travel far and get cultured or own a radio and be common.

EDUCATORS and other watchful people have as hard a time keeping propaganda out of the curriculum as they do trying to keep hooch out of Chicago. I doubt if a constitutional amendment would suffice either. This propaganda comes in so many disguised forms that we need a Sherlock Holmes to serve on our school boards and regent committees. Pretty demonstrators invade the domestic science classes with cook-books and tasty menus in which somebody's culinary product or new fangled stove is featured. Association and bureau lecturers ask for 10 minutes at assembly hour to put across their favorite theme. Essay writing contests in which the dumbest usually wins the laurel are fostered and foisted on the teaching staff under the guise of patriotism or pyorrhea. Vexing prize trips and other distracting doctrines are held up as bait to inveigle the youthful mind. Even the sage professors who help write our text-books on a meager salary and a small royalty are exposed to bribes in the interest of private propaganda.

It is indeed fortunate that our chil-

(*Turn to page 60*)

This photograph, taken from an aeroplane at an elevation of 800 feet, shows the letters written on the alfalfa with "ink" consisting of an application of muriate of potash at the rate of 200 pounds per acre.

The Keystone Farm

By Irvin J. Mathews

Winamac, Indiana

WHEN more than 1,200 progressive farmers and representatives of state experiment stations, the agricultural press, and the fertilizer industry spend a full day in studying the agricultural practices of one farm, that farm indeed might be considered a keystone farm. This is what happened on August 8, 1929, at the Field Day held on the Pennsylvania Railroad Company's Demonstration Farm, near Howard City, Michigan, where the "Keystone" method of farming sandy soils came into full prominence and won the interest and praise of those in attendance.

The meeting held this year was the second annual sandy land farmers' field day to be held on this farm. Many features had been prepared for the day, and the large crowds in attendance were not disappointed, many of them still being piloted about at sunset.

The Pennsylvania Railroad bought this farm-sized tract of Plainfield sand in southern Michigan in 1916. Here it was proposed to demonstrate, if possible, that these sandy soils, of which Michigan has some 9,000,000 acres and through miles and miles of which the roadbed passes, could be managed profitably. The late D. L. Hagerman, at that time agricultural agent for the railroad, decided that the best way to treat the proposition was to consider the whole farm as a unit for demonstration and to operate it permanently on that basis rather than on the small plot basis. Accordingly the Keystone rotation was originated and since has been demonstrated by his brother, B. O. Hagerman, and the resident farm manager, Gerritt Posthumus. That it has been a success is evidenced in the remarks of J. F. Cox, Dean of Agriculture of the Michigan State College.

"The hazards of frost, drought, and wind are very great here," said Dean Cox, at the recent field day, "but you have shown beyond question that by following the Keystone rotation you recommend, this sandy soil will give a good account of itself."

The Keystone rotation is a four-year cropping program, evolved particularly for porous, sandy soils because of the need for conserving soil moisture and maintaining fertility through the addition of humus in green manures and cover crops to supplement barnyard manure. At the outset, the plan was to start in a modest way, as a farmer would do, and through gradual improvement develop a productive farm. Guernsey cattle were chosen as a means for turning legume roughage into cash and fertility, the start being made with a purebred Guernsey bull calf, a three-teated 13-year-old purebred Guernsey cow, and two grade heifers, at a cost of $395.

Practically all of the farm was marled, using four to five cubic yards per acre, preparatory to growing the legumes. The rotation called for peas and oats seeded to sweet clover; sweet clover for hay or seed or pasture, seeded to rye and vetch; rye and vetcl seeded again to rye and vetch; ther a cultivated crop, such as corn, po-tatoes, or beans, and the land agair seeded to a legume crop such as alfalfa The rotation calls for at least on legume on all of the land each year a cover crop during the winter, th return of the greatest possible amoun of organic matter, and carries with i the recommendation of the generou use of manure and commercial fer-tilizers.

The Use of Fertilizer

Regarding the use of commercia fertilizers, Mr. Hagerman has said "We make no apology in recommend ing the consistent use of commercia fertilizer. The majority of sandy lan has been cropped until it contain little or no humus. Its mineral ele ments have leached out until ther remains little else of the soil thar finely pulverized rock.

"The commercial fertilizers provid an economical and successful means o returning these missing elements an thereby establishing successful stand of legume or grass crops. The invest ment per acre in the application o

Superphosphate (525 pounds of 16 per cent per acre) produced 676 pounds of very weedy hay. Whe potash was added to the mixture, the acre yield went to 1,864 pounds of high quality weedless al falfa hay.

Mr. B. O. Hagerman (center) conferring with Dean J. F. Cox (left) while Professor G. M. Grantham of Michigan State College is giving a talk, at the Keystone Field Day.

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."

During the last three years, commercial fertilizers high in potash have been applied and the results carefully watched. That potash will pay on these sandy soils was uniquely demonstrated in a feature of the field day held on August 8, when from an aeroplane hovering over the crowd, air messages floated down to call attention to a potash demonstration in the alfalfa field. This demonstration consisted of the letters "POTASH PAYS" plainly written by alfalfa plants which stood out from the rest of the plants because of greater growth and a darker green color.

The alfalfa was sown in a regular Keystone rotation seeding of peas and oats on May 11, 1928. The young alfalfa plants showed signs of potash-hunger, so on September 7, 1928, the letters POTASH PAYS were laid out and sketched in. They were 75 feet across from top to bottom, and a one-horse five-disc wheat drill was used to go over the outlines of the letters, putting on muriate of potash at the rate of 200 pounds per acre. On July 9, of this year, when the first cutting of hay was made, these letters had growing on them about 2½ times as much hay as the untreated areas alongside.

In following Mr. Hagerman around the farm, the visitors were told when they came to a field of young sweet clover half way to their knees and dotted with shocks of oats which were thick and long, "On these oats we used 225 pounds of 2-8-16 fertilizer, a good percentage of potash to stiffen the straw and for sweet clover following." (These oats later threshed better than 40 bushels per acre.)

Next came a field of second growth sweet clover which was knee-high. "We got 2.3 tons of sweet clover hay off this field the first cutting. The growth you see here will be turned over and sowed to vetch and rye this fall. This field shows how the Keystone rotation increases fertility. It produced 24.72 bushels of corn in 1923, and the next corn in the rota-

(*Turn to page 54*)

The buildings on the Highmoor Farm of the Maine Agricultural Experiment Station are typical of New England.

MAINE

Agricultural Experiment Station

By Charles E. Crossland

Alumni Secretary, University of Maine

DEMAND for fertilizer control was the real force which brought the Maine Agricultural Experiment Station into existence by act of the state legislature in March, 1885. It was the fourteenth station to be established in the United States. With no building or equipment and an appropriation of only $5,000 for salaries and expenses, the station actually began operation in April, the staff consisting of three men.

Up to 1885, the College of Agriculture which was established in 1868 had been doing some research, as a means of securing information to use in the classroom. With the opening of an experiment station, resident teaching and research were separated, a plan which is still followed today. The station is a department of the University of Maine.

At first all station research was done at the University then known as the Maine State College of Agriculture and Mechanic Arts. The field experiments were conducted near the station building and livestock research was done by using the college animals. Gradually the two have been entirely separated. The station now does no crop work on the campus, other than that performed in the small greenhouses attached to Holmes Hall. The poultry plant is separate from the college plant and cattle investigations are conducted at one of the two experimental farms controlled by the station.

Not until 1888, following the passage of the Hatch act by Congress the preceding year, did the station have a home. A comparatively small structure was erected in 1888 to which additions were made in 1890 and 1904. The building is known as Holmes Hall, named in honor of the founder and first secretary of the State Board of Agriculture who was very active in the establishment of the college.

In 1909 the station acquired what is now known as Highmoor Farm located in central Maine. It consisted originally of 225 acres, but 30 acres adjoining recently have been purchased. There are on this farm about 3,000 apple trees, and most of the acreage is tillable. It is used chiefly for experimental work in crops, orchard, and livestock.

In 1913 Aroostook Farm in Aroostook county was purchased for the special purpose of research in potatoes. About one-half of the 275 acres on the farm is tillable. The potato industry had grown to such proportions that extensive research was necessary; furthermore, results of experiments in central Maine did not always work out in Aroostook county, because soil and climate conditions were so different.

The passage of the Purnell bill made possible the establishment of agricultural economics and home economics departments.

Today the income of the station is approximately $140,000 annually, and the staff consists of 26 administration and research employees working on about 50 different projects.

Probably the Maine station is best known for the lead it took in poultry research, food digestibility investigations, studies upon economic aphids by Dr. Edith M. Patch, work in genetics as done by Dr. Raymond Pearl and others, potato disease research under direction of Dr. Warner J. Morse and Dr. Donald Folsom, and more recently by the work of Dr. John W. Gowen on the mode of inheritance of milk and butterfat production in dairy cattle.

During the 44 years the station has been operating, there have been but three directors, which doubtless accounts in considerable measure for the continuity of studies along certain lines and the close adherence for the most part to the strict idea of research.

Dr. Whitman H. Jordan, a graduate of the University of Maine in 1875, was the first director, beginning July 1, 1885, al-

Left: That more experimental work has been done on potatoes than on any other crop is evidenced in the number and size of these plots.

Below: All phases of potato raising have been or are being studied. The proper ratio of the plant food elements and most profitable amounts of application are important problems.

Dr. Whitman H. Jordan,
First Director.

Dr. Charles D. Woods,
Second Director.

though appointed three months earlier. During his 11 years incumbency, Dr. Jordan gained a wide reputation for his successful administration as well as for his own research in digestibility studies as a result of which he became director of the New York Station on July 1, 1896, which position he held for 25 years until his retirement. Dr. Jordan became known as the dean of station directors by virtue of having served the longest in that capacity. Although retired and residing in Orono, he still retains very active interest in research.

Following Dr. Jordan came Dr. Charles D. Woods, who had for a time been associated with the former in Connecticut. He too was an outstanding chemist. He served within a few months of 25 years. The present director, Dr. Warner J. Morse, took the helm in April, 1921. He had, however, been connected with the Maine Station for about 15 years, having started the plant pathology department in 1906 when he was first appointed. His work on potato diseases had won for him an outstanding place as a plant pathologist.

Dr. James M. Bartlett should also be mentioned at this time because of his unusual record. Probably there are few, if any, who can claim the distinction of still being in the service of the station since its organization. Dr. Bartlett was appointed assistant chemist upon the establishment of the Maine Station in 1885 and is still a member of the staff, being chief chemist. He has also served as acting director.

During the early days analyses of fertilizers, and later also of feed and foods, were of first importance, but in 1914 the state relieved the station of its police duties. It now does

Dr. Warner J. Morse, Third and Present Director.

Test plots on Aroostook Farm—clover in the foreground, grain in the center, potatoes in the background.

only the analytical work involved. Dr. Jordan pioneered in the field of digestibility studies. Increased production of potatoes and grains as well as milk were emphasized. Establishment of fundamentals of the dairy business, too, was undertaken, perhaps the most important of which was the introduction into Maine of the Babcock test as a means of selling butterfat rather than measuring the cream by inches. Then, too, the station for many years endeavored to carry information to the farmer, to help him make practical use of the results of experimentation. This was done largely by participation in Farmers Institutes. These contacts strengthened the position of the station which in turn made stronger the position of the College of Agriculture with the rural people.

Concentrated Research

One experiment, perhaps the very first involving human beings ever conducted, was carried out by the Maine Station. As a result of the study involving all the men then in the dormitory, it was shown that milk satisfactorily did replace so-called dry food.

In recent years research has been concentrated more or less so that several projects are proceeding simultaneously on different phases of the same subject. Typical illustrations of this is the work which has been and is being done on potatoes, orcharding, and blueberry growing.

More experimental work has been done on potatoes than upon any other crop. Practically all phases of potato raising have been or are being studied. The results of the work of the Maine Station on diseases is widely known. Control of late blight was the first outstanding achievement. This has been followed by a long series of projects dealing with the isolation and control of potato diseases and their effect upon yield. The determination that the aphid was the carrier of mosaic and other virus diseases was a discovery of national importance. The Maine Station was one of the first to work on potato scab.

Bulletin 350 just published contains the results of experiments involving the use of concentrated fertilizers for raising potatoes. This is thought to be the first publication issued on this subject giving the results of extensive field data. Because of the geographical location of Aroostook county, the economical factor of reduced expense from transportation alone is important. In general uniformly good results were obtained from double strength when compared with ordinary strength fertilizer, due perhaps in part at least to favorable type of soil and to ample, well-distributed rainfall. Application of most mixtures was made fairly well with the fertilizer attachment, though difficulty was experienced with such highly concentrated mixtures as 15-24-21.

Among the many other research projects completed in addition to those already mentioned are potato aphids, spraying and dusting, analysis of Maine-grown potatoes, method of applying fertilizer, effect of different forms of ammonia and of high and low ridge cultivation.

Current Projects

Projects on which work is now being done are—potato mosaic, potato diseases associated with or related to mosaic, potato spindle tuber, potato leafroll, net-necrosis, stem-end browning, and spindling-sprout. Others include fertilizer experiments with potatoes in rotation with grain and clover, effect of selection within a variety, rots of potato tubers and seed pieces, dusting and spraying, retentive powers of Aroostook soils for mineral nitrogen, effects of fertilizing materials upon the composition of the ash of vines and tubers, seed disinfection, comparisons of healthy potato strains, and commercial, tuber-line, and chemical work including hydrogen-ion determinations on the differences in potato plants and tubers due to certain degeneration diseases.

Many phases of orcharding, more especially apple raising, have been and are being stuided. All the work has been done at Highmoor Farm. Some of the work done in the past disclosed that pollination may influence size and shape but not the color of the fruit, the relationship between tree type and yield, control of certain diseases and insects, the value of a few pounds of nitrate, bud and root selection, and an economic study of the apple industry of Maine.

Somewhat as a continuation of the economic study is one on marketing apples now under way, involving first, the actual marketing of Maine fruit and consumer's preferences, and second, cull apples and their economic significance. Bud selection investigations are under way. Results thus far indicate that selection will apparently only maintain normal productivity of a variety. The study of relationship between shape and yield is being continued. Pollination studies, particularly of the New England Seven varieties, are being carried on. Further experiments on the use of fertilizers in orcharding are being conducted, as well as research on apple scab control, breeding new varieties, especially a later MacIntosh, variety tests of apples, plums, and small fruits under Maine conditions, and the relationship if any between size of tree when set, annual rate of growth, and subsequent yield. Preliminary data would seem to indicate that there is some correlation.

Work on Blueberries

Research into the many problems incident to raising blueberries in Maine, other than insect control, have only recently been started. Heretofore the propagation of this fruit has followed a natural course, but with a realization of the possibilities of what this crop might mean to the state, investigations attacking many phases of the industry are now under way.

An economic study is being made as a background to gain a knowledge of the industry in Maine. A study is being made to determine the soil and fertilizer requirements of the native blueberry. As a result of the first-year plot tests, field experiments are being established this season. Early results of selection and variety tests of low-bush berries indicate that there are some strains superior in yield and quality. Propagation methods, culture, and field management, as well as pollination and sterility studies, have been started. Entomological investigations of insects affecting blueberries have

Holmes Hall, headquarters of the Agricultural Experiment Station, on the University of Maine campus.

been under way for some time. Several distinctive insect pests of the blueberry have been studied and control measures established.

Although perhaps more work has been done on the subjects already discussed, they by no means include all the important nor even outstanding achievements of the Maine Station investigations.

As a result of several years of experimentation, the station produced the Maine 340 oat which after tests in practically all sections of the state has been found to be the best for Maine conditions. Extension Service reports of field demonstrations show consistently an average increased yield of 10 or more bushels per acre above the average of varieties commonly planted. This seed was first offered for sale in 1914 and has meant thousands of dollars to Maine agriculture each year.

Dr. James M. Bartlett, chemist, has been in the service of the Maine Station for 44 years.

Tests are being continued to determine the value of new varieties, not only of oats but of other grains. Supplementing variety tests are fertilizer experiments to determine the kinds and amounts of fertilizers needed under varying conditions. Extensive tests of silage corn varieties have been made to ascertain those best adapted to Maine's short growing season. Early maturity and yield have been studied, especially with some attention to fertilizer requirements.

According to the results published in 1926, the older methods (*Turn to page* 50)

Extension Workers Attend First School

By Rensselaer N. Sill

Madison, Wisconsin

EXTENSION workers from 11 states came to the first summer school in America for county agents and home demonstration specialists held this year at the Wisconsin College of Agriculture, Madison. The school proved so popular and worth while that a similar extension course will be offered next year.

The course, which grew out of long agitation by county agents and their associations, was founded primarily with the purpose of helping extension specialists to render an even greater service to the cause of agriculture and the farm home. It was enthusiastically attended by men and women from widely separated sections of the country. They came from Arkansas, Wisconsin, Mississippi, Montana, Maryland, Colorado, Ohio, Missouri, and other states.

Two major courses of exceptional interest to members of the various state extension forces were offered to the students. One of these courses, listed in the catalog as Extension Methods, was under the direction of M. C. Wilson of the United States Department of Agriculture and his associates, C. B. Smith, G. E. Farrell, A. B. Graham, E. Merritt, H. W. Gilbertson, and R. A. Turner.

This course was based on the field studies of Mr. Wilson who has conducted extension research during the last five years in cooperation with the extension services of twenty states. In one of his studies, about 200 state extension workers participated, and information was obtained from farmers and farm women on 9,287 farms in 27 counties in 13 states.

The findings of this and other investigations were analyzed by those enrolled in the course in extension methods. They discussed in considerable detail ways of measuring extension progress, methods of collecting research data relative to extension, and the influence upon the effectiveness of extension teaching of such factors as the size of farms, land tenure, educational training, age, and contact with extension workers. In addition to these group discussions, an analysis of the means and agencies employed in extension work was made. Here, the students studied the effectiveness and cost of the result demonstration, the method demonstration, meetings, news stories, personal service, bulletins and other extension media. Attention was also devoted to such important problems as program determination, leader training, extension campaigns, and the educational principles underlying extension teaching.

Proves Inspiration

Other courses at the school of interest to county home demonstration agents dealt with special problems in extension, the methods and problems of agricultural journalism and advertising, public speaking, community recreation, marketing farm products, and farm relief programs.

"The entire summer school," as Robert Amundson, Wisconsin District Supervisor says, "was a revelation to most county and home demonstration agents. It not only provided a means of getting the facts regarding the cost and relative effectiveness of various media used in extension work, but it also presented ways of improving the old standpat extention methods. To me, the course offered quite a little in the way of inspiration and introduced me to one of the most challenging and interesting fields in extension work, research."

The old method of conducting extension teaching is being supplanted by a new scientific method based on the facts uncovered through research.

At the summer school extension workers became thoroughly familiar with this research and discussed in detail its findings and applicability to practical conditions. What might prove a successful method in one state might prove a total failure in another. The method demonstration might be effective for teaching home economics and very costly for preaching the good gospel of efficient alfalfa culture. Just what methods are best for what crops and kinds of livestock? The answer was based on facts that would make possible the choosing of a method to accomplish the desired results with a minimum expenditure of time and money.

They found, for example, that of every 100 practices adopted, 93 could be credited to method and result demonstrations, general meetings, news stories, bulletins, farm and home visits, office calls, and indirect spread. The remaining seven practices were

STUDENTS IN THE FIRST SUMMER SCHOOL IN AMERICA FOR EXTENSION WORKERS

Bottom row, left to right: G. M. Henderson, Kansas; Mrs. Lillian Stille, Mississippi; Grace Freisinger, Washington, D. C.; M. C. Wilson, Washington, D. C.; J. A. James, Wisconsin; Iren Grouch, Illinois; P. B. Pancoast, Maryland.

2nd row: J. O. Hembre, Montana; Waldo Frasier, Arkansas; G. E. Annin, Wisconsin; J. M. Thomason, Arkansas; H. A. Pflughoeft, Minnesota; C. B. Drewry, Wisconsin; J. N. Kavanaugh, Wisconsin; J. B. Hayes, Wisconsin.

3rd row: R. A. Amundson, Wisconsin; C. C. Randall, Arkansas; B. E. Hart, Arkansas; H. M. Knipfel, Wisconsin; M. H. Alberts, Wisconsin; W. W. Clark, Wisconsin; I. H. Ley, Wisconsin; H. A. Graham, Oklahoma.

4th row: F. E. Henry, Wisconsin; F. T. Price, Wisconsin; E. H. Biddick, Wisconsin; I. R. Trumbower, Colorado; Cannon Hearne, Missouri; J. J. Lacey, Wisconsin.

traced to the influence of circular letters, exhibits, radio talks, correspondence, extension schools, leader-training meetings, telephone calls, posters, and study courses.

From the research of Mr. Wilson, the county agents also found that a unit of their time spent on the preparation of news stories and interviewing local editors influenced the adoption of three times as many practices as the same unit of time spent on farm and home visits, and 15 times as many practices as a unit of time devoted to extension exhibits.

Also a unit of time spent on farm and home visits was three-fourths as effective as the same time devoted to general meetings, and nearly twice as effective as a unit of time spent on result demonstrations.

However, this conclusion was reached only for total extension activities. There is a great variation in the effectiveness of the same methods when they are used for different practices. For example, the method demonstration is an excellent means of influencing people in regard to their clothing, health, sanitation, and, in general, the entire field of home economics, but if used for potatoes, corn, and wheat, it is very likely to be one of the least efficient methods.

In the case of such crops as corn, wheat, potatoes, alfalfa, soybeans, and cotton, the general meeting, the news story, the farm visit, and office calls will invariably give the best results. And for dairying, swine, and poultry, it was found that the general meeting and the farm visit are good extension methods. However, in the case of poultry alone, the method demonstration proved exceptionally effective. Tree fruits and vegetables are best promoted through a liberal use of the method demonstration, the general meeting, bulletins, and farm visits.

For soil improvement programs, the county agents concluded that no method is superior to farm visits, the next best is office calls, the next news stories, and the next general meetings.

Another, and a rather surprising finding, is that older farmers make the same response to extension methods as the younger ones. "Age," says Mr. Wilson, who is in charge of the school, "has been found to be absolutely no bar to education. This finding is in full accord with Dr. Thorndike's studies at Columbia University that were undertaken for the American Association for Adult Education."

"In practice", Wilson points out, "the worker should consider the methods to be employed for each new task. The time available, the adaptability of methods to a particular job, the possibility of reaching the desired number of people by means of certain methods, the necessity of establishing local proof and confidence, and the interrelationship of the methods selected are all points to be considered if the task is to be performed efficiently."

Advanced Course Planned

Obviously the course in extension methods was practical and well worth the time and study it demanded. Not only was the effectiveness of various methods for different farm and homemaking practices discussed, but the facts unearthed through recent research were considered thoughtfully. The course did not stop with a mere consideration of effective extension methods, but ways were worked out to make all methods even more effective. The advantages and disadvantages of each medium were listed, means suggested for the correction of their weak points, and the total experience of the group brought to bear on the subject.

In addition to the information secured from the courses at this first summer school of its kind in America, the members of the extension forces in attendance had the beautiful and long-famous campus of the University of Wisconsin to enjoy. There were picnics, boat rides, tours to noted beauty spots near Madison, and placid,

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Hairy vetch and Austrian peas in a pecan grove—soil improvement demonstration on the farm of W. P. Bearden, Morgan county, Georgia.

Winter Legumes

By G. A. Hale

Assistant Agronomist, Georgia Experiment Station

THE practice of growing vetch or other winter legumes for green manure between corn or cotton crops is rapidly gaining favor with southern farmers. Summer legumes for hay and winter legumes for turning under are very desirable and profitable where intelligence is used in handling the crop. Trials prove that winter legumes can be made a very economical source of plant food for southern crops, but many farmers and agronomists seem to be blinded by the large yield increases and lose sight of fundamental principles of soil fertility which underly the practice of green manuring.

Legume enthusiasts claim that green manuring will greatly increase the organic and humus content of southern soils. Some go so far as to say that the organic matter in green manure crops is more valuable than the nitrogen in the plowed-under material. Carefully conducted experiments show that small amounts of green manure may actually reduce the organic content of fertile soils, as often more nitrogen is recovered in the following crops than was contained in the green manure. Very few long-time green manuring tests have been run in the South, but the results show no promise of increasing the humus content of soils where organisms are active throughout the entire year. Oftentimes small amounts of turned-under material will increase yields of following crops about as much as large amounts and these results indicate that something besides organic matter is responsible for good results with winter legumes.

Heavy clay soils will be sticky when wet and cloddy when dry regardless of how many winter legume crops are turned under, and only a soil chemist can detect any changes in soil texture or organic content of southern soils where green manuring is practiced. The main value of organic matter is no doubt as food for soil organisms which in turn store nitrogen from the air and unlock mineral plant foods from fertilizer residues and natural soil fertility. Next to putting the land in pasture or forest crops, the surest way to increase its organic content is by combining the wise use of commercial fertilizers with the best green manuring practices.

Nitrogen

Nitrogen production is the usual yardstick for measuring the value of a winter green manure crop since the total pounds of nitrogen turned under can be determined chemically much easier that the increase in yields of the following crops can be measured. Many soils men ignore the other plant foods of the legume crops and attribute all the benefits from the manure to its nitrogen content. Experiments show that large amounts of commercial nitrogen will not compensate for the increase in corn and cotton yields where winter crops are plowed under in the spring. Some workers are even estimating the value of the legume nitrogen at the current prices of commercial nitrogen while tests show the former to be only about one-half as valuable for fertilizer. Although an average winter legume crop will add at least 90 pounds of nitrogen per acre to the soil, there is no satisfactory evidence to show that a large part of this does not come from the soil supply. Lysimeter studies show that some nitrate may be lost by leaching and washing during the winter, but again no figures are available to indicate just how valuable winter legumes are as holders of plant food which would otherwise be lost by leaching. As with liming, turning under legumes on many soils may stimulate soil bacterial and fungus activities to the point where the soil is left, after several crops are removed, with much less nitrate than before the practice was started.

Phosphoric Acid

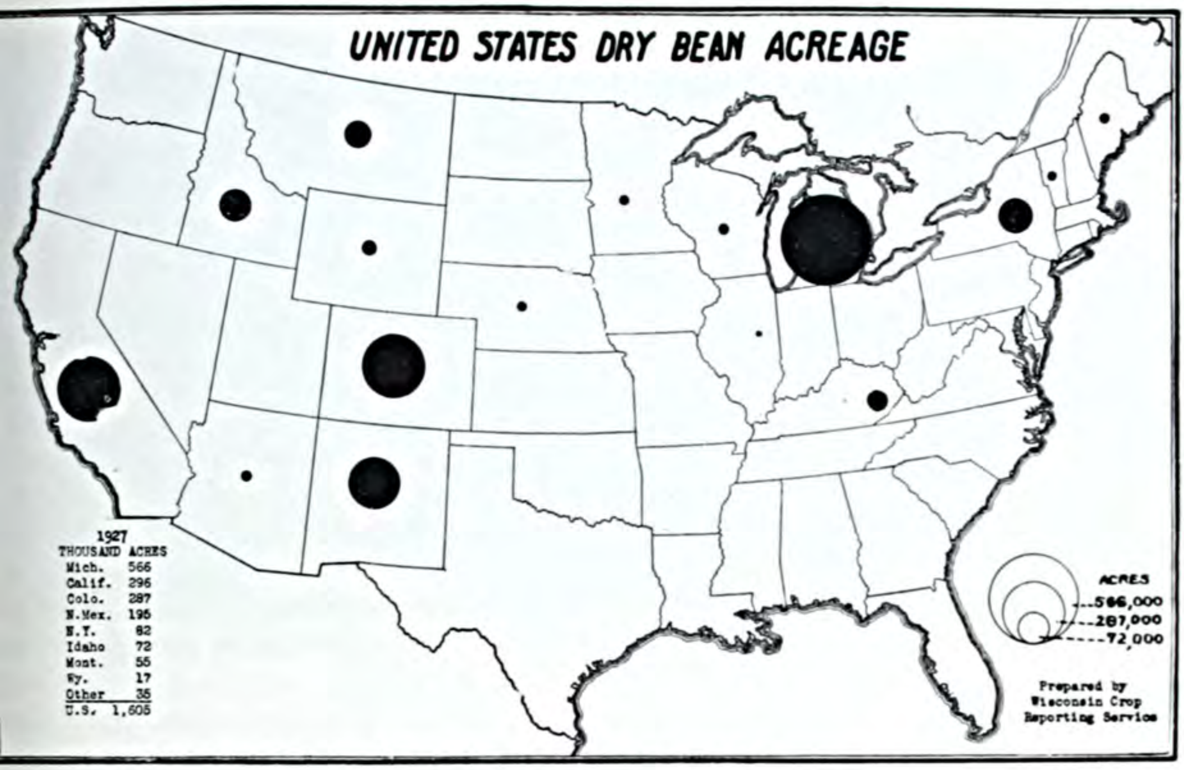
Unsuccessful attempts at winter legume growing demonstrate that liberal amounts of phosphates and possibly other fertilizers are essential for satisfactory growths of green manures. Unless excessive amounts of phosphates have been applied to the previous crops or the soil is naturally well supplied, legumes will not make enough growth to be profitable. Fortunately, cotton farmers have been using more phosphates than any other fertilizer in proportion to the needs of the crop, but this does not mean that the same amounts will suffice where green manuring is practiced.

A good winter cover crop will take from each acre of soil and make available to the following crop the equivalent amount of phosphoric acid contained in 100 pounds of superphosphate. It is clear that unless more superphosphate is used in the future this fertilizer will become more and more of a limiting factor in southern crop production. Tests indicate that cheaper sources of phosphates such as basic slag and rock phosphate can be used to advantage where legumes are included in the cropping system.

Potash

The important role of potash fertilizers in southern soils is being realized more and more as the idea of using potash in connection with nitrates for top-dressing cotton and corn is being demonstrated. Much work needs to be done on the value of potash in improving the quality of southern crops and its effect on disease control and other factors closely related to yield. Although the response to

(*Turn to page* 47)



Dry Beans

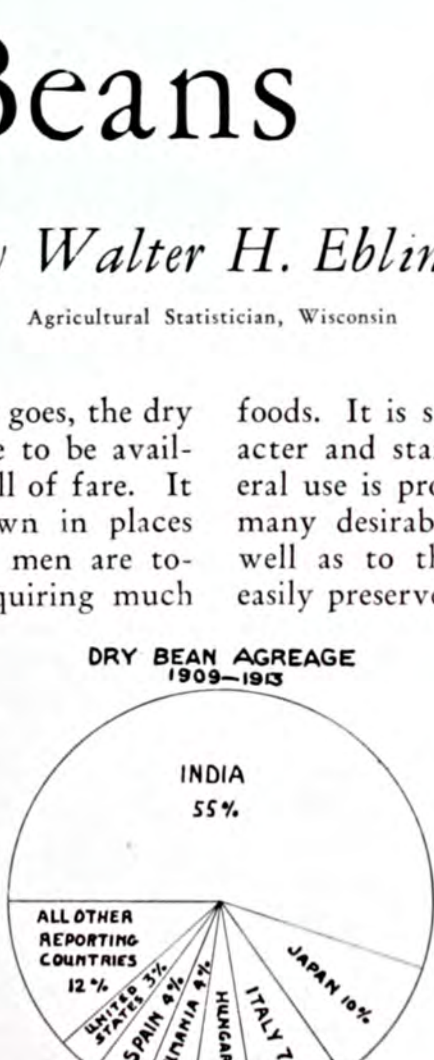
¶ *Eleventh in this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

NO matter where one goes, the dry bean is almost sure to be available somewhere on the bill of fare. It is particularly well known in places where large numbers of men are together for operations requiring much physical labor such as construction camps, lumbering, mining, the army, and the navy. So well in fact has the bean been associated with the navy that many refer to our ordinary varieties of white beans as "navy beans."

The dieticians give the bean a high food value and rank it very favorably with other foods. It is strongly alkaline in character and starchy in nature. Its general use is probably attributable to its many desirable qualities as a food as well as to the fact that it is fairly easily preserved and transported under a wide variety of conditions.



In the United States, Michigan is the leading bean producer with about one-third of the national acreage. California ranks second, Colorado third, New Mexico fourth, and New York fifth in 1928. In general, the commercial dry beans are

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The potato vines on the left received a complete fertilizer, while those on the right received an unbalanced fertilizer. (U. S. D. A.)

Potato Soils *and* *Their* Fertilization

By B. E. Brown

Soil Fertility Investigations, Bureau of Chemistry and Soils, United States Department of Agriculture

(*Reprinted from the American Potato Journal, July,* 1929)

THE potato, while widely grown in the United States on many different kinds of soils, does better on certain types of soils than others.

If one were attempting to describe an ideal soil for potatoes, it would be about as follows: The soil should work easily and not get in poor physical condition after heavy rains; should be well supplied with organic matter or humus; and should be well drained but possess a good water-holding capacity, due to the presence of organic matter on the one hand and a proper proportion of the fine soil constituents, silt and clay, on the other. The soil should possess a good physical condition to some depth to enable the roots of the potato plants to enter the soil readily and allow for proper tuber development.

Well-drained, sandy, gravelly or shale loams, if well supplied with organic matter, generally are excellent soil types for potato production. A good crop of potatoes may be obtained on fairly heavy clay loam provided the drainage is all right and organic matter is incorporated with the soil by turning under a leguminous crop or sod with any available manure. Muck soils will produce very satisfactory crops of potatoes if adequately drained and well supplied with available plant food.

The soils to avoid for potato production are deep, sandy soils which tend to shift or blow, and heavy, poorly drained clays or clay loams with compact subsoils near the surface. Soils which are very sandy will possess a low water-holding capacity and during a droughty spell a lack of soil moisture may prove very detrimental and result in too early maturity of the vines. Heavy, poorly drained clays and clay loams lacking in good tilth may be counted on generally to produce low yields of tubers of inferior shape and quality. Avoid such soils for potatoes until put in good condition.

The foregoing are rightly termed marginal soils. There is entirely too much wasted effort on the part of some in trying to produce potatoes on them when it would be much wiser to grow crops better adapted to such soils. In the aggregate there are enough potatoes grown on such land to seriously compete with the product of good natural potato soils, thereby contributing to some of the surplus potato crops of recent years.

Good soil preparation for the potato crop is indispensable to good yields; just as much so as good seed, spraying, and cultural care are essential. When and how to prepare land, what kind of rotation to practice, and other equally important matters, varying from one section to another, will need careful consideration before deciding what and how much fertilizer to use.

This plant, grown on a soil deficient in potash although abundantly fertilized with nitrogen and phosphorus, is stunted; the leaves are crinkled; and the petioles shortened. The leaves, deep green at first, later become bronze in color. The entire plant may collapse. (U. S. D. A.)

A healthy plant with strong, sturdy, upright stems, and smooth, even-colored leaves results when potatoes are fertilized with a complete fertilizer containing nitrogen, phosphorus, and potash. This is the type of plant that pays the farmer a good margin of profit. (U.S.D.A.)

As nitrogen, phosphoric acid, and potash are the plant-food elements which generally are most likely to be deficient in the soil in an available form, brief reference will be made to their functions in plant growth and development. It will be understood that each of these elements plays a specific part in plant growth and that the functions of one element cannot be substituted for those of another.

It should also be considered that a thrifty vine development is of paramount importance, for good vine growth is what insures starch formation and tuber development. One after all applies fertilizer primarily to influence leaf and stem growth; the tuber development follows. If the plants are fed in the beginning with plenty of available plant food the chances are, unless seasonal conditions are very unfavorable, that tuber development and resulting yield will be more certainly assured than in the case of underfed plants possessing comparatively limited leaf areas. Such plants are better able to produce starch than under-nourished potato vines.

The presence in the soil of plenty of available nitrogen is especially important in giving the crop a quick start with a corresponding stimulation of the growth of the

The result of applying proper and improper fertilizers—reading left to right: (1) No fertilizer; (2) P_2O_5 and K_2O, without NH_3; (3) NH_3 and P_2O_5, without K_2O; (4) Complete fertilizer. (U.S.D.A.)

leaves and stems. There results a more rapid, larger growth of vines possessing a healthy appearance and normal color.

A deficiency of available nitrogen is evidenced by the vines turning a lighter green than normal. In some cases a yellow shade will develop, giving the plant a distinctly abnormal appearance. As a result, the plants fail to grow as well as they should, and if the lack of nitrogen is long-continued, the plants will remain stunted. As starch formation is more or less proportional to leaf development, a lack of nitrogen may materially lower the yield. In case of a lack of available nitrogen, no amount of available phosphoric acid and potash will overcome this deficiency. As previously stated, one plant food cannot be substituted for another as each has its specific functions in the growth and development of crops.

An excess of available nitrogen encourages late maturity and is apt to render the vines more susceptible to attacks of disease organisms. Too much nitrogen may result in tubers of inferior cooking and keeping quality.

For crops in general phosphoric acid is helpful in promoting root development in the early stages and seed or

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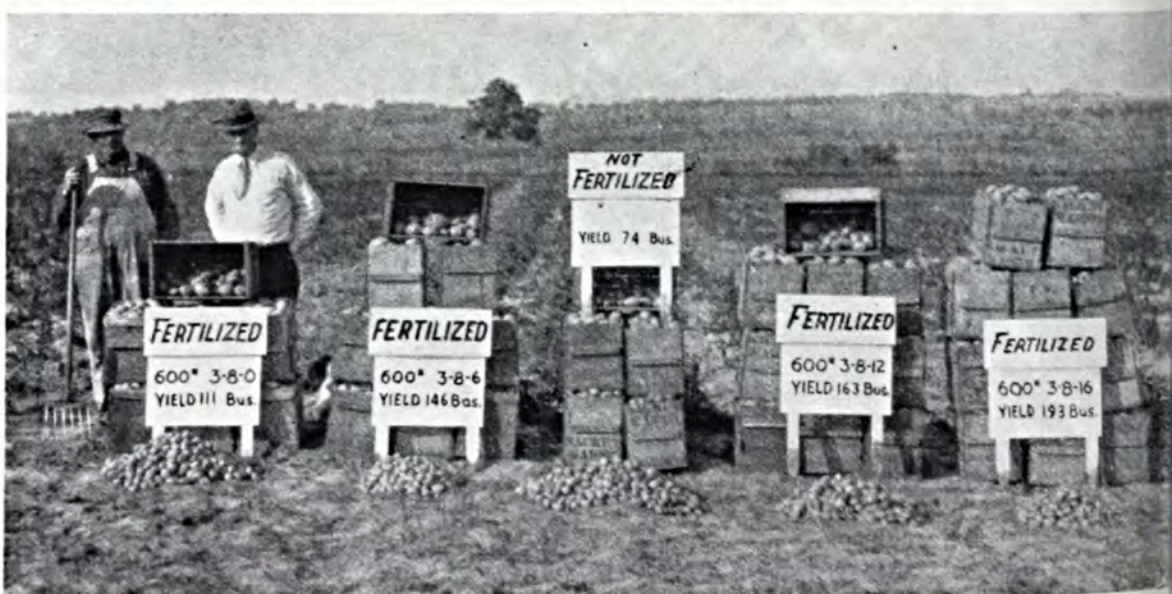

Showing how potash increased the yield on a Miami fine sandy loam in Wisconsin.

Future Farmers

By M. D. Mobley

Assistant State Supervisor for Agricultural Education, Athens, Georgia

BEGINNING about five years ago in Virginia, the Future Farmer organization, composed of vocational agricultural pupils, has spread from state to state and has grown until at present there are more than 50,000 members. The national organization known as the F. F. A.—Future Farmers of America—was formed last fall when delegates from 19 states gathered at Kansas City, Missouri. The delegates that met represented the various state organizations.

Credit for starting the Future Farmer chapters in America is due Henry Grosclose of Virginia. For some time Mr. Grosclose had thought of the farm problems of the nation and had wondered why farming did not seem to hold the appeal for boys that it did when Washington was farming at Mount Vernon and Thomas Jefferson at Montecello. While thinking of these and other illustrious sons of the Old Dominion, who belonged to the first families of Virginia, Mr. Grosclose thought of the F. F. V. — Future Farmers of Virginia. While in a hospital in Baltimore, Mr. Grosclose worked out the constitution of the organization and framed the initiation ceremony for the first degree.

The idea proved very popular among boys, and it was only a very short time until a local chapter was formed in every school in Virginia where agriculture was taught. It was from this beginning that today there are Future Farmer Organizations in more than half the states of the nation, with a membership of more than 50,000 boys.

The purposes of the national organization as set forth in the constitution are: To nurture a love for country life; to promote thrift; to encourage recreational and educational activities; to create more interest in the intelligent choice of farming occupations; to study farm problems; to encourage cooperative effort; to render unselfish service to rural communities; to develop rural leadership; to strengthen the confidence of the farm boy in himself and his work; and to improve farm practices through the application of scientific methods. It is encouraging to follow the work of the organization and to see that the purposes are being accomplished.

The Degrees

There are four grades of membership in the organization, namely: Green Hands, Future Farmers, State Farmers, and American Farmers. Each degree is attained upon accomplishment in farming and leadership ability. Ceremonies for raising members to the various degrees have been worked out. The boys take great interest in initiating new members.

The organization from the local chapters to the National Congress at Kansas City is in the hands of the boys. Officers are elected annually, from among the active members, who are composed of vocational agricultural pupils only. While teachers and state officials may advise with the boys, they have no vote on questions that come up.

It is really surprising to see the interest the farm boys are taking in this new organization. When I first heard of it, I thought that it would be popular with only the leaders of vocational agricultural work, but I have found that it really carries an appeal for boys.

As advisor for the Future Farmers of Georgia, I have been thrown in very close touch with members of the organization in this state during the past year. After a close study of the interest taken by the members, and observing their desire to carry out the purposes of the organization, I am convinced that the Future Farmers of America within a very few years is destined to be an important factor in the nation's agricultural situation.

Influence Is Wide

Recently the following letter, which strikingly points out the influence a Future Farmer Chapter has on the attitude of the members toward the school and community and tells briefly some of the things being carried on, was received from H. A. Jones, Supt., of the Sale City High School, Sale City, Georgia:

"I feel that I should write you concerning the Sale City Chapter of the Future Farmers of Georgia.

"I will enumerate a few of the things that it has meant to the boys, the school, and the community. They are as follows: it has helped the members to speak before an assembly; it has taught them the value of cooperation not only in their school work but in everyday life; it has caused them to enter into the school spirit better than ever before and to get behind any school movement and see it to a successful finish; it has helped them to enter into their farming operations with more confidence.

"The chapter has helped our school in all worthy activities, and we have felt its influence in every community undertaking.

"I recently attended one of their meetings, and I have never seen older men carry out a program with more order and seriousness than these boys. I have only enumerated some of their achievements and will not attempt to mention all. Suffice it to say that we are proud of our Future Farmer Chapter and that we consider it one of the community's greatest assets."

(Signed) H. A. JONES,
Supt. Sale City High School.

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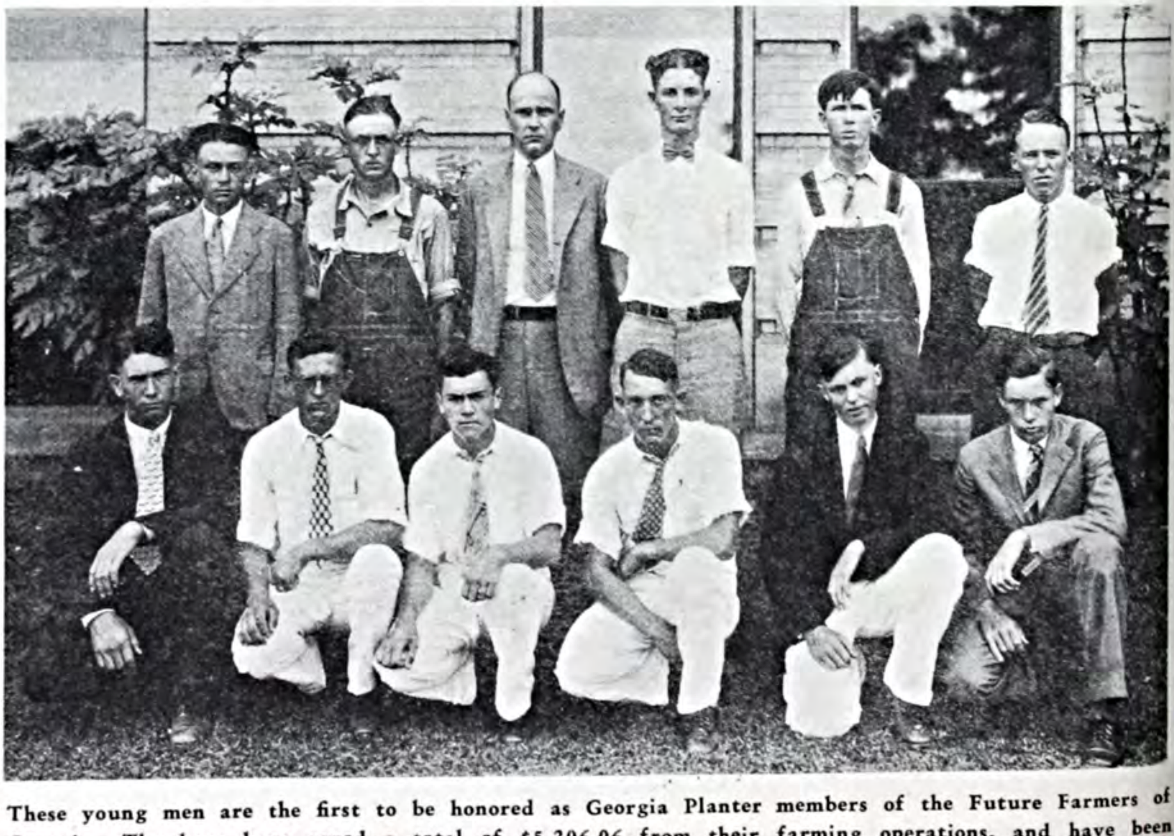

These young men are the first to be honored as Georgia Planter members of the Future Farmers of Georgia. The boys have saved a total of $5,206.06 from their farming operations, and have been outstanding in many other school and community activities. They hail from 10 communities.

John F. Rode of Swedesboro, N. J., insures the production of "chunks" by applying potash in the fall.

The Fall Application *of* Potash *for* "Sweets"

By R. H. Stinchfield

IN one of the most prosperous sections of New Jersey, the Garden State of America, is a group of farmers who have worked out for themselves one of the major problems confronting sweet potato growers. Centered around Swedesboro in Gloucester county, this group of farmers are building a reputation for growing "Chunks" which top the market.

The problem which these growers have solved is that of applying sufficient potash for profitable yields of sweet potatoes without injury to the stand. Large amounts of potash are essential to the growth of chunky tubers which the market demands. Sweet potatoes are grown largely on sandy soils naturally low in potash content. The tubers are very sensitive to injury when set in a soil having a high concentration of plant food. Therefore, the big proposition before many growers has been to get enough potash into the soil to give profitable yields of quality potatoes without injury to the stand.

In the years before the war, the common practice among many growers in this section was to use kainit in the fall on the land on which sweets were to be set the following spring. During the war, when potash was not available, the quality of the crop diminished until there were almost no "chunks," which depend upon potash for their formation. The percentage of long, slim, unmarketable "shoe-strings" was so large that there was no profit in growing the crop.

Following the war, when the problem of building up the supply of potash which had been depleted from the soil became uppermost, it was found that large applications, especially in the spring before setting, resulted in serious injury to the stand. About this time, Mr. H. A. Black, President of the Swedesboro Supply Company, Inc., who also had several farms in the community, began experimenting with the fall application of muriate of potash for his sweet potatoes. He found that although the muriate contained about four times as much potash as the kainit, profitable returns could be obtained with applications of muriate of potash up to 500 pounds per acre. Mr. Black obtained such good returns himself that he encouraged other growers to take up the practice. They, too, found it profitable, so that the practice has become well established in this section.

John Rode's Success

Typical of the farmers who have adopted the fall application of potash is John F. Rode of Swedesboro. Tall, thin from active participation in hard farm work, and with a keen eye gleaming with intelligence, Mr. Rode leaned against the fender of the truck from which he had just unloaded a load of prime sweet potatoes, and gave the writer his reasons for his fertilizer practices and his general views on the present farming situation.

"I am always ready to spend a dollar to make a dollar," Mr. Rode remarked. "The only way to make money is to produce. Am I right?" A check-up of his practices proves that he is right, and that the philosophy of farming which he has worked out for himself is sound.

John F. Rode is considered by his neighbors and by the business men in his community as an outstanding farmer, practical, level-headed, and successful. The system of farming which he has worked out for the light, sandy land which he cultivates, is one based upon his own experimenting for profits. He admitted that most of what he knows about farming he has learned from actual experience, and by keeping his ears open for helpful suggestions which he thought he could apply to his own work.

"Why do I use so much potash on my sweet potatoes?" he repeated, "because I found that during the war when I couldn't get potash, I couldn't raise sweet potatoes. Why do I apply the potash in the fall? Because in order to get a sufficient amount into the soil for the sweet potato crop and build up the reserve which was depleted during the war, without injury to the plants, I found it was better to make an application of part of it in the fall."

Sweet potatoes, tomatoes, and asparagus are Mr. Rode's cash crops. Corn and alfalfa are grown merely to make a convenient rotation and keep the soil producing to its greatest capacity. A field of 8 or 10 acres of corn is grown each year, and this field receives an application of 500 pounds per acre of muriate of potash in the fall before the corn is planted in the spring. The corn does not need this application of fertilizer. However, Mr. Rode explained that potash does not leach out of the soil and that this application for the corn crop made that much more potash available for the sweet potatoes which followed the corn.

About 20 acres of sweet potatoes are grown annually and are fertilized with a preceding fall application of 500 pounds of muriate of potash per acre, followed by a spring application of from 600 to 700 pounds per acre of a 5-8-5 fertilizer. Twenty acres of tomatoes receive from 600 to 700 pounds per acre of a 5-8-5 fertilizer applied in the spring; 25 acres of alfalfa receive only one-half ton of ground limestone per acre.

This year Mr. Rode cut 12 acres of asparagus and 7 more acres were planted. The asparagus is fertilized with 1,500 pounds of a 5-8-5 and 1,500 pounds of King Crab in the

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Soybeans Are Becoming Important *to the* South

By R. B. Fairbanks

THE soybean as a hay crop literally has leaped forward in the South in the past decade. It long has been grown for seed purposes in some sections of the South, but it is as a soil improver and more particularly as a producer of feed for livestock that it has gained such prominence in recent years.

One of the big problems with southern farmers has always been that of feed for the livestock. In fact, the lack of home-grown feeds has been the most serious drawback to the development of the livestock industry in the South. This lack of feed has been a serious detriment to cotton production in that many cotton growers have been buying much of the grain and roughage for their work stock, thus making it difficult to make a net profit on this type of farming. It is here that the soybean fits in, and during the last decade southern farmers have found out how profitably this crop may be grown.

For a long time the cowpea was the summer legume that was grown almost exclusively, but now that the merits of the soybean have become so well known the cowpea has been relegated to a second place as a summer legume in southern farming, except where very late plantings are to be made. The soybean is much more easily handled than the cowpea; the hay cures more rapidly; and there is not nearly so much shedding of the leaves of the soybean while curing, as is the case with the cowpea. Where planting is to be made after June 15,

Soybeans either can be planted in rows or broadcast.

Above: A good growth of soybeans which have been kept free from weeds by cultivation.

Left: While good stands can be secured by broadcasting, on rich land weeds get a good foothold.

however, the cowpea will usually produce a better yield of hay, but when planted prior to June 15, and especially when planted during May, the soybean is very much superior to the cowpea as a hay producer.

As a hay producer the Laredo soybean is one of the leading varieties. The stem is small and, therefore, produces a more palatable and more useable hay than those varieties producing the larger stems. The Laredo, however, will not produce the abnormally large yield that the larger growing varieties such as the Mammoth Yellow and the Biloxi will produce. Many claim that just as much useable hay will be secured from the Biloxi or Mammoth Yellow as from the Laredo, claiming that the residue, or that part which the livestock will not eat well, will serve as bedding and later as good manure. For this reason many plant the Biloxi and the Mammoth Yellow, but the larger percentage of farmers figure that the Laredo is the leading hay producing variety. Another advantage of the Laredo is its earliness. The Biloxi is quite late. The Otootan is a good variety, especially to plant with corn, but it is also a late maturing variety.

Methods of Planting

The practice of planting a hill of soybeans between each hill of corn at the same time the corn is planted is becoming more and more the custom. When planted at the same time the corn is put in, the yield of corn may be reduced slightly, but not to any great extent, and certainly not enough to offset the great value that will be received from the soybean both for soil improving purposes and as a producer of hay. Some plant two hills of soybeans between each hill of corn, putting four to six beans to the hill. It is probable, however, that one hill of beans to each hill of corn is more nearly right. When the corn is harvested and enough beans are picked for seed, the hogs, cattle, and other livestock may be allowed the run of the fields to eat the remaining beans and vines. Many cut the bean vines and store them, but more and more it is being found profitable to allow the livestock the run of these bean fields in the winter to do their own harvesting.

Generally speaking, however, those who want to get the most hay and the greatest quantity of high quality hay, plant the beans by themselves. It is usually best to plant them in rows two and one-half to three feet wide, planting from late April to early May and giving two or three cultivations. On very rich soil, broadcast seeding may be practiced, but as a rule this is not dependable, because weeds and grass are liable to choke out the beans. While planting in rows and cultivating two or three times makes the hay a little more expensive, yet it is the best method, except on very rich ground and usually then the row method is superior to the broadcasting method.

Even where soybeans are grown for seed, the soybean straw has been found an excellent winter roughage. Mules that are not at work, beef cattle, and dry dairy cattle can utilize it to decided advantage during the winter, provided a small amount of grain is fed along with it. It is a good roughage for any kind of livestock when properly supplemented with grain. Analysis shows that it is very much superior to corn fodder, stover, wheat, and oat straw. Generally speaking, it is figured that a good grade of soybean straw is worth about half as much as soybean hay or alfalfa hay. It is not depended upon as a roughage, however, for feeding to mules or horses when at work because of there being such a large percentage of indigestible material in it. It is excellent, however, for all kinds of cattle. The soybean hay itself, that is the stalk and the beans combined, when properly cut and cured, gives a hay that is equally as good as alfalfa and as a

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Onions

¶ 800 bus. per acre

By A. E. Wilkinson

Professor of Vegetable Gardening, Connecticut Agricultural College

ANDREW URE of Highwood, Connecticut, is considered one of the best market gardeners in the State and rightly so. With more than 53 years of experience in market gardening in the Highwood section, besides being a naturally systematic type of man, he could not be otherwise than an excellent grower.

While visiting his farm one day in July, he was harvesting a most excellent crop of onions. The illustration pictures over 800 bushels per acre of onions grown on his land. The picture was taken on July 22.

Between the rows of onions in the center of the illustration are planted late squash. Eight feet away another row was planted and so on throughout the patch. Thus Mr. Ure had two crops from his land in one year.

These onions were grown from sets of a variety known as Ebenezer, often called Japanese. Mr. Ure planted 22 bushels of sets per acre. The rows were 12 inches apart and from 8 to 10 sets were planted in every foot of row. The land was in a very high state of cultivation, and Mr. Ure, being of the older type of farmer, used considerable stable manure on his land.

Just how much he used he was unable to say, but he said, "Why speak about the manure used as I consider it largely a physical creator of soil conditions. I used 3,000 lbs. of 5-8-7 fertilizer per acre on this crop and feel that the artificial fertilizer and not the stable manure is the one to feed the crop."

All I can say is, that it was, because the results of over 800 bushels backed up Mr. Ure's statement.

Farms *Now* Are *Too* Cheap

By Arthur P. Chew

United States Department of Agriculture

FARMERS and others interested in agricultural real estate should pay more attention to the rule of the golden mean. In the war-time boom they erred from overoptimism. Now they err from excessive pessimism. It is hard to say which is the more disastrous mistake.

Overoptimism leads to inflation, which makes farming difficult by burdening it with heavy capital charges. Pessimism, however, leads to excessive deflation, which harasses the farmer by drying up the sources of his credit. In the last few years thousands of competent farmers have been unnecessarily separated from their farms because their creditors had too little faith in the future of the farming business.

In reacting against inflation, with its heritage of unwise speculation and overextended credit, the country has impaled itself on the opposite horn of the dilemma. In trying to get away from the blind confidence that boosts values falsely, it has given undue scope to the forces that depreciate real values.

Figures just issued by the United States Department of Agriculture plainly show that, taking the country as a whole, farm values are now below an earning basis. In other words, a conservative estimate of average farm earning power would justify a higher average farm valuation. All such statements are necessarily general. It would be imprudent to suggest that farms can be picked up at bargain prices anywhere. That farms generally are too low, however, seems to be undeniable. In the last eight years, though farm commodity prices and farm earnings have made substantial gains, farm land values have continued to fall. Some lag in the adjustment of valuations and earnings is usual, but the existing lag is very unusual.

Attention should be widely directed to this fact because an unduly depreciated farm realty market robs the farmer of his savings, makes his credit scarce and dear, and impairs his efficiency by sapping his courage. More harm may be done to agriculture this way than is done when values overestimate earning power. Right now thousands of farmers in the Midwest are having trouble with the renewal of conservative mortgages, because the mortgagees are too much influenced by the psychology of depression. This is bad for the country as well as for the individual farmers concerned. It tends to separate good men from the tools of their trade and to throw land into hands that cannot use it well.

Values Decline

Farm land values on March 1, 1929, for the United States as a whole were more than 30 per cent below the peak reached in 1920. In some states the recession from the 1920 peak runs up to nearly 50 per cent. These are stupendous declines, unprecedented in the Nation's history. They seem considerably to exceed what might be considered a natural or logical reaction from the inflation of the preceding boom. In order to justify a cut of 50 per cent in the farm values of an agricultural state, it would be necessary to assume that the previous level was twice too high; in other words,

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Starting a Scare

Left: Damon and Pythias are proverbial as the closest friends the world has known. It is not without cause, therefore, that Jack, the cockerel, and Cocktail, the horse, have been called the Damon and Pythias of the animal kingdom. They are constantly together at horse shows all over England. Jack is shown perched on the head of his equine pal.

Below: Some Maryland farmers still use the oxcart to haul their tobacco to market. Oxen have done this job in the "Free State" since Colonial times. A farmer can smoke a good bit of tobacco while getting his crop to the warehouse or wharf.

Right: Here is stoicism for you. This elephant in Bronx Zoo, New York City, endured great pain while a dentist worked on a sore tooth. The expression in the eye registers more than a roar or bellow could the fright and suffering which the animal is subjecting to his confidence in men.

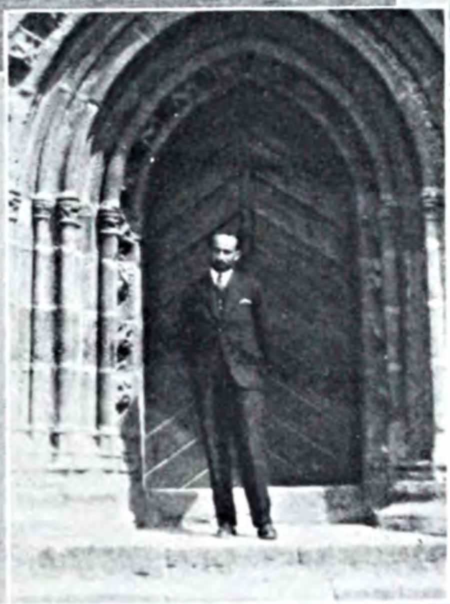
Below: In the Ghetto, lower East Side, New York City, there are many commercial transactions involving less than five cents. Bread from brown loaves is sold by the slice in Norfolk Street. The bread seller will cut off the slice of bread and butter it for his customer. The butter is two cents extra. The bread is German "black" rye.

Above: This view of the country near Brest, French Brittany, shows the small fields with their dirt fences. The river in the foreground is used by the farmers to haul their produce. (See story on page 43.)

Left: This church at St. Thegonnec was built in the 13th century and is typical of the architecture of Brittany.

Below: In Brittany the common way of hitching a team is in tandem. The farm implement in this picture is a cultivator.

Above: The houses in Brittany are in groups or villages. The thatched roof of this typical country house covers the house on the left, the barn in the center (in white), and the storage on the right. (See story on page 43.)



Right: Mr. George Gloux, Ingenieur Agronome, Pontivy, Brittany, in front of the church at Locronon.

Below: The market square at Morlaix is typical of the market squares in Brittany. Note the big two-wheeled cart.

Agricultural courses are made intensely interesting to boys and girls through demonstration and actual observation of living things. Here a group of students in Florida are examining citrus insects through a microscope.

This county agent in Missouri is demonstrating the field selection of seed corn to a group of boys who have entered a 5-acre field contest. The year before, these boys stored more than 700 bushels of early selected seed corn.

The Editors Talk

Plant Food Ratios

There is a great deal of talk about plant food ratios that farmers should use in fertilizing their crops, that is, the ratios between nitrogen, phosphoric acid, and potash. In connection with the theoretical ratios or the ratios that have been determined by laboratory and experimental work, it is important to determine what ratios are being used by the farmers themselves and what changes have been made in these ratios.

The farmer pays the bill. Therefore, if the ratio which he is using does not correspond with the official recommendation, there is some probability that there are other factors influencing the ratios actually used other than the plant food requirements as determined by experimental work.

The research workers in fertilizers at experiment stations have been concerned primarily with determining the plant food requirements of the various crops. Data on the actual ratios used can be approximated for many states from the annual fertilizer reports which are published in connection with the state fertilizer laws and the regulatory work on fertilizers done by the state fertilizer control boards.

The most striking change that has occurred in these ratios used by the farmers as determined from this source has been a marked increase in the amount of nitrogen in mixed fertilizers. In the northern states the nitrogen content is now some thirty to fifty per cent more than the prewar content. This probably in large part is due to the lower prices especially of mineral and synthetic nitrogen. The index number of this group of fertilizer materials has been notably lower than prewar and also lower than all the rest of the fertilizer materials.

The second striking feature, accompanying this upward trend of nitrogen, has been an upward trend in the amount of potash in mixed fertilizers. This increase in the amount of potash primarily has been a recovery from the low levels during the war period. In some states this increase in potash has brought the potash content above the prewar level.

In nearly all states the percentage of phosphoric acid is higher than prewar. The fluctuations in the phosphoric acid content of mixed fertilizers have been less violent than in the case of the other two plant foods.

Roughly, for the northern states, the ratio is one of nitrogen, to three of phosphoric acid, and two of potash. In the South the ratio is more nearly one of nitrogen, to three of phosphoric acid, and one of potash. The striking feature in the South is that the nitrogen and potash in mixed fertilizers are usually in equal proportions and in some of the important southern states seem to move up and down together. Similarly in the South, the recovery of potash from its low post-war point has been noticeable.

It is undoubtedly true that the price of fertilizer materials affects the ratio used by the farmer. We may experiment all we like to determine the ideal ratios for maximum crop production, and this work is essential, of course, but in the end the ratio actually used probably will be influenced not only by the agronomic need as determined by such experimental work, but also by the prices of the different plant food materials. Changes in the relationship between the prices of these plant food materials probably also will affect the ratios commonly used.

It is probably true that our chief fertilizer crops ten years ago required just as much nitrogen and potash as they do now. The agronomic need has not changed. Ten years ago the prices of both nitrogen and potash were much higher than they are now. The ratio of nitrogen and potash to phosphates was much wider then than at present. The narrower ratios now used are due in part to the lower prices of nitrogen and potash.

This all goes to show that studying simply the plant food requirement, no matter how perfected the technique may become, will not alone determine the ratio that the farmer will use.

Teaching Teachers

On page fourteen of this issue is an account of the first summer school for extension workers ever held in America. We would like to call the special attention of our county agent and teacher readers to this story for the reason that the success and favor with which this school met undoubtedly will result in the demand for and establishment of other schools.

The first school, which was held at the Wisconsin College of Agriculture, gathered its students from experienced extension workers and teachers of agriculture in eleven states. This contact of workers from different sections of the country engaged in the same line of work was in itself of great value to the individual student. Ideas were exchanged and taken away from the courses, which undoubtedly will have effect in stabilizing the effectiveness of extension work.

Dr. C. W. Warburton, director of extension work of the United States Department of Agriculture, after visiting the class in July declared:

"A forward step has been taken this summer at the University of Wisconsin in providing opportunity for extension workers to take advanced training designed to enable them to better meet the problems of their profession. As extension work grows older and becomes better established, there is a constantly growing demand for a better trained personnel. From the experimental beginning made this year, I look for marked development in the opportunities provided extension workers for advanced training.

"That extension workers are interested in opportunity for advanced training in their profession is shown by the genuine interest in the course," Director Warburton said. "Although nearly half of the state colleges of agriculture are offering some undergraduate training to juniors and seniors interested in taking up extension work, the course offered by the University of Wisconsin this summer provided graduate training for experienced extension workers."

Many county agents, teachers, and other extension workers will appreciate knowing that there is now a school in which they can expect a solution of the problems which have arisen in their work and for which they were not prepared. Wisconsin is to be congratulated in pioneering the movement for the advanced training of extension workers.

Fertilizer Tonnage

Now is the time that a lot of people will start calculating the fertilizer tonnage for next season, the amount which will be sold by next June. What is the outlook?

Fortunately, at the present date the outlook is better than at this time last year, although, of course, there is yet time for a good many things to happen. But bearing this in mind, at present some of the chief fertilizer crops are selling for higher prices than they were at this time last year.

In September the average farm price of cotton was 18.2 cents, compared with 17.6 cents in September, 1928. While this is a small increase per pound, it is a significant increase when the total crop is considered. Furthermore, it is significant to note that the cotton crop east of the Mississippi river will probably be larger than last year, and it is in this territory that most of the fertilizers are used.

In some sections the price of tobacco this fall has been greater than last fall. In other sections the situation has been reversed. It is still somewhat early to determine whether or not the total value of this year's tobacco crop will exceed that of last year.

The price of potatoes in September was more than twice the price at the same time last year. The crop will be considerably smaller, but as a general rule the farmer receives more money for a small crop of potatoes than for a large one. The chances are, therefore, that the farmers' income from this crop will be higher than last year.

The income received from these three crops has a very significant influence on the total fertilizer tonnage. At present, therefore, still bearing in mind that it is very early in the season, the outlook is better than the outlook a year ago. On the one side the purchasing power of the fertilizer consumer apparently is going to be greater than last year.

On the other side is to be noted a decline in the wholesale prices of some fertilizer materials. There has been a decline in the prices of mineral nitrogen and phosphoric acid. Organic nitrogen also is lower. The price of potash in September was four per cent less than the prewar price.

This feature of lower fertilizer prices in conjunction with the increased purchasing power of the farmer gives reasonable grounds for believing that the coming fertilizer season will be better than the last season.

Applying Science

While we may not agree fully with Dr. R. B. Von Kleinsmid, president of the University of Southern California, that the lack of scientific method based upon widest information and wisest application is at the root of the troubles of the farming industry, there is much food for thought in the idea.

Dr. Von Kleinsmid recently gave an address, "Today's Laboratory is Tomorrow's Industry," before 5,000 bankers assembled in convention at San Francisco. He asked if it were not the failure of the farming industry to see the truth of the discovery and adoption of new methods that was responsible, in part at least, for the present low ebb of agriculture and the alarming spread of sterile acres all over the country.

He called attention to the 300,000 farms which have been abandoned annually and stated that this was not to be wondered at in view of the fact that of the 86,000,000 horsepower on American farms, only 3,000,000 represent the product of machinery.

"To prove the assertion that research pays dividends," he said, "one has only to point to the activities and prosperity of General Motors, American Telephone and Telegraph, and Standard Oil—to name the largest corporations which make up a very appreciable amount of the $65,000,000 which industry invests in research every year."

It often has been said that there is enough scientific data as the result of experimental work at the colleges of agriculture in this country to revolutionize our whole American agriculture. The big job now is the job of the extension man—to get the farmers to apply science to their farm practices.

Well I'll Be —

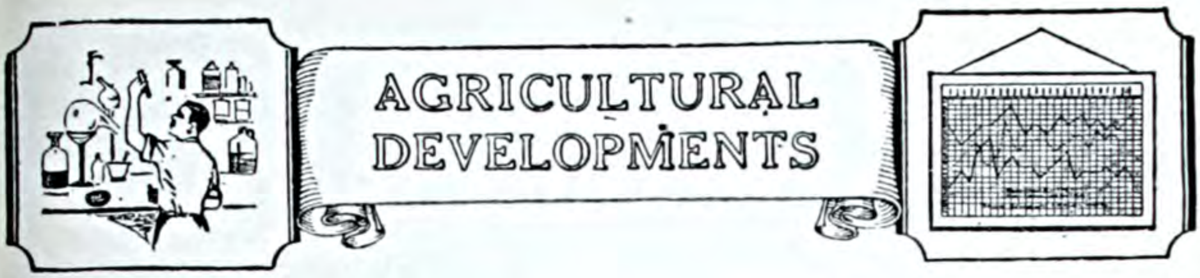
There seems to be no end to the remarkable stunts being tried with cows. It wasn't more than two month's ago that we heard of the 1,200-mile hike to the National Dairy Exposition which two Ayrshire cows were taking. Now the Guernsey breed breaks into the headlines with an experiment whereby three Guernsey cows were milked by radio.

"Only cows with sense enough to operate a radio set will be in demand by future dairymen," the news announcement says. "If a cow hasn't education enough to tune in on its owner's little broadcasting station when it comes milking time, it might as well pack up its lunch and start for the nearest butcher shop.

"Three Guernsey cows were led into a hotel in Racine, Wisconsin, connected to a milking machine, and the machine started by an electrical impulse sent from a broadcasting station some distance away. One cow donated seventy-five pounds of milk by way of radio. With such a system a farmer could load his portable broadcasting set into a car and go fishing for a week, his only care being to remember to press the milking machine button night and morning. Another button might call the chickens and crow like a rooster if necessary. Another button could be added to feed the pigs, throw down hay, and water the sheep. Still another button might be attached for winding the clock and putting the cat out at the proper time.

"If science continues to advance by 1950 a farmer can quit agriculture and go into the electrical button business on a large scale."

In all seriousness, the above incident opens our minds to wonder at the great developments in science as applied to farm practices which may take place in the next few decades. We have only to consider the advancement in electrical usage, in air transportation, in the radio, and various other fields, to realize that we may live to see in actual farm practice, what may seem impractical and even almost impossible now.



By P. M. Farmer

THE TRUTH ABOUT NECTARINES

The nectarine, the fuzzless peach, has received a great deal of attention from the New York State Agricultural Experiment Station, which this year put on an exhibit of this fruit at the State Fair that proved very popular. Dr. U. P. Hedrick, Director of the Station, says this fruit is only now coming to be appreciated. The lack of good varieties, he says, is one of the principal reasons that nectarines have not found more favor in the East, but that the experiment station has more than 30 different sorts in its orchards, two of which are highly recommended—the Hunter and the Sure Crop.

"The nectarines," says Dr. Hedrick, "are peaches in every respect except that they lack the fuzziness which characterizes the peach. Nectarine trees can not be told from peach trees unless the fruit is present. There are clingstone and freestone varieties of nectarines, just as there are of peaches, while the flesh of the nectarine may be red, yellow, or white."

FOREST FIRE EXPERIMENTS

Anyone who has seen a forest fire would hardly expect such a dangerous thing would ever be created for experimental purposes, but that is just what Raphael Zon, of the Lake States Forest Experiment Station, is planning to do. A tract of forest land consisting of several sections in the sandy, jack-pine belt near Roscommon, Michigan, will be used. This area will be surrounded by a 300-foot fire line and divided into lots of 20 to 40 acres. Fires will be set in order to determine the effect of such factors as temperature, humidity, wind velocity, and inflammability of the duff. Fires will be set during the spring summer, and fall; in the morning, noon, and evening; and under all sorts of wind, weather, and other conditions. Reforestation of the burned-over land will also be studied.

DON'T WASTE FERTILIZER

Fertilizer application by present-day-machinery, says the U. S. Department of Agriculture, is only about 50 per cent efficient. Specialists in the department are now working toward the improvement and standardization of distributing machines, and are also trying to improve the drilling qualities of fertilizers. A. L. Mehring, of the Bureau of Chemistry and Soils, talking before the recent meeting of the American Chemical Society at Minneapolis, said: "The principal qualities of fertilizers that affect their distribution qualities are the tendency to absorb moisture, fineness or coarseness of particles, physical uniformity, apparent specific gravity, and friction and cohesion between particles. The kind of weather to which the fertilizer has been exposed has a great deal to do with the mechanical condition of the fertilizer. This scientist reported that dry nitrate of lime drilled very well in an atmosphere of 40 per cent relative humidity, but became very soggy and drilled poorly in an atmosphere of 50 per cent relative humidity, and at 60 per cent it was entirely liquid. Sodium nitrate, which drilled well at 40, 50, and 60 per cent relative humidity, could not be handled in the distributor when the humidity was 70 per cent or higher. Superphosphate was too dusty at 40 per cent relative humidity, and too damp at 90 per cent, but could be distributed at any humidity under 90. The concentrated phosphates-ammophos, monoammonium phosphate, and monopotassium phosphate, drilled well in all humidities up to 90 per cent. Urea, ammonium nitrate, and leunasalpeter—concentrated nitrogenous fertilizers—behaved much like nitrate of soda, although urea, like ammonium sulphate, could be drilled at humidities 10 per cent higher than could nitrate of soda.

Since some mixed fertilizers tend to separate because of the vibration of the distributor, the department specialists recommend mixing the fertilizers in small, readily drillable particles. This will reduce loss resulting from poor drillability and poor and improper proportions of the various elements.

KEEP IRON OUT OF MILK

People shouldn't try to get their iron ration from milk. If much of the advertising we have seen is correct, they much better depend on raisins and spinach. According to scientists at the University of Wisconsin, the cow puts as much iron in milk as ought to be there. More iron spoils the flavor of dairy products. It is found by these investigations that 24 hours' contact of milk or cream with a rusty can will increase the iron content of the milk 250 parts per million, while only one part per million produces an off-flavor—metallic in milk and cream, and tallowy and fishy in other dairy products. Some manufacturers, knowing the importance of this iron factor in the quality of their products, are installing equipment of stainless steel, nickle, aluminum, and some with glass lining.

WATERMELON COMPETES WITH BEE

A report from Russia says that a sirup factory recently established at a town on the Volga River is using watermelons in place of sugar cane or beets, making a sweet known as "nardek." It is an old process in the region, but has never before been carried on in a factory. Honey-bees are said to be scarce in the locality as a result of the melon competition.

HORSES AND MUSHROOMS

The automobile industry has been worrying the mushroom growers, for the mushroom growers have always looked upon horse manure as very necessary in the production of a good crop of high-quality mushrooms. It has been harder and harder to get enough of the manure to grow this crop to supply the steadily growing demand for these tender buttons. However, Edmund Lambert, of the Department of Agriculture, has had considerable success in growing them on what is called artificial manure. This manure is made by mixing straw with chemicals, such as ammonium sulphate, superphosphate, and ground limestone. The damp straw, treated with these chemicals, rots and forms a manure which seems to provide the right sort of plant food.

BLUE WINDOWS FOR THE COWS

The dairy barn at the University of Nebraska has had its windows painted blue—and the cows are well pleased, and probably give more milk. The cool, subdued light discourages flies. The paint will be removed after the fly season.

Foreign and International Agriculture

Picturesque Brittany

By G. J. Callister

AUTHOR'S NOTE: For the opportunity to make a tour of Brittany and for the information derived from this tour, I am deeply indebted to several people, particularly to Mr. J. LeCornec, General Manager, Societe Commerciale des Potasses d'Alsace, and to Mr. A. Bruno, Directeur du Service Scientifique et Agricole, Societe Commerciale des Potasses d'Alsace, which gentlemen made it possible for the tour to be undertaken.

For faithful, cheerful, and unremitting guidance on the tour itself, I am indebted to two gentlemen, Mr. J. Henry Debieve, Mulhouse, and Mr. George Gloux, Ingenieur Agronome, Pontivy, Brittany. Without their help we could not have properly seen Brittany.

I have also to thank a host of others whom we met in Binic, Perros, Landerneau, Morgat, Quimper, Riec, Vannes, Rennes, and other places in Brittany. I am very glad that I had the opportunity to talk to farmers, merchants, business men and agricultural advisors in these places and regret that limitation of space does not permit my giving more individual appreciation.

THE lure of Brittany is that it is a country not afraid to be different. It is a welcome oasis in this modern age of uniformity and sameness.

Driving along the highways and byways of Brittany, one is impressed with a land of stimulating and charming contrasts, in the Breton architecture, in the sea and landscapes, and in the people. Picturesque contrasts of the old and the new voice a culture rooted deep in the history of the centuries, but withal sympathetic to the present.

What is more picturesque, for instance, than Mademoiselle Louise Charle standing beside the old well in the square of the ancient village of Locronon? Note the white lace cap and black dress, which by the way were not donned solely for the photograph. Lace caps and headdresses of different types and colors, varying according to the district of Brittany, are part of the every-day working equipment of many of the women-folk of the countryside.

In another photograph, note a group on the beach at Vel-Andre—the ladies in the foreground in the every-day Breton costume, while immediately behind are ladies in the most modern of modern dress. Men dress differently, too. Note the man in the market square.

Both the domestic and ecclesiastical architecture are full of individualistic appeal. Dotted over the countryside are many old and interesting houses, villages, and churches. The photographs on pages 34 and 35 show some of them.

Geographically, Brittany is a rocky peninsula on the west coast of France, thrust out into the sea between the English Channel and the Atlantic Ocean—"an ancient province and duchy of France," comprising about 18,630 square miles, or about one and one-half times as large as the State of Maryland. The greatest distance between the Channel and the Ocean is 155 miles.

Brittany is distinctly and popularly divided into two zones, the inland and coast zones, the inland area being dominated by two plateaus, in many places covered with moorland, presenting a somewhat rugged and wild aspect. The highest points are about 1,100 feet. Between the two inland plateaus and the sea is the coast zone, circling Brittany on the northern, western, and southern shores. The roads and arable land of the coast region are on the whole better developed than is the case inland. Generally speaking, the best farm land is in the valleys near the sea, as shown in one of the photographs which is a picture of the valley between Brest and Landerneau.

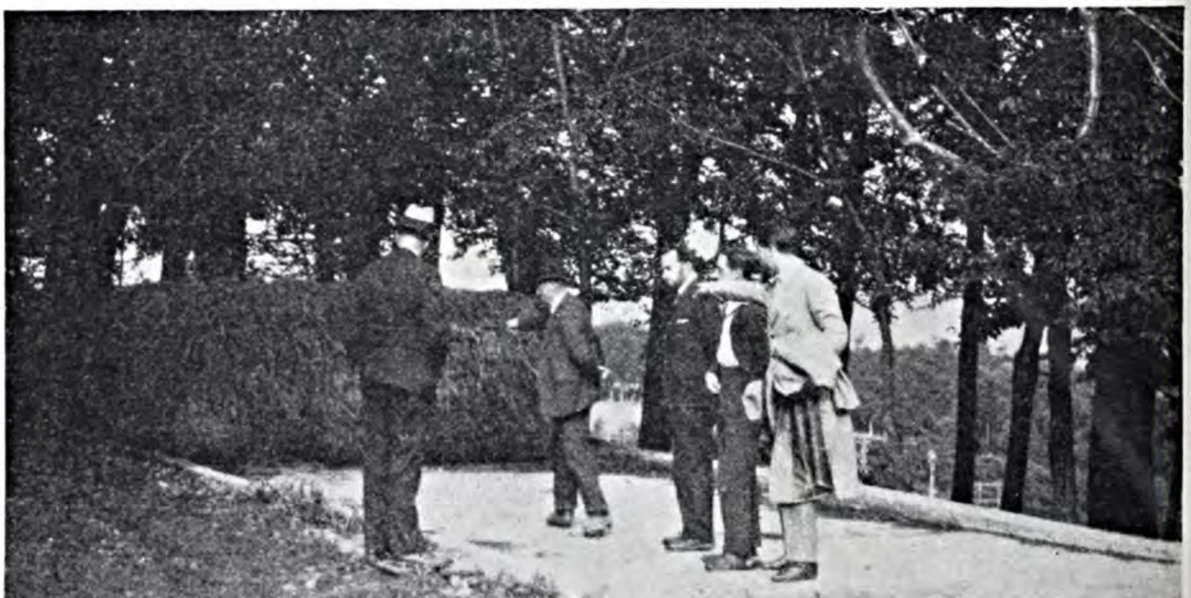
The coast line is rugged and picturesque in the extreme, indented by bays, inlets, and estuaries and surrounded here and there with reefs and islands. The Gulf of Morbihan on the South coast is particularly picturesque and well worth a visit.

Politically, Brittany comprises approximately the departments (which correspond somewhat to counties in America) of Cotes-du-Nord, Finistere, Ille-et-Vilaine, Morbihan, and Lower Loire.

In all departments agriculture predominates. Industry is developed, especially in some of the seaport towns. Brest is also an important naval base, but the backbone of Brittany still is her agriculture.

The soils are formed largely from schists, gneiss, and granite. In many areas the soils are thin and not naturally the most fertile. The development of Breton agriculture has, therefore, not been easy. According to the authorities this development started in the fifth century when the Celtic inhabitants of the country founded monasteries and "helped to clear the land, the greater part of which was

(*Turn to page 59*)



Mr. J. Henry Debieve points out a manure pile built on a cement bottom. Underneath is a pit for the liquid manure.

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 Study of the Effect of Commercial Fertilizers on the Performance of Peach Trees," is the title of Bulletin 239 of the Arkansas Experiment Station. The authors, J. R. Cooper and C. B. Wiggans, present a most interesting discussion of their data, which lends itself to a variety of interpretations concerning the influence of the three essential plant food elements, separate and in combination. The unique layout of the experiments involving N, P, and K alone; N—P; P—K; N—K; N—P—K; NN—P—K; N—PP—K; N—P—KK with yield data, production and handling costs, value per acre, and profit or loss, for each treatment for a period of four years, makes this bulletin a most valuable contribution. The arrangement of the three most profitable treatments (average of four years) are as follows: First, N—P; second, N—P—KK; third, N—K. The basic analysis was a 3-8-3 or the equivalent of 1½ pounds of nitrate of soda, 4 pounds of superphosphate, and 1½ pounds of kainit per tree per acre.

Another very interesting and important bulletin is No. 63 of the Virginia Truck Experiment Station, giving the results of two years' work on the study of synthetic nitrogen salts on the fertilization of spinach. This bulletin should prove of value to the fertilizer mixers and to farmers who mix their own fertilizer materials.

The sweet potato acreage in the Atlantic Coastal Plain, as well as the value of this crop is very large. That larger profits are possible with the proper methods of cultivation and with careful attention to fertilization is conclusively shown in Bulletin 66 of the Virginia Truck Experiment Station. Data from 15 fertilizer treatments determined by use of the triangle method covering a period of eight years shows that high potash, low phosphorus, and low nitrogen formulas proved most effective. The most satisfactory amounts of these elements were 150 pounds of actual potash and 30 pounds each of phosphoric acid and nitrogen per acre. Every sweet potato grower and agricultural leader should have a copy of this bulletin for ready reference.

"A Field Test for Available Phosphorus in Soils," Agr. Exp. Sta., Bul. 337, Aug., 1929, R. H. Bray.

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

"Cyanamid, Its Uses as a Fertilizer Material," U. S. D. A., Washington, D. C., Cir. 64, May, 1929, F. E. Allison.

Crops

A timely leaflet coming to hand this month is Pennsylvania's Circular 127, "Potato Grading," by J. B. R. Dickey. Grading in marketing is assuming such importance that this circular should serve an urgent need for the information in respect to the potato crop. It will undoubtedly find its way to a large majority of the growers in the eastern states.

Another timely publication is South Carolina's new circular 37, "Winter Cover Crop Experiments," by T. S. Buie. In his study, the author sets forth the information gained from experiments conducted at the college to determine the best practices of growing the cover crops best suited to the soils of South Carolina.

"Sweet Sorghums for Syrup and Forage," Agr. Exp. Sta., Fayetteville, Ark., Bul. 241, June, 1929, C. K. McClelland.

"Cotton Breeding Studies," Agr. Exp. Sta., Fayetteville, Ark., Bul. 243, June, 1929, J. O. Ware.

"The Japanese Persimmon in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 205, June, 1929, A. F. Camp and Harold Mowry.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XII, No. 1, Aug., 1929.

"American Potato Journal," The Potato Assn. of America, East Lansing, Mich., Vol. VI, No. 7, July, 1929, and No. 8, Aug., 1929.

"Extension Service for New Hampshire Farms and Homes," Ext. Serv., Durham, N. J., Bul. 35, Feb., 1929, J. C. Kendall.

"Report for 1928," Agr. Exp. Sta., Durham, N. H., Bul. 238, Feb., 1929.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, July-Aug., 1929, No. 139, and Sept.-Oct., 1929, No. 140.

"Selecting Fruit for Exhibit," State Hort. Soc., Inc., Knoxville, Tenn., Bul. 2, June, 1929, E. M. Prather.

"Varieties of Cotton for the Blackland Region of Central Texas," Agr. Exp. Sta., College Station, Tex., Bul. 399, July, 1929, D. T. Killough, Henry Dunlavy, and H. E. Rea.

"Ornamental Plants for the Home Grounds," Va. Truck Exp. Sta., Norfolk, Va., Bul. 62, Jan. 1, 1928, M. M. Parker.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 260, Aug., 1929, and Bul. 261, Sept., 1929.

Economics

The new bulletin 202, by H. G. Hamilton of the Florida College of Agriculture, discusses the "Cost of Handling Citrus Fruit From the Tree to the Car in Florida." The purposes of this investigation as stated by the author were first, analyzing the facilities for handling citrus fruit in Florida; and, second, determining the cost and the factors influencing cost of handling citrus fruit. He found that the average cost per box for handling citrus fruit from the tree to the car was 95c for the 1924/5 season, and \$1.04 for 1925/6. A combination of large capacity packing-house and high percentage use greatly decreased the cost per box. This study indicates that some of the important factors in the efficient handling of citrus fruits are a reasonable investment per box, adequate volume, large volume per car capacity, large volume per grower, and an efficient arrangement of packing-houses.

"An Economic Survey of Salt River Valley Project in Maricopa County, Arizona," Agr. Ext. Serv., Tucson, Ariz., Ext. Cir. 59, June, 1929.

"Returns from Different Systems of Farming on the Salt River Valley Irrigation Project," Agr. Ext. Serv., Tucson, Ariz., Ext. Cir. 60, Aug., 1929, Byron Hunter and Harry A. Stewart.

"The Farm Credit Situation in Southwestern Arkansas," Agr. Exp. Sta., Bul. 237, June, 1929, B. M. Gile.

"Organization and Management of Tomato Canning Factories in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 240, June, 1929, Carlos E. Campbell.

"The Consumer Demand for Apples," Agr. Exp. Sta., Amherst, Mass., Bul. 250, Apr., 1929, Lorian P. Jefferson.

"A Local Farm Real Estate Price Index," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 96, Mch., 1929, F. M. Thrun.

"What Makes Some Farms Pay," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 187, Feb., 1929, E. B. Hill and F. T. Riddel.

Insects

"The Known Predacious and Parasitic Enemies of the Pea Aphid in North America," Agr. Exp. Sta., Madison, Wis., Research Bul. 93, June, 1929, C. L. Fluke.

"The Mexican Bean Beetle in Eastern Virginia," Va. Truck Exp. Sta., Norfolk, Va., Bul. 65, Oct. 1, 1928, P. J. Chapman and G. E. Gould.

Diseases

"Smut Control in Cereals," Agr. Col. Ext. Serv., Lincoln, Neb., Ext. Cir. 132, July, 1929, P. H. Stewart and D. L. Gross.

"Supplements for Copper Fungicides," Agr. Exp. Sta., Amherst, Mass., Bul. 252, June, 1929, E. B. Holland, C. O. Dunbar, and G. M. Gilligan.

"Fusarium Wilt of Tomato in Virginia," Va. Truck Exp. Sta., Norfolk, Va., Bul. 64, July 1, 1928, F. P. McWhorter and M. M. Parker.

Winter Legumes

(*From page* 18)

potash applications on winter legumes has not been as outstanding as that of superphosphate, no doubt tests will demonstrate that a proper balance between fertilizers will be most profitable in fertilizing winter legumes. Sandy soils, where greatest profits are made from green manuring, are usually most deficient in potash and no doubt part of the increased yield is due to the effect of the potash in the green manure and its effect on the availability of the soil potash.

A good crop of winter legumes will take from the soil and make available to the following crop the equivalent amount of potash contained in 100 pounds of muriate of potash which is more nearly the amount needed than is commonly supplied in commercial fertilizers. Trials show that unless liberal amounts of potash are supplied to the main crop, poor stands and greatly reduced yields from the use of green manures may result.

As with phosphates, it is clear that the potash supply rapidly will be depleted unless provisions are made whereby the supply is replenished through the wise use of commercial fertilizers. Some comparisons of winter green manure crops with commercial fertilizers are unfair to the latter because fertilizer practices are followed which favor the use of green manures and tend to exaggerate their value. The ratio of fertilizer elements in the green manure crop is usually better balanced than that of the commercial fertilizer used and naturally best results are obtained with the green manure. Besides no account is taken of the future fertility of the soil as effected by plowing in large amounts of organic material.

The winter legume idea for soil improvement and increased crop production in the South has a big kick because of the immediate return on the investment and the non-interference with the one-crop system of farming, but more attention must be given to the wise use of commercial plant food in connection with green manuring if the greatest benefit to both the man and land is realized. Many farmers are simply cashing in on fertilizer residues and leaving their land poorer than if no legumes were ever grown.

Extension Workers' School

(*From page* 16)

cool Lake Mendota with its fish, swimming, and refreshing summer breezes. The summer was a most enjoyable one as well as thoroughly informative and worth while from an educational standpoint.

The great majority of students declare they will return next summer and continue their course of study in extension methods when additional and more advanced courses will be available in psychology as applied to extension, rural sociology, farm relief, and the entire field of agricultural journalism and advertising from a publicity and promotional angle.

"In the future," says Mr. Wilson, "it is highly likely that there will be established throughout the country in four or five geographically strategic centers courses of instruction similar to this pioneer course begun last summer at the Wisconsin College of Agriculture. I feel that these courses will aid members of the various extension forces to do considerable original research that will prove of great value to the entire extension movement. They will, no doubt, be a powerful force in making extension a profession of the highest calibre."

Future Farmers

(*From page* 24)

At the state meeting of the Future Farmers of Georgia, there were three or four delegates from each of the 54 local chapters of the state. During the State Meeting, officers were elected, a public speaking contest was held, and the state stock judging contest was conducted. Each delegate of the 185 present, at some time during the conference, which was held as round table discussions, was on his feet and took part in the discussions before the body. Such training tends to take away from the farm boy the inferiority complex from which many of them suffer.

"Georgia Planters"

The 11 boys, who were raised to the "Georgia Planter" degree, the highest conferred by the state organization, have deposited in a bank or profitably invested more than $5,000.00, an average of $473.27 each, which they have earned from projects carried on as a part of their agricultural instruction. They all at some time or other had been members of stock judging or other teams, had an average of 85 or above on all high school subjects, and showed leadership ability.

Not long ago it was my privilege to visit the Southwest Dekalb School, on the day the Future Farmers were doing their banking. The treasurer of the local chapter received the money each member had to place on savings. The amount was entered in the member's thrift book and a record of it placed in the treasurer's book. The total amount of the money deposited by the chapter members was carried to the bank and placed on deposit as one account. By this system the members were allowed to deposit very small amounts. Several of the members who started with very small amounts now have a nice savings account that has been built up by small deposits each week.

"The value of this thrift bank," said H. S. S. Munro, instructor at Southwest Dekalb, "is that it teaches the boys to systematically save a part of whatever they are making."

The Future Farmers of Georgia as well as other states are putting into practice the purposes of the organization, and as a result are receiving training that will no doubt have a marked effect on the agricultural situation of the nation in a very few years.

Dry Beans

(*From page* 19)

found in the northern part of the United States and throughout the West, though they are always grown in gardens in practically all parts of the country.

In 1928 the United States bean acreage was estimated at 1,577,000 acres. The average yield per acre was 10½ bushels, the total production 16,598,000 bushels. The price average for all varieties was placed at $4.17 per bushel, making an aggregate value of the crop of $69,294,000. This clearly makes the dry bean one of the important minor crops in the United States. The acreage maintained at the present time is about twice that of prewar years and nearly four times that of 1899. It has not increased, however, during the last five-year period. Yields have been somewhat lower in recent years.

The most important commercial region in the United States is an area including Michigan and New York. Here the white pea bean is most commonly grown, although other varieties such as the large white and the red kidney bean are also common. The white pea bean makes up about 32 per cent of the United States production, the large white about 4 per cent, and the red kidney about 6½ per cent.

A second region of commercial importance is the interior valley of California and along the southern coast of that state where white beans known as large and small Californians are extensively grown. In recent years this area has declined somewhat in importance. A third region of importance centers around the states of Colorado and New Mexico where a bean variety known as "Pinto" is most important there, this variety making up about 13 per cent of the United States production. Lima beans are quite largely grown in California. They comprise about 13 per cent of the nation's production.

Ordinarily beans grow on a great variety of soils, but probably do best on limestone soils of moderate fertility. They are usually grown in rotations with other crops and their commercial distribution in the United States is largely determined by such factors as diseases, insects, and the competition of other crops.

World statistics on this crop are not as satisfactory as for most others. Old data, going back to prewar years, indicate that India grows about 55 per cent of the world acreage, Japan following in second place with 10 per cent. The United States, from the standpoint of world production, is not one of the leading nations in bean production, producing about three per cent of the world's acreage in these prewar years.

Soybeans Are Important to South

(*From page* 28)

matter of fact, contains slightly more digestible nutriments than the alfalfa. The digestible nutrients of five good quality hays are as follows:

	Per Cent
Soybean	53.6
Cowpea	49
Alfalfa	51.6
Red clover	50.9
Timothy hay	48.5

This shows that the soybean hay leads the next highest one, alfalfa, by 2 per cent in total digestible nutrients.

Many have found that by planting sorghum and soybeans together, that is, one row of soybeans and one row of sorghum, that the maximum amount of feed may be produced. These two when fed green as a soiling crop have been found excellent for all kinds of cattle, mules, and horses that are not at work. It also makes a good feed for hogs.

The soybean, being a legume, naturally takes nitrogen from the air and stores it in the soil. Cotton planted after soybeans frequently yields 25 to 50 per cent more than cotton on similar land planted after corn or cotton. The soybean, therefore, is an important crop from the soil building angle, and yet to get the best results from this crop, under average conditions, it needs to be fertilized. When planted on soil that is not very fertile, a small amount of nitrogen even will be found profitable, although two per cent is about as much as usually is found advisable. However, liberal applications of superphosphate and potash are quite desirable under average conditions. From 400 to 600 pounds per acre of a fertilizer running 2 per cent nitrogen, 8 to 10 per cent superphosphate and 4 to 8 per cent potash is about the analysis that has given best results. The higher per cent of potash is desirable on many soils, especially those that contain much sand. While the crop can be grown without fertilizer, yet it cannot be grown most profitably without it, and as said above, except where the ground is quite rich, at least 1 to 2 per cent nitrogen should be used along with liberal applications of superphosphate and potash.

Viewed from every angle, the soybean is unquestionably a profitable one in the South and is rapidly becoming a crop that will be grown on every southern farm. It is doubtful if many southern farms can be operated most profitably and economically without making use of the soybean in some way. The fact that it is good for so many different purposes makes it one that will fit in with almost any system of farming. It is fine as a soil improver, produces seed that can usually be sold at a profitable price, and above all, produces a high quality hay which the southern farmer needs so badly.

Maine

(*From page* 13)

of breeding by ear selection, plant selection, and even ear to row selection, have little value in increasing yields of well-bred varieties, and the quality of sweet corn, while partly due to varietal differences, is primarily dependent upon climatic conditions and length of time from picking to packing. For several years bean tests have been conducted to determine varieties best suited to Maine.

Work is now being done on inheritance of certain characteristics in relation to yield and quality in certain grains and vegetables, clover failures in potato rotation, cut-worms affecting vegetable crops, effect of lime on soil and relationship to growth of clover and alfalfa, and varieties of vegetables adapted to Maine conditions.

Maine has done much along livestock lines. During the early days extensive research was done to determine the food value of feeds. Later the results of poultry research was of outstanding importance. The open-front, unheated house was found to be better than the old, closed and heated type. The mode of inheritance of egg production as a result of which it was possible to systematically improve flocks is a product of breeding research done at the Maine Station. The management and disease bulletins published years ago giving the results of poultry

Potato fields of this size and larger are commonly found in Aroostook county, Maine.

investigations probably had the widest call of any bulletins ever published anywhere up to that time. At present two important investigations are in process, (1) physiology of reproduction including sex determinations and (2) growth and ricket studies.

In the field of research involving cattle, much was done along breeding and management lines to influence increased production, including the determinations of the effect of inbreeding upon production and the milk yield and butterfat percentage transmitting power of bulls and cows. Lactation and cattle disease studies have been carried out. The effect of temperature upon rising quality of cream and the effect of feed upon quality and hardness of butter are but two of several dairy investigations.

The results of years of animal husbandry research are now being brought to conclusion. During this time thousands of records of registered cattle have been studied to determine, if possible, the criteria for measuring inheritance of milk yield and butterfat percentage, as a result of which it has been possible to prepare a formula or equation by which milk production can be predicted. Perhaps the most outstanding evidence of the practicability of this research is the fact that the largest company operating commercial dairy farms keeping several thousand cattle has indicated its intention of using the results of these investigations. Incidental to arriving at the foregoing conclusions were studies involving the relationship of age and body form to gland secretion, the results of which were somewhat contrary to the old body points formerly accepted as indicating high producing ability. Body size as measured by weight and the structural form as indicated by the form taken by the shoulder girdle were found to be the outstanding body characteristics influencing milk secretion.

Most of the chemical and much of the entomological investigations have been carried on in connection with other projects. Home economics projects include an electrical cooking study and iron in human nutrition. An investigation of the cooking quality of Maine potatoes is to be undertaken. An economic study of the local market conditions and requirements in Aroostook county prices of farm products and price trends, an economic study of the dairy industry, and a study of apple marketing are in progress, with a study of the Maine potato industry contemplated.

Farms Now Are Too Cheap

(*From page* 30)

that land prices at the peak of the boom were 50 per cent water.

Noting the money decline in farm land values since 1920 tells only part of the story. As everybody knows, the dollar is worth considerably less today than it was before the war. Economists have to allow for this fact in all their calculations. They take account of it in reckoning up the real value of the working man's wages, which depends not merely on the sum he gets but on what that sum will buy. It is the same with farm land values. Before we can tell what farms are actually worth now as compared with what they were worth 15 years ago, we must make allowance for the decline that has taken place in the value of the dollar.

When this is done, the Department of Agriculture tells us, farm values for the United States as of March 1, 1921, figured out at 20 per cent lower than the average valuation in 1914. In other words, an acre of land sold now will on the average bring a price capable of buying only 80 per cent as much food, clothing, shelter, automobiles, or anything you like, as the price obtainable for that piece of land would have purchased before the war.

Here is our starting point in trying to determine whether or not farm values have been forced down too low. What other important economic factor exists whose exchange value is 20 per cent less now than it was before the war? Certainly not labor. Real wages, that is to say the purchasing power of the wage earners' income, are considerably higher now than they were from 1910 to 1914. Certainly not manufactured goods. Not even farm commodities. In April the purchasing power of a unit of farm products in exchange for goods bought by farmers at retail was only 11 per cent below the pre-war average, compared with 20 per cent below in the case of farm land values.

Efficiency Increases

Figure it any way you like, farm valuations have undergone heavier punishment than other values in the post-war readjustment process. Some people argue that this punishment was due. They hold that the overboosting of values that took place from 1916 to 1920 necessitated correction. Correction, yes, but not overcorrection. Overcorrection is a disastrous mistake; and that is what we are experiencing. Farm land values normally reflect current earnings plus an allowance for future increases in earnings. If unfavorable sentiment alters this relationship, trouble ensues.

In reality farm land today is worth what it can earn plus an allowance for possible gain in its earning power just as it was before the slump. It is not valued on that basis however. That is evident from the fact that net farm incomes, averaged for the country as a whole, have risen pretty steadily since 1922 without producing any corresponding favorable change in farm land prices.

Farm operators, according to the Department of Agriculture, averaged a return on their capital plus a reward for management of about 2.3 per cent less than nothing in 1921-22. In other words, they suffered a loss in that year. In 1922-23, however, they had a favorable balance of 1.2 per cent, which rose to 1.6 per cent in 1923-24, to 3.2 per cent in 1924-25, and to 4.3 per cent in 1925-26. In 1926-27 a setback occurred, which caused the average net return to drop to 2.9 per cent, from which it rose to 3.4 per cent in 1927-28. If these averages look small—and undoubtedly they are small—it must be remembered that they include the returns of the inefficient as well as those of the efficient farmers.

Normally a steady increase in earnings is followed by a corresponding recovery in the farm realty market. Moreover, the farm realty market makes some allowance for expected increases in earnings. This expectation, all pessimistic views to the contrary notwithstanding, is just now very substantial. Farm efficiency has increased greatly in the last few years with a corresponding fall in costs of production. As soon as difficulties in the adjustment of output to markets are measurably overcome, the post-war gain in efficiency will be registered in increased earnings. The increased potential earning power is there. It will become actual current earning power with every forward stride in the solution of the surplus problem.

In the 5-year period 1922-1926 American agriculture increased its output nearly 14 per cent over the preceding 5-year period. This was not done by increasing the area in cultivation, the means by which increased production was most commonly obtained in former times. It was accomplished notwithstanding a decrease in the crop area and a heavy decrease in the number of persons engaged in farming. In other words, it was the result of increased efficiency. It is estimated that the decade 1913 to

1923 showed a decrease of 17 per cent in costs per unit of output in American agriculture. Further progress has been made since 1923, as the above quoted figures show.

Earnings Should Increase

In the usual course, a decline in farm costs of production means at least a proportionate, and sometimes a greater, increase in farm earnings. This has not been the case since the war chiefly because the surplus problem has remained vexatious. Though increased efficiency has reduced costs, it has also enlarged the volume of production, with the result that prices have been held down. In time, however, this difficulty will be measurably overcome, production will be adjusted with more nicety to consumers' requirements, and the benefits of increasing farm efficiency will stay with the producers. That favorable situation, if the basic forces that have determined land values heretofore remain unchanged, will be reflected in a rising farm realty market.

In short the agricultural position is stronger than it appears on the surface. Wider public appreciation of its essential strength is urgently necessary. Such appreciation, besides smoothing the path of farm debtors, would create opportunities for competent farmers who have been separated from their land to re-enter farming on conditions looking to their re-establishment as landowners. The credit agencies that are holding "distress" land dislike parting with it at present prices. And who shall blame them? They know that present prices do not reflect real values. They might be glad to let some land move, however, were a demand for it to arise among farm operators.

Lack of funds among farm operators is not as important a factor in the prevailing quietness of the farm realty market as one might imagine. Greater importance attaches to their skepticism as to basic values. A preference for renting as against buying land under present conditions is very wide-spread. Sometimes, of course, it is better to rent than to buy. That is the case on inflated realty markets, when farm valuations discount the future too heavily. But the present market is a deflated one. In all probability the balance of advantage as between renting and buying most often lies with buying. Only the farm operators don't see it. If they did, a farmers' market for farm lands would spring up, because holding agencies are offering exceptionally easy terms.

The Outlook

In a letter to the writer the president of a leading Iowa bank expresses a strong preference for getting distress land back into the hands of owner-operators. He recognizes that certain elements in the situation favor experiments with various forms of large-scale farming, but believes the best results in the long run will continue to come from the family-sized, owner-operated farm. Accordingly this banker thinks letting farm operators in on the ground floor will be justified if they can farm in the manner required by modern conditions.

Obstacles to this program would vanish under the stimulus of a more realistic estimate of farm prospects. With sellers and buyers equally informed that better times are in store, working capital as well as funds to finance land purchases would be available to competent and industrious men. It is safe to predict that the curve of farm realty values will shortly turn upward, if it has not already done so. In the year ended March 1, 1929, the trend for the country as a whole showed a decline of 1 per cent. That is a trifling drop compared with the declines registered in 1922, 1923, 1924, 1925, and 1926. It looks like heralding the turn of the tide. Special significance attaches to the fact that the declines last year were not below the national average even in states that experienced very sharp drops in the immediately preceding years. The time is about ripe for some new and bold agricultural financing.

Just how this will be done will depend materially on whether corporation farming on a large scale turns out to be practicable. In that case, much distress land now held by financial agencies will not be thrown back upon the market, but will be farmed by hired labor or by tenants under central supervision, or perhaps by agricultural corporations. Competent observers, however, are not yet convinced that this will work out. It is difficult to standardize agriculture, particularly where crops are much diversified; and yet large-scale production seems impossible without standardization. Heretofore the intelligent judgment of the financially interested operator has usually been necessary to success in farming. Whether or not that can be dispensed with remains to be seen.

If it cannot be dispensed with, the alternative is to identify ownership with operation once more; in other words, to re-establish the working farmer as the mainstay of the farm realty market. This necessitates, not sacrifice prices, but easy terms. Joint stock land banks and some other credit agencies are pioneering along this line. They have indicated a willingness to enter into long-time contracts with individuals for the purchase of land and require simply that the intending buyers shall be men of character and agricultural experience.

Once land begins moving in this way, it will move fast; and the benefits of the change should be widely diffused. Holders of land will begin to draw revenue from properties now not producing anything like what they might, and farmers will acquire land on terms assuring them a profit on their undertakings. Action awaits wider perception of the fact that declining costs of production and better adjustment of production to markets are laying a foundation for increased agricultural earnings.

The Keystone Farm

(*From page 7*)

tion in 1927 yielded 51.5 bushels per acre, shelled corn, too, mind you."

The next field had grown rye and vetch. The shocks were thick and the bundles tall. Guesses were that they would thresh 20 bushels to the acre. (The field actually threshed more than 22 bushels.) Into this stubble a seeding of rye and vetch would be drilled to be turned under as a green manure crop before corn is planted next spring.

The alfalfa field was next in the tour. Yellowish snake-like lines where the drill that put on last spring's top-dressing of 200 pounds of muriate of potash per acre did not quite lap, again told the potash story. From the ground the letters were plain, but it was difficult to get the proper perspective on the two words which occupied a half acre of ground.

At the north end of the field were a set of plots to show what combination of phosphoric acid and potash grows best alfalfa on this sand. The plots started with 16 per cent superphosphate and on each plot, eight units more of potash were added. Each one had 525 pounds per acre. Every plot where potash was used showed alfalfa. The strips between were brown and sere; untreated they produced nothing but weeds and grass. The plot which received only the 525 pounds of 16 per cent superphosphate had no more alfalfa on it than there

Groups of people were guided over the farm to observe results of the rotation.

was on the untreated check plot on either side. A plot that seemed to be half green was where only half as much potash as phosporic acid was used. Three plots that appeared solid green were where as much or more potash as phosphoric acid was used. The straw-colored check plots bore mute testimony of the winter-killing which takes place on these sandy soils when no fertilizer is used.

Back to the barns, Mr. Hagerman showed with pride a nice herd of Guernseys headed by a bull with four daughters that make an average of 414 pounds of fat, a herd which would easily sell out for more than $2,000.

It is no wonder then that Dean Cox stood ready to congratulate the managers of this farm for the splendid work which they have done in demonstrating how this originally poor white sand, upon which only scrub oak would grow, can be brought back into profitable production. Nor is it any wonder that an invitation to the annual sandy land farmers' field day on the Keystone farm calls forth from considerable distances a big attendance of farmers who have sandy land problems.

Potato Soils

(*From page* 22)

fruit production during the final stages of growth. Phosphoric acid in the fertilizer is essential to profitable returns, more especially if manure is available (manure having a low content of phosphoric acid in comparison with nitrogen and potash). Phosphoric acid serves to counteract the influence of an excess of nitrogen which may occur from too liberal applications of manure or unbalanced fertilizers. Under such conditions phosphoric acid tends to insure more favorable conditions in promoting the growth of healthy plants. It is helpful especially in a cold and wet season in hastening maturity.

Potassium, like nitrogen and phosphorus, is an essential plant food element. One of the most important functions potash exercises is closely connected with the formation and movement of starch, sugar, and similar compounds in plants. Such crops as potatoes, sweet potatoes, sugar beets, and other root crops are generally responsive to applications of potash salts and their quality favorably influenced by such treatment.

Potash exercises a stabilizing influence in cases where there is an excess of available nitrogen. Plants liberally supplied with available potash are thought to be less susceptible to plant diseases or fungus attacks. Tubers grown with plenty of available potash are said to possess generally a better cooking and keeping quality than those grown with fertilizers containing no potash.

The potato appreciates liberal applications of available plant food and generally responds best to all three of the major plant food constituents found in complete fertilizers. The kind and amount of fertlizer to apply depend to a large extent on the soil type, whether manure is available, and whether a leguminous or non-leguminous crop is to be plowed down.

The nitrogen in potato fertilizers may be derived largely from inorganic sources, particularly if a sod or cover crop is plowed under and manure used. The sod or cover crop and the manure supply slowly available nitrogen in organic form, much cheaper than cottonseed meal, dried blood, tankage, or fish scrap. Owing to the high cost of the latter materials, only enough should be included in the fertilizer to insure a good physical condition. If practicable to use other materials for this purpose the high-priced organic materials can be left out altogether.[1] Good physical condition of the fertilizer mixture means uniform application, as a result of which every potato plant gets its proportionate share of plant food. Where a heavy sod, top-dressed with manure, is plowed under, the percentage of nitrogen can ordinarily be reduced somewhat; if not much manure is available and the sod is comparatively light, more nitrogen in the fertilizer will be desirable.

Phosphoric acid is customarily derived from superphosphate. Results of experimental work suggest that a range of from 6 to 10 per cent of this constituent in the fertilizer is about right. Where there is plenty of manure, the larger rate is desirable.

[1] This statement is made primarily with reference to potato soil types of the late or main crop potato belt. The relative value of inorganic and organic nitrogen under southern soil conditions constitutes a separate study which is now under way.

Results in general show that potash is very essential for potato production, from 4 to 8 per cent giving the best results. The percentage of potash will vary somewhat with the type of soil. Sandy soils ordinarily will respond to larger applications of potash than heavy soils.

Field work generally tends to show that the muriate gives as good yields as the sulphate, without measurably affecting the quality of the tubers. As the muriate is considerably cheaper, the potato grower should benefit from its use in potato fertilizers. With respect to the rate of application of fertilizer, there will be some variation from one soil type to another. Sometimes 1,000 pounds or less, where plenty of manure in available and a heavy sod turned under, make an economical rate of application; sometimes a ton and over to the acre proves profitable.

Finally, the ratio of the plant food constituents, nitrogen, phosphoric acid, and potash, to one another, is important. No one ratio, it will be conceded, will fit all soils. The ratios approximating 1-2-1 to 1-2-2 come close to northern potato soil requirements. In the South the proportion of nitrogen, phosphoric acid, and potash lie within narrower ranges, more like 1-1-1, or 1-1-.75.

The tendency in the northern sections is to put about twice as much phosphoric acid as nitrogen in the mixture and the percentage of potash practically falls between the nitrogen and phosphoric acid. Thus we have 4-8-6, 4-8-7, and 5-8-7 mixtures. In the South 7-6-5, 7-7-4, and similar analyses are employed, thus catering to the requirements of the early crop. The late crop in the South is apt to receive a higher proportion of phosphoric acid.

In some potato growing sections, where manure is available and a sod is plowed under, the ratio in the past has been close to a 1-4-4, or 1-4-5.

The latter represents the familiar 2-8-10. It is doubtful whether as much as 10 per cent of potash is required. Certainly a higher proportion of nitrogen should be used. Results obtained indicate that 4-8-6 or 4-8-7 analyses are nearer the mark year in and year out.

Use High Analyses

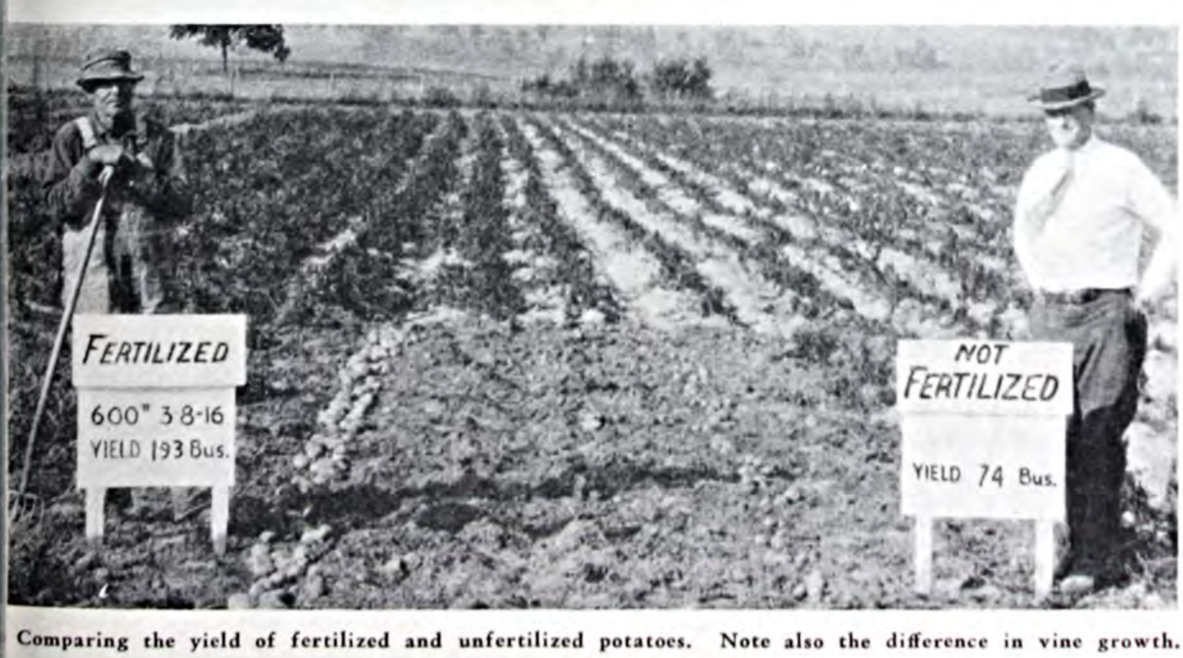
The use of low analysis fertilizers for potatoes is pretty much a thing of the past. Already potato growers have sensed the value of both high analysis and concentrated fertilizers. They save time and labor. Work conducted by the Experiment Stations and the United States Department of Agriculture has definitely shown the economic and crop producing value of high analysis fertilizers. Considering the fact that in many potato growing regions it is not uncommon to use 1,500 to 2,000 pounds of fertilizers to the acre, that freight has to be paid, the bags handled, hauled and distributed, makes it essential to increase the plant food and correspondingly lower the quantity of fertilizer to be handled in the field.

With respect to concentrated fertilizers containing two, three, and sometimes practically four times as much plant food as ordinary high analysis fertilizers, present indications are that such mixtures, particularly those containing twice as much plant food as ordinary strength fertilizers, are going to prove very satisfactory for potatoes, especially in sections where the soil has a relatively high water-holding capacity and serious droughty periods are rarely experienced.

A concentration which permits the grower to apply, for example, 1,000 pounds of fertilizer to the acre instead of 2,000, or just one-half as much, but no less plant food, is an important factor in the cost of production of potatoes.

When it comes to using treble or quadruple strength fertilizers we have a different story because these plant food concentrations mean less and less conditioning material. Otherwise it would be impossible to get the concentration desired. In order, therefore, to get the plant food in the mixture boiled down, as it were, to where there is a minimum of inactive ingredients, it becomes necessary to use in the mixtures highly concentrated carriers of nitrogen, phosphoric acid, and potash.

No trouble has been experienced with the potash or phosphate salts employed in the production of concentrated fertilizers. The nitrogen carriers cause more trouble because some



Comparing the yield of fertilized and unfertilized potatoes. Note also the difference in vine growth.

of them absorb moisture readily from the atmosphere. This is particularly true of the most concentrated, but even here chemical engineering ingenuity is expected to improve matters to the extent that even treble and quadruple-strength fertilizers will become safe to use under different soil conditions.

It is not inconceivable that with certain highly specialized vegetable crops grown on high-priced land near cities overhead fertilizing may som day be a common practice. By dis solving soluble salts in elevated storag tanks, or utilizing a pressure systen the crops could be supplied with nu trient solutions at any time desirec Ordinary watering could follow in or der to wash the salt solutions fror the foliage into the soil. Where w can now apply water to such crops a any time, it may prove just as prac ticable to feed them at any time.

Fall Application of Potash

(*From page* 26)

spring, and after cutting with 500 pounds of muriate of potash per acre. Last fall he left off the 500-pound application of muriate of potash and applied instead 1,000 pounds of 5-8-5. He was dissatisfied with the results, and this year has gone back to the muriate of potash. While he cut as much grass as a result of the application of 1,000 pounds of a 5-8-5, it was not as big nor of as good quality as resulted from the application of straight potash.

Asked for his reason for applying fertilizer after cutting, Mr. Rode explained that he had learned full well that the asparagus to be good in the spring depends upon a strong, vigorous growth of tops after cutting, which in turn stores up in the roots energy to produce quality shoots the next spring. Applications of ample nitrogen and potash encourage such vigorous top growth. The 12 acres of asparagus this year yielded 2,200 crates of good-sized stalks; approximately 1¼ tons per acre yield.

The alfalfa is grown on the farm simply to build up the land. Hay for six or seven head of cattle is harvested and the rest of the yield is plowed under.

Mr. Rode uses between 600 and 700 pounds of a 5-8-5 on his tomatoe thereby applying more potash and les nitrogen than some of the growers i his section, because he has found i more profitable to grow vines fron which he can pick tomatoes through out the whole season rather than tw or three weeks.

Accused of being a potash enthusi ast, Mr. Rode exclaimed, "Yes, sir, i it wasn't for potash, I wouldn't b here, simply because I wouldn't b farming. I was born and brought u on a farm and I like it, but I wouldn' be farming if I couldn't mak money."

"We learned during the war when w couldn't get potash, that we couldn' grow sweet potatoes. All we coul grow were a few 'shoe-strings.' Ther were no marketable chunks of th types which I have just brought in There is a difference in price righ now on sweet potatoes of $1.25 a bas ket; primes are selling today fo $2.25, and mediums for $1.00. Pot ash makes the difference. Potash als makes potatoes which I can dig an get on the market early in order t get advantage of early high prices For me, potash doubles the value o my crop."

Picturesque Brittany

(From page 44)

barren and wild." For centuries Brittany, because of her natural position, was more or less isolated, but in the nineteenth century the development of railways and other means of communication "drew Brittany from its isolation." In the nineteenth century also, agriculture "developed in a remarkable manner" which development has continued to the present day, all the more remarkable when the natural conditions are borne in mind.

The total area of farm land (cultivable area including land being farmed and prairies) in the four departments of Cotes-du-Nord, Finistere, Ille-et-Vilaine, and Morbihan is about five million acres, or about one and a half million acres more than our potato acreage. The farms are mostly small, for the Bretons are a thrifty and hard-working people. For instance, in the Department of Cotes-du-Nord there are 42,910 farms of from 3 to 25 acres and 14,998 farms of from 25 to 100 acres. In Finistere there are 52,000 farms of 25 to 100 acres. Characteristic of the small farms are single fields divided into several strips, of a few rods in width, wheat possibly being grown on one strip, then other strips of other crops such as buckwheat, oats, potatoes, hay, or possibly a truck crop. Cattle are tethered. Unique in parts of Brittany are the fields divided by fences of earth on which ferns to be used for bedding often are grown.

The chief crops of Brittany are wheat, rye, barley, buckwheat, oats, potatoes, beets, cabbage, and other truck crops, clover, alfalfa, and flax. Some of these crops are confined to two or three of the departments. Fields of buckwheat are common and typical of the landscape. By far the most important crop is wheat. Apple orchards are also common in some parts, as a result cider, and not wine as in other parts of France, is the drink of the countryside.

In increasing the yields of crops, fertilizers are coming into more and more popular usage, either purchased through local merchants or through thriving cooperatives, some of such cooperatives having as many as 30,000 to 35,000 farmer members, while there are also hundreds of local merchants who sell fertilizers and fertilizer materials in every town and village.

While mixed fertilizers are used, the much more common system is to buy fertilizer materials and apply such according to the needs of the soil and crop. Such materials available to the farmer in every village include several forms of nitrogen, superphosphate and rock phosphates, while the sources of potash are cheifly high-grade sylvinite and muriate of potash, but particularly the former. The amounts of fertilizer used have increased in recent years, the tendency being to balance up the phosphoric acid with more nitrogen and especially with much larger amounts of potash salts. The consumption of these salts in the two provinces of Cotes-du-Nord and Morbihan has doubled in the last two years, and in the other two departments has increased in the same period from 50 to 60 per cent. Thus, by the careful buying and careful use of fertilizers, the present-day Breton farmer is carrying on the fruitful development of his agriculture, started long ago by his Celtic forefathers.

As a basis for the use of fertilizers, the care of the farmyard manure is not overlooked. In fact this is considered most important. For instance, a photograph shows a manure pile on a cement bottom, underneath which is a pit for the liquid manure.

Brittany also has a breed of dairy cows all its own. It is called the "Black Piebald." They are a small type. The weight is given as generally

An old lady sitting on the stone bench in front of her home in Locronon.

less than 300 kilos (661 lbs.). But though of small size, the breed is very thrifty and hardy and has remarkable qualities for the production of milk and butter. The breed is located chiefly in the departments of Finistere and Morbihan.

In selling his produce, the farmer often uses the lo cal markets whic are found in mos of the towns an villages. One c two of the pho tographs show typical marke scenes. One las picture that mad a strong impres sion is the pictur shown at the lef of a dear ol Breton lady in he lace cap an black dress, sit ting one Sunday afternoon on th ancient stone sea outside her hous in the old vil lage of Locronon—a lady happy i the dignity of honest toil and seren in the faith of her fathers—a simple humble picture, but a picture no without a gentle charm and to many possibly not without a suggestive power in the art of living.

Such, so it seems to me, is Brittany

Education

(*From page* 4)

dren have inherited some of the native discernment and discrimination that have made us shrewd enough to attempt this exploitation of the schoolroom. If they were no smarter than we were in adolescent days, I would entertain grave fears about it. But the most of them stick to the educational circus in the main tent and forget the freaks in the side-shows.

In furbishing up our educational system in America, do we fall into the error of so many country merchants who put all the nice goods in the show window and disappoint the customer who inspects the back shelves? Some English teachers touring my state recently exclaimed with admiration over our wealthy colleges and state schools and our city palaces of athletics. They marveled at the money we lavished for experiments in education and the sums generously given by taxpayers for research and propaganda. But nobody took them for an auto ride out in the sticks a dozen miles from the State University where the three R's are still taught in a shack that resembles the joint where Henry Ford made his first mistake.

Just a few kids each year come in from the country to high schools or colleges supported by public expense and located on some concrete highway 'here everybody admires them. As)on as they arrive people are solicitous or their health and educational welare, but in many cases their "horse" ense was stolen and their health detroyed before we locked the barn oor. We speak and write in flamoyant platitudes about the stocks of 'irile youth who bring from the soil he future stability of the nation. Yet ione of us would expect to raise a rop of good seed ears on neglected and by injecting vitamins when the talks are knee high.

This happens largely because the eachers in the finishing schools are etter organized than the young kids n knee skirts who are expected to nind incorrigible youngsters for nother and prepare adolescents for iigh school at the same time. The nly spokesman for the girl instructors n the bush league are the state super-visors, and they are usually tongueied or politically ham-strung. My tate needs a strong organization of common school teachers to stand up for the rights of the submerged maority.

Has the halo around the teacher's brow become dim in these garish days? Our common schools have passed from the era of slates, fist fights, and men tutors to the age of paper, petty pranks, and petticoats. In many of our elementary schools the boys never meet a masculine preceptor until they leave the grammar grades, and then the ones they meet are often "old maids." This process tends to provide us with an excess of fresh bullies and impering sissies among the boys, while the girls discover long before they should that the world is run by women.

Your Hoosier Schoolmaster type was no uncommon man in the times when your father and mine snatched brief glimpses of literature and logic from McGuffey's reader and Webster's speller. When I hear some of our educational bombasts making light of those men and their methods it sounds like the ridge-pole scoffing at the corner-stone. Those brawny zealots of the birch rod were the first servants of the public system of education and it wasn't their fault if muscle was often a greater necessity then mentality.

Perforce in those days the wilderness school might have borne above its door the verse from Chapter 9 of the Proverbs of Solomon the Wise: "Whoso is simple let him turn in hither," and again in another place: "Stripes are prepared for the back of fools." Yet continuing to search the scriptures for apt references, we might well post at the entrances of some of our institutions of higher taxes and higher learning the ancient Hebrew legend:

"Though thou shouldst mix a fool in a mortar with wheat with a pestle yet not will his foolishness depart from him." We lack sorting and eliminating methods in our common schools and so we pack our big institutions with chaff and tares. Let's invent a recleaner attachment for our scholastic separator!

EMERGING from the tall corn of Iowa each year, 200 farm boys and girls hasten to cities from every county in the state, there to complete their "education" amid the hard knocks of city life. Secretary Hyde estimates that if the education of these youngsters averages \$500 apiece to their parents, the farmers are contributing \$100,000 per county every year for material with which the city welfare is built. Out of this realization comes the thought that cities must contribute out of their concentrated wealth to help carry the burden of rural school support.

Equalization laws that are based on the newer idea that education is a broad state duty, instead of a local issue, have been passed in some of the advanced states, to relieve the handicaps surrounding the lives of hundreds of bright children stifled under a system of school mismanagement that is a disgrace to rural America.

I am sorry to acknowledge that the worst opposition to greater state aid and direction often comes from the country districts. Our district school units are boastful of their independent democracies, jealous of their petty privileges, and anxious to hire and fire teachers on the same old narrow neighborhood prejudice that survives the dunce-cap days.

Education should be compulsory in attendance and regularity but never compulsory in tone and character. I am not thoroughly sold on some of this hue and cry about keeping all our bright children in the country. Some of our best friends in the cities are men and women whose early farm training and sympathy puts them in strategic places to give moral support to farmers when the crisis comes. I would as soon pass laws to bar the marriage of people of German descent with folks of Yankee or Norwegian ancestry as to erect legal barriers or monkey with social interchange between country and city.

In some of our earnest agricultural high schools the directors feel somewhat concerned when they cannot point to 100 per cent enrollment of country youth in the agricultural courses and field projects. I do not believe the agricultural teacher's job is to multiply the number of inefficient or half-hearted farmers by any process of cramming or sugar-treating the courses. Mental irrigation schemes are as unwholesome as wholesale land reclamation. It is just as satisfying in the end to keep two misfits away from a good farm as it is to save one crackerjack agriculturist from making a metropolitan blunder. Is it not wiser to teach one capable man how to do three men's farm work with modern equipment than to insist on the entire quartet going afield with hoes?

America's slogan is "freedom and equality." Let's have freedom of choosing an education and equality in the chance to get it. That's about all the doctrine we need, and he who brings in too many blue prints and too many kegs of nails for erecting the platform is only confusing the issue.

I HAVE never believed that you could educate an unwilling boy to be a farmer—I mean the kind of farmer who could keep cents, and sense. Laboratories won't do it alone, projects won't accomplish it either, and poetry is a dismal failure to a man who thinks great things in prose. We must keep the machinery oiled and in repair, of course, but let's not bust the gears and spoil the sprockets by feeding in the wrong kind of raw material.

In this way education is worse than the tariff, which some wiseacres say is a local issue. This means that too many overhead, cut-to-fit systems of supervision are an abomination to those who are closest to the problem.

Liberal education and vocational or practical "do it" education have been at loggerheads among the supposed shapers of American theory for some time. Originally the term "liberal" education meant the training of a gentleman and scholar, and even Aristotle said that a liberal education was not for workers in either manual arts or trade, because the one debases the body and the other debases the mind.

Our earliest private academies in America were usually for the privileged classes, and not until Andrew Jackson and the illiterate politicians of his day got in the saddle did we begin to open up the avenues of "book larnin'" to the common classes. Today the mob movement for universal culture as far as it can be secured in our factory system of education is at the zenith.

Materially, we have indeed gained tremendously by the advance in education. At least we have learned to *want* more of the dressy and classy things of life and have sped up the machinery for making them. But

Iorace Mann, who dreamed of a lib-
:al education as the salve of all our
iental deficiencies, and who thought
iat its universal application would
ive us a veneer of culture—well, his
hilosophy has somehow struck a snag.

I am sure that the librarians will
ell you that the essays of Montaigne,
lato, Bacon, and Drummond are just
bout as dusty and have as many un-
ut leaves as they did a generation
go. Quantity production, found so
ood for material things, has been
aken over into the cultural and men-
al avenues, and so we find that what
ne tired man wants in his hours of
ase just about controls the level of
ur culture. I know, of course, that
ou are personally an exception to the
ule, or you wouldn't be reading this.
omehow or other the opening up of
he liberal education feed bag hasn't
one what Horace hoped.

OUR modern education has centered on trying to fit men and women
o meet emergencies with dash and
urface skill rather than by any
rocess of deep thought or liberal
earning. We are educated to keep
usy rather than educated to be happy
vhen alone. So the modern house-
older, left by himself at vacation
ime, reads his tabloid thriller and then
oes to the movies.

When I meet a man who can splice
ope, plow furrows, and quote Shakes-
eare I invariably find him one of the
ortunate chaps who has never had
nuch modern schooling.

We often hear somebody derided be-
ause he has no opinions. Ignorance is
pinionated. Educated folks think
ifferently than ignorant folks and
isually refuse to settle down on china
iest egg opinions hoping they will
atch into achievement. Don't worry
ecause you cannot follow the ruth-
ess and enthusiastic mob after some-
ody with a mission and a freak opin-
on. He who has no doubts is not
eally educated.

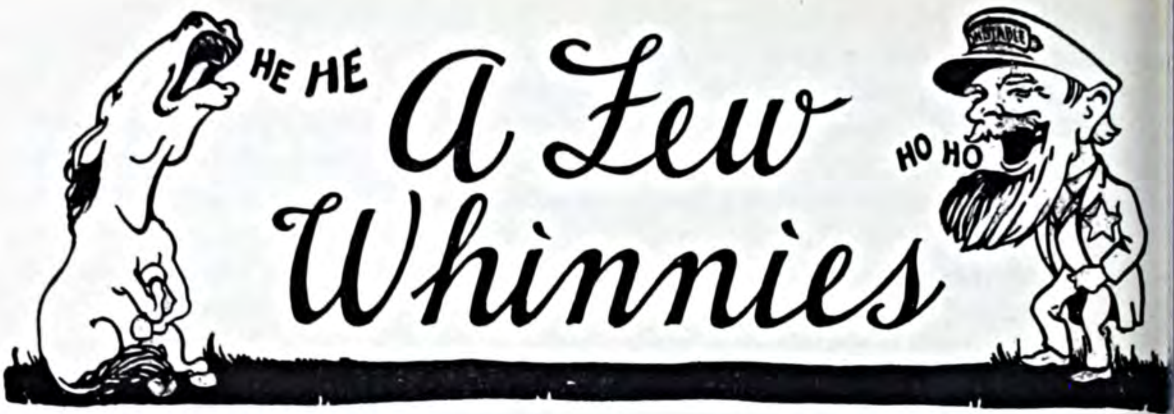
Specialized education that shuts out all that is foreign to its field is almost as bad as being blind. We are "folks" first of all, and then bankers, lawyers, dentists, and farmers afterwards. The old wheeze, "What are you going to be when you grow up, sonny?" has been responsible for man's missing more fun than the Volstead act. We need more education for life's enjoyment than for mere money-making.

Education begins when you toddle and ends when you totter. They talk much about "adult education" in a formal way, as though it were something newly discovered. Moses learned more about the cussedness of human nature on Mt. Sinai than he knew in the bull-rushes. Even Thomas Edison is learning something from those youthful contestants of his. In fact, real education seldom begins until you are beyond the reach of normal teachers. It is not for nothing that they call graduation "commencement." The best form of education we get is by contact with other folks in the work-a-day world. Whether it is by cooperation or by competition, one learns vastly more in a month rubbing elbows with the human equation than in a year of mathematics.

THIS month the kiddies settle down in their studies after a season of sunburn. If they go slowly in their work or seem to lack intelligence, don't blame it all on the teacher without investigation. If they march home with Grade A report cards it isn't entirely safe to bank on ancestry either. Probably the chief credit belongs to the school.

Finally this is the season when adult education will count for much, if you would save your reputation within the family circle. The best use of adult education I know is for a parent to be able to answer "posers" without betraying his ignorance. To flunk in such an examination is far worse than a con in the days of our youth.

A Few Whinnies



THE BEST SHORT STORY OF THE MONTH

The tourist guide was getting tired. He had to answer too many dumb questions. "And just where did you say this rock came from?" inquired another wahoo. The guide politely replied that a glacier brought it down. Then up spoke the inquisitive one again: "And where did the glacier go?"

"Aw," said the guide, "it went back after another rock."

Mrs. Bloop: Does your car have a worm drive?

Mrs. Bleep: Yes, but I tell him where to drive.

Small Boy (on arrival at country cottage): Mummy, where is the bathroom?

Mother: There isn't any bathroom, dear.

Small Boy: Good! This is going to be a real holiday.—*Typo Graphic.*

"Your wife is talking of going to France this summer. Have you any objections?"

"No, certainly not. Let her talk." —*Wall Street Journal.*

The little girl had been visiting. When it was time for her to be going home, her hostess said: "Goodbye, Marjorie; you must come again soon. We should like to see more of you."

"But there isn't any more of me," replied Marjorie.

Mrs. Henpeck: "Everything is get ting higher."

Mr. Henpeck (meekly): "Oh, don't know, Maria. For instance there's your opinion of me, and my opinion of you, and the neighbors opinion of both of us."—*Tit-Bit* (*London*).

Abie: "Paper, vat is science?"

Abie's Papa: "My, how could you be so dumb! Science is does ting vat says, 'No Smoking.'"

The scholarly appearing little man rushed into the police station. "I wish to report," he gasped, "that my ca has just been stolen!"

"See who did it?" queried the desk sergeant.

"Ye-yes."

"What'd he look like?"

"I fear I could not describe him accurately," replied the little man "But" (and he brightened up and produced a note book from his pocket) "I succeeded in taking the number of the car."

Irate Father: "What is that stuff on my new car? Where have you been?"

Calm Son: "That's only traffic jam."—*Tit-Bits* (*London*).

She: "Is it dangerous to drive with one hand?"

He: "You bet. More than one fellow has run into a church doing it." —*Cornell Widow.*

If cows could TALK—

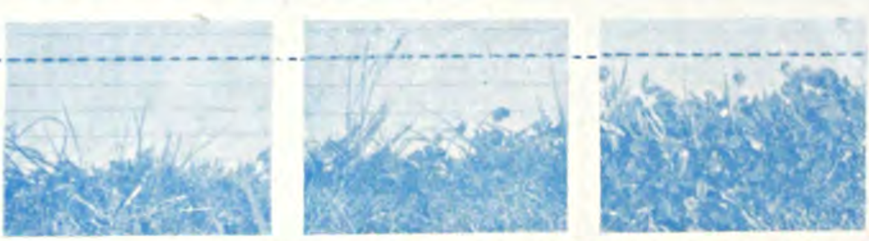
OLD DAISY, pasture expert SPEAKING:

"Grazing sure is better on our farm since the Boss limes our pasture and fertilizes it every four years with 1,000 pounds of 0-10-10 per acre. We save our energy to make milk now that we only have to work a couple of hours to fill up on luscious, succulent, green feed.

"Before our pasture was fertilized we spent all day and half the night searching for a little good grass. We had to be fed in the barn to keep us producing milk. The Boss got tired of most of his milk check going for feeds and decided to try fertilizing an acre of pasture for each cow.

"The lime, phosphorus, and potash brought back clovers and good grasses and crowded out the weeds. This treatment in the Fall and a nitrogen top-dressing in the Spring keeps our pasture in tip-top shape. No wonder we are contented cows."

Pasture improvement is a problem that is getting more important each year. Some very interesting literature on the subject for distribution among your farmer friends will be sent you free if you communicate with: Agricultural and Scientific Bureau,* N. V. Potash Export My. *(of Amsterdam, Holland), at 19 West 44th Street, New York City.



These three plots of a fertilizer test in a Maryland pasture show the value of the proper fertilizer treatment. The plot at left was fertilized with 1,000 pounds of 0-10-0 per acre. The center plot received 1,000 pounds of 0-10-0 and 1 ton of ground limestone per acre. The plot at right received 1,000 pounds of 0-10-10 and 1 ton of limestone per acre. Addition of potash resulted in a 10,000 pound increase in the amount of green weight produced per acre in three months' time.

Printed in U. S. A.

Better Crops

WITH PLANT FOOD

Nov. 1929

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 XIII NUMBER FIVE

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of Amsterdam, Holland
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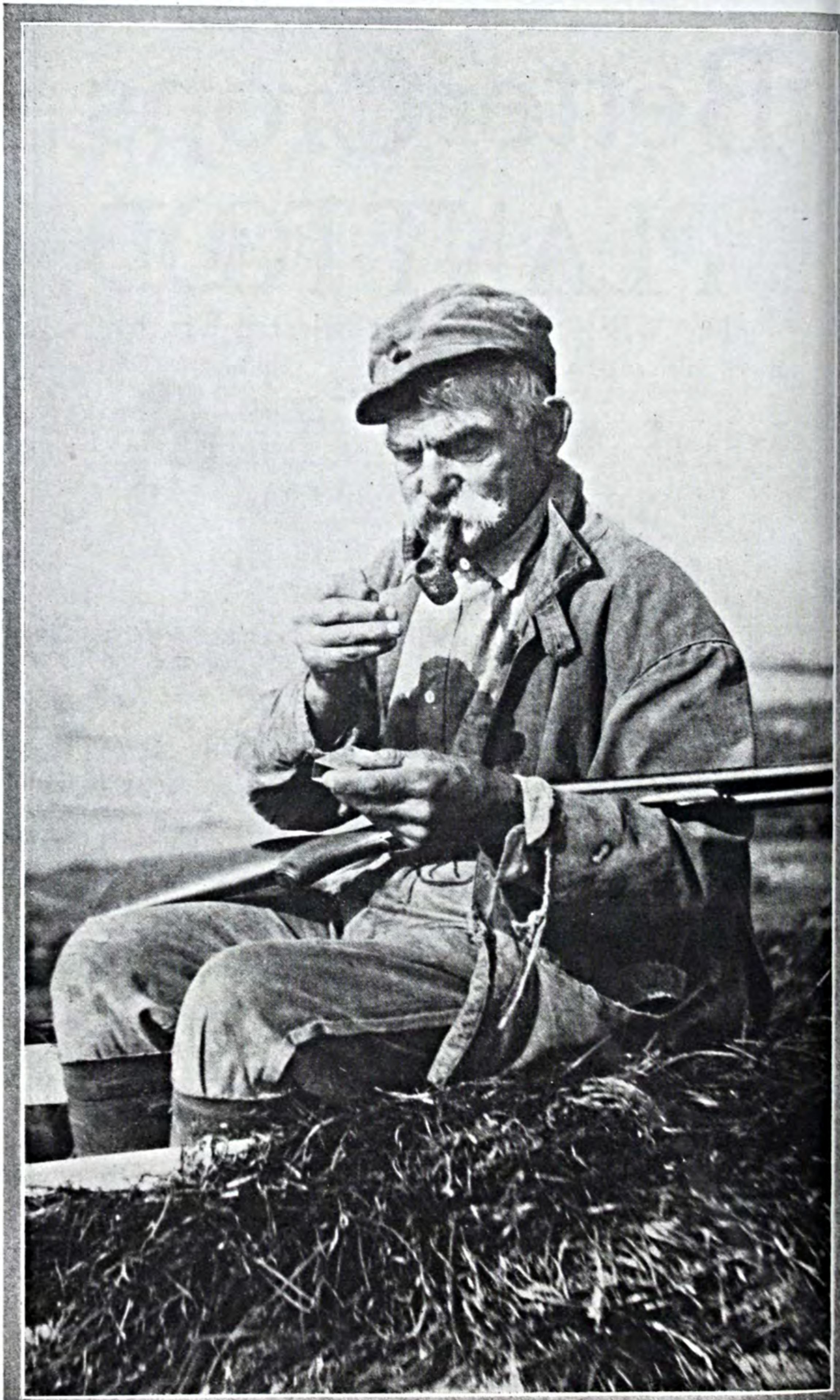


WHILE WAITING

Better Crops with Plant Food

Published Monthly by the Better Crops Publishing Corporation, 9 West 44th Street, New York. Subscription, $1.00 Per Year; 10c per Copy.

Vol. XIII — NEW YORK, NOVEMBER, 1929 — No. 5

Jeff finds much of value in —

Frost Warnings

By Jeff McDermid

UP in my home state the Grand Lodge of Winter is about to hold a congealed conclave. The work will soon open in the zero degree. The anxious home provider is waylaid by three villians of the drama, Jubila, Jubilo, and Jubilum—the coal bin, the wood pile, and the ash heap. By their countenances we know them to be brothers and by their cost we know them to be bothers.

You of the South may be somewhat limited by lassitude, but we of the glacier belt are inhibited by latitude. I know the historic slogan should have been written "Fifty-four Forty and Freeze."

You of the South may find solace in the thought that up here we have to use all *our* wood alcohol in the garage instead of the gin rickey. But our nearness to Canada does not prevent some of us from warming up thoroughly, which is perhaps something of an isothermic paradox.

Frankly, I do not know how I could enjoy living in a land where the houses have no chimneys. Not because I am an inveterate user of economical cigarettes, but because I would miss the annual soot surveys, the bats and swallows, and the vast quantity of homemade creosote with which to preserve my fence posts.

How pleasant it is to mount a gable roof and rub elbows with the last autumn leaves while you point the chimney chinks with plaster! And the chimney sweep! What a lesson in vocabulary he gives, and what a demonstration in the law of gravity he provides; clad in overalls, mackintosh, and a silk opera hat, doing more with a coil of rope than Will Rogers himself!

When the sweep sounds his trumpet in our bailiwick, it means a paean of temporary victory over the iceman. From now on my money will not melt, even though some of it will burn. I will at least have ashes to scatter on my stubborn soil, left from the sums paid to the bituminous barons.

Just why so many of my neighbors want to use petroleum, coke, or something that is ashless is beyond me. My lifelong observation along and upon slippery sidewalks goeth to the very bottom of things. I am thankful for the furnace residue on such occasions, for they are cheaper than salt and handier than portable cushions.

My father had a wood lot and a base burner and grandfather fed a fireplace with virgin logs. I run a furnace on nothing to begin with but last year's coal dust. Perhaps I should move out on the land and use chips to save checks. But as most of the land is now being reforested, even the farmer has his anthracite anxiety.

Fuel saving among our ancestors consisted of shutting up the parlor and going to bed early. My method is to spend the evening reading up on the British thermal units in various grades of clinkers and let the fire go out. A little morning exercise in the cellar with Carry Nation's emblem gets me in fine fettle to meet the chief or correct my stenographer.

WINTER gets a black eye in most ballads and allegories. Like agriculture, it has had a host of defamers and critics, with but very few defenders. I admire the firmness with which it faces opposition and slander, always coming back regularly if not serenely to do business at the same old storm windows.

Actually I believe Winter is simply obeying the Bible in his own interpretation of the thought that it is necessary to chastise those you love the most. If such is the case, then there has been a lot of natural love misplaced up in our state.

Old age is reckoned in terms of "so many winters," and Youth is said to have enjoyed "sixteen summers." The dramatist mentions the "winter of our discontent." But dear me suz! Old Age may link arms with Winter if he must and say he represents "the last and best of life for which the first was made," or settle down with R. L. Stevenson by the fire and exclaim: "I can now remember the faces of women without jealousy and the deeds of men without envy."

It is not so bad to be in a snowdrift if your heart is warm!

JUNE is the month of happy weddings it is true, but the plots were probably hatched during the cozy season of snuggling in the ingle-nook. In fact, the term "sparking" probably originated when couples sat by the open hearth and built air-castles in the dancing embers.

If my state were a perpetual summer paradise, we should lose the quaint charm inherent in the Oldest Inhabitant, who is consulted at times when almanacs or Indian lore are not available. Paul Bunyan himself was not as facile as one of these. Not only does the O. I. have a retentive memory, but he has what the modern world craves most—expansion and imagination.

Strangely, hot summers and tornaadoes do not fire his reminiscent tinder, albeit the tallest stein has outlived the vanished fin for his favorite recollection. It really takes the bitter frost of winter to excite his noblest comparisons, amid the snuffling circle of the hot stove league. California and Florida know him not, for out there all is now as it ever has been—a bleak

(*Turn to page 62*)

A most satisfactory method of growing seedlings has been found in fertilized plots having an area of 48 square feet.

Man-made Forests

By Jerome J. Henry

Wisconsin College of Agriculture

MILLIONS of pine seedlings representing future forests are springing up in the nursery at Nekoosa, Wisconsin. Their roots fed with "milorganite," a product of Milwaukee, Wisconsin, sewage plants, seedlings have grown to greater size in one year than ordinary two and three-year seedlings.

Milorganite is a recently developed product of the sewage disposal plant in Milwaukee. It is a highly available form of nitrogenous fertilizer recovered from city sewage and processed in a large plant.

The nursery plots are also treated with a 3-12-12 fertilizer. About one pound of 3-12-12 and one pound of milorganite are mixed and applied to each plot of seedlings. Ordinary size plots at the nursery are 48 square feet in area.

Paper mills in the territory surrounding Nekoosa, Port Edwards, and Wisconsin Rapids, in the Badger state, are taking an active part in sponsoring the reforestation of the region with trees that are suitable for the production of pulp woods. Already they have a nursery with a capacity of 2,000 acres annually. This acreage calls for about 2,500,000 seedlings.

Expert foresters say that if plantings of this size are made every year for the next 35 years, the vast paper milling industry of the section will have sufficient timber from the plantings to support the industry permanently.

Abandoned farms are being purchased by the paper companies within a radius of 20 miles of the mills. When these areas are reforested, they will have available a constant supply of logs and will have eliminated practically all transportation costs.

And the foresters are taking every precaution necessary to make their plantings successful. Commercial concerns, in cooperation with the Lake States forest service, United States forest service, and Wisconsin College of Agriculture, are devising methods for efficient and rapid planting as well as adequate protection from fire and other hazards peculiar to pulp wood forests.

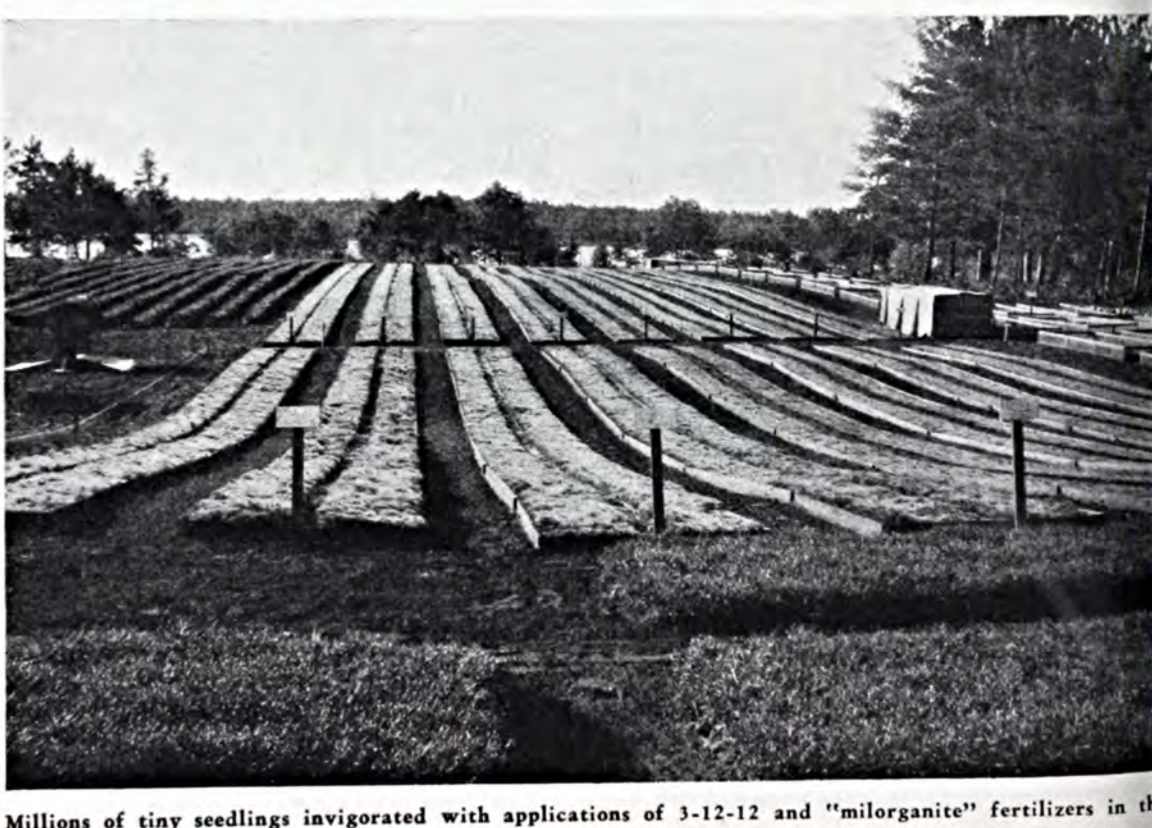
To control devastating fires that may start in the planted areas, fire lines are kept clear around each 40-acre tract. Having the width of a well-traveled highway, these lines are ever ready to check invading flames that may leap to the bareness of plowed ground. In addition water pumps are located in the timber so that, once a fire starts, water may be employed to check its spread. Just as soon as the foresters can provide a fire truck it will be installed as a part of the fire protection equipment. Like the modern city fire truck, it will be ready to ex- tinguish blazes as soon as they ar discovered.

Realizing the importance of re forestation on a large scale to make th vast paper industry of the state per manent, the Nekoosa companies hel a foresters' field day which attracte officials from interested companies i the Lake States, Minnesota, Michigan and Wisconsin.

The Badger governor, Walter Koh ler, when he flew to the site in a mod ern plane, could look down on thou sands of acres of cut-over land whicl will soon be reforested as a result o the efforts stimulated by the field da programs.

With the nursery producing a con stant supply of seedlings nursed alon rapidly with fertilizers, vast acreage of cut-over lands will soon be pro ducing potential pulp wood supplies Once the forests are ready to cut, constant supply of logs will be avail able for the mills right at their fron door. This will eliminate shippin costs which have to be paid when log must be shipped from as far as Can

(*Turn to page* 53)



Millions of tiny seedlings invigorated with applications of 3-12-12 and "milorganite" fertilizers in th vast Nekoosa nursery will produce the pulp for paper used by future American generations.

Fertilizers *for* Sweets

From Pine Shats to High Analyses

By George L. Schuster

Delaware Agricultural Experiment Station, Newark, Delaware

THE sweet potato enterprise is not a new enterprise. It is an old enterprise presenting new problems.

In the report of the Peninsula Horticultural Society of 1892 we find these words from E. H. Bancroft in speaking of manures being poor and carbonaceous or fresh and rich. "That it may be coarse, raw, and mainly carbonaceous seems to be indicated by the use of pine straw and forest rakings in the Eastern Shore, Va. If rich stable or pound manure is to be used, it should be largely mixed with sandy soil and well rotted, otherwise it is liable to stain the tubers, producing the brown color to which the market objects."

Little investigation had been made with commercial fertilizers. Experiments made by Dr. Neale of the Delaware Station about this time indicated the value of potash, while the New Jersey Experiment Station was obtaining best results from the use of bone. These results are conflicting but not alarming in the light of our present day understanding. An application of 500 lbs. of complete fertilizers was as good as 1,000 lbs.

In the report of the Society for 1897, W. L. Elzey of Exmore, Va., stated that he grew sweet potatoes by the use of pine woods manure. He said, "The shats and mold are shoveled up in the autumn and composted with a little good stable or hog pen manure, sufficient to make the heap go through heat. A one-horse load of this manure is spread evenly over every 400 square feet. On rich land the shats are used just as they come from the woods, using about one load to every plot 30 ft. square."

If the land was poor, Mr. Elzey would sow 400 to 500 lbs. per acre of the following fertilizer mixture in addition to the manures.

500 lbs. of acid phosphate
400 lbs. of dissolved bone
400 lbs. of muriate of potash
150 lbs. of kainit
150 lbs. of nitrate of soda
400 lbs. of bone tankage or fish scrap.

If crimson clover had been turned under he recommended 100 lbs. of acid phosphate and 150 lbs. of muriate of potash. He added a word of caution by saying, "The worst failures happen on highly manured rich land."

Later Mr. Elzey said, "The best sweets can be grown on old, worn-out land that has grown up in sedge grass, ploughed shallow in the fall, thoroughly pulverized the following spring, then treated with 1,000 pounds per acre of a fertilizer made of 800 lbs. of dissolved rock, 300 lbs. nitrate of soda, 400 lbs. of muriate of potash, and 500 lbs. dried fish or tankage. Grown on such land they keep better and sell better than when grown on rich land."

Commercial fertilizers came into more general use after this period, and in 1900 we find John J. Rosa of Delaware recording the statement, "I have known people that have grown sweet potatoes without manure and they would not haul the manure to the field to put on the sweet potatoes if the manure was given to them." Recording further he says, "We use commercial fertilizer and apply about half a ton per acre broadcast."

Two years later Mr. Rosa was using a fertilizer, with a good proportion of fish scrap and rock and 10 per cent potash costing $20.00 per ton, and cleared $1,600 from 15 acres.

Conducts Own Experiment

About this same time J. W. Killen of Felton, Delaware said, "The use of artificial fertilizers has now become a necessity to almost every farmer in this country. In fact, farming without the use of fertilizers does not pay." But he adds a word of caution as to recommendations. "As we all know, there is a great difference in soils, and in order to find the best and most economical means of using artificial fertilizers, I believe that every farmer should be his own experimenter. He should try the various elements of plant food, that is, potash, nitrogen, and phosphoric acid, in different proportions in order to find out that combination which suits best and brings most profit." Valuable advice, even today, but with the aid of the Experiment Station, sub-stations, and field trials conducted by the agricultural investigators of today, most important soil types have been studied as to their requirements. This information relieves the grower of the bulk of the "cut and try" methods of the earlier days.

Mr. Killen, being an investigator as well as a farmer, conducted rather an extensive test on fertilizers for sweet potatoes for four years. The same plots of light sandy loam soil were used for the four-year test. On one series the potash and phosphoric acid was applied in the fall, and in the other the application was made in the spring. The nitrate of soda was applied in three equal installments at di ferent times during the summer c both series.

The accompanying Table I giv Mr. Killen's results. Lime was a que tion in those days, but with the pre ent knowledge of diseases and the control, lime is not recommended. Tl highest yield of firsts was obtaine from the 3-9.3-11.4 fertilizer applie in the spring. Sulphate of potash di not show any decided advantages ov muriate of potash.

Later H. C. Thompson of the U. D. A. made the statement, "On sand soils that are lacking or low in humu stable manure is recommended as fertilizer. Heavy applications of fres manure, however, a short time befo planting will stimulate growth c weeds and vines at the expense of th tubers. It is much better to use we rotted manure at the rate of 10 to 1 loads per acre either broadcast or i furrows under the sweet potato row Where barnyard manure is not avai able a leguminous crop should b grown on the soil to supply humu Crimson clover planted in corn wi answer the purpose."

"Where commercial fertilizer fur nishes plant food, it can be supplied a the rate of from 500 to 1,500 lbs. pe acre. A fertilizer analyzing from 5 t 6 per cent nitrogen, 7 to 8 per cen phosphoric acid, and 8 to 10 per cen potash is very good for sweet po tatoes."

Post-War Recommendations

Recommendations during this perio ranged from 1,000 to 1,500 lbs. o mixed fertilizers of 3½-8-7 to 10 2-8-12, and 3-8-10. Discussions cen tered upon methods of application o the large amounts of fertilizers so a not to have plant injury. Broadcas applications of a part or all of th fertilizer at least two weeks prior t planting as well as side-dressing afte planting were recommended.

The war period had its effect upo the potash supply and the productio

I. MR. KILLEN'S RESULTS AT FELTON, DELAWARE

Plot	Fertilizers per Acre	Approximate formula	Average yields 1897-1900 Incl. Baskets per A.					
			Fertilized in Spring			Fertilized in Fall		
			1sts	2nds	Culls	1sts	2nds	Culls
1	No fertilizer		108	60	40	74	57	36
1a	2,000 lbs. lime		84	65	44	75	75	31
2	200 lbs. Nitrate of soda (N) 615 lbs. Acid Phos. (P)	4-12-0	179	77	54	188	88	47
2a	Ditto + 2,000 lbs. lime	4-12-0	188	84	55	182	87	49
3	200 lbs. N., 615 lbs. P. 120 lbs. Muriate of potash (KCl)	3.4-10.5-6.4	310	89	58	316	101	51
3a	Ditto + 2,000 lbs. lime	3.4-10.5-6.4	320	90	48	331	84	43
4	200 lbs. N., 615 lbs. P. 240 lbs. KCl	3-9.3-11.4	351	58	55	363	87	44
4a	Ditto + 2,000 lbs. lime	3-9.3-11.4	405	94	51	371	89	43
5	200 lbs. N., 615 lbs. P. 240 lbs. Sulphate of potash	3-9.3-11.4	360	67	42	359	93	42
5a	Ditto + 2,000 lbs. lime	3-9.3-11.4	392	73	39	357	93	41

of sweets. In 1918 Dr. T. F. Manns stated, "Sweet potato men who know the crop's requirements are using manure, when they can get it even at high cost. The demand for potash ought to make us preserve carefully every pound of manure."

The more recent investigations have been made by Schermerhorn of New Jersey, Houghland of Maryland, and Zimmerly of Virginia.

Schermerhorn (1924) concluded from his studies that (1) under average conditions, 1,000 to 1,500 lbs. per acre of a 3-8-8 fertilizer will give the best results, the rate of application being modified to meet individual fertility needs; (2) muriate of potash is the most economical source of potash for sweet potatoes; (3) nitrogen in excessive quantities tends to produce long potatoes, while potash produces a chunky type; (4) it is not economical to use more than 8 per cent of potash; (5) organic nitrogen is superior to either nitrate of soda or sulphate of ammonia, but the most economical supply of nitrogen may be obtained through the use of one-half mineral and one-half organic nitrogen.

Houghland (1928) working with a Norfolk sandy loam concluded that a ratio of 60 per cent inorganic nitrogen and 40 per cent organic nitrogen is a satisfactory proportion of each. The yield of primes produced with Leuna-salpeter plus organics was somewhat higher than that obtained from nitrate of soda, but about the same as that produced with sulphate of ammonia in a 3-8-8 mixture. Green manures of rye and vetch used in the rotation of white potatoes and sweet potatoes gave significant increases in sweet potato yields. Working with a 3-8-8 fertilizer he found that applications of between 1,000 and 1,250 lbs. gave the highest yields. Sulfate of potash ranked first as a source of potash, then muriate of potash, and manure salts in a 3-8-8 and 3-8-10 mixture, but muriate was first in a 3-8-5 mixture. Concentrated fertilizer (6-16-16) was tried at half rate (750 lbs.) for one year with satisfactory results. A

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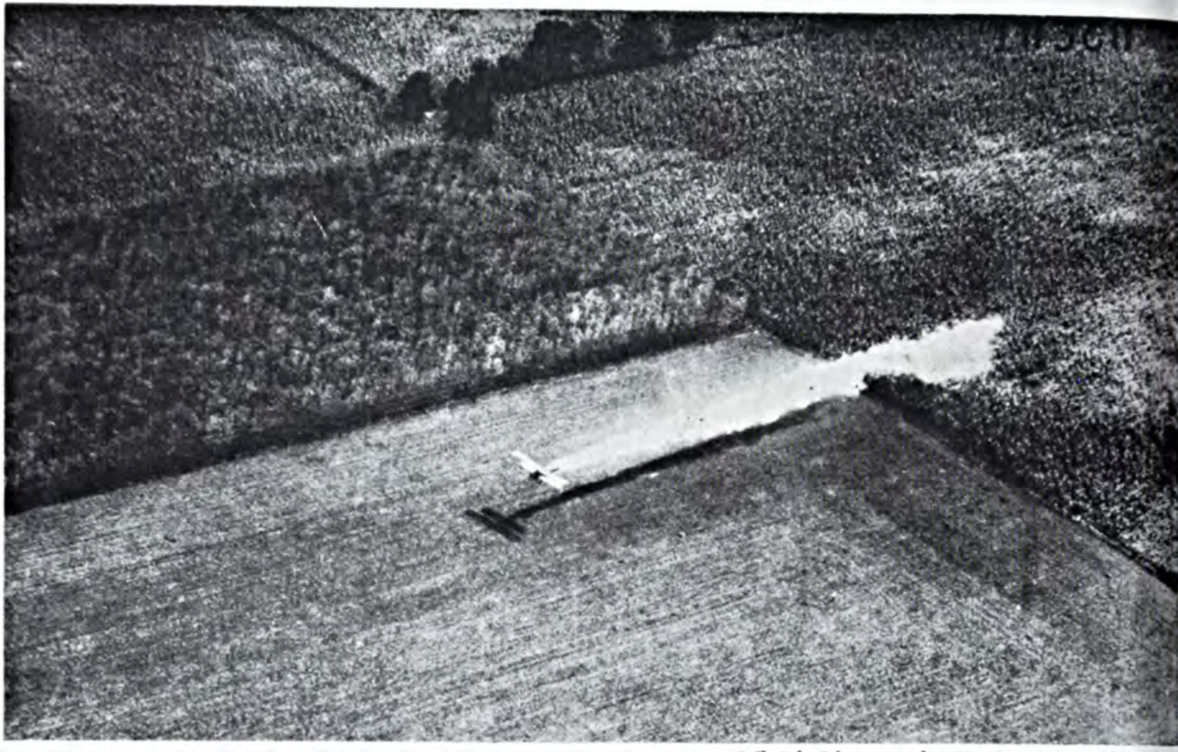

Official Photograph, U. S. Army Air Cor

Experiments have been successful in spraying poison dusts and broadcasting seeds from airplanes.

What's Ahead?

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

¶ A New Series

By Frank George

AGRICULTURAL historians 50 years from now are going to be puzzled at several paradoxes that occurred in the 10 years following the World War.

They will read volumes about a financially embarrassed agriculture coincident with unprecedented prosperity among industries that sell goods to farmers, and they will wonder where farmers got the money to pay for these goods. Where, for example, did farmers get the money to pay for more than 1,000,000 tractors between the years 1918 and 1930?

They will read the opinions of leading agriculturists of the day that increased farming efficiency which resulted from the use of tractors, combines, corn-huskers, and other machinery was in large part responsible for the so-called surplus problem, and they will wonder at an agriculture that bought more and more of farm machinery in order to dig itself deeper in the financial hole.

But regardless of these and other anachronisms, the historians will be generally agreed that the so-called agricultural depression following the World War was a great blessing in that it stimulated a laggard industry, in the industrial sense, to take stock of itself and to reorganize on a basis of equality with other industry. They will see the beginning of an industrial era in agriculture to the point where, by the year 1980, almost double the quantity of crops and livestock grown in 1930 will be produced with about one-half the man power used in the years following the World War.

Agriculture 50 years from now will be no more like the agriculture of today, than is the agriculture of today like that of the year 1880. The past 100 years have been a period of extensive farming. It was cheaper to cultivate new lands than to intensify on old lands. But now we are entering upon a period of intensive farming. Last year, American farmers used approximately fifty-eight million acres to produce less than one billion bushels of wheat, or an average of one acre for every 15 bushels. The day will come when they will grow one billion bushels of wheat on half that acreage.

With our present agricultural setup, to be sure, one-half the wheat acreage in the United States could not be taken out of production. But as the demand for wheat increases, there need be no increase in the present acreage. The time is shortly at hand when acreage cannot be expanded, and the only way to satisfy the increased consumption demand will be through greater production per acre. European producers reached that condition many years ago, with the result that today, in some countries, wheat and other grain production per acre is on the average more than double that in the United States.

Recent land utilization surveys show that practically all of our good arable land available for use without reclamation is contained in our present crop area. With the greater part of our available agricultural area already in use and a population that is growing at the rate of 1,400,000 persons a year, the problem of productivity and soil fertility in their relation to our future food supply is becoming of increasing importance.

Surface Only Scratched

It is expected that the increasing demand of our steadily growing population for food will result in a level of prices that will economically justify the wider use of improved methods of production. That means the use of better cultivation methods; development of more suitable rotations, including the growth of legumes; more efficient use of crop residues and animal manures; greater use of commercial fertilizers, and the more common use of selected seed.

American farmers have made some progress in increasing acre yields in the last 40 years, but they have barely scratched the surface of possibilities in

An economical and efficient power-farming combination is a tractor and harvester-thresher with a truck for hauling the grain.

that direction. The statistics show that from an average of the 5-year period 1885-89 to the 5-year period 1920-24 the combined acreage of corn, wheat, oats, and potatoes in the United States was expanded about 52 per cent, whereas the total production of these crops increased 77 per cent.

The rise in the yield per acre of these crops during that period of 40 years made available annually during the half decade 1920-24 more than 800,000,000 bushels of corn, wheat, oats, and potatoes more than would have been realized under the yield level prevailing at the beginning of the period. In other words, the increase in total production as a result of the rise in acre-yield level provided the population of the United States annually with about seven bushels more of these crops per capita than would have been available under the acre-yield level of the base period 1885-89.

The larger part of this increased yield per acre was secured for the most part in the older farming regions east of the Mississippi River, in regions that according to popular notion were "worn out." In the early decades of the last century the belief was general that virgin fertility in the older settlements was coming to an end. Crop yields were low in contrast with yields to be obtained on the cheap lands west of the Appalachians, and farm abandonment in the East was regarded as an evidence of soil deterioration. But the East, faced by the new competition from the West, launched upon a program of soil improvement, and yields began to rise.

Other Increased Yields

During the last 40 years there has been a marked increase in corn yields in the northern portion of the South Atlantic States. Corn yields during that period in the North Atlantic States increased from 6 to 10 bushels per acre; in the East North Central group from 6 to 12 bushels; and in the northern section of the South Atlantic States (comprising Delaware, Maryland, Virginia, West Virginia, and North Carolina) from 9 to 14 bushels per acre. The averages of the quinquennial period of 1885-89 compared with the averages during the half decade of 1920-24 in Iowa and Minnesota show increases of 6 to 8 bushels per acre.

Wheat yields for the several States have increased during the 40-year period from 5 to 6 bushels per acre in the northeastern States. There was a marked decrease in average wheat yields in Ohio and other States in the Ohio Valley during the period of 1920-24, but this was largely the result of unfavorable weather conditions during the years 1920-22, inclusive. In Kansas, despite the expansion of wheat acreage into the semi-arid portion of the State, yields have remained prac- (*Turn to page* 57)

An outfit like this will plow from 12 to 15 acres in one day.

How Businesslike Should a Farmer Be?

By Arthur P. Chew

FARMERS probably have to put up with more uninformed outside criticism than most other occupational groups. They get it from all sides. Your tyro in science declares the farmers depend too much on rule-of-thumb methods. The wage-earner says farmers have a comparatively soft snap, watching the crops grow and charging the city consumer fancy prices when the products are harvested. The business man thinks the chief trouble with the farmers is that they are not businesslike. He recommends the adoption of factory efficiency on the farm.

But what does all this criticism amount to? Nothing, because it is not based on knowledge. This country has some six million farmers. That number should be a fairly representative sample of the population, neither better nor poorer in character, intelligence, and energy than any other group of comparable size. Its methods, in its own line, are unquestionably better than any methods that outsiders could suddenly improvise. It is a notable fact that those who know the farmers best are the last to disparage them. Among federal and state extension workers, the most valued means of improving agriculture is study of the methods used by the most successful farmers. The criterion of good practice in agriculture is sought in the logical place, that is to say on the farm itself.

This does not mean that prevailing farm practices are necessarily the best that could be employed. Not the most enthusiastic champion of the farmers could seriously maintain such an absurdity. It does mean, however, that any practice in wide use probably has considerable merit and justification, and that proposals to change it need the test of experiment as well as of theory.

Recently a dairy extension man, full of enthusiasm for his specialty, recommended a degree of emphasis on dairying in a certain locality that the farmers there knew to be impracticable. They had facts about rainfall and forage production that the dairy expert had overlooked. It happens constantly that expert advice, when applied to particular farm problems, needs to be seasoned with local lore based on experience.

The Need for Records

When "outlook" work became popular among agricultural economists, it seemed to indicate possibilities for rather quick shifts in production to suit changing market requirements. Experience showed, however, that general economic information must be related to the needs of particular farms before it has great value as a guide in production. Types of farming extant in this country are the result of long experience and cannot be remade overnight.

Perhaps the criticism most frequently leveled against the farmers is that they are not sufficiently businesslike. Involved here is the question how businesslike should a farmer be? Can he afford, and is it necessary for him to keep books, watch costs, maintain a budget, and husband labor-time as industriously as the average trader or manufacturer does? It goes without saying that there is room for improvement in business practices on the farm. Probably the post-war depression would have been much less damaging to agriculture had a knowledge of business realities enabled the farmers to prepare for it.

Much farm work, for lack of sound accounting, is done for nothing. Many farmers do not receive an ordinary interest return on their capital plus an average wage for their labor. They work in this unsatisfactory way because they do not realize their true situation. Capital can earn interest without exertion on the part of its owner, and labor can earn wages without possessing capital. Many an unbusinesslike farmer could improve his condition by selling out, investing the proceeds of the sale, and working for wages.

Farms Are Not Commercial

But the average farm is not a place of business in the same sense as a factory or a store. Indeed, only yesterday, historically speaking, the farm was not a place of business at all. It was primarily a source of foods and fibers for home consumption; production for sale was secondary. The farm is still far from being completely commercial. Perhaps that is why it is usually still far from up-to-date in its business technic. In short, the relative backwardness of agriculture in business methods has an obvious historical and economic explanation.

Hence criticism of the farmers on the ground that they are unbusinesslike is pointless. More useful is an inquiry into the question how rapidly are the farmers bringing their methods into conformity with the requirements of a business age. An astonishingly large proportion of the farms in the United States are still predominantly in the domestic as distinguished from the commercial stage of production. These farms yield only trifling commercial surpluses, and rely heavily for their incomes on products furnished by the farm for home consumption.

Studies in the department of agriculture indicate that nearly 40 per cent of the country's farm population live on small farms of poor and difficult land, on a comparatively low standard of living. Naturally, however, it is not these farms that furnish the bulk of the agricultural products offered for sale. Production for the market is mainly in the hands of a body of farmers as intelligent and efficient as can be found anywhere in the world. Recent technical progress in American agriculture has enabled American farm workers using mechanical power to produce from two to five times as much as similar workers produce in the older countries of Europe. It might be expected that a group of producers thus alert to keep in the forefront of technical progress would not be altogether lacking in a sense of the value of up-to-date business methods. That is what we actually find.

Probably 20 per cent of the farmers of the United States keep accounts in some form, and many of them do so in an entirely adequate manner. More than 80,000 farmers applied to their county agents in 1927 for simple farm account books of the type recommended by the U. S. Department of Agriculture. Twelve thousand sought aid in summarizing their accounts, and 16,000 more obtained expert help in analyzing their costs of production. These farmers thus learned the cash results obtained from different combinations of crop and livestock enterprises, and ascertained what changes were advisable in their cropping systems.

In one county in Kansas a group of farmers have kept accounts for several years under the direction of a group of Farm Bureau leaders. The records in the early years indicated a general failure to handle the largest possible area per work horse, and also inadequate production per milk cow.

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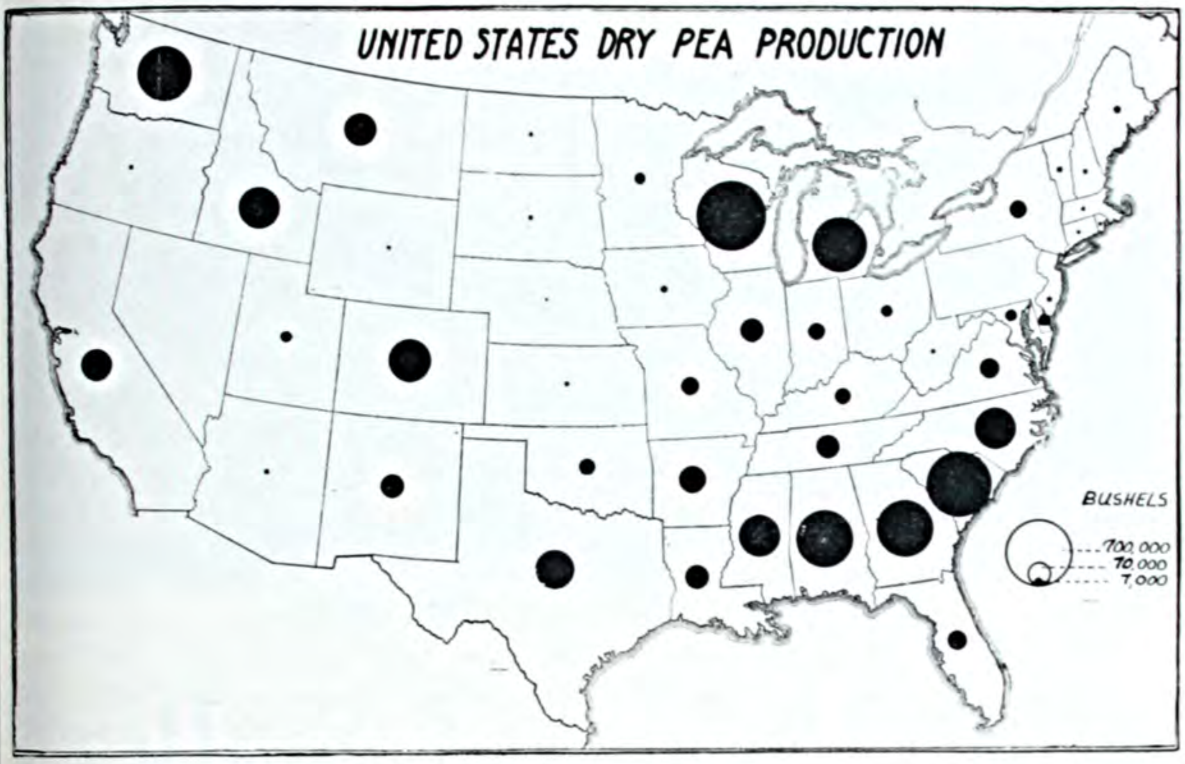


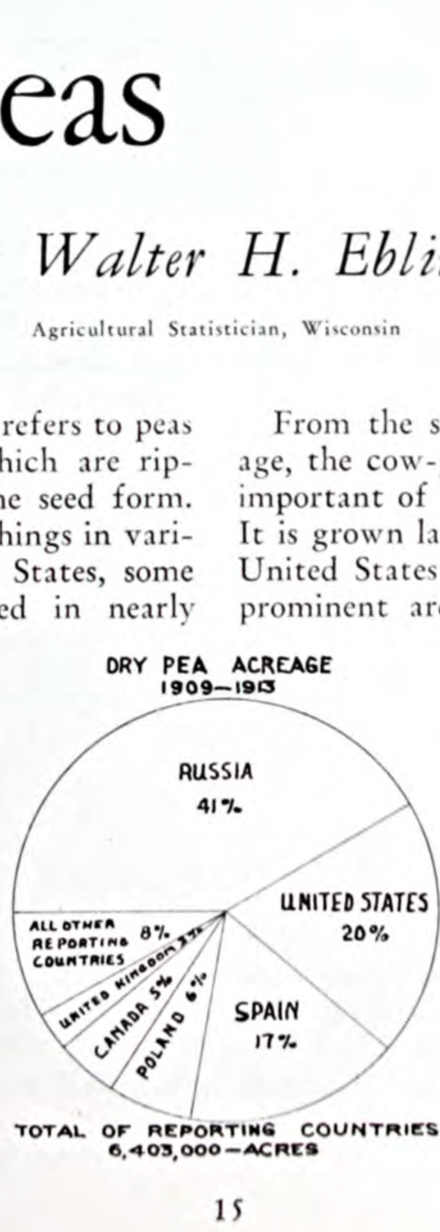
Dry Peas

¶ *Twelfth in this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

THE term "dry peas" refers to peas of various kinds which are ripened and harvested in the seed form. It means quite different things in various parts of the United States, some dry peas being produced in nearly every State in the Union. Formerly, the United States grew well over a million acres of the various types to be harvested as dry peas, but in post-war years there has been something of a decline and the production is now under a million acres. At the last census the crop had a value of $21,000,000.



From the standpoint of total acreage, the cow-pea is probably the most important of the peas grown for seed. It is grown largely in the southeastern United States and is represented by a prominent area extending from Virginia to Texas. It is essentially a cotton belt crop with South Carolina leading, followed by Georgia and Alabama. In 1928 it is estimated that for various purposes nearly 2,000,000 acres of cow-peas were grown in the United States. Much of the average, however, is used for hay and

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A corn-stalk harvester in use in an Iowa cornfield.

The Value *of* Stalks

By A. A. Burger

Cedar Falls, Iowa

THE industrial chemist holds in his hands one of the keys that will unlock some of the now hidden secrets and future possibilities of agriculture. These will be found in the utilization of the waste, the by-products of the farm.

Most of us have already seen the beautiful rayon-silk fabrics that have been made from the corn-stalk. But not so many of us know that corn-stalks now are made into wall-board, insulating material, movie films, explosives, paper, and many other materials that may be made of cellulose, for cellulose constitutes 35 to 40 per cent of the stalk.

Cost Becomes a Problem

The corn-stalk is the source of a new kind of raw material which bids fair to have an important effect upon our future. The only question is the cost of this raw material and the price at which it can be placed upon the market at a profit.

What are these stalks worth to the farmer when left upon the farm? What are they worth to the farmer after he has collected them? Do these costs make them too expensive for commercial use? These are now important and pressing questions of the Corn Belt. On the answers depends the acceptance or rejection of a new industrial advance.

Professor O. R. Sweeney of Iowa State College has already demonstrated the possibilities of the corn-stalk as a source of raw material, and is now at work with the United States Bureau of Standards to develop new technical and chemical methods of handling the stalks in order that their use may be both practical and profitable to the farmer and manufacturer.

Professors J. B. Davidson and E. V. Collins of the same institution are at work collecting material on the cost of collecting the stalks. With a combination of a mowing machine, hay loader, and hay baler, pulled by a tractor, they were able to harvest the stalks after the ears had been removed by the usual method, at a cost of $3.12 per ton. Adding $1.70 per ton for hauling to the factory, the total cost of collecting and delivery was $4.82. This item does not include the fertilizer value of the stalks.

Other Cost Data

In Illinois, in 1927, one company collected 10,000 tons of stalks in a commercial way at a cost to the company including collecting, baling, hauling, and compensation to the farmer for the stalks, of less than $8 per ton. The average haul here was 15 miles. Some of the stalks were delivered at a distance of 20 miles, at a cost as low as $5.70 per ton. These operations took place during a very unfavorable season, the stalks were badly down and the ground abnormally wet. The company feels that the cost might be reduced to $6 per ton or even less, without reducing the compensation to the farmer.

In Grundy county, Iowa, L. W. Plager, county agent, who had charge of the corn-stalk project in that county, gives a cost figure of baled stalks at the farm of $8.50. The method of collecting here was to break the stalks with a railroad iron when they were frozen in the early fall, rake them into piles, pitch them onto a wagon, and haul to the baler. The farmers received $1.50 for the stalks. The company furnished the baler so that practically all of the balance of this cost was paid to the farmer—he was given preference in doing the work on his own farm at the rate of 40 cents per man hour, 20 per team hour, and $1.25 per hour for a tractor to run the baler. Plager estimates that it was possible to break 40 acres of stalks in 10 hours, rake 17 to 18 acres, and haul 12 acres to the baler. An acre of good stalks would make a ton per acre, and an acre of heavy stalks more.

Last year Grundy county baled 13,000 bales, averaging about 90 pounds per bale. Plager thinks that while the price paid to the farmer for the stalks was not high, the amount paid to him in the way of labor which he furnished during the slack season of the year made it a profitable enterprise.

In Illinois a favorite method of collection was to cut the corn in the field with corn binders, deliver it to the crib on wagons where it was run through a husker-shredder, the ear corn being elevated into the crib and the baled product loaded onto five-ton trucks ready for the run to the factory. This work was done by the company. The farmer thus received about $2.40 per ton for the stalks—estimating that his corn would go 40 bushels per acre and the cost of husking at six cents per bushel.

County Agent L. W. Plager directed the baling of stalks in Grundy county, Iowa.

It is evident that the prices of labor involved for the mechanical operations are relatively easy to determine. From the standpoint of the farmer, they are the least important, for he is concerned primarily in the price paid him for the stalks, that is, where he cannot apply his own labor in doing the work. It is quite largely a question as to what is the fertility value of the corn-stalk. Here eminent soil chemists, practical farmers, and county agents differ very widely in their estimates and opinions. Some place this value as high as $5 per ton; some as low as 45 cents. Some say that it is more economical to remove the stalks from the land; some that it would eventually ruin the country.

Now what are the facts? First, the opinion of Professor Stevenson of Ames: In the past a good many teachers handled the subject by stating that a ton of corn-stalks contains about 16 pounds of nitrogen, 2 pounds of phosphorus, and 17 pounds of potassium, and an amount of organic matter about three times as large as that found in a ton of manure. At the present market price of these three elements of plant food in commercial fertilizers, a ton of corn-stalks would be worth about $3.84. In addition, the organic matter in the stalks would probably have some beneficial effects on the physical condition of the soil. This factor, however, cannot be definitely determined.

On the face of it these figures seem to give corn-stalks a rather high fertilizer value. But there is another side which merits consideration. Sir John Russell, the well-known English authority on soils, makes the point that well-rotted straw is an example of an effective manure, and undecomposed straw of a non-effective manure. If corn-stalks are put in the same class with straw, from the standpoint of the type and rate of decomposition that normally takes place in the soil, it would seem that stalks would not prove to be very effective as a fertilizer. They would probably tend to allow the micro-organisms in the soil to multiply greatly, and this might tend to diminish the amount of nitrate available to the crop and unfavorably effect crop growth.

Experiments on the fertilizer value of straw and stover (corn-stalks) carried on at the West Central Experiment Station in Minnesota are of interest. They were started in 1916. The rotation was wheat and corn, both plowed under in the fall at the rate of none, one ton, and two tons per acre, the corn stover for the wheat and the wheat straw for the corn. The yields were as follows:


Corn-stalk wallboard coming from press rolls on way to dryer.

Corn.

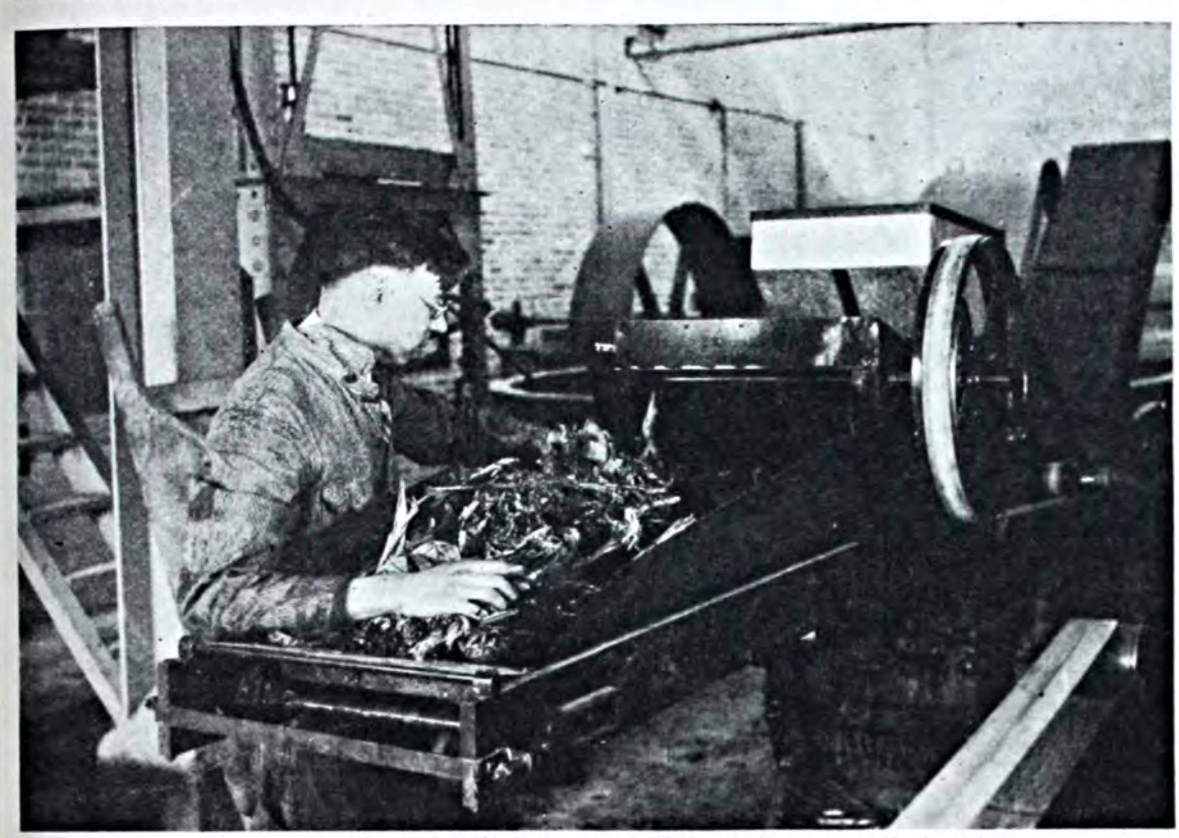
No treatment	39.1 bu.
Straw, 1 ton	40.9 bu.
Straw, 2 tons	40.5 bu.

Wheat.

No treatment	17.9 bu.
Stover, 1 ton	19.2 bu.
Stover, 2 tons	20.2 bu.

The increase in the corn crop was a little over one bushel per acre and that of the wheat a little under two bushels per acre.

Bear of the Ohio Experiment Station, says that if corn-stalks are plowed under in the spring, they tend to



In the preparation for wallboard manufacture, stalks are well shredded.

cause molds to grow in the soil which are very harmful. The molds actually rob the plants of the nitrogen which they would otherwise get. We know, also, that in the process of breaking down the cellulose of the corn-stalk, nitrogen is consumed, and that means the nitrogen stored in the soil. This process of decay does not take place appreciably except when the stalks are in contact with, or are covered with the soil. The utilization of the stored-up nitrogen in the soil is the reason why so many soil chemists do not credit to the corn-stalk as high a fertility value as their chemical analysis would seem to indicate.

What then would be the fertilizer replacement value of the stalks? Professor Sweeney says that it would be about $2. And he points out that if we replace the nitrogen, phosphorus, and potash which they contain by buying these materials on the open market from firms furnishing commercial fertilizers, that their value would be still less. In other words, he says that a ton of stalks will not give the same returns that $2 worth of commercial fertilizer will give.

In his close anaylsis of the value of the stalk, Professor Sweeney goes still further. He calls attention to the fact that the most costly element of plant food which the stalk contains —16 pounds of nitrogen, which would cost, roughly, 16 cents per pound—is very cheaply grown by the farmer on the farm in such crops as clover, alfalfa, sweet clover, soybeans, etc., and the practice of supplying a part of the plant food by this method very greatly reduces the estimated plant food value of stalks.

Professor Sweeney points out that many farmers of the Corn Belt evidently do not consider the stalks of very much value, for in many instances they follow the plan of burning them. This has been especially true over large sections of Iowa where they are extremely heavy. The fact that stalks are often very troublesome in plowing under, always bother more or less in cultivating the growing crop, interfere seriously often in the preparation of a good seedbed for small grains and especially for such

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What Potash Has Meant *to* Evangeline Parish

By Auris Mayeux

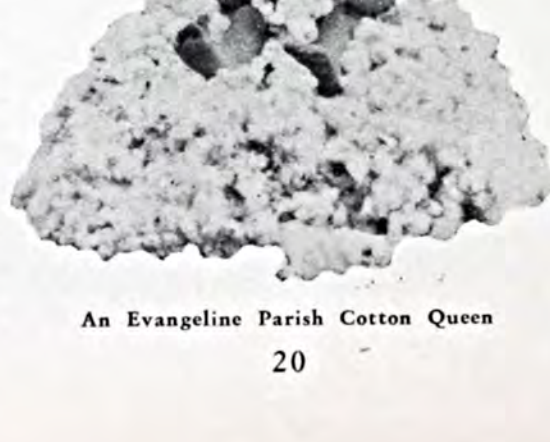
Principal, Vidrine High School, Ville Platte, Louisiana

THE Evangeline Country as immortalized by Longfellow in his wonderful poem "Evangeline" is familiar to every high school boy and girl, particularly as a land of romance and beauty. From the stage of this beautiful setting comes the following story, not of romance and beauty, which is yet unsurpassed, but of economical discovery which has added hundreds of thousands of dollars to the annual income of these Acadian farmers. It was a descendant of these French Acadians of early pilgrim days who is largely responsible for this important discovery.

Evangeline parish, located in the southwestern part of Louisiana, is largely prairie land just sufficiently rolling to assure good natural drainage without soil erosion. The soil is fairly uniform of type, ranging from the Crowley silt loam to a fine sandy loam with a light colored clay subsoil about 10 to 14 inches below the surface.

In this land of plenty it was the popular opinion that fertilizers were not needed; in fact, many thought that the producers of fertilizers were schemers who were trying to swindle the farmer out of his hard-earned money. Eventually a few of the more enterprising farmers used a few sacks of superphosphates, about 12 per cent available, and obtained good results. Within a few years superphosphate became generally used and was thought to be all this soil needed. Some of the fertilizer manufacturers later introduced a fertilizer sold under the trade name of "Rawbone," which analyzed 1.65-10-2 (N-P-K) and proved more satisfactory than superphosphate alone.

In 1911 the first agricultural course in the parish (county) was offered in the Vidrine High School. In the courses offered, the boys learned abstractly the different plant food elements and some of their functions. It was an assumed opinion of the instructors as well as others of authority that our soil contained a plentiful supply of potash, this opinion being based on chemical analyses of soils similar in nature to that of this locality. The boys who were conducting home projects were advised to use superphosphate at time of planting, with a side-dressing of nitrate of soda at time of first cultivation. Results obtained were much better than from superphosphates alone. Potash continued to be studied



An Evangeline Parish Cotton Queen

Auris Mayeux compares at his right a stalk of cotton grown on soil where no potash was used with a stalk at his left which got an ample supply of potash.

as a plant food of which some soils were likely to be deficient but not our soil, and was regarded by most of the students as a plant food in theory but not really practical.

Prior to 1923 there had been no potash used as fertilizer in this parish except the small quantity contained in the above mentioned 1.65-10-2 (N-P-K). It was in this year that, as a former student of the above mentioned high school and a graduate of the agricultural course of the Louisiana State University, I became the agricultural instructor in this high school. In order to conduct some field tests independent of the school plots, I purchased a 32-acre farm near the school. This farm had become so unproductive that the owner could no longer make a living on it. The usual production of 11 acres planted in cotton was from two to three bales because of rust, which in the months of July and August would cause the cotton to die. I now rented the farm to the original owner.

Introduces Potash

Springtime came and with it, time to purchase the supply of fertilizer. It was proposed to the tenant that he use some potash in fertilizing his cotton. On learning the cost of muriate of potash per hundred pounds he refused, stating that he could not afford to pay such a high price for a new fertilizer when he could get superphosphate at less than half that price per hundred pounds. I then proposed to buy the potash myself if the tenant would apply it, and at the close of the harvest, if in the opinion of the tenant the potash paid a profit, he was to reimburse me. To this the tenant agreed, and 500 pounds of muriate of potash were purchased.

The tenant applied his usual amount of 100-200 pounds of 16 per cent superphosphate before planting. At the first cultivation the potash was applied as a side-dressing at the rate of approximately 100 pounds per acre. In order to be sure to detect the effect of the potash, if any, it was applied on four rows and four rows were skipped, continuing this method across the 11-acre field.

The result was very marked, four rows of healthy, vigorous cotton loaded with a full crop of mature bolls sandwiched with four rows of small rusty and dead cotton with inferior,

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Fall Care *of* Orchards

By T. J. Talbert

Professor of Horticulture, University of Missouri

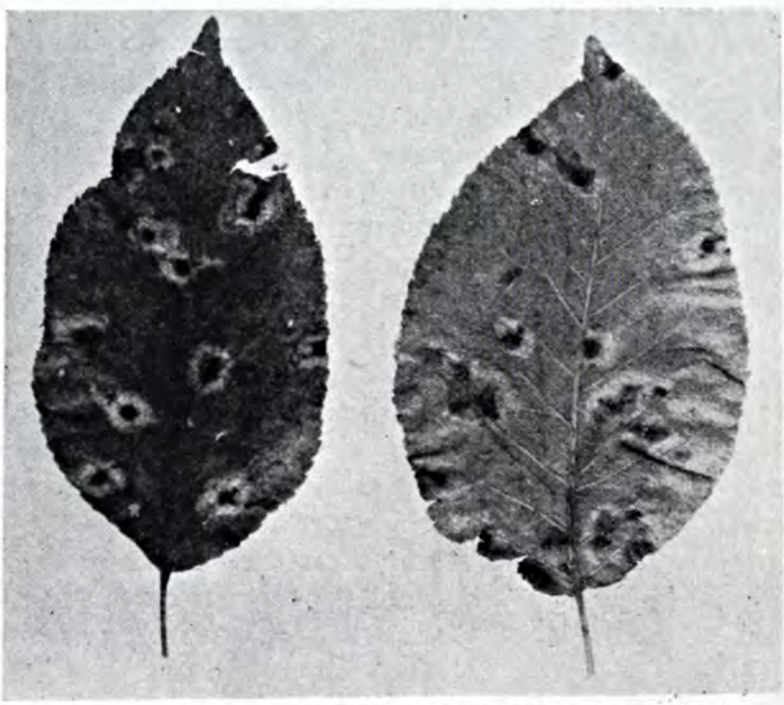
FALL and early winter treatment to rid the orchard of serious insect pests and diseases is in many ways the best one of the year for effective results. This is true because the grower, to cope with orchard enemies successfully, must take advantage of them at every opportunity. The grower may have more time at this period to study his trees and their needs. The days are generally fine for work and much may be accomplished in a comparatively short length of time.

In the fall many insects are in a dormant or semi-dormant condition. Some pass the winter in the adult stage, others in the pupa or resting stage, some in silken cocoons or other especially prepared places in the larvae or worm stage, and still others may be found wintering in the egg stage. The orchardist is fortunate when he knows the stage of development and where these pests spend the winter. He may then be able to destroy them successfully at his leisure.

Destroy All Refuse

All wormy, decayed, knotty, and what are generally termed cull apples should be removed from the orchard, fed to the hogs, or buried a foot or more in the earth. If such precautions are not taken with cull apples, they may furnish a serious source of codling moth infestation the following spring and summer. From 10 to 50 per cent of such cull apples often contain codling moth larvae. Fungous diseases like apple scab and black rot may winter over in such fruit.

All dying trees, branches, and dead wood, as well as trash and litter, should be removed from the orchard, made into fire wood, or carefully burned. Blister canker, black rot canker, as well as other diseases, are destroyed by such measures. Apple tree borers may also be combatted effectively by such clean-up practices. Over-wintering codling moth larvae, which are tucked away in silken



The top and bottom sides of apple leaves showing injury by cedar rust.

These apples have been ruined by a bad infection of apple scab.

cocoons in cracks and crevices of the bark and in the crotches of branches and under branches, trash, and litter on the ground, are destroyed. Such material affords over-wintering quarters for some of our most dangerous insect pests and diseases.

Late fall and early winter plowing may do much toward the control of apple scab. This is true because the disease passes the winter mainly on the fallen leaves. When these are buried deeply beneath the furrow slice, the spores do not have a chance to escape to the air and infect the foliage and fruit in the spring.

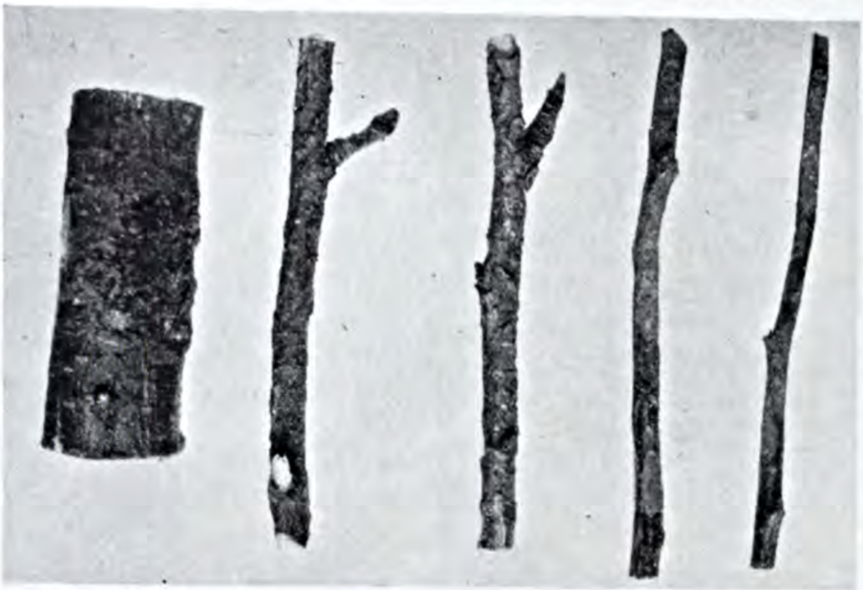
Apple blotch passes the winter on the infected or cankered twigs and branches. Careful pruning during the fall and winter in nice weather should enable the grower to get rid of most of the sources of infection, and thus lessen materially the fight with sprays the following spring and summer.

During the late fall and early winter, if the apple trees have been banded, the bands should be removed and the over-wintering larvae under them destroyed. The rough bark on the trunks, large branches, and in the crotches of the branches should be removed. In so doing, many larvae will be killed. Such work will lessen greatly the number of the first brood of codling moth. This means, of course, a reduced attack of worms the next year.

Dead and dying branches and trees are frequently heavily infested by borers. The destruction of these by burning is effective in cutting down later injury.

Young apple orchards should be gone over in the fall or early winter and examined for the presence of borers. Injury will usually be found at the base of the tree trunks where chain-like masses of sawdust may be found, marking the hole through which the borer may be removed or destroyed. Use a sharp knife in cutting away the infested area, making the cuts up and

Cedar rust injury on the apple fruit.



An apple branch and twigs injured by blotch.

down as much as possible to avoid girdling the trees. Injury to the trees by cutting may be avoided and time saved if a stiff wire is used as a probe. It may be made serviceable by nicking the probing end with a hatchet.

Cedar rust, a fungous disease of the apple, cannot be effectively controlled by spraying. It is, therefore, necessary to cut all red cedars growing within one or one and one-half miles of apple orchards. The fungus has two hosts, or food plants, the red cedar and the apple. Closely related fruits like the crab apple and the haw are also injured by cedar rust. Late fall and early winter is an effective season for cedar eradication, as the trees may be seen long distances and the orchardist may have more time to search them out, cut, and burn them.

If San Jose scale and peach leaf curl must both be combatted, these troubles may be controlled by using lime-sulphur 1-7 or a 2 per cent lubricating oil emulsion with bordeaux made according to the 3-4-50 formula. Where San Jose scale is not present, the bordeaux alone or lime-sulphur 1-15 or 1-20 is effective. One spraying is sufficient and it may be made in the fall after the leaves drop or in the spring before growth starts. In the control of peach leaf curl it is imperative that the work be done before the buds swell in the spring. For both San Jose scale and peach leaf curl thorough spraying cannot be emphasized too strongly. Unsprayed or partly sprayed buds may show scale and curl.

The only safe way to prevent rabbits from gnawing the bark of the trunks of young fruit trees is to wrap the base of the tree trunks from the ground to a height of about 18 to 20 inches, or the space between the ground and the lowest branches. Where the branches are less than 18 inches above the soil, the wrappers should include both trunk and branches. Various kinds of wrapping material may be used. Some of the most common are one-inch mesh poultry wire, galvanized window screen wire, galvanized wire netting having 3 or 4 meshes to the inch, old newspapers, gunny sacks torn in strips 6 to 8 inches wide, and corn-stalks. Wood-veneer wrappers, patented wire wrappers, tarred paper, and building paper may be bought and used.

The wrappers should be placed around the tree trunks about the time the leaves drop in the fall. All except wire should be removed early in the spring as growth starts. Wrappers like newspapers, gunny sacks, corn-stalks, building paper, wood-veneer, etc., wrapped around the tree trunks may form a harbor for insects and diseases if left on the trees during the spring and summer. The bark of the tree trunks when so inclosed will not develop normally. The permanent wire wrappers do not have these disadvantages and may remain around the tree trunks without attention except to see that they stay in place until the trees are six to eight years old. The

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VERMONT

Agricultural Experiment Station

By Leon W. Dean

University of Vermont

"THE Vermont Station is one of the least of the sisterhood," says it director, Dean Joseph L. Hills. He ought to know. He has been director from 1893 to date and dean of the College of Agriculture of the University of Vermont since 1898. He is now dean of American Experiment Station directors in active service and likewise dean of deans of agriculture in active service. Those who have known the solicitude with which through the years he has watched over and built up the agricultural interests of his state will tell you that he is also many other creditable things. But he is a modest man. Perhaps that is one reason why he has thrived so long and successfully. Modesty, although it may have gone out of style with the styles, is still considered a virtue in staid New England. Dean Hills, then, is a modest man and might neglect to mention that—

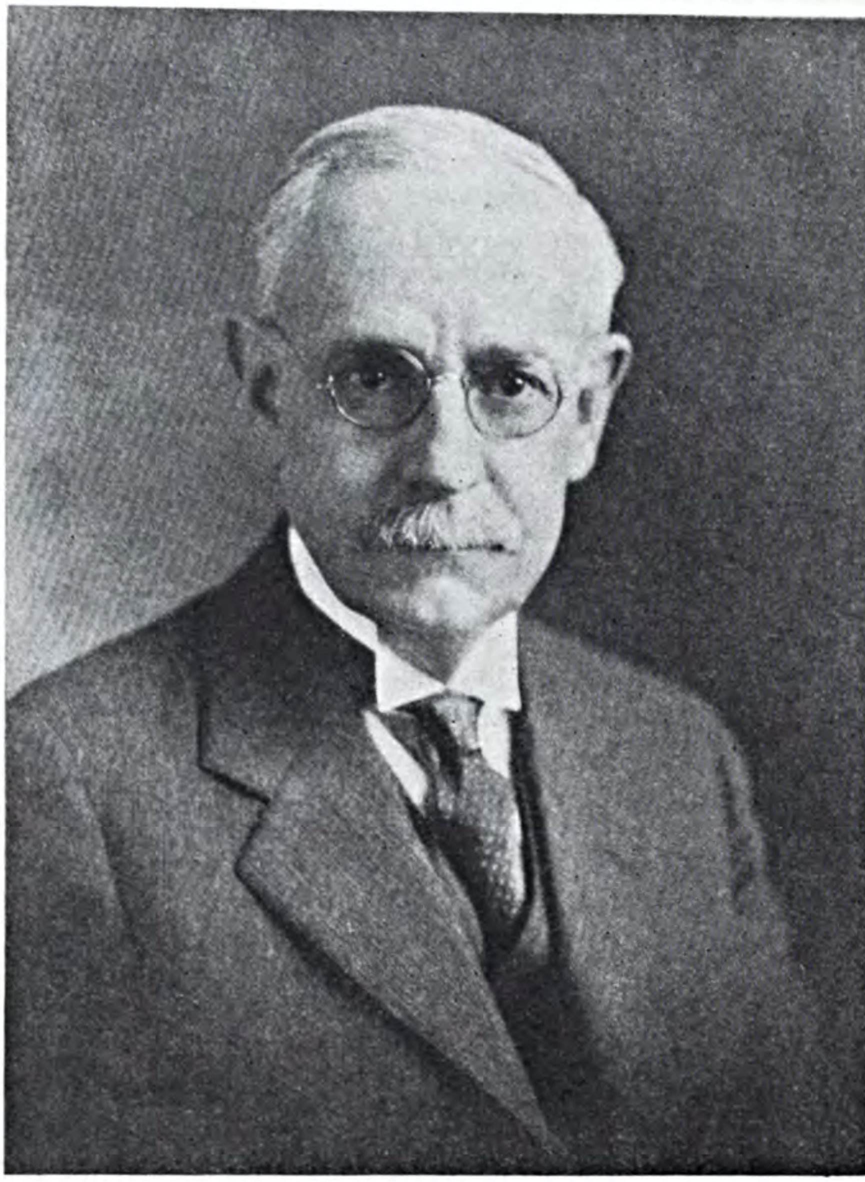
(1) One of the two official methods now employed the country over for the detection of the use of relatively unavailable forms of organic ammoniates in commercial fertilizers was devised and perfected at the Vermont Station.

(2) One of the several successful and simple methods for measuring so-called soil acidity, or better called "lime requirement," was devised at the Vermont Station.

(3) Some 10 years ago, a bulletin was published, the only one of its kind issued by an American experiment station, describing the methods employed in commercial fertilizer manufacture. This bulletin represented its author's own experience during his early years in the chemical oversight of a fertilizer factory and visitation to and study of a considerable number of modern plants. The bulletin has been widely used in school and college classes.

(4) The usual fertilizer control work has been carried out, being now in its forty-seventh year, during forty-two of

The late Senator Justine S. Morrill of Vermont, Father of the Land Grant College Act, from a portrait now hanging in Morrill Hall, agricultural building of the University of Vermont and State Agricultural College.



Dr. Joseph L. Hills, Dean of the College of Agriculture, University of Vermont, and for 36 years Director of the Vermont Experiment Station.

of service only by the station chemists of Maine, Massachusetts, and New Jersey.

Vermont is almost the smallest state in the land in terms of population and wealth and does not finance agricultural research work. The General Assembly of 1886, which created the station, appropriated $3,500 to start its work, derived mostly from fees paid in by fertilizer companies, but this sum was promptly withdrawn with the first Federal appropriation act passed.

Vermont's area is small and her tillable area is still smaller, but her bovine population is as large as her human population. Her farmers every year buy between ten and fifteen million dollars worth of grain, consisting largely of dairy feeds. Her soils, which are inherently the most fertile in New England, have had more natural manures applied to them than have the soils of any other state in the Union. They are, speaking broadly, relatively rich in organic matter. The calcium content of her pasture grasses is distinctly higher than is usually found elsewhere. Her Green Mountains are green and "there's a reason" why they are green.

All this explains why the Vermont Station has paid relatively little attention to the study of plant food

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which it has been under the oversight of the present director.

The Vermont Station was established by state law in 1886, and with no partisan politics on the university campus, with a tendency on the part of Vermonters to stand loyally back of those who serve them well, oversight of the station has changed less often than has that of any other station in the country save those of Pennsylvania, Ohio, and Wisconsin. Dr. Hills' only predecessor was W. W. Cooke, director from 1886 to 1893. It is also interesting to note in this connection that Mr. C. H. Jones, the experiment station chemist, began service in New England stations 39 years ago and is outranked in point of years

Potash Starvation *of* Irish Potatoes

By E. R. Lancashire

Extension Specialist, Ohio State University

AT a field day meeting held at the Ohio Experiment Station last year, attention was called to the fact that some of the potato plants appeared to have a bronzed cast to them. On other plants an abnormally dark green color was beginning to appear.

The experimental fields were in charge of Dr. John Bushnell. His explanation for the appearance of the abnormality was as follows: "On plots receiving no manure and no potash in fertilizers, potato plants took on an abnormally dark green color, became stunted in midseason, produced small tubers, and died prematurely with a characteristic abscission of the lower leaves. The abnormal color was due to an accumulation of blue pigment, which is normally present in small amount in varieties of the Rural group; varieties that do not have this blue pigment became bronzed instead of bluish green.

"Chemical analyses of the tops of such plants disclose an accumulation of soluble sugar and a deficit of hydrolyzable polysaccharides. Qualitatively the carbohydrates seem to be normal. It thus appears that in the growing plant the conversion of soluble sugar to polysaccharides is impeded by the deficit of potassium, and as a result of the accumulation of sugar, glucosidal pigment is produced in abnormal amount, and presumably normal photosynthesis is retarded."

Substituting the words of the street for those of the scientist, it might be said that the plants starved to death. This happened not because of a lack of soluble sugars but because the absence of the element potassium prevented the conversion of such sugars into starches and celluloses and into other substances used by the plant in building up its complicated vegetative structure. The photograph used to illustrate this article tells the story of the potatotes that starved to death much better than any number of words could possibly do it.

An Easy Test

A very simple way of telling whether or not any particular plant is starving to death because of a shortage of potassium is that of pulling off a few of the lower leaves. If the leaf parts from the main stem of the potato vine readily and without a peeling away of the outer skin on the main stem the plant is suffering from the lack of the element potash. Should the leaf show a tendency to separate from the main stem only after a decided effort to remain attached, the condition is normal and the plant is supplied with at least a moderate amount of potash. This tendency was referred to by Dr. Bushnell when he described a potash deficient plant as showing a characteristic abscission of the lower leaves.

In the fertilizer experiments carried on at Wooster, Ohio, some very interesting effects have been noted in connection with the elements nitrogen, phosphorus, and potassium. An attempt has been made to find the influence of the several fertilizer elements upon the number of tubers set per plant and upon the size of the tubers.

As far as the effect of fertilizers on the number of tubers per plant is concerned the work shows that nitrate gave an increase in number of tubers per plant when added to four of five basic treatments and that where either potash or phosphate alone was deficient in the basic treatments, the addition of this deficient element increased the number. So nitrogen increases the number of tubers per plant irrespective of the supply of potash and phosphate.

Potash Influences Size

In regard to the effect of fertilizer on the size of the tubers, the most outstanding fact is the consistently large increase from potash. Potash is clearly deficient in all the plots of the experiment in which it is not added in the fertilizer treatment. The effect of potash on the tubers was very largely confined to increasing their size.

As compared with the effect of potash, the results from nitrate and phosphate on the size of the tubers are negligible. The only increases in size from these elements are found when the basic treatment is potash alone or potash plus nitrate. To these basic potash treatments, an addition of phosphate or nitrate has a small effect in increasing the average size.

These effects may be generalized: A deficiency of potash has resulted in small tubers; relieving this deficiency by the application of 100 pounds per acre of muriate of potash increased the size of tubers about 50 per cent. Where this potash application was accompanied by 160 pounds of superphosphate there was a further small increase in size.

In general nitrate increased the number of tubers per plant, but had no appreciable effect on the size of the tubers. Potash had a marked effect in increasing the size of tubers but no consistent influence on the number. Phosphate had no effect on number and comparatively little effect on size of tubers. As the soil had a high lime content, the phosphate may have been largely converted into an insoluble form, and this may account for the negative results from the element.

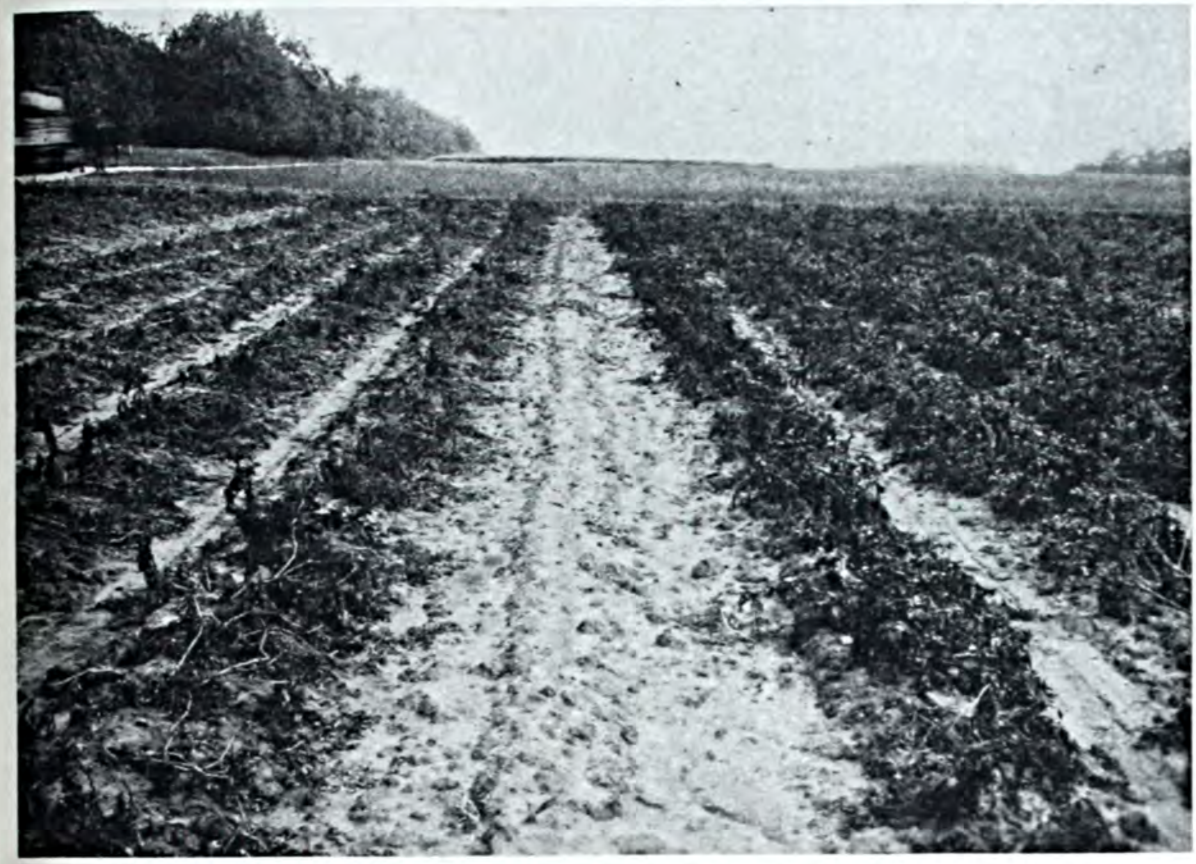
While no one as yet can say definitely with any degree of certainty just how much and what kind of fertilizers should be used for the potato crop, it might be interesting to note that nitrogen does not pay consistently. In some years when the season is cool or when the potatoes are planted real early, the use of nitrogen has paid liberally. Big increases in yields have been noted. This refers to the use of chemical nitrogen on fields which include clover in the rotation.

Phosphorus is particularly beneficial on acid soils. The amount used depends on how heavily the field has been fertilized during the years previous. The residue of this fertilizer element accumulates over a period of years when applied in excess of the amount needed to meet the particular requirements of the crops grown. It is suggested that if the soil has no accumulated residue that from 10 to 12 per cent of superphosphate be included in the complete fertilizer used.

Potash Improves Quality

Quality in potatoes, especially when grown on muck soils, depends upon the presence of the needed amount of potash. Even on good soils potash pays on potatoes. Just how much should be used is another question. It would seem that at least six per cent of potash should be included in every potato fertilizer.

The following list of fertilizer mixtures are suggested as basic treatments for the various soils: On light colored sandy soils which have received barnyard or green manures, a 6-8-6 applied at the rate of 800 to 1,200 pounds per acre in the row, for the



The premature dying of the plot at the left is due to potash starvation. This plot receives superphosphate only. The plot at the right gets potash.

early potato crops; a 4-10-6 can be used in the same way for the late potato crop on this type of soil. On light colored silt loams, clay loams, or clays which have been manured, the fertilizer used is often a 6-8-6 for the early crop and a 4-12-4 for the late crop. On dark colored soils such as silt loams, clay loams, or clays which have been manured, the early potato crop receives a 4-10-6 and the late crop a 2-14-4. On mucks and peats which receive neither barnyard nor green manures, a 3-9-18 is used on the early and late crops. In all cases the fertilizer is used at the rate suggested above and is applied in the row at planting time.

In the end the potato grower will find it profitable to try out the several fertilizer elements in varying amounts. A reasonable amount of investigation should pay good returns in the intensive business of raising a profitable potato crop. Perhaps the best illustration of what kind of fertilizer pays best on the potato crop can be found in an analysis of the fertilizers used by men who produce yields of 400 bushels and more per acre. It would seem that men who can do that are on the right track in most of their practices.

Records kept by 29 potato growers last year show that the average fertilizer mixture used in producing yields above the 400-bushel mark was a 3.7-13-7.4. The average amount of nitrogen used was 3.7 per cent of the total number of pounds applied per acre. The figure for superphosphate was 13 per cent and that for potash was 7.4 per cent.

The following list of mixtures was included in the figures used in arriving at the composite fertilizer analysis used by these successful potato growers:

Applied broadcast

500	pounds per acre	2-12-6
600	" " "	3- 8-6

Applied in the row

1,000	pounds per acre	2-8-16

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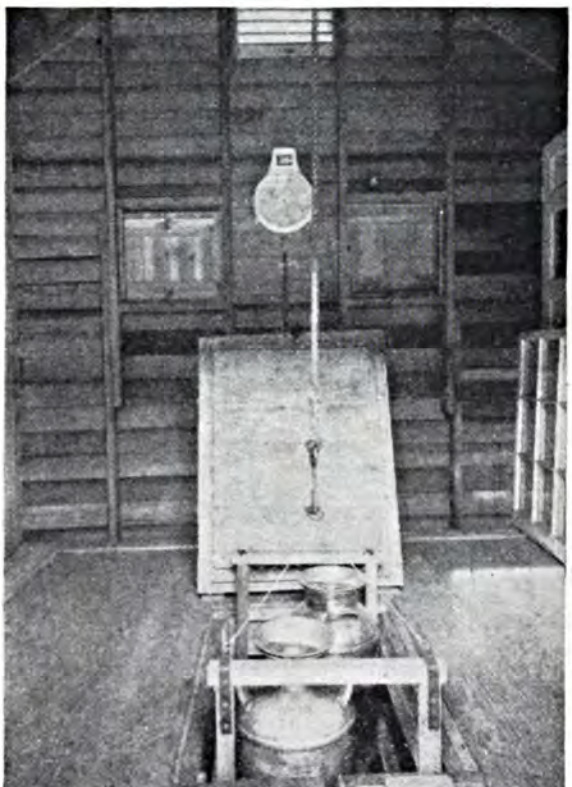
Ice Wells May Solve Farm Refrigeration

IN many of the Northern States the "ice well" may be the solution for the farmers' refrigeration problem. The Bureau of Dairy Industry of the Department of Agriculture and the North Dakota Agricultural College have cooperated in testing out the ice well and report good results.

The ice well consists of a pit in the ground in which a large solid cake of ice has been formed by running a small quantity of water into the hole daily during freezing weather. The well tested at the United States dairy field station at Mandan, North Dakota, followed closely plans suggested by the Saskatchewan Department of Agriculture.

On a well-drained spot near the milk house and convenient to the well, a pit was dug 8 feet square and 9½ feet deep. The sides were boarded up with cheap lumber and the bottom covered to a depth of 1½ feet with coarse gravel to insure good drainage. A small house was erected over the pit. The floor was of two thicknesses of planking with building paper between the layers, and it was built in sections to permit easy removal during freezing. Windows in the house provided air circulation in the winter, but were closed during the summer. A wooden rack or basket suspended from a pulley overhead served for raising and lowering the cans of cream and other food in storage.



The mechanism of the ice well is simple.

Freezing was started in January. A small quantity of water, two to four gallons, was run into the pit each day. By the end of February there was a solid cake of ice 8 feet square and 6½ feet deep. When freezing weather was over, the house was closed tightly and the floor replaced.

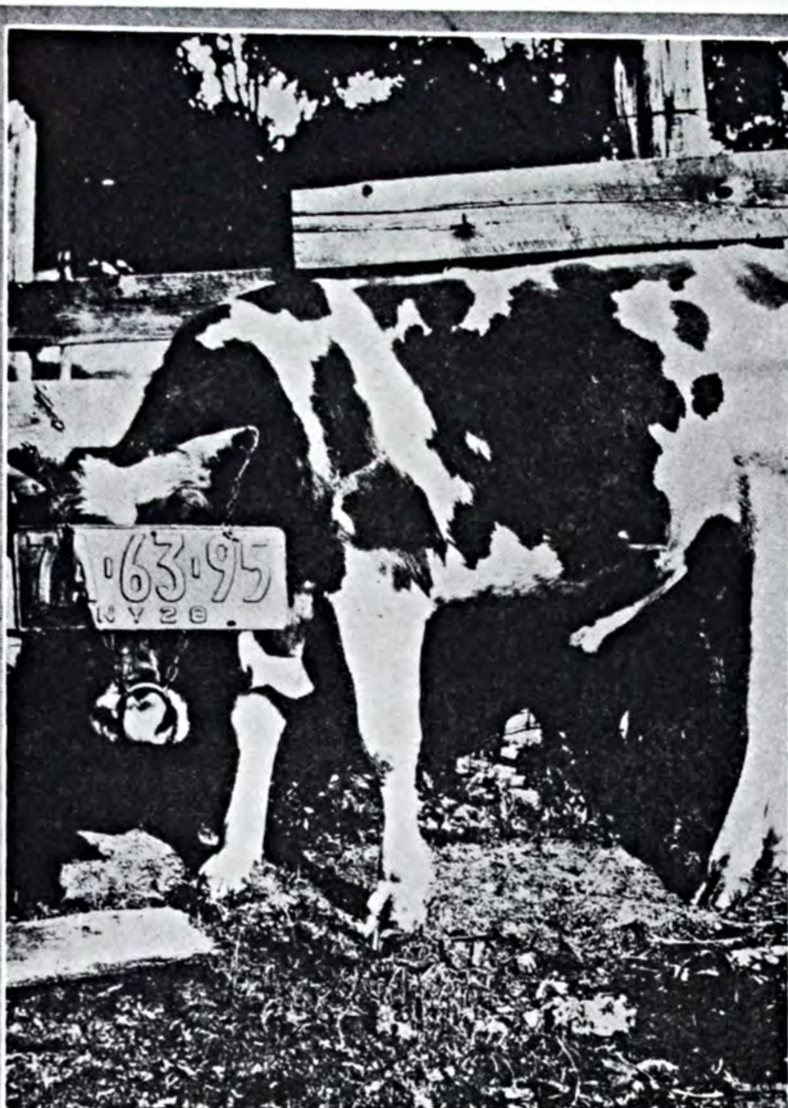
Storage of cream was started May 25. The ice lasted through the summer, and September 1, after a storage period of 98 days, there was still a block of ice 68 inches square and 22 inches deep, or 58 cubic feet of the 416 cubic feet in the original block. At the same rate of melting the ice will last until well into October.

Careful records were kept throughout the summer. Cream cooled with well water to 56.5 degrees Fahrenheit and placed in the rack in the pit at 8:30 a.m. was cooled to 48 degrees within three hours and to 42 degrees by 4:30 p.m. Cream in cans placed directly on the ice was cooled to 34 degrees in the same period. Cream was kept in a perfectly sweet condition for

(*Turn to page 52*)

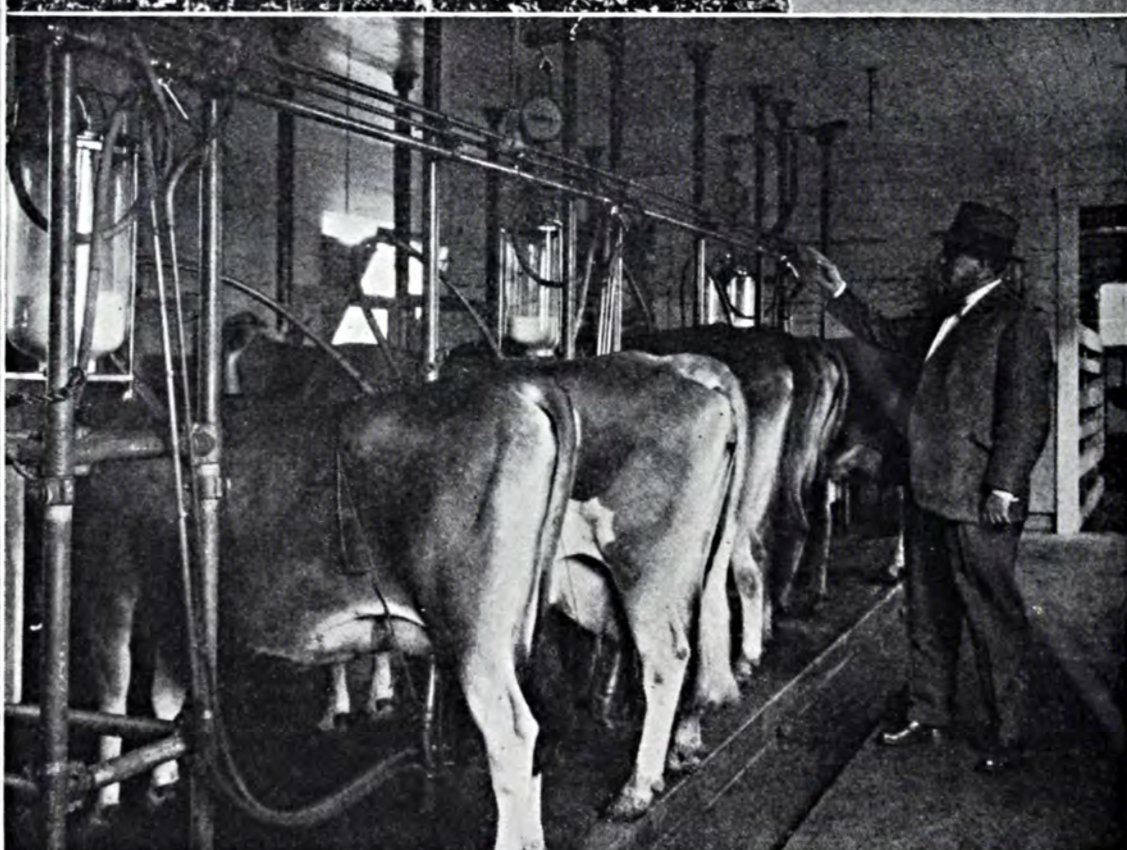
WORKING UP A THANKSGIVING APPETITE

PICTORIAL



Left: A New York farmer has found a new and good use for old automobile license plates.

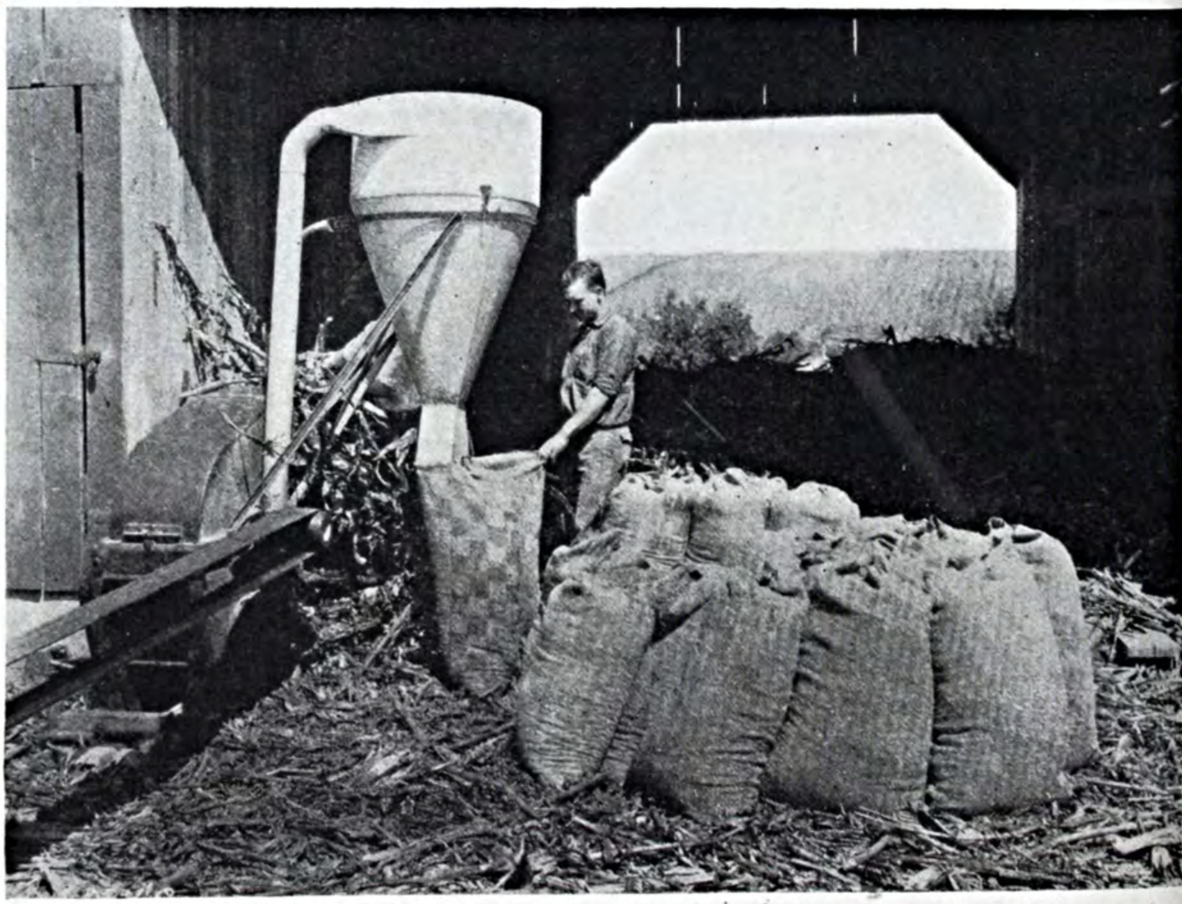
Below: R. R. Graves of the United States Department of Agriculture has developed new milking equipment to reduce the cost and labor of milk production, facilitate the keeping of records, and produce a cleaner product. The milk, after being drawn into a stationary glass container suspended from a weighing mechanism, is drawn on out through pipes and goes to the cooling and bottling equipment without contact with the outside air.



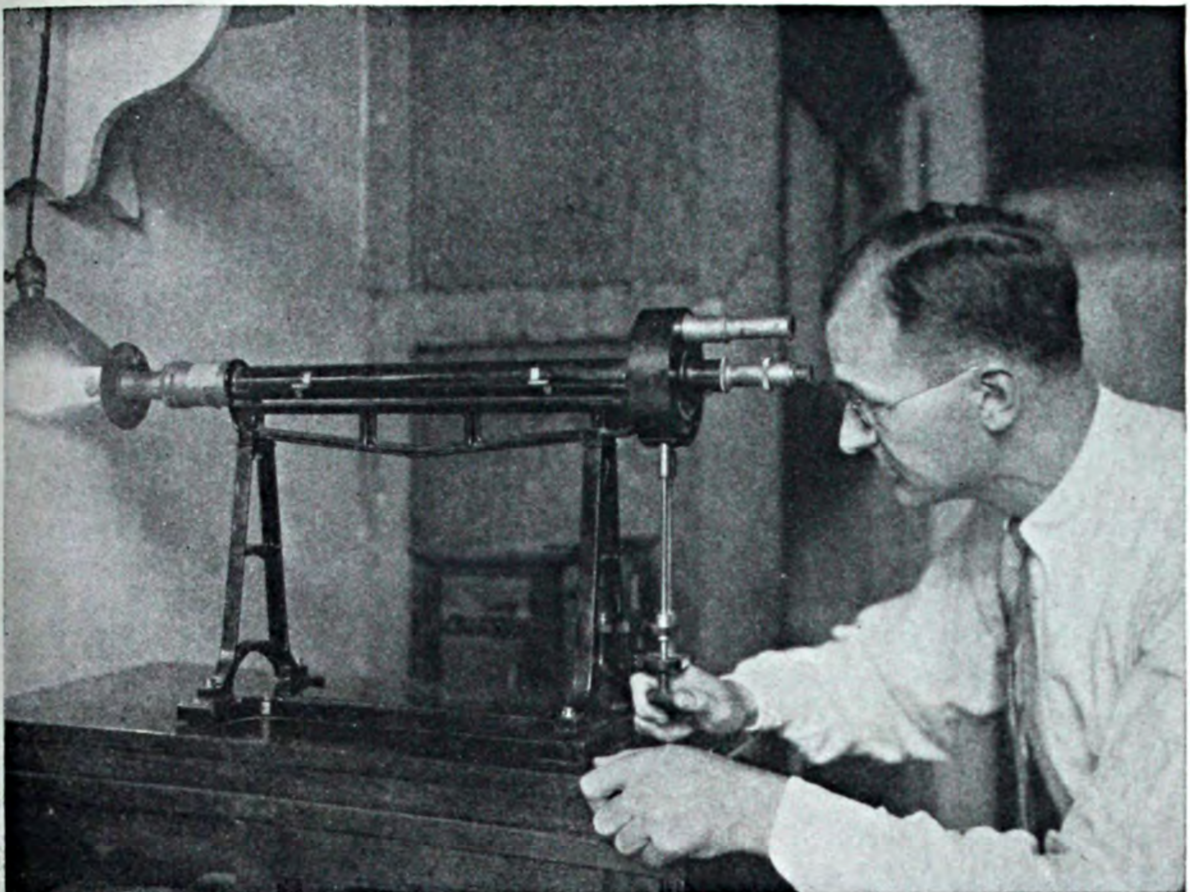
Right: At the recent National Dairy Show held in St. Louis, the United States Department of Agriculture had in its exhibit a plaster man with mechanical hands apparently drawing milk from a cardboard cow. This was one means used to attract attention to the importance of sanitary equipment in the production of milk.

Below Good beef in the making is evident in this picture of 280 Hereford steers around the feed troughs on the farm of Livingston Bros., Monroe, Iowa.

H. G. Leslie, Governor of Indiana, could not find an egg broken in this basket dropped by parachute from an airplane 1,000 feet in the air. At the Governor's right is Dr. E. C. Elliott, President of Purdue University, and at his left are Professor L. H. Schwartz and Dean J. H. Skinner of the Purdue School of Agriculture.

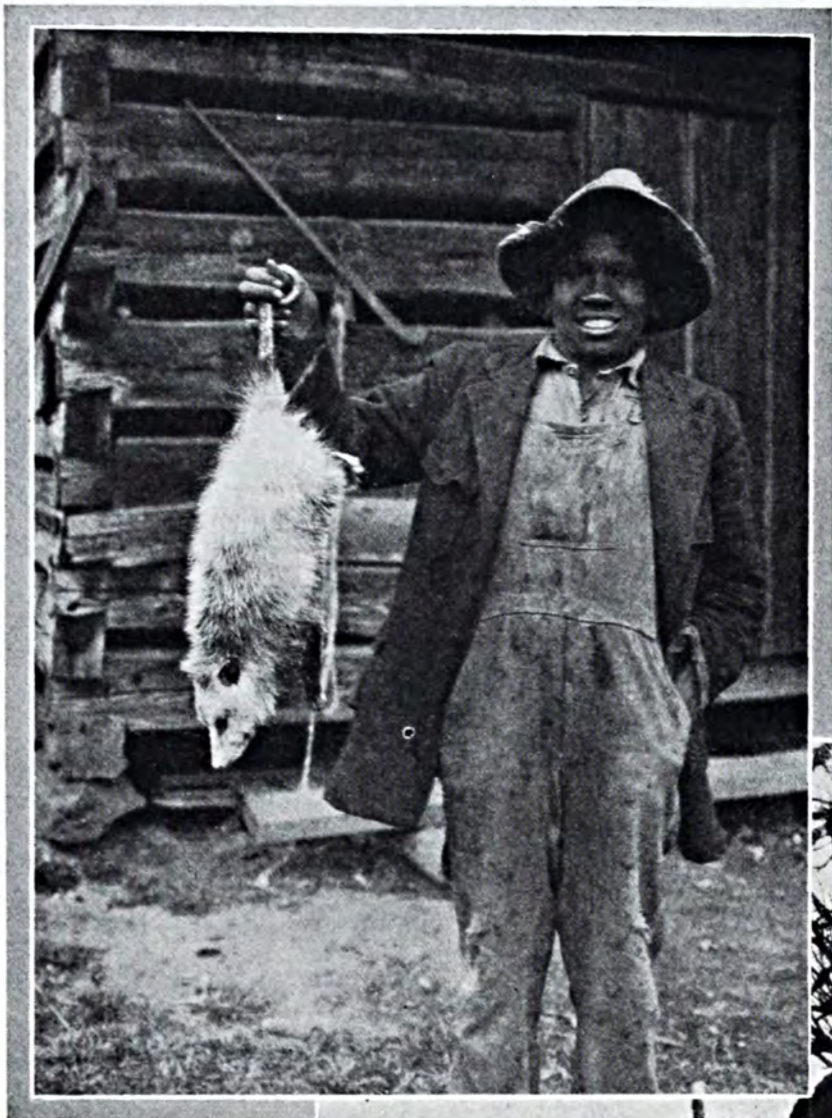


This Maryland dairy farmer uses a mill to grind the entire corn plant—ear, stalk, and leaves—thus saving his cows a lot of hard work.

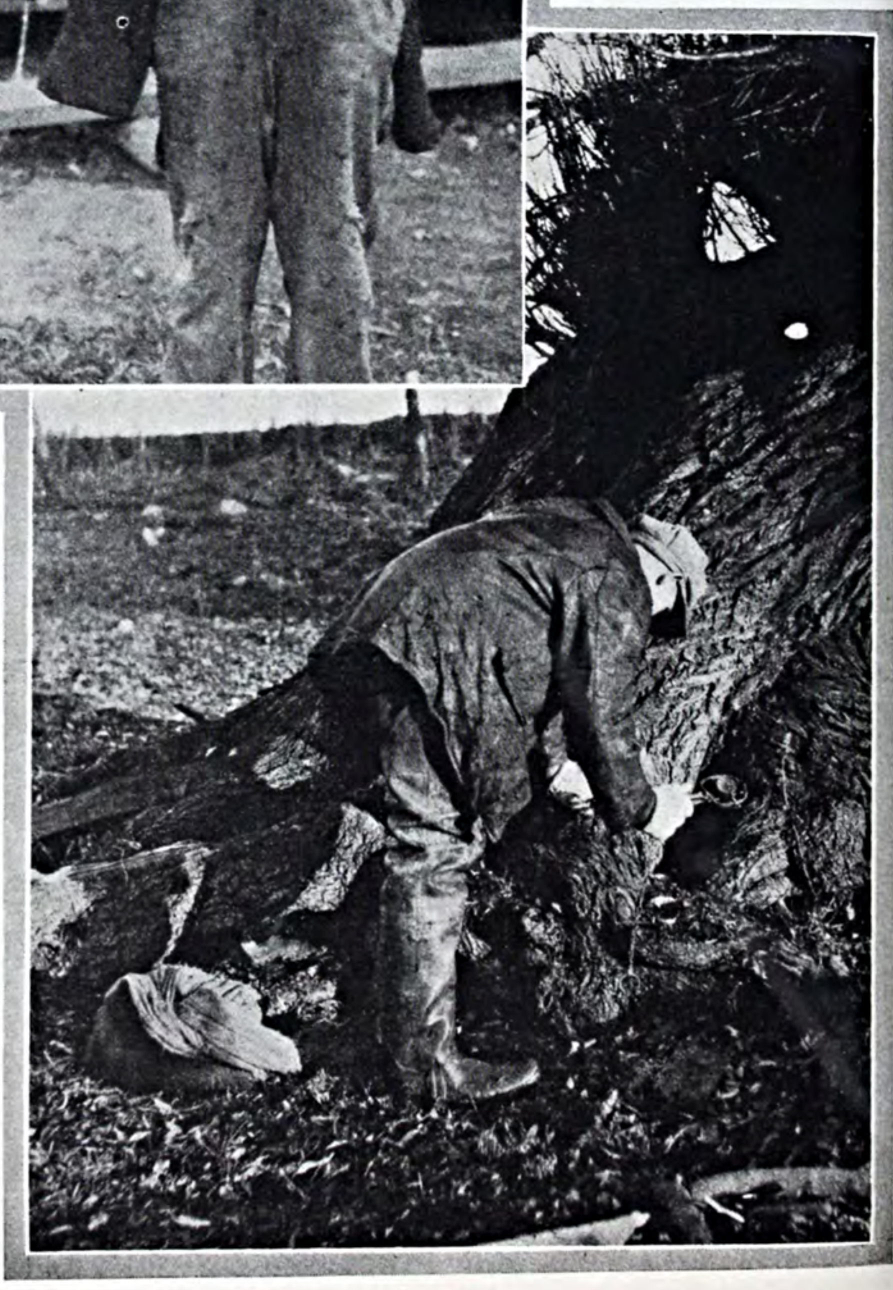


Dr. R. W. Bell, United States Department of Agriculture, recently discovered a commercial process for making a new form of milk sugar, of great value as a constituent of infants' food and in the diet of patients suffering from intestinal disorders. The new milk sugar tastes good enough so that it will be taken as a food rather than as a medicine.

This team weighing 3,630 pounds and belonging to George Wilcox, Greenville, Ohio, recently broke a world's record in heavy-weight horse pulling with a tractive pull of 3,500 pounds.



Left: His Thanksgiving dinner is assured.



Right: Trapping is a profitable winter pastime with many farmers.

The Editors Talk

Cooperation

A new and deeper significance has been given to cooperation among farmers by the creation of government agencies whose function it is to make loans to aid the farmers. The cooperative movement has grown up. It is here to stay and it will grow.

This newer significance brings a new problem in its train. Or probably to be more correct, adds dimensions and acuteness to the old problem of the relation of established trade to cooperative trade. In other words, how can the established trade that deals with the farmer live in peace and harmony and make all the living it wants to in rivalry with the cooperative organizations that naturally want to buy in the cheapest market and sell in the best.

There is one thing certain—the solution of this problem as the cooperative movement grows will not be worked out in any one sitting. Neither will it be worked out by the use of any high-sounding and magic formulas. Any lasting solution will require a solid basis of a study of local and regional problems in specific markets of purchase and sale. But the main thing required before any solution will be found is a mental adjustment that it is far more profitable for established trade and cooperatives to learn to get along with each other. Trade might as well realize that cooperatives are here to stay, that they will thrive and grow in spite of anything that established trade can do, and that adopting a policy of ignoring the cooperative movement will in the end result in failure.

On the other hand, the cooperatives might realize that business has been established to provide goods and service, that it is entitled to a fair profit, and that where it is providing such service for moderate profits, these facts should be recognized in the policies of the cooperative movement. These points of view are very essential before anything will be accomplished in doing the greatest good for the farmer. And as it is only as the farmer profits that either trade or the cooperative will thrive, why not tackle this problem of adjustment between each other.

Fertilizing for Quality

We hear a great deal of talk about the quality of crops and the need for stressing quality as well as yield.

For this reason results of cooperative fertilizer tests on tomatoes conducted on the Eastern Shore of Maryland are of significant interest. For the past two years different fertilizer analyses have been compared, particularly to ascertain the effect of potash on the canning qualities of tomatoes. Such analyses as 4-8-6, 4-8-10, 4-8-12, and even 4-8-18 and 4-8-20 have been used, the object being to get a wide range in the amounts of potash used in order to get definite results.

In the results, it is found that 1,000 pounds per acre of a 4-8-12 produced 366 baskets, while the same amount of a 4-8-18 produced 614 baskets per acre. Using less fertilizer per acre, 500 pounds of a 4-8-6 produced 210 baskets, but the same amount of a 4-8-18 produced 364 baskets. Again on another demonstration, 1,200 pounds of a 4-8-10 produced 467 baskets, while a similar amount of 4-8-20 produced 585 baskets. These figures relate to the yields only, but what of the quality of the tomatoes when canned?

Canning tests were conducted at two points during the past summer. In one case a four-basket sample was taken from the plots. But in the other case, a whole day's picking was canned. In the first case, four baskets from the 4-8-18 plot packed out 84 cans, which is an average of 21 cans per basket, or 1,260 cans per ton of raw product. This was in contrast to the high average for the factory of 16 cans per basket, or only 960 cans per ton of raw product. Thus, the higher analysis produced a definite increase in the amount of tomatoes packed from a given quantity of the raw product.

The second test showed an average of 16 cans per basket from the 10 per cent potash plots and 18 cans per basket from the 20 per cent potash plots, while the high average for the factory was 14 cans per basket. In other words, if all the tomato growers hauling to this factory had used 20 per cent potash and obtained similar results from its use, this factory would have averaged 240 cans more per ton of raw product than its high average.

The tomatoes from the plots where the higher analyses of potash were used had thicker cell walls, fewer and smaller seed cavities, and much more meat than tomatoes from the low potash plots. In addition, the tomatoes from the high potash plots were better shaped, had better color, and fewer cracks and other defects.

If the canning industry is to compete with the truck growers putting fresh vegetables on the market, it is highly important that the quality be of the best. It would seem, therefore, that the management of canning factories should be intensely interested in the use of well-balanced, high-grade fertilizers and that they might well encourage tests with fertilizers to find out, not only which analysis will yield the best, but which analysis will pay them the biggest profit after the tomatoes have been packed. And with larger returns at lower costs per can to the canners, they in turn will be in better position to increase the price to the growers of quality raw tomatoes.

An October Meeting

The work and meeting of the Association of Official Agricultural Chemists which is held every October should be better known. As the title indicates, the Association is formed chiefly of the official agricultural chemists from each State, members of the staff of the United States Department of Agriculture, and from other official bodies. "The eligibility of every member is conceded by virtue of the position he occupies and it continues only so long as such position is held."

The Forty-Fifth Annual Convention of the Association was held in Washington October 28 to 30.

In addition to hearing papers on fertilizers, feeding stuffs and sugar products, insecticides and fungicides, dairy products, drugs, and many other subjects, the meeting is a unique opportunity to meet people interested in the new development in these important fields. For instance, what does high analysis fertilizer mean exactly? What is the thought of the leading agricultural chemical workers on this subject? Again, a vast amount of research and practical work is going on in connection with new forms of nitrogen and concentrated fertilizer materials.

The Association appoints a number of committees, among them a Committee on Definitions of Terms and Interpretation of Results on Fertilizers. This Committee holds a meeting at each annual convention where many important matters relating to fertilizers are discussed. This is an excellent place for representatives of industry to become acquainted with the developments in the fertilizer field. The whole convention is an excellent place to obtain a good idea of the trend of activities in other important fields of work, and as one of the big jobs in industry is very largely a matter of adjustment to modern trends, the annual meeting of the Association of Official Agricultural Chemists affords a definite contribution to progressive industrial activities.

Forms of Nitrogen Used

Striking changes are occurring in the nitrogen content of mixed fertilizers. These changes are taking place both in the amount of nitrogen in mixed fertilizers and in the form of nitrogen and also in the nitrogen carriers.

In Connecticut, for instance, the percentage of organic nitrogen in mixed fertilizers has been decreasing for over 30 years. In contrast with this decrease the percentage of nitrate nitrogen has tended to increase, but the most striking change is in the increase in the percentage of ammonia nitrogen in recent years. This subject is fully discussed in the November issue of "Fertilizer Economics" under the title of "Forms of Nitrogen in Connecticut Fertilizers."

Putting this matter on a definite basis of index numbers, the organic nitrogen has decreased from the index number of 127 for the five-year period, 1896-1900, to 90 in the past five years, 1924-1928. On the other hand, the ammonia nitrogen for the same periods has increased from an index number of 33 to 236, while nitrate nitrogen increased from 61 to 103. It is very interesting to note that for a decade from 1896 to about 1906 the content of nitrate nitrogen in mixed fertilizers was over twice as great as the ammonia nitrogen. In other words, as organic nitrogen declined, for a decade, nitrate nitrogen tended to take its place. But in more recent years, ammonia nitrogen has gone ahead much faster.

These striking changes in the nitrogen content of complete fertilizers are due probably to two chief causes: first, the lower price of inorganic nitrogen, especially in the ammoniate form, and secondly, the new forms of ammonia nitrogen that have come on the market.

If these changes are indicative of the changes that are taking place in the fertilizer tonnage as a whole, then we can assume that lower prices of fertilizer materials will to a certain extent cause an increase in the consumption of such materials, though it is also important to note that while the index number for nitrate nitrogen has been quite low, it has not replaced the organic nitrogen to the same extent as the ammonia has. The changes in the nitrogen situation are, therefore, probably due to changes in prices and a better understanding of the function on different forms of nitrogen in crop production.

Remedies and Diagnoses

The American people are interested in remedies. For real or fancied ills, we spend millions of dollars annually for patent medicines. Many of these may be of no value whatever. Some are of value for specific purposes. These if used for purposes other than what they are designed for, are of no value. Improper usage will give a good remedy a bad name. In this case the trouble is not with the remedy but with the diagnosis.

Agriculture has many valuable remedies proposed for its ills. Few of these are panaceas even though some of their proponents would lead us so to believe. To be specific, during the past few years diversification, cooperative marketing, and farm loans are remedies which have been advised to cure farm ills. These are good remedies under certain conditions, yet too often they have been advised as panaceas and have thereby suffered ill repute. Where they have failed to bring relief, it often has been that the remedy proposed was not what was needed. In other words the failure has been in the diagnosis of the trouble.

As an example the story is told of the earnest young man addressing a group of wheat growers. He advised diversification. This to him meant poultry. Finally an elderly farmer in the front of the hall held up a slip of paper and asked the speaker if he knew what it was. The speaker admitted that he did not. "It's a check for $30,000 which I received for this year's wheat crop," said the farmer. "Wouldn't I look like hell setting a hen?"

Through years of research, remedies for many of the problems of agriculture have been developed. They are remedies for specific situations. If, through failure to properly diagnose the problem, the wrong remedy is used and results are unsatisfactory, it should not cast a cloud on the remedy, yet it does. The present need is not for more remedies, but for better diagnoses. This calls for men who are more interested in solving the problem than in pushing a specific cure.

The Fertilizer Situation

The outlook for fertilizer consumption from a national viewpoint continues better than a year ago. The index number of the prices of 12 fertilizer materials is 10 per cent less than in October, 1928. Even though the farm price of cotton in October was 0.6 cents per pound less than a year ago, the prospective yield per acre in practically all of the States east of the Mississippi river is greater than in 1928. The value per acre of cotton in the chief fertilizer States, based on October farm prices, was 6 to 20 per cent greater than a year ago. Records show that an increase in the value per acre of cotton is usually followed by some increase in the fertilizer tonnage. In the potato regions, where an average crop has been obtained, the outlook is better than a year ago. Potato prices are much higher.

Total imports of fertilizer materials during August and September were in smaller volume than in 1928.

But while the present situation for the country as a whole is brighter than at this date a year ago, there are local areas where conditions are not so good—caused by crop disease, damage, and other factors. There is also yet time for changes in crop and fertilizer prices to occur, which may modify the present more favorable outlook.

AGRICULTURAL DEVELOPMENTS

By P. M. Farmer

ACID PEAT EATS TILE

Unless concrete tile is of good quality, it will not stand up against the eroding action of acids found in many peat soils. After five years of tests, D. G. Miller, drainage engineer of the U. S. Department of Agriculture, cooperating with the Minnesota College of Agriculture, found that good concrete was damaged almost not at all, while that of poor quality did not last long. He says farmers can't tell by the price paid whether or not the tile is good. They should send a sample to their agricultural college or experiment station.

TESTS SOIL WITH TIN ROD

Whether a soil is high or low in available phosphorus may now be determined by a simple field test devised by R. H. Bray, an agronomist of the University of Illinois. All that is needed to make the test is a certain chemical solution, a tin rod, and some test tubes or small bottles. The formula for the solution is given in a new bulletin just put out by the College of Agriculture. To make the test one part of soil is shaken up with three parts of the solution in a test tube or small bottle. Only enough shaking is needed to mix the soil and the solution. When the soil has settled out of the liquid, which usually will be in five minutes, the clear solution is stirred gently with the tin rod so as not to roil it. A blue color in the solution indicates available phosphorus, and the stirring must be continued until the color no longer deepens. Soils very low in available phosphorus will produce a light green in the solution, and those high in available phosphorus will produce a deep blue. Shades in between show varying amounts of phosphorus.

With the various field tests for soils now available, it looks as if the county agent or the farmer soon will be able to carry his little satchel of bottles to the field and analyze the skeletons in the soil's subterranean closet.

SPONTANEOUS IGNITION

Apparently bacteria are not the efficient firebugs they were once thought to be. Dr. C. A. Browne of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture says that bacterial action is not responsible for the high temperatures which cause spontaneous ignition of stored products such as hay. Dr. Browne has reviewed the efforts made during the past several hundred years to solve this problem of spontaneous "combustion" and suggests that more work is needed on it. From work done at the department and elsewhere he advances the theory that chemical action following the bacterial action runs up the temperature to the ignition point. The compounds made by the bacteria, he thinks, are oxidized with the result that the bacteria are soon killed off while the temperature continues far beyond this point. In the case of fire from cotton waste soaked with linseed oil, bacteria take no part, Dr. Browne says. Here the unsaturated substance which readily takes up oxygen is the linseed oil and the entire process leading up to spontaneous ignition is chemical.

VITAMINS GROW ON VINE

Tomatoes that are picked early for shipment to market in colder regions are now commonly colored by means of ethylene gas, also used for coloring lemons, oranges, and bananas. In this way fruits are given a more uniform appearance and of course are more attractive to the buyer, and the treatment makes no change or addition injurious to the consumer. But, says the U. S. Department of Agriculture, tomatoes ripened on the vine are richer in vitamins than those picked early and given the gas treatment. It seems that ethylene is not a vitamin producer even though it brings out the red color and mellows the fruits. Maybe the result will be a greater consumption of canned tomato juice and canned tomatoes.

SEVEN COME A HUNDRED

The Ohio 100-Bushel Corn Club is teaching the corn growers of that State a lot of fundamental facts about the growing of this crop. In 40 counties more than 100 yields of more than 100 bushels to the acre have been produced. After a study of the records of the large number of farmers who have taken part in these contests, E. P. Reed, extension specialist in crops and soils for Ohio State University, says there are at least seven essentials to successful corn growing in that State, and most of them probably will apply just as well in other places where corn is grown. Here are the seven: good seed of an adapted variety; a fertile soil; a well prepared seedbed; proper fertilization; approximately 14,000 plants to the acre on soil well adapted to corn growing; sufficient cultivation to kill weeds and keep the soil in good tilth; sufficient moisture and warm sunshine to keep the corn growing rapidly. And, the way things are going nowadays, we might add an eighth essential—a cultivator with a built-in receiving set.

AN ANTI-VITAMIN

In the world's cereals it seemed for a long time that vitamins were having it all their own way, but now scientists at Sheffield University, England, and at the University of Cape Town, South Africa, call attention to the presence in cereals of "toxamins" and "anti-vitamins." Vitamin D, found in cod liver oil and in other fats, has been considered a cure for rickets, but Dr. Mirvish of the University of Cape Town medical school says it has been shown by recent experiments that the principal cause of rickets is the lowering of the calcium content of the blood. Dr. Mellanby, of Sheffield University, discovered that there are "anti-vitamins" in oats and wheat. The South African scientist found that this substance extracted from oatmeal and injected into the bloodstream of rabbits cut down the calcium content of the blood. It is suggested that rickets may sometimes be caused by too much cereal. We may have to change our notions about vitamin D and possibly some of the others.

BIG STEER WANTED

B. H. Heide, manager of the International Livestock Exposition, Union Stockyards, Chicago, is advertising for a big steer. At the last International a demonstration of the three progressive changes of beef cattle type over the last half century was very popular, and it has been decided to repeat this feature. But it is necessary to have a steer resembling the old-time animal which often wasn't sent to market until it was four or five years old and weighed often much more than a ton. If anyone has a steer that might be made to look like this old-type by November 30, he should write to Mr. Heide at once. No price is mentioned, but those who want rarities do not quibble.

Foreign and International Agriculture

The Province *of* Groningen, Holland

The World's Heaviest Manured Province

By H. Lindeman

Amsterdam, Holland

MOTORING east from Assen, we pass a part of Drenthe and arrive in the province of Groningen, which borders Germany on the east. Having passed the sandy soils, we come into an area of about 80,000 acres which has been reclaimed from peat.

The work of reclamation started near the town of Groningen by the making of a canal on which the peat was to be shipped. Year by year over a long period the main canal and its branches, formed at regular intervals, have been extended until the main canal is almost 50 miles long and the branches several times more. These branches are at right angles to the main canals at intervals of 50 or 100 yards and were first made near the peat area to drain the water off the "flow" moss and moss hags. They now form the line of divisions between small farms.

There is a main road on either side of the canal connected at intervals by drawbridges. Passing along from Groningen the houses gradually become newer and more modern as you approach the peat area of the unreclaimed area. For miles and miles as far on either side as the eye can see, luxuriant crops, principally of potatoes, rye, and oats, strike the spectator's eye. It is difficult to believe that such crops can be grown on land reclaimed from the heath.

A typical picturesque scene in Holland.

The land is prepared in the following way: first of all the peat is cut and from 8 to 10 feet are cast for fuel. About 2 feet of peat, including the surface layer, are put aside and spread on the subsoil, which is composed of fine brown sand. After the peat has been levelled, about four inches of sand dredgings from the canals are spread on top along with two tons of ground limestone per acre.

When broken, at first the peaty subsoil is "quick" and spongy, and to prevent the horse from "bokking" or sinking, pattens or large wooden shoes which protrude about two inches all around the hoof are put on. After the land has consolidated and been ploughed about 10 inches deep, the sand and peat make a soil of fine texture, on which, with suitable manuring, large crops are produced.

The farmers of this district run paper-mills on a cooperative basis. At some of these mills more than 20,000 tons of straw are used annually. There are 10 cooperative paper factories and 18 potato flour factories in Holland. These use enormous quantities of peat, which are on the spot and produce power cheaper than coal.

The farming practised in this area is unique in the respect that practically all of the crops, grown with artificials only, are sold off the farm. Although the system has been carried on for many years, judging by the weight of crop grown, the fertility of the land is as good as can be expected.

The only bulky manure applied to the soil is a small quantity of farmyard manure from a few cows kept for family use and some sows and poultry.

On this great reclaimed area each farm faces the road and canal, which run together, and entrance is had by a neat drawbridge across the canal. The gables of the farmhouses face the road, and as there is a farm every 50 yards or so, you would imagine you were passing along a suburb of a prosperous town with beautiful gardens and trees. The farms here are subdivided by canals every 50 to 100 yards, according to whether there are 50 or 25 acres, and the land runs in long straight stretches behind the buildings. Much of "the carting" to and from the fields is done by small boats on the canals.

The Use of Fertilizers

These peaty soils are of a very poor nature. The surface layer in air-dry condition contains 1 per cent of nitrogen, 0.06 per cent of potash, 0.054 per cent of phosphoric acid, and 0.175 per cent of lime. Only nitrogen is present in rather large quantities. This certainly is the reason why it is unnecessary in the first years to give more nitrogen and still get the large crops.

Formerly only compost of the city of Groningen (capital of the province of that name) was used. Later on compost was imported from other more distant cities. Large rates of compost were given, but they did not contain sufficient potash to produce the highest possible potato yields.

Artificials were used for the first time in

(*Turn to page 59*)

The canals, for which Holland is famous, are utilized for hauling farm produce to market.

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

One of the most interesting bulletins of the year on fertilizer experiments with cigar leaf tobacco, is the new Bulletin No. 240 of the Pennsylvania Agricultural Experiment Station, entitled "Results of Tobacco Experiments in Pennsylvania 1922-27." The authors, Otto Olson and D. E. Haley, bring up-to-date and present in a most interesting manner, the results of their work at Ephrata, Pa., and outlying cooperative experiment fields. Of particular interest is their finding that manure alone was not satisfactory. Both yield and quality of plants produced under these conditions have been consistently inferior to those produced by applications of manure supplemented with commercial fertilizers. At the same time, high yield and good quality were obtained when commercial fertilizers alone were used.

Another bulletin of particular interest and value to agricultural workers and farmers in the great cotton belt of the south is Georgia's new Bulletin No. 152, "Cotton Fertilizers and Cultural Methods" by R. P. Bledsoe. A most comprehensive treatment of cotton fertilizers and cultural methods is given. Of particular interest are the results with potash as a top-dressing, applied at chopping time. One year's results indicate that such a treatment pays highest gains where approximately 100 pounds of muriate of potash per acre were applied. The author advises farmers to try potash as a top-dresser on a small scale until more data supporting the practice are available.

Bulletin No. 309 of the Maryland Agricultural Experiment Station gives some very interesting information on "Amounts of Fertilizer and Manure Required for Maintenance of Fertility for Vegetable Production." The authors, T. H. White and V. R. Boswell, emphasize the importance of net returns. While they appreciate the value of manure, the scarcity and high price of manure prompt them to recommend light manure applications, supplemented by commercial fertilizers. The bulletin is timely, comprehensive, and most practical.

"Quarterly Bulletin (Fertilizer Report), Vol. 19, No. 2, January-June, 1929, State Board of Agriculture," Dover, Delaware.

"Compositing Barnyard Manure with Sulphur and Rock Phosphate," Agr. Exp. Sta., Experiment, Ga., Bul. No. 154, July, 1929, W. G. Friedemann.

"Commercial Fertilizers," Agr. Exp. Sta., Lafayette, Ind., Cir. No. 163, May, 1929.

"Sugar Cane Test Fields and Fertilizer Demonstrations," Agr. Exp. Sta., Baton Rouge, La., Louisiana Bul. No. 203, Apr., 1929, C. B. Gouaux.

"Testing Fertilizers for Missouri Farmers; 1928," Agr. Exp. Sta., Columbia, Mo., Bul. No. 270, May, 1929.

"Artificial Manure from Straw," Agr. Exp. Sta., Geneva, N. Y., Bul. No. 573, Aug., 1929, R. C. Collison and H. J. Conn.

Soils

Bulletins discussing soil and field crop management, emphasizing importance of typography, soil type, drainage, cropping systems, and recommended fertilizer practices, should serve to alleviate the ignorance and consequent agricultural distress prevalent in many regions. Bulletin No. 482 of the Cornell Agricultural Experiment Station at Ithaca, New York, reflects the trend of thought in this connection and is a valuable contribution. The title of the Bulletin is "Soil and Field-Crop Management for Yates County, New York," and its authors are H. O. Buckman, H. P. Cooper, and F. B. Howe.

Crops

There have been many important and interesting bulletins under this heading coming into circulation this month. One of the two more unusual in the group is the small and attractive four-page leaflet No. 149 of Purdue University on "New and Old Lawns." In very concise form, S. D. Connor, the author, presents general information of interest to every land owner who takes pride in the appearance of the immediate surroundings of his dwelling.

The other publication is the small "Crops and Soil Handbook" for the Red River Valley, which is published by the Northwest School and Experiment Station at Crookston, Minnesota. This publication is pocket-size and the authors, R. S. Dunham, T. M. McCall, and E. R. Clark, have arranged their information for very convenient reference and use.

"Experiments with Alfalfa," Agr. Exp. Sta., Fayetteville, Ark., Bul. 242, June, 1929, Martin Nelson.

"Monthly Bulletin of the Department of Agriculture, State of California," Sacramento, Calif., Vol. XVIII, No. 7, July, 1929.

"High Points in Work of Georgia Experiment Station," Agr. Exp. Sta., Experiment Ga., Bul. 156, June, 1929, C. A. Whittle.

"Quality of Cotton Grown in Georgia," Agr. Exp. Sta., Experiment, Ga., Bul. 157, Sept., 1929, W. T. Fullilove and W. B. Lanham.

"Cotton Fiber Studies," Agr. Exp. Sta., Experiment, Ga., Bul. 158, June, 1929, R. C. Campbell.

"The Cotton Program for Georgia," Agr. Exp. Sta., Extension Division, Athens, Ga., Bul. 364, Vol. XVII, April, 1929, R. R. Childs.

"Onion Culture in Georgia," Agr. Exp. Sta., Extension Division, Athens, Ga., Bul. 367, Vol. XVII, April, 1929, J. C. Morcock, Jr.

"Winter Legumes for Georgia," Agr. Exp. Sta., Athens, Ga., Bul. 374, Vol. XVIII, Aug., 1929, E. D. Alexander.

"Georgia Extension Service Report 1928," Agr. Exp. Sta., Athens, Ga., Bul. 375, Vol. VII, Jan., 1929.

"Agricultural Extension Work in Indiana," Purdue University, Lafayette, Ind., July 1, 1927, to June 30, 1928.

"The Home Vegetable Garden," Agr. Exp. Sta., Ames, Iowa, Cir. No. 115, April, 1929, E. S. Haber.

"Relation of Certain Ear and Kernel Characters of Reid Yellow Dent Corn to Yield," Agr. Exp. Sta., Ames, Iowa, Bul. 257, Jan., 1929, H. D. Hughes and Joe L. Robinson.

"Annual Report for Fiscal Year Ending June 30, 1928," Agr. Exp. Sta., Ames, Iowa.

"More Tomatoes from Fewer Acres," University of Maryland, College Park, Md., Ext. Bul. No. 46, Mch., 1929, L. M. Goodwin.

"Factors Influencing Yield and Quality of Peas—Biophysical and Biochemical Studies," Agr. Exp. Sta., College Park, Md., Bul. No. 306, Mch., 1929, Victor R. Boswell.

"A Study of Spinach Varieties with Special Reference to Their Canning Qualities," Agr. Exp. Sta., College Park, Md., Bul. No. 307, Mch., 1929, Horace B. Farley.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., Vol. VI, No. 9, Sept., 1929.

"Blackberries, Raspberries and Dewberries," University of Missouri, Columbia, Mo., Bul. 265, Jan., 1929, H. G. Swartwout.

"How the Experiment Station Solves Farm Problems," Agr. Exp. Sta., Columbia, Mo., Bul. 272, May, 1929.

"Forty-Second Annual Report of the Agr. Exp. Sta. of Nebraska," Agr. Exp. Sta., Lincoln, Neb., Feb. 1, 1929.

"Premature Seeding of Celery," Agr. Exp. Sta., Ithaca, N. Y., Bul. 480, May, 1929, H. C. Thompson.

"A Study of Some Factors Affecting Seed-Stalk Development in Cabbage," Agr. Exp. Sta., Ithaca, N. Y., Bul. 488, June, 1929, Julian C. Miller.

"North Dakota Potato Grade Inspection Service," Agr. Exp. Sta., Fargo, N. D., Cir. 38, July, 1929, E. M. Gillig, R. C. Hastings.

"Langdon Substation Report for 1927 and 1928," Agr. Exp. Sta., Fargo, N. D., Bul. 228, May, 1929, Victor Sturlaugson.

"Hettinger Substation Report for 1928," Agr. Exp. Sta., Fargo, N. D., Bul. 229, May, 1929, C. H. Plath.

"Horticulture at the Ohio Agricultural Experiment Station," Agr. Exp. Sta., Wooster, Ohio, Special Cir. 23, Aug., 1929.

"The Culture of Greenhouse Chrysanthemums," Agr. Exp. Sta., Wooster, Ohio, Bul. 439, Aug., 1929, W. W. Wiggin.

"Organic Food Reserves in Relation to the Eradication of Canada Thistles," Agr. Exp.

Sta., Wooster, Ohio, Bul. 441, Sept., 1929, F. A. Welton, V. H. Morris, and A. J. Hartzler.

"Further Investigations on the Harvesting, Storing, and Ripening of Pears from Rogue River Valley," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 254, Aug., 1929, Henry Hartman, F. C. Reimer, and R. K. Norris.

"The Persistence of Certain Lawn Grasses as Affected by Fertilization and Competition," Agr. Exp. Sta., Kingston, R. I., Bul. 217, July, 1929, E. S. Garner and S. C. Damon.

"Forty-First Annual Report of the Director of the Agricultural Experiment Station," Kingston, R. I., Jan. 15, 1929.

"Work of the Newlands Field Station, Nevada, 1924-1927," U. S. D. A., Washington, D. C., Cir. No. 69, Sept., 1929, E. W. Knight.

"Work of the Huntley Field Station, Montana, in 1925 and 1926," U. S. D. A., Washington, D. C., Cir. No. 70, July, 1929, Dan Hansen, A. E. Seamans, David A. Savage.

"Chemical Injury to Watermelons in Transit," U. S. D. A., Washington, D. C., Cir. No. 74, July, 1929, W. W. Gilbert and F. C. Meier.

"Seed Potatoes and How to Produce Them," U. S. D. A., Washington, D. C., Farmers' Bul. No. 1332, June, 1929, William Stuart.

"Spring-Sown Red Oats," U. S. D. A., Washington, D. C., Farmers' Bul. No. 1583, June, 1929, T. R. Stanton and F. A. Coffman.

"The Production of Johnson Grass for Hay and Pasturage," U. S. D. A., Washington, D. C., Farmers' Bul. No. 1597, July, 1929, H. N. Vinall and M. A. Crosby.

"Influence of Freezing of Seed Potatoes on Viability and Yields," U. S. D. A., Washington, D. C., Technical Bul. No. 119, June, 1929, R. C. Wright and P. M. Lombard.

Bulletin No. 262, Oct., 1929, Dept. of Agr. Immigation of Va., Richmond, Va.

"Some Stock and Scion Observations on Apple Trees," Agr. Exp. Sta., Madison, Wis., Research Bul. 94, June, 1929, R. H. Roberts.

Economics

"Credit Problems of Georgia Cotton Farmers," Agr. Exp. Sta., Experiment, Ga., Bul. 153, June, 1929, Arthur N. Moore, J. K. Giles, R. C. Campbell.

"Types of Farming in Iowa," Agr. Exp. Sta., Ames, Iowa, Bul. No. 256, Jan., 1929, C. L. Holmes.

"The Corn Enterprise in Iowa," Agr. Exp. Sta., Ames, Iowa, Bul. No. 259, Apr., 1929, Edgar B. Hurd.

"The Crop System in Iowa County," Agr. Exp. Sta., Ames, Iowa, Bul. 261, June, 1929, J. A. Hopkins, Jr.

"An Economic Study of Crops and Livestock in the Purchase Region of Kentucky," Agr. Exp. Sta., Lexington, Ky., Research Bul. No. 289, Nov., 1928, J. B. Hutson, W. G. Finn, and Z. L. Galloway.

"Land Valuation II," Agr. Exp. Sta., Columbia, Mo., Bul. No. 269, Mar., 1929.

"The Production and Marketing of New York Market Peas," Agr. Exp. Sta., Ithaca, N. Y., Bul. 475, May, 1929, Dilworth Walker.

"A Study of the Business Practices of Farmers' Local Cooperative Purchasing Associations in Pennsylvania," Agr. Exp. Sta., State College, Pa., Bul. 242, June, 1929, J. K. Stern.

"Farmers' Cooperative Associations in the United States, 1929," U. S. D. A., Washington, D. C., Cir. No. 94, Aug., 1929, Chris L. Christensen.

"The Adjustment of Agricultural Production to Meet Home Market Demands in the Clifton Forge-Covington Trade Area," Agr. Exp. Sta., Blacksburg, Va., Bul. 266, Apr., 1929, J. J. Vernon, T. D. Johnson and Wilbur O'Byrne.

"Cooperative Buying in West Virginia," Agr. Exp. Sta., Morgantown, Va., Bul. 221, Mar., 1929, Paul A. Eke.

Insects

"Heat and Time of Exposure Necessary to Kill Larvae of the European Corn Borer in Ear Corn," U. S. D. A., Washington, D. C., Cir. No. 71, June, 1929, George W. Barber.

Diseases

"The Control of Root-Knot in Seedbeds," Agr. Exp. Sta., Gainesville, Fla., Press Bul. No. 416, Sept., 1929, J. R. Watson.

The Value of Stalks

(*From page* 19)

small seeded crops as the clovers, alfalfa, and the grasses, where a well-worked and compact seedbed is so much to be desired, are all factors that must be considered in arriving at their actual value. And when the European corn-borer, now just around the corner, comes to live with us, what then? I shall leave that for you to answer.

"Judging from my own experiences as a farmer," said Mr. Plager, "and from other farmers in Grundy county who have had experience in taking off corn-stalks for several years, I will say that there is about 45 cents' worth of value in each ton of stalks. This year where the stalks were taken off, farmers, without exception, had a better yield of oats than others who left the stalks on the field. We have one farmer, Ike Hasbruch, of Grundy Center, who has increased both his oats and his corn yields 15 bushels per acre by removing the stalks. Of course, he grew clover every time he seeded small grain. He does not credit, entirely, the increased yield to taking off the stalks, but indirectly part of the increase is due to better seeding of the oats and clover and to the better working of the seedbed. The rest he attributes to the clover."

Over a term of years, corn-stalks have a definite fertilizer value when turned under, but that value is by no means as great as a chemical analysis, on a fertilizer basis, would seem to indicate. Both from the economic and the fertility standpoint, we have reached the time in the expansion of agricultural products to other uses when we must consider their value in relationship to other products, and we must find out in just what form they are most economically disposed of in the markets of the world. Herein lies one solution for the disposal of our by-products, our troublesome, price-depressing surplus, and our agricultural wastes.

Our Federal Department of Agriculture and the various States are now at work trying to determine the value of the corn-stalk. But we know now that the nitrogen and humus replacing value of our newer legumes, alfalfa, sweet clover, and soybeans, will be important and cheap sources of the free nitrogen of the air. When we come to phosphorus and potassium, we must consider their replacement value in a commercial form—eventually we will, for there is no other method of replacement.

The lowly corn-stalk is dressing up for polite society. Already 184 products are made from it. In addition to those already credited to the stalk, we might mention such others as face powder, corn syrup, gun powder, papier-mache, and breakfast food—all are articles for which there is a demand. Advancing industry, in new ways, is bidding for our products. Shall we consider this opportunity, or refuse the bid? There are possibilities here for agriculture—perhaps beyond our fondest hopes.

The Care of Orchards

(*From page* 24)

permanency of wire wrappers and the saving of labor in wrapping and unwrapping each year makes them the cheapest in the long run. Protection to the tree trunks is also afforded all the year round. This is important because rabbits may do injury even in the summer time. Wire wrappers should be removed as soon as they begin to bind, otherwise they may girdle the trees and kill them.

When the apple trees reach an age of from 8 to 10 years, they are not likely to be seriously injured by rabbits. The same holds true with other fruit trees such as peaches, cherries, and plums. To minimize the liability of injury, however, the grower should continue to keep wrapped the trees which may grow near fence rows, ravines, or other quarters of the rabbit.

For the parts of the bearing orchard located more distant from the haunts frequented by the common cottontail rabbits, serious injury may often be prevented by commencing the regular pruning work shortly after the leaves begin to drop in the fall, leaving on the ground near the trees the branches removed. These furnish food for both rabbits and field mice, and they may be fonder of the tender bark on the pruned branches and shoots than that on the tree trunks. As a result, the rabbits and mice do little injury to trees eight or more years old.

Potash for Cotton Diseases

The idea of potash correcting the effects of rust in cotton is not a new one, and not confined alone to investigations in the United States. As far back as 1924, we find published in a book "Cotton in South Africa," page 183, by W. H. Scherffius and J. duP. Oosthuizen, the following:

"Black Rust"

"Yellow Leaf Blight; Potash Hunger—Plants affected by this disease are stunted and chlorotic. The leaves first become sickly yellowish, then they assume a reddish brown color and finally curl up and drop off. Rust usually occurs in definite spots or irregular areas but is not caused by any disease-producing organism. It is associated with unfavorable soil conditions and usually breaks out in crops planted on badly drained, sandy soils that are lacking in both humus and potash.

"Control of this trouble lies in improving the soil conditions. This may be effected (1) by practising a good crop rotation, (2) by plowing under green-manure crops so as to provide the necessary humus, and (3) by the application of from 50 to 100 pounds of muriate of potash to the acre."

A Potato Experience

By M. V. Bailey

Soils Department, Ohio State University

MR. WM. CLARK, Rutland, Meigs county, Ohio, has learned by experience that money spent for high-grade fertilizers for potatoes is an excellent investment. Late in March, 1929, on a mineral soil, he planted Irish Cobblers and used different amounts of a 6-8-6 fertilizer to compare with no fertilizer. A clover sod, manured at rate of 8 tons to the acre, had been plowed down. All the fertilizer was applied in the row.

The potatoes were harvested August 25, and the following yields secured:

No fertilizer	120	bushels
400 lbs. 6-8-6	140	"
800 lbs. 6-8-6	280	"

"The season was unfavorable as we had three or four days with the temperature above 90 degrees. The yield on the fertilized plots was greatly reduced by hot weather and lack of rain," reported Mr. Clark.

In Mr. Clark's community a 6-8-6 fertilizer cost about $2.35 per hundred pounds. For the 800-pound application this meant a cash expense of about $18.80. The increase resulting from it was 160 bushels of potatoes.

REVIEW OF THE POTASH EXPERIMENTS CONDUCTED IN BAVARIA IN THE YEARS, 1919-1925, BY F. FURST

"Ernaehrung der Pflanze", 23 No. 1, 1927

Abstracted by Kleeberger, Giessen, in "Zeitschrift fur Pflanzenernahrung Dungung und Bodenkunde" B, 1929, No. 1, p. 48.

The average of 624 potash experiments gave an increase in yield of 17.11%.

I kg of potash (K_2O) gave an increase of 3.62 kg of rye, 4.67 kg of wheat, 4.33 kg of barley, 3.30 kg of oats, 24.72 kg of potatoes, 73.59 kg of mangels, and 10.45 kg hay.

24.04% of the experiments showed little or no response to potash; 26.06 responded medium and on 49.36% of the soils a very decided potash deficiency was noted.

Thus approximately 76% of the experiments showed the need for potash.

Potash Starvation of Potatoes

(*From page 29*)

800	"	"	"	2-8-16
1,500	"	"	"	5-10-5
1,000	"	"	"	4-16-4
1,500	"	"	"	5-13-8
1,500	"	"	"	5-13-8
800	"	"	"	4-16-8
800	"	"	"	3-8-10
1,000	"	"	"	2-16-6
800	"	"	"	2-12-6
800	"	"	"	2-12-6
800	"	"	"	2-12-6
800	"	"	"	2-12-6
700	"	"	"	2-12-6
1,000	"	"	"	4-10-6
900	"	"	"	5-13-5
1,000	"	"	"	3-8-6
900	"	"	"	3-8-6
1,500	"	"	"	4-8-6
500	"	"	"	4-24-12
500	"	"	"	4-24-12
1,000	"	"	"	4-12½-5
1,000	"	"	"	4-12½-5
1,360	"	"	"	5-14-4½
1,400	"	"	"	3-14-7½
300	"	"	"	15-30-15
850	"	"	"	3½-18-11½

One man used no fertilizer.

In many instances these men have arrived at the analyses they are now using through the trial method. A composite of all their formulas would be a 3.7-13-7.4 applied in the row at the rate of 900 pounds per acre.

Potash in Evangeline Parish

(*From page 21*)

immature bolls. It was an odd sight to see a field of cotton streaked in such a manner. This field was located on the main highway leading by the high school and community store where there was much traveling, particularly of local farmers and business men. Immediately they would inquire the cause of this unusual cotton field. It became the principal topic of interest wherever a group of farmers were gathered.

Needless to say, the tenant was very much pleased with the results, as he harvested five bales from the 11 acres where he had previously been harvesting two to three bales. He and many of his neighbors immediately placed their order for a supply of muriate of potash for the following crop. The second year he applied potash to his entire crop, not leaving any check rows, and produced on the same 11 acres eight bales of cotton. The third year he produced 10 bales. He has had no trouble with rust since, and the old run-down farm which was considered a place only to starve a farmer and his family is today one of the best farms of the community.

Since the introduction of potash into this territory a new problem arose, not how to get farmers to use potash but how to keep them from using too much. The farmers generally used 100-200 pounds of 16 per cent superphosphate per acre in fertilizing cotton. To this they would add 100 pounds of muriate of potash, giving an unbalanced fertilizer. However, the soil was so deficient in available potash that the above mixtures gave good results, and that was what the farmer was concerned with.

In 1924 an evening school for adult farmers was organized at the Vidrine High School, also one at the Mamou High School in an adjoining community, which about 150 farmers attended. A practical course in fertilizers was offered where the functions of the plant food elements of which our soil is likely to be deficient were explained, also the sources of these plant food elements, and the form in which the plant can take them up. Each farmer who enrolled was required to conduct a cotton project and fertilize according to recommendations of the instructor. At the conclusion of this course in the fall, when the results of these projects were obtained, a general meeting of the two classes was held and these results were discussed. This discussion resulted in the farmers using 300-500 pound of a complete fertilizer of which a 4-10-7 (N-P-K) analysis is mostly used.

The county agent, Mr. T. H. Vidrine, gave his full cooperation in this work and extended it to other communities of the parish.

It would be a mere guess to attempt to estimate in dollars and cents the value potash has been to the farmers of this parish and the public in general. Since its introduction the farmers have learned to fertilize intelligently, the rust problem has been solved, and a considerable increase in yield per acre of cotton and other crops is realized. The farmers are more progressive and willing to consider new practices in farming, as the use of good seed, fertilization, cultivation, and crop rotation.

More than 300 tons of muriate of potash and 2,000 tons of 4-10-7 fertilizer were used in this parish this year, not considering the quantity of fertilizer of other analysis that was used.

Vermont

(*From page* 26)

problems in comparison with her nearby sisters; why studies of dairy feeding and management, the utilization of dairy products and by-products, of the maple sap flow and of the economics of this unique industry, of the business side of dairy farming, of forestry problems, and the like have been stressed; and why her contribution to this special series of articles may seem less striking than those furnished from most other states. Yet Vermont, a land where the dairy cow, and therefore meadows and pastures, is the backbone of existence, has an increasing interest in soil productivity. It may be noted in addition to what already has been noted that—

(1) A somewhat superficial survey of the soils of the state, covering some thousands of samples, indicates that in the great majority of cases organic matter is relatively plentiful in the soil, that nitrogen and potash are fairly plentiful, and that phosphoric acid, speaking broadly, is more likely to be lacking than other plant food.

(2) A reconnaissance soil survey of the entire state is under way under the auspices of the United States Bureau of Chemistry and Soils, the Vermont Comprehensive Rural Survey and the Experiment Station. It is expected that the field work will be completed in the fall of 1930 and the results made available at some later date.

(3) Pasture feeding is a vital factor. A 64-page station bulletin now in press, dealing with the yields and composition of unfertilized pasture grasses on many pastures, good, poor, and very poor, furnishes food for thought as well as food for animals.

Dr. Ernest Van Alstine, Professor of Agronomy of the University, has for years conducted demonstration trials all over Vermont on meadow lands and pastures. Ground limestone has very generally worked well on hay lands. The average acre gain on 70 farms following its application was approximately a half ton of hay. On 13 of these 70 where observation was continued, the same half-ton gain appeared for at least three years. On only 9 of the 70 was no gain whatsoever secured. Superphosphate, 200 to 600 pounds per acre, in the several cases in which trials were made, usually resulted in increased hay yields, averaging five-eights of a ton per acre.

The results of some of Dr. Van Alstine's pasture fertilization trials carried on in Vermont's island county recently have been published. "Nitrophoska" (15/30/15) was used in early May as a top-dressing on about 6 2/3 acres at the rate of 284 pounds per acre, followed in early and late June with 45½ pounds Calurea (34 per cent nitrogen) and in early September with another 75-pound application. The fertilized area and an adjacent area of similar size and quality of original herbage were pastured at alternate periods throughout the summer.

"Milk production for the days when the fertilized field was being pastured amounted to 3.8 times as much as it did while the unfertilized field was being pastured. This was the case in spite of the fact that 50 per cent of the pasture days and 59 per cent of the milk produced from the unfertilized field came in the spring, nearer the beginning of the lactation period, while only 39 per cent of the pasture days and 50 per cent of the milk produced on fertilized pasture came during this period.

"During the spring period the fertilized field had a little less than three times the carrying capacity of the unfertilized field, while during the summer period, the short grass period, the fertilized field had five times the carrying capacity of the unfertilized field. During the fall period, fertilizer increased the pasture feed to about 4½ times what was produced without fertilizer. In other words, fertilizing benefited the pasture during the summer and fall when benefit is most needed relatively more than it did during the spring."

Ice Wells

(*Continued from page* 30)

14 days during July, the hottest part of the summer. The temperature in the pit an inch above the ice varied from 32 to 42 degrees. Six inches above the ice it varied from 44 to 50 degrees, and a foot above, the temperature was never higher than 50 degrees Fahrenheit.

Meat, fruit and vegetables as well as milk and cream were stored in the pit and kept perfectly. No offensive odors were detected at any time during the summer in the well or in the stored products. These results obtained at Mandan represent only one season's trial and the work will be continued with some variations.

Points suggested for consideration in building an ice well are the selection of a well-drained site and provision of proper drainage so the ice water can run away from the bottom of the pit. The pit should be located as near the milk house as possible and near the well for water supply. The floor of the house should be tight so the air circulation can be reduced to a minimum during summer months. The cost of an ice well will vary with conditions, but by using home labor and the cheaper grades of lumber the cost will be very small.

Additional information regarding the ice well can be obtained from the U. S. dairy field station, Mandan, the North Dakota Agricultural College, Fargo, or the U. S. Department of Agriculture, Washington, D. C.

Fertilizers for Sweets

(From page 9)

word of caution is added that different results may obtain in a dry season.

Zimmerly (1929) worked with various fertilizer combinations on sassafras sandy loam in a rotation of Irish potatoes, sweet potatoes, and corn with cover crops. Fertilizers were applied at the rate of 2,000 lbs., 1,000 lbs., and 500 lbs. respectively to each crop.

II. Zimmerly—Average Yield of Prime Sweet Potatoes 1920-28

Treatment	Bushels per acre
3-3-15	289
6-3-12	283
3-6-12	268
6-6-9	259
9-6-6	253
3-9-9	246
6-9-6	241
3-12-6	237
12-3-6	236
9-9-3	232
15-3-3	206
15-6-3	204
3-15-3	197

The average yield of primes for nine years 1920-28 are given in the accompanying table II.

Zimmerly says, speaking of the 1,000 lb. application of 3-3-15, "A higher ammonia content, as a 4-3-15 or a 6-3-15 mixture, may be advisable for soils deficient in nitrogen. The 3-3-15 combination is similar to the 2-8-10 mixture commonly used, with the exception of the phosphoric acid content. If we multiply the 3-3-15 mixture by 2/3, we will get a 2-2-10 formula. It will be necessary to use a 2-2-10 or a 2-8-10 at the rate of 1,500 lbs. per acre to furnish the same amount of ammonia and potash as is carried in 1,000 lbs. of a 3-3-15 goods or 750 lbs. of a 4-4-20 formula. The use of the last formula is recommended from the standpoint of economy."

From pine shats to high analyses in 40 years is the story of progress in sweet potato fertilization.

Man-made Forests

(From page 6)

ada to keep the mills in operation.

Some forestry experts have predicted the end of available timber within the next decade. However, when the swish of the last mighty pine falling down the hillside where forests once reached into the skies vanishes, "man-made" trees will be ready to replace those that nature provided for the Nekoosa mills.

Not unlike the other natural resources of the country, for instance farm animals which satisfy the needs of the human race, foresters say the "primeval forest" must be domesticated if it is to withstand the blows of man's axes.

So the commercial interests in the Nekoosa-Edwards region have answered the call to replace virgin forests that have for years furnished log after log to the hungry mills. And, not unlike the early livestock breeders who developed animals to suit human needs, not unlike conservationists who have established protection for the buffalo and other animals nearing extinction, the managers of paper mills are meeting the danger of having their forests become extinct by building forests for themselves.

And in building these "man-made"

Mighty brush plows like this are used to plow the furrows in which the seedlings are planted. This plow, designed by agricultural engineers at the University of Wisconsin, is capable of plowing furrows through brush up to 10 feet in height.

forests, ways are rapidly being devised to help nature do her work in less time.

These methods and conveniences were demonstrated at the field day held in the paper milling region. Many types of machinery were shown, from a plow devised by agricultural engineers at the University of Wisconsin, which plows furrows through brush up to 10 feet in height, to a fire truck for extinguishing a forest fire purposely started so the equipment could be demonstrated in action.

With the aid of all these conveniences, the foresters expect to maintain a forest which will supply the mills during the coming centuries. They plan, by selective cutting, to make the forests permanent once they are established in sufficient size.

The project calls for the planting of 2,000 acres or about 2,500,000 trees annually for 35 years. Think of it! Seventy thousand acres of jack pine, spruce, and other pulp wood trees to furnish an endless supply of pulp to the paper mills!

Besides producing valuable timber, the present barren areas of abandoned farm lands situated near the edge of Wisconsin's "sand belt" will be beautified by the trees. Instead of bare unproductive fields to greet the tourist in his search for beauty, forests will furnish everlasting beauty. But when admiring tourists drive by the plantings, even then the subject of their delight will be furnishing and ready to furnish increasing amounts of the products they demand in paper for books, magazines, newspapers, and hundreds of other modern conveniences.

How Businesslike Should a Farmer Be?

(*From page* 14)

Improvement in these and other respects followed. The most recent returns indicate that substantial benefits have been derived. On all these farms the percentage of legumes, the amount of beef sold, and the average receipts per hen showed a gain in 1927 compared with the year before the accounting work began.

Farm bookkeeping has many substantial triumphs to its credit. One county agent who induced 41 farmers to keep accounts systematically for several years reports that as a result of this work an area formerly devoted almost exclusively to cash crops is turning rapidly to a diversified form of agriculture. The aggregate net income of these 41 farmers has been much increased.

Farm accounting has had a great boost in Illinois. In one county in that State a group of farmers who kept accounts for a number of years last year reported an income averaging about $1,000 more than the average on similar farms in the same district where no accounts were kept. This object-lesson in the value of farm bookkeeping was made widely known, with the result that farm accounting suddenly became very popular.

In a locality where most of the farmers are rather recent converts to the practice of keeping accounts, a number recently asked what benefit they got out of it. One said the first year's figures showed him how to decrease his hired labor expenses by about $200, and to cut out many unprofitable practices. This man increased his annual labor income from $387 to $2,227 within a comparatively short term of years. Another man in the same group reported that keeping accounts showed him he had been paying $1.07 for feed yielding only $1 in returns. A third farmer said his accounts showed him how, without investing a cent in additional equipment, he could raise from $300 to $500 worth of corn that he had been accustomed to buy each year.

Thousands of American farmers have gone a step further and adopted a budget system by which their farm business can be planned in advance on the basis of an estimate of probable receipts and expenditures. This system makes outlook reports on market prospects much more useful, since it permits a reasoned judgment as to the prospects for the individual farm.

Another indication that our farmers are waking up to the significance of business considerations in their work is their increased demand for crop and market news. More than 5,000,000 mimeographed reports on livestock alone were distributed by the U. S. Department of Agriculture last year, though every effort was made to keep the mailing lists down. The department's leased wire service for the transmission of market news now brings timely crop and market information to the farmers of 26 States.

How Much Bookkeeping?

In attempting to judge the business efficiency of farmers it is quite inappropriate to compare their methods with those used in other occupations. Methods suited to industrial concerns may be quite unsuited to agriculture. The real test is the suitability of the means employed to the ends desired. Farmers can afford to spend some time regularly in keeping accounts. They can not afford, however, to do this work as minutely as it is usually done in business. Bookkeeping that shows the farmer where he stands and indicates how he may alter his work to make it yield him a better return is essentially all that he requires. If he attempts too complicated a system and accumulates a multiplicity of unnecessary details, he will waste much time, and possibly throw up the entire undertaking in disgust.

In recent years American farmers have probably made more progress in the collective than in the individual use of business technique. Producer-owned and controlled cooperative marketing associations have attained a very high degree of business efficiency, as is proved by their financial results and also by the testimony of competent observers. Cooperative units have become larger and a start has been made in the coordination of sales among different cooperative associations. More than 200 farmer-owned cooperative associations now each transact an annual business exceeding $1,000,000. Such a development puts agriculture distinctly in the big business field. It necessarily calls for strict accounting, economic handling of products, and successful merchandising. It should not be many years before the business organizations of agriculture stand fully on a par with those of industry and trade. It is coming to be recognized that good business in agriculture necessitates the application of business mthods in the planning as well as in the actual conduct of production so that marketing programs will not be frustrated by burdensome surpluses.

In all probability the business education of agriculture is going forward as rapidly as can be expected and as comprehensively as the circumstances require. Many of the principles involved have not yet been determined. Economists freely acknowledge, for example, that efforts to forecast market prices on the basis of supply and demand information are as yet only partly successful. It is not possible to advise farmers with confidence just how much they should increase or decrease their acreage or livestock breeding. Farmers who should assume that everything is cut and dried and should plan their operations on the false assumption that supply and demand can be calculated as accurately in agriculture as it can be calculated in other industries would make a very hazardous mistake.

There is much in the conduct of the farm business that must be left to the judgment and intuition of the experienced farmer, since it can not be completely revealed by the most thorough-going accounting. In making haste slowly in this matter of applying business technique to agricultural practice, the farmers may disappoint certain enthusiasts; but the chances are that their policy is well advised. It is still the chief business of the farmer to produce efficiently. He can find out more to-day as to *what* he should produce than was possible heretofore. But in this field experience is at least as reliable a guide as a hasty analysis of prospective market changes. Each year sees a stronger tendency on the part of the farmers to plan their work in the light of economic information and on the basis of results disclosed by cost studies. They are probably moving as fast in this direction as they should move.

Dry Peas

(*From page* 15)

forage and a considerable amount is also used as a soiling crop.

The cow-pea is related to the bean family rather than to the true peas. It is a very old crop, a native of southwestern Asia where it is important as a human food. In America, however, it is grown only as a stock feed, being used both in the seed and forage forms. It makes an excellent green manure crop and much of the acreage is used for this purpose. The true seed belt corresponds closely with the older United States cotton belt.

The field pea is essentially a northern crop. This is the true pea family and includes many varieties. The seed of the field pea is mostly grown in Wisconsin and Michigan and to a lesser extent in adjoining States. Some production is also found in the western States, particularly Colorado. Climatically, the field pea seems to prefer the same region as the potato, though it thrives best on the heavier soils. This crop is used both for human food and for stock feeding. The dry peas used for human food are mostly the various varieties of soup peas which are also grown extensively in foreign countries. In Wisconsin, the leading soup pea State, large acreages of Green and Scotch field peas are grown. These are especially well suited for the use of splitters who prepare soup peas. The Canada field peas so commonly used for forage and seed are yellow colored. In recent years the soup pea industry has been somewhat depressed due to foreign competition.

The canning pea is probably an offshoot of the field pea and there are many varieties. Most of the canning types are rough skinned, that is, pitted or wrinkled, and the production of canning pea seed is an important industry in the western States, the leading producers being Idaho, Washington, Montana, and Colorado. Some canning pea seed is also grown in central and eastern States. In addition to the production of canning pea seed, the western region also produces much pea seed of the garden varieties which are becoming increasingly important. California also has an important dry pea production, but it is quite varied as to types.

The canning and garden peas are mostly harvested green and the commercial acreages are largely grown in the more humid parts of the United States, Wisconsin and New York leading. Wisconsin usually packs upwards of half of the United States' canned pea production, but most of the seed for this production is grown in the drier western states where yields are higher, diseases less troublesome, and harvesting weather more favorable. Certain canning pea seeds, especially the early or Alaska varieties, when not used for the growing of green peas or seed, are frequently used by splitters as soup peas. The late or wrinkled varieties are not suitable for this purpose.

The map shown herewith shows three prominent dry pea areas. The southeastern or cow-pea area, which represents essentially the cotton belt, produces peas almost entirely for stock feed. The Wisconsin-Michigan area produces largely field peas which are used as seed for forage crops and as peas for soup, and some canning pea seed. The western section from Colorado to Washington produces mostly canning and garden pea seed, though in some States like Colorado and California, a considerable variety of types is grown.

World data on dry pea production are not especially satisfactory, the only available material dating back to prewar times. At that time, however, Russia was the leading producer followed by the United States and Spain. Together, these three countries produced over three-fourths of the world's output. It is of interest to note that the foreign pea production is almost entirely of the field or soup pea types, and much of it is used as human food. This accounts for the foreign competition which has been felt so keenly in recent years by American producers of soup peas. The production of canning peas in foreign countries, outside of Canada, is quite unimportant, this being almost entirely an American industry.

What's Ahead

(*From page* 12)

tically stationary for the entire 40-year period; and in Missouri, on a considerably expanded wheat area, yields have been practically stationary. The statistics of yield per acre indicate that the southern part of the Corn Belt, as represented by Missouri and eastern Kansas, have lagged behind the northern portion, as represented by Iowa and Illinois, in the development of agricultural practices and soil-management methods that tended to raise the acre yields of the important crops.

Europe's Progress

In western Europe, there has been an enormous increase in productivity during the last 150 years, largely on account of increase in crop yields. Wheat yields per acre rose gradually from a level ranging between 6 and 10 bushels per acre in the various countries to a level of 20 bushels per acre in France and over 32 bushels per acre in England and Germany. In the smaller countries such as Denmark, even higher acre-yields have been obtained.

For many years preceding the American Civil War, the increasing demand for food to supply the needs of the growing European population resulted in rising prices that made possible the development of intensive types of agriculture in northwestern Europe. Under the common field system on the continent the soils had long before the end of the medieval era lost their power to produce more than 6 or 8 bushels of wheat per acre, but from the later half of the eighteenth to the middle of the nineteenth centuries the methods and practices used in the times of the Romans were re-adopted. The introduction of root crops and clovers from Flanders, the development of crop rotations, the increase in numbers of livestock, and the increasing and more efficient use of animal manures raised crop yields in England to 20 bushels per acre.

Wheat yields in Germany rose from 10 bushels per acre in the closing years of the eighteenth century to about 16 bushels by the middle of the nineteenth century. In France, wheat yields increased from an average of about 12 bushels per acre during the decade following the Napoleonic wars to about 16 bushels per acre by the middle of the century. Following the depression of the Napoleonic wars there was a steadily growing demand for food products as a result of the rapidly increasing urban population in England, and crop yields began to rise until by the late eighties wheat yields had risen to a fraction of a bushel less than 30 bushels per acre.

Cheap grains from the United States, following the Civil War, acted as a check upon both acreage expansion and efforts to increase yields in Europe but the figures for the last 40 or 50 years show a continued rising trend in crop yields. Whereas the average yield of wheat in England and Wales in 1884, for example, was 29.9 bushels per acre, the average yield in 1928 was about 34 bushels per acre. The average wheat yield in France in 1878 was 15.5 bushels per acre, but now it is nearly 22 bushels per acre. In Denmark the average yield of wheat in 1878 was 35 bushels per acre, but in 1928 it was 48 bushels per acre, a peak of 57 bushels per acre having been reached in 1911. In Germany the average yield in 1878 was 21 bushels per acre but in 1928 it was 34 bushels per acre. These increased yields are reported to be the result of widespread adoption of improved scientific methods in recent years and the increasing use of commercial fertilizers.

The Manless Farm

The so-called agricultural depression of the post-war period having ceased to be news, the press is now filled on the one hand with opinions of the great era of prosperity upon which agriculture is about to enter, and on the other with calculations of the deplorable state in which agriculture will find itself within the next few decades. The view is expressed, for example, that the population of the United States will become stationary within 30, 50, or 75 years—the latest opinion is that we will reach this state about the year 1960 with a total population of 150,000,000 people—and that production can be increased with such great ease that we will always have a surplus problem with consequent low prices and an agriculture that will always be in the dumps.

The optimist, to the contrary, sees a condition when the problem will be to increase production, whereas now it is to hold down production. Agriculture will have expanded to its territorial limits, says he, and if the larger population of two and more decades hence is to be fed, emphasis must once more be placed upon intensity of production—of growing the proverbial two blades. Per acre costs under these conditions will mount high, but with the use of even more efficient machinery than we now know, and the use of intensive cultivation practices, we will have low unit cost of production on the highest priced land in the world. Farm land values then will make the war-time values look like "thirty cents."

The American farmer of 50 years from now, says he, will sit in an office before an electric switchboard and control automatic plows, cultivators, and harvesters which will produce his crops without the aid of a single field laborer. Automatic farm machinery which runs without constant human supervision will be used widely. Field markers will be located so that all machines necessary for field operations will be guided by long arms attached to these monuments.

The manless machines will be able to work all night if necessary, thereby doing the work of two or three man-driven machines. Their forerunner, which has already proved successful, is a manless plow in use at Iowa State College which, after being steered across the field to make the first furrow, guides itself automatically by a guide wheel which follows the last furrow plowed until the field is completed.

Farm engineers now, he continues, are developing a soil-tilling machine which will so pulverize the soil, organic material, and plant food as to make their full richness available the same year instead of consuming two or three years. A feed-grinder starts automatically at a certain time, is fed automatically, and stops when the grain runs out. It is operated at night by electricity when the power rate is cheap.

Meanwhile, there is the practice and not the theory, of the man on the farm. Regardless of whether the population is going to continue to increase or stop at a given point, his job year after year, as he sees it, is to grow the biggest possible crop at the lowest possible cost. Examine the record of every successful farmer and you will invariably find low unit cost of production. His total operating expenses may be enormous, but when they are reduced to per unit cost, they show a profit even in the worst years of the agricultural depression.

Wouldn't it be fun to run a manless farm?

Holland

(*From page* 44)

1880. They caused a fight but at last artificials won.

Already in the first years after 1900 artificials only were used. Compost was no longer applied and the stables, originally built for a big number of cows, remained empty and the *colonial agriculture without cattle and with the use of artificial manuring only* started.


After preliminary drying, the peat blocks are stacked in neat piles for further drying.

Without doubt there is no country in the world that uses so many artificials as Holland. On an average there was used during the last years per acre of the arable soil in the form of artificial manure:

36 pounds per acre of K_2O
36 pounds per acre of P_2O_5
18 pounds per acre of N.

Holland has 5,604,694 acres arable area of which 3,143,675 acres are in pasture and meadows, 2,199,996 are under the plough, and 261,022 acres are used for horticultural purposes. Moreover it is to be considered that Holland has the following stock of cattle: horses, 363,668; cows, 2,062,771; sheep, 668,211; pigs, 1,519,245; fowls, 9,660,799, so that there is a very large production of manure.

The average yields in Holland are, per acre:

542 bus. of potatoes for industry-purposes
238 bus. of potatoes for consumption
14.27 tons of sugar beets
38.51 bus. of wheat
50.19 bus. of barley
31.8 bus. of rye
59.6 bus. of oats.

On an average the Holland farmer spends $12 on fertilizer per acre; in the peat-settlements the use of artificials is so intensive that $60 worth of fertilizer is used per acre.

The first year 267-312 pounds of K_2O (patentkali* or potash manure salt 40 per cent), 152-178 pounds of P_2O_5 (basic slag), and 134 pounds of N. (nitrate of soda or nitrate of lime) per acre are applied for the growing of potatoes. Furthermore, 890-1800 pounds of lime (shell-lime) are used.

In the second year potatoes are grown again and the same manuring but without lime, is supplied. The first year farmers raise 520 bushels of potatoes or more per acre. Such a crop contains 308 pounds of K_2O, 60 pounds of P_2O_5, and 140 pounds of N., so that there is a good balance with the quantities of manure supplied.

In the third year rye or oats are grown in which clover is sown.

Later on potatoes and rye or oats are grown alternately. Sometimes people raise two crops of potatoes in succession and then oats, or horse-beans, or beets.

When the soil has been cultivated for a number of years, the quantities of fertilizers are lowered a little. Cereals get less than indicated for potatoes, that is to say two-thirds of the quantities for potatoes.

Still the quantities supplied for potatoes on soils that are under cultivation for 50 years are about 180 pounds of K_2O, 90 pounds of P_2O_5, and 90 pounds of N. per acre.

The use of lime is not regular; some people think that sufficient lime is supplied with the other fertilizers (artificials); other people, for instance, apply 710 pounds of shell-lime per acre every four or five years.

*Patentkali-sulphate of potash magnesia.

On Other Soils

In connection with the great number of cattle in Holland a big quantity of manure is produced. In other parts, as, for instance, in the peat-colonies (veenkolonien), and in some horticultural centers, fertilizers are used exclusively. The potash is used on all sandy and peaty soils in Holland.

On the clay soils the practice of using potash has developed only within the last years. Before that people had thought that the use of potash on these soils was not necessary because they were rich in potash. The results showed, however, that in consequence of the intensive culture, of the increase of the cultivation of beets and potatoes, of the increased use of nitrogen many clay soils responded readily to the use of potash. In consequence of the rather humid climate of Holland considerable quantities of both lime and potash are leached out of these soils and so people generally suppose that soils containing little lime also contain very little potash. On the new clay *polders** one can cultivate for a number of years without the use of potash. The longer the soil is under cultivation and the more it is handled intensively, the sooner the use of potash will be necessary. A very important factor is the origin of the clay soils. Sea clay soils are able to supply soluble potash for a greater length of time than river clay, and the river clay formed by the Rhine contains more potash than that from the Maas.

During the last 10 years people have discovered clay soils in different parts of Holland which, in experiments, proved to be very responsive to potash. These parts include different old sea clay polders in the provinces of Groningen, Friesland, North Holland, South Holland, North Brabant and Zeeland; but to a larger degree, they were the river clay polders along the great rivers, especially along the Maas in the provinces of Gelderland and South Holland. Some soils contained so little potash that different crops showed distinct signs of potash starvation.

A very interesting region in this respect is the Bommelerwaard situated between the rivers Maas and Waal which consists of river clay. In this case, the experiments were started seven years ago and potash is now generally used in consequence of the splendid results obtained. Under the supervision of Mr. H. Lindeman, Director of the N. V. Vereenigde Kalimaatschappij, more than 200 experiments have been carried on in this rather small district. During the last few years there have been added hereto the well-known central experimental fields for potash in Hedel and Ammerzoden. The soil at Hedel contains in average 30 per cent clay and at Ammerzoden, the clay runs as high as 50 per cent.

* A polder is land that has been reclaimed from the sea.

The peat is cut into blocks and dried for fuel. This is a scene at Valchemont, Holland.

In spite of this fact, the crops grown on these soils show marked increases in yield when potash is applied, and show distinct signs of potash deficiency when no potash is given.

The results on these experimental fields have had a great influence on the use of potash in Holland, especially since the liberal use of potash prevents the turning blue of potatoes.

Frost Warnings

(*From page* 4)

blank of climatic perfection, except for a few shakes and showers.

There are no professional rememberers out in the bonny belt. This is simply because they are all organized to acclaim that it never could be any nicer and under no circumstances any worse. Here we are optimists with the creed that the worst has passed and the best is yet to come. It is the faith of the mighty in the midst of the snows. It is the crystal of comfort in a cake of ice.

Yet this same philosophy of the stoic North has enabled us to vote the Republican ticket for half a century and pay higher tariff duties at the same time, without flinching. What Prometheus could dare for more?

I appreciate our fleeting summers because I have never lived through a California winter in B. V. D.'s, or puddled through any of Oregon's winters in a raincoat. As I take the moth-balls from the pockets of my frayed balbriggan for another cold wave, it is with no sigh of resignation or sense of thwarted hopes. Furthermore, I am very proud of a paisley scarf my wife bought for me, with more discrimination than is usual with neckties. So I welcome the falling mercury as a chance to display it.

This reminds me to ask what do the doting grandmas do in the winterless climes with no lumpy woolen socks, gaudy wristlets, and kid mittens to knit and darn? Likewise and more pertinent still, what can possibly induce and prolong a first class Thanksgiving appetite in milder states than ours? What are the Christmas substitutes out there for chimneys, that lead to expectant stockings and sleighbells that lull to dreamland?

We were raised on the traditions of frigid New England and we settled the West with brawn built out of pumpkin pies and baked beans. Climates that encourage hot tamales and mint juleps do not jibe with our inherited and acquired personal prejudices.

Of course in our own slushy cities there *are* children so bereft of their rights that they have never heard a sleigh-bell or seen a cutter or a bob—except in the barber shops. To them the change from the vernal equinox to the radiator knocks means less of parks and more of janitors. This superficial shielding and softening of the resistance and the senses is something to be condoned in our modern method of child rearing.

In my garden the last mosquito has gone and the last tomato is harvested. I have yanked up the incomplete cantaloupes and the tentative turnips, sinking my spade in the earth with fond hopes of longer growing seasons and earlier varieties next year.

My neighbor goes away with a gun on his shoulder for duck shooting forays, probably to return via the meat market under cover of the dusk. It is the last call for outdoor sporting, and I long to join him in his tramp before the season of artificial amusement begins.

As the period of parlor pastime draws nigh, the obliging husband keenly realizes that the great bridge expert is aptly named Work. To us fellows with no memory for cards played and unplayed, dental bridge holds no greater terror than the other kind. There are folks, however, who insist that bridge makes a long winter evening shorter, but they usually hold the aces.

LIKE most public men, I think best while on my feet. Hence I would enjoy playing a bridge game standing up, with the result that I might not be "set" quite so often. Waiting so long for some "specialist" to think hard and get the upper hand on me is indeed debilitating. And the acrid aftermath of trumping your partner for a loss! I verily believe that bridge holds the only post-mortem where the deads ones are conscious of it. But in order not to spoil somebody's round of pleasure, I crowd my knees under the table, grit my teeth, and blunder along. I am sure of grabbing the little prize they hand out with a ha-ha

Then, of course, some blustery night it's time to attend a dancing party. Just as you get into your slippers for another selfish evening, your Best Friend reminds you that the Bore-climbers are throwing a shuffle fest. Sure, you'd like a chance to wear the tux after investing so much in overhead to wear over your underwear. The only time that it gets the air otherwise is at spring house-cleaning.

The honorable Farm Board itself could not relieve the pangs of a surplus corn crop under these circumstances. But spavins, spring-halt, and ringbone make no difference after the music starts and the first heat is run. Stirrings of forgotten money-musks and devils' dreams loosen our rusty shanks and bring us the blessings of joy after a preamble of grumbling. If by modern fad some old-time fiddler has been secured for the event, the years reel off like a cinema of the centuries until Home Sweet Home reminds us of a furnace to be banked and morning paths to shovel.

Aurora borealis twinkles above us as we stumble home through the muffled drifts. Its gleam reminds us in this mood of gayety how we used to pile into mammoth country bob-sleds with bags of pop-corn balls and palpitating hearts. Taxis and tuxes did not fret us in those halcyon days of hilarity. Nowadays they legislate the narrow sleigh to the backwoods and travelers prefer to roll instead of sliding.

THE list of abandoned winter traditions are many. My children have never ridden in a sleigh, have never seen a kerosene lamp, have never thawed out a pump, have never worn red flannels. They have never arisen in their shirt-tails on a frigid morning to kindle a fire in the cook stove with corn-cobs and cuss words. Thank heaven, they have never seen me attempt to wrestle a two-ton, eight-foot base burner through a newly varnished door and across a cherished rag carpet made from my fat aunt's wedding dress. They have been spared the sounds accompanying the fitting of stove pipe and wire. They have never found the family dipper frozen solid in the water pail. They have never wound the clock and coaxed out the cat. Almanacs mean nothing to them and the sun-dogs bark in vain. In other words, Winter has been reduced to Cleveland's happy phraseology, that of "innocuous desuetude."

We have actually reached a point where we are proud of our climate. I have just returned from an autumnal jaunt with some jaded Kansans browsing up among our minor mountains.

I was pleased to note that the hills our farmers call infernal, they dubbed "eternal." I have observed Jack Frost nibbling at the trees and shrubs ever since I was a child, but it took the appreciation of southern friends to stir my pride in it.

In one spot in particular they halted the parade to pause and drink in this visual nectar. Oaks, maples, and brilliant sumac bushes had felt the first dab of winter war paint and had spread an oriental rug to soften the pathway of departing summer.

They forgot to ask me again how cold it got in January, but they were elated to think they had visited us when the real estate was looking even better than the prospectus prophesied.

SO, like the squirrels, we know full well that the season of cloistered congeniality is approaching and sense it in the whiff of the leaf fires and the tang of the November breeze. We, too, busy ourselves gathering a few herbs and nuts together to fortify the stores of eatables required to meet the rigors of the dormant time.

Human and animal life in the North share a common beleaguered brotherhood as the days get shorter and the rivers darken and congeal. But just as the bear and the groundhog retire to dream anew of the blueberries, wild honey, and toothsome roots of 1930, we likewise sort our canned goods and calculate our coal piles with hopeful minds on the spring surcease.

Somehow, we never think with dread about the spring mud or the barrowfuls of cinders, the leaky roofs and the high cost of keeping comfortable. In a pinch we can go to the library and borrow books on the tropics or scan some of the latter day literature one handles with tongs. Or possibly a political argument will provide a little free heat by friction.

Winter is the time when farm folks have time to become receptive audiences and extension workers extend themselves by every means in their power. It must be hard to be an agriculturist in climates without a recess.

I know farmers who have made more money with a lead pencil and self-analysis in winter than they did all summer long. The radio reception is better on clear, cold nights and the rural mail carriers tote college courses to stable seminars.

Yonder soil under its coverlet of snow and ice now becomes a tantilizing puzzle to be solved with the solvent of modern methods. By study and testing in winter one finds that the cows deemed to be gold mines were simply gold minus.

To the studious farmer guess-work glimmers away when the thaws come in the spring. Old-timers used to keep a pack of cards for a winter tournament of old sledge, but the farmer of today uses his cards to make an index. The farmers of today spend the winter in absorbing something besides bad air and batter cakes.

HENCE we shall hibernate with malice toward none and with expectations of a ninety per cent hatch in the spring. Should you chance upon any helpful literature that might aid us in fomenting some critical commentaries, send it to the tolerant publishers, who are familiar with our whereabouts.

Once more I go out and look at my thermometer. My only fear is that its longitudinal capacity below the thirty-two degree mark is not going to be sufficient. However, it is a good stout weather glass which has stood the attack of many gales and glaciers. No matter what it does, I am going to believe it religiously and govern myself accordingly.

So I accept my climate and adopt my winter without apology to readers in fancier places. Every time it hits me a slap in the face, I imagine I am not getting worse treatment than I earned.

And thus I close with good wishes and a polar period.

STOP—LOOK—LISTEN

"Hey, Mike," said a workman to his fellow laborer, "Don't come down that ladder on the north corner. I took it away."—*Fyr-Fyter News.*

President Hoover has smashed another precedent, and now follows Mrs. Hoover down the aisle or into the limousine, despite the rule that the President must go first, and we honor him for it, although, of course, it may be that he got tired of being told that his coat needed pressing.

Two ladies stopped at a livery stable and asked for a gentle horse to drive.

The liveryman brought out one, saying: "This horse is perfectly gentle so long as you don't let the rein get under his tail."

Within a few hours they returned. "How did you get along?" asked the liveryman.

"Oh, we got along just fine. Had a couple of showers while we were out, but we took turns holding the parasol over the horse."

The teacher was reading the story of the man who swam across the Tiber three times, when a small boy sniggered.

"Don't you believe he did it, Jimmy?" the teacher asked.

"Yes, I believe it," Jimmy answered, "but I wonder why he didn't make it four times and get back to the side where he left his clothes."

—*Tit-Bits* (*London*).

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

"Ah takes nothin'," responded the bridegroom, gloomily. "Ah's being tooked."—*Tit-Bits* (*London*).

"FIRST THINGS FIRST"

"A story is told of a Durban gentleman who had a farm in the Eastern Transvaal. This man knew very little about farming, and had only a limited amount of money. Running short of cash, he telegraphed to his manager, "Shear the sheep as soon as possible." His manager wired back: "Impossible to shear the sheep; the ewes are lambing." So again he telegraphed, "Stop the lambing and go on with the shearing."

Wifie: "It's my birthday today, and you haven't remembered!"

Hubby: "My dear, how should I remember? You don't look a day older!"

"Dey ain't no justice no mo'," mourned Rufus to a friend. "Ah's a sick man. Guess Ah's gwine to die suah. De doctah says my veins is too close an' dat Ah got very close veins, an' de only help fo' me am to eat chicken broth three times a day an' stay in nights. An dat jet' can't be done."

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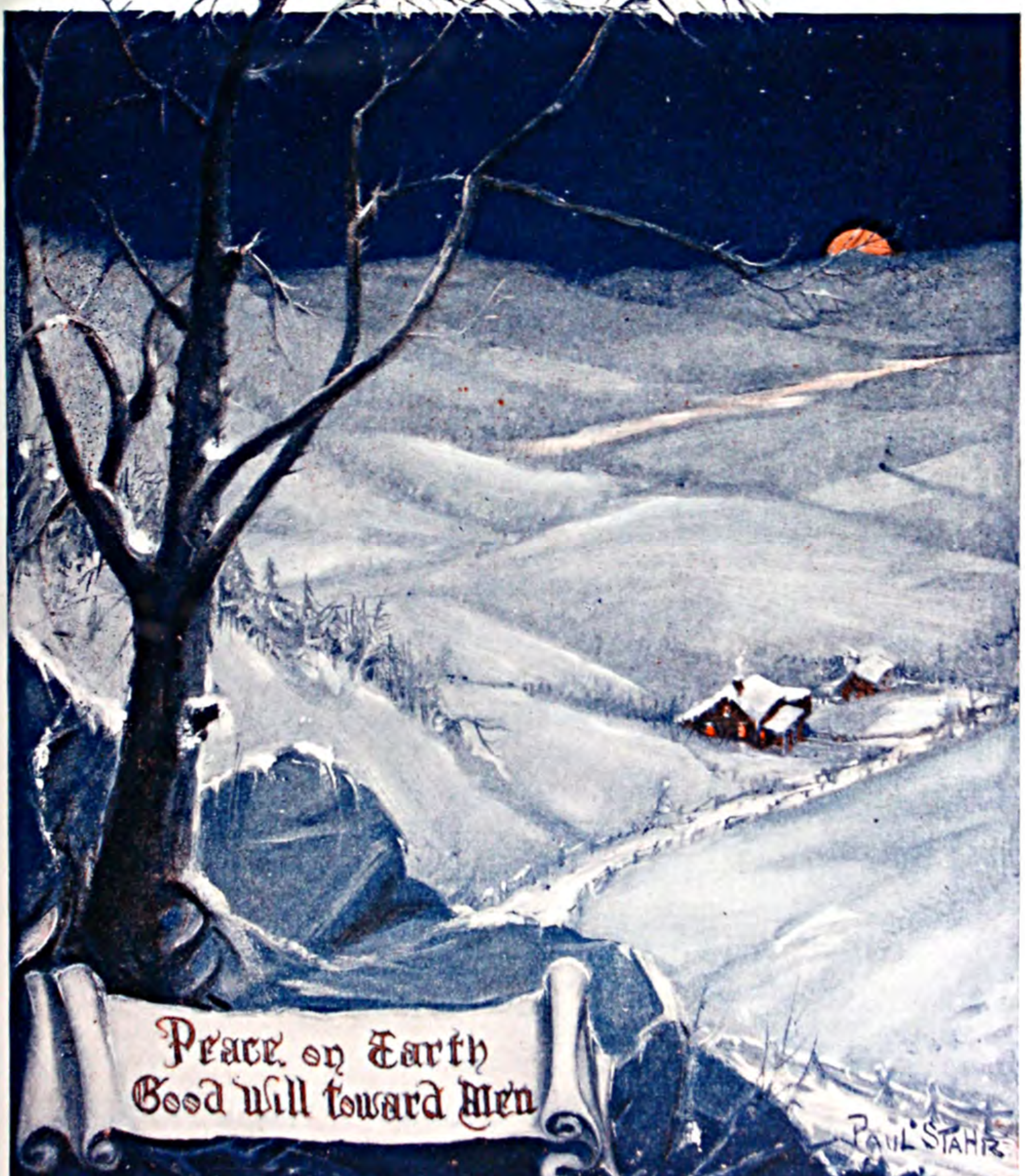

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VOLUME XIII NUMBER SIX

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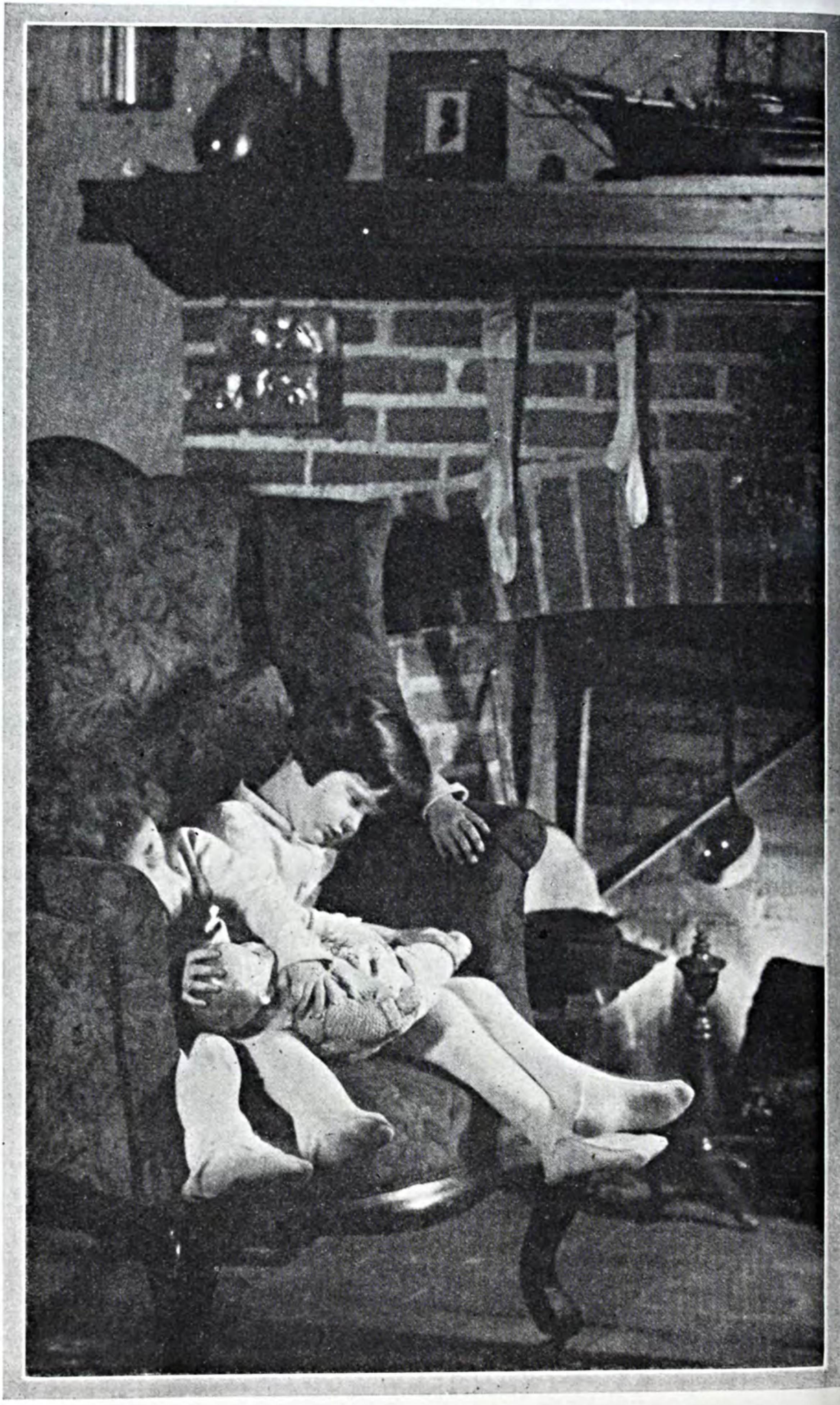

ASLEEP ON THE JOB

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VOL. XIII NEW YORK, DECEMBER, 1929 No. 6

Jeff wishes you a calm Christmas—

YOUR YULE

By Jeff McDermid

IS your Yule what it used to be? Have you lost half its glamor even as you have adopted half hose to hang instead of the long woolen stockings of boyhood? But if your socks and sentiment have lost half their original capacity for Christmas cheer, remember there are other minds more open to the thrill of this gleeful holiday. You now belong to the generation of doers and donors, and it ill becomes us to be pooh-ers and groaners when a little judicious spending will bring somebody delight for a dime.

Christmas is passed by those who enjoy it and others who just endure it. I concede that it has become a panic on both sides of the counter. I admit that Dad's share often consists of fumigating flares and minstrel neckties. I allow that Mother-in-law has everything she deserves that the law will permit. I agree that those maiden aunts who refuse to let you remember their birthdays are expecting something on the great anniversary of faith, hope, and charity. I perceive without difficulty that the goose hangs high on the price scale and that I must put another leaf in the table and there won't be any left-overs. Caught as we are between coal bills, insurance premiums, and tax receipts, I am going to enjoy this thing like Tom Pinch did when he found it a credit to be jolly.

If it were possible for me to go to the chain store and buy youth, hope, and health to dispense to well-chosen friends on Christmas, I wonder if they would appreciate it. Or would they want to exchange their gifts for the temporary trinkets I am obliged to offer them instead?

Many of them would act as they do now were I able to shower them with the priceless possessions named. Those receiving health would be the most grateful, for with it would go a little of both other gifts. If I gave youth alone to many of my cronies they would burn it quicker than any members of the flaming generation we condemn. If I offered hope they would discard it as the cheap gift of a Scotch philosopher.

But if such physical and spiritual gifts could be given and received with honest tokens of satisfaction at Christmas what a heap of improvement we could make manifest in each other's personalities! I have a few friends who would give me several pounds of flesh to pad my lean and hungry frame, but the additional weight to carry might rob me of that alertness which Caesar so much feared in his retainers. My stenographer could stand a package of good looks for a holiday gift, but somebody must give me a parcel of stamina before I offer it to her. Another girl, bizarre, blonde, and brainless, would only trade her Christmas box of intellect unopened for six sodas and a gallon of skin destroyer.

YET we would make the greatest improvement in our friends by giving them just a little imagination here, a little energy there, a dash of fortitude in another spot, a sock full of humor for another person, a carton of courage to a misanthrope, and a sprinkling of human appreciation and thankfulness to all of us.

Altering our friends' moods and modes, however, is not quite Christmaslike in tone, regardless of its temptations. Probably we could perform miracles of equal value by a greater attention to our own shortcomings.

For after all, it is *our* eyes and *our* ears and *our* senses which are set on edge by the faults of those around us, and could we but graft onto ourselves some insulating material that would keep our friends from shocking us maybe it would be as satisfactory as to have them all made over to order.

Americans may be said to enjoy a whole calendar of Christmases. You recall the amusing story of how the skeptical garage man, overwhelmed at the simultaneous appearance of Edison and Ford at his door, offered to "crown John Burroughs with a wrench if they claimed he was Santa Claus.

Yet the lean Henry Ford and the smooth-shaven Edison and all they typify in the march of invention and marvelous ingenuity surely spell a universal and constant Santa Claus to the millions, almost regardless of means.

OUR ancestors at the Yuletide were thankful to be clean, warm, healthy, and well-fed; but in our ambitious and restless era we look beyond the prime creature comforts for something novel and de luxe.

Steam, gas, electricity, magnetism, radio, super-power transmission, talking pictures, television, flying, and what next? As Galsworthy remarks, "those amazing conquests of the present age have crowded one another so fast that we have never had time to assimilate them." Truly he opines that each of those marvels would have been a subject of careful study and thought by thousands had we not been plunged into a state of chronic mental dyspepsia. He says modern man has absorbed these wonders so fast and realized their value so little because we have the appetite of a cormorant and the digestive powers of an elderly gentleman.

The stunning effect, the stupefying result of all these recurring discoveries has frittered down the line to the youngest of us so that "what to give at Christmas" becomes a greater national conundrum than "driving the wolf from the door" used to be. If you want some fun, try giving wristlets and ginger cookies!

(*Turn to page* 61)

Mr. Cole of Toano, Virginia, planted Irish Cobblers as an inter-crop with strawberries. The rows of strawberries were five feet apart.

Plant Less—Make More

By John R. Hutcheson

Director of Extension Service in Virginia

THE early potato growers of the southeastern States put on last year a very effective demonstration of the fact that when those interested in the production and marketing of a so-called "money crop" are given full and complete "outlook" information they will cooperate in adjusting production to market demands.

For many years the potato growers of Northampton and Accomac counties on the eastern shore of Virginia were pointed to as the most successful farmers in Virginia and among the most successful farmers in the United States. This prosperity was attributed to the fact that the farmers in these counties had learned how to grow and market early potatoes successfully. They organized the Eastern Shore Produce Exchange about 25 years ago and gradually increased the acreage in potatoes as they found new markets for them. Over a period of 20 years there was an increase of from 10,000 to 90,000 acres planted to early potatoes, and year in and year out the potato crop was profitable. During this period land values increased from $25.00 to $500.00 per acre, and for a period of five years it is said that not an acre of land changed hands in Accomac county for less than $250.00. It seemed that no other section could produce early potatoes as economically or sell them as efficiently as could the growers on the Eastern Shore.

Roads were rapidly improved, banks flourished, and the schools and churches were of the best. Such a condition created a feeling of independence and self-satisfaction seldom seen among southern farmers. These potato growers thought that they had solved their farm problem and that they had "the world by the tail with a down hill swing."

This prosperous condition continued for a year or two after the World War; then trouble began. Farmers in North and South Carolina who had been satisfied to grow cotton were hit by the boll-weevil and by increased competition from Texas. They were advised to diversify and began looking for a new money crop. Some one suggested that they try early potatoes and for a few years early potato production was very profitable. This led to rapid increases in acreage all the way from Florida to Virginia. North Carolina farmers planted 15,000 acres of potatoes in 1919 and 46,000 in 1928. South Carolina farmers increased their plantings from 9,000 to 24,000 during the same period. The increased acreage in Florida was almost as great. During this same period Virginia farmers did not increase their acreage materially but did increase their yields per acre; the average number of bushels per acre increasing approximately 25 per cent during this period.

The net result of this increased production was that the early potato growers began to lose money about two out of every three years and early potato production became a highly speculative business. Not only did the new growers in the Carolinas lose money, but the old growers on the eastern shore of Virginia and Maryland, who had been prosperous for 20 years, began to go in debt. The co-operative marketing exchanges which had functioned so successfully in the past tried heroically to meet the situation but without success. With no control of production in the new areas to the south, and with increased competition from speculative buyers in their own territory, they had a hard row to hoe.

Establish Committee

In 1927 the growers, bankers, and potato sellers of Virginia and Maryland established a "quotations committee" and a clearing house for the purpose of trying to meet the situation. This quotations committee did a good job as long as the growers and dealers stuck, and it undoubtedly saved the early potato growers from terrific losses during that year, but it was not long before the speculators and independents began to cut in on the quotations committee and the people making up the committee got tired of "holding the umbrella." The activities of the quotations committee, as is often the case,

A normal scene on the Eastern Shore any day during the shipping season.

This group of Virginia farmers are inspecting a "source-of-seed" demonstration.

were especially helpful to those growers south of Virginia who did not cooperate with the committee.

The good prices which resulted from the activities of the quotations committee in 1927 caused a considerable expansion of acreage the following year. For instance, North Carolina growers planted 36,000 acres in 1927 and 46,000 acres in 1928. South Carolina growers planted 18,000 acres in 1927 and 24,000 acres in 1928. Virginia growers planted 78,000 acres in 1927 and 90,000 acres in 1928, and the Maryland growers planted 15,000 acres in 1927 and 17,000 acres in 1928. This expansion in acreage, coupled with good weather, resulted in the largest production of early potatoes on record. The large production was, of course, accompanied by very disastrous prices. The total production of early potatoes in Maryland, Virginia, and the Carolinas in 1927 was 23,000,000 bushels which sold for $33,000,000. The growers in these States produced 26,000,000 bushels in 1928 for which they received only $11,000,000.

Everybody that touched potatoes in 1928 lost money, and for a time there was complete demoralization throughout the early potato producing section. However, the eastern shore people are not folks to take a beating lying down. The officers of the Cooperative Exchange, farmers, bankers, dealers, and others realized that since potatoes were their main source of income, something must be done to improve conditions before another year. They got in touch with the State Conservation and Development Commission and the extension division of the state agricultural college and asked these people to make a survey and work out a plan for bringing order out of chaos. The representatives of these organizations in Virginia got in touch with representatives of similar organizations in the other early potato producing States and made a rapid but complete survey. This survey indicated three things:

(1) That the problem confronting the early potato industry was a long time problem.

(2) That this problem was a regional one.

(3) That it could only be solved by the closest possible cooperation of every one interested in the production and marketing of early potatoes.

These facts were presented to a

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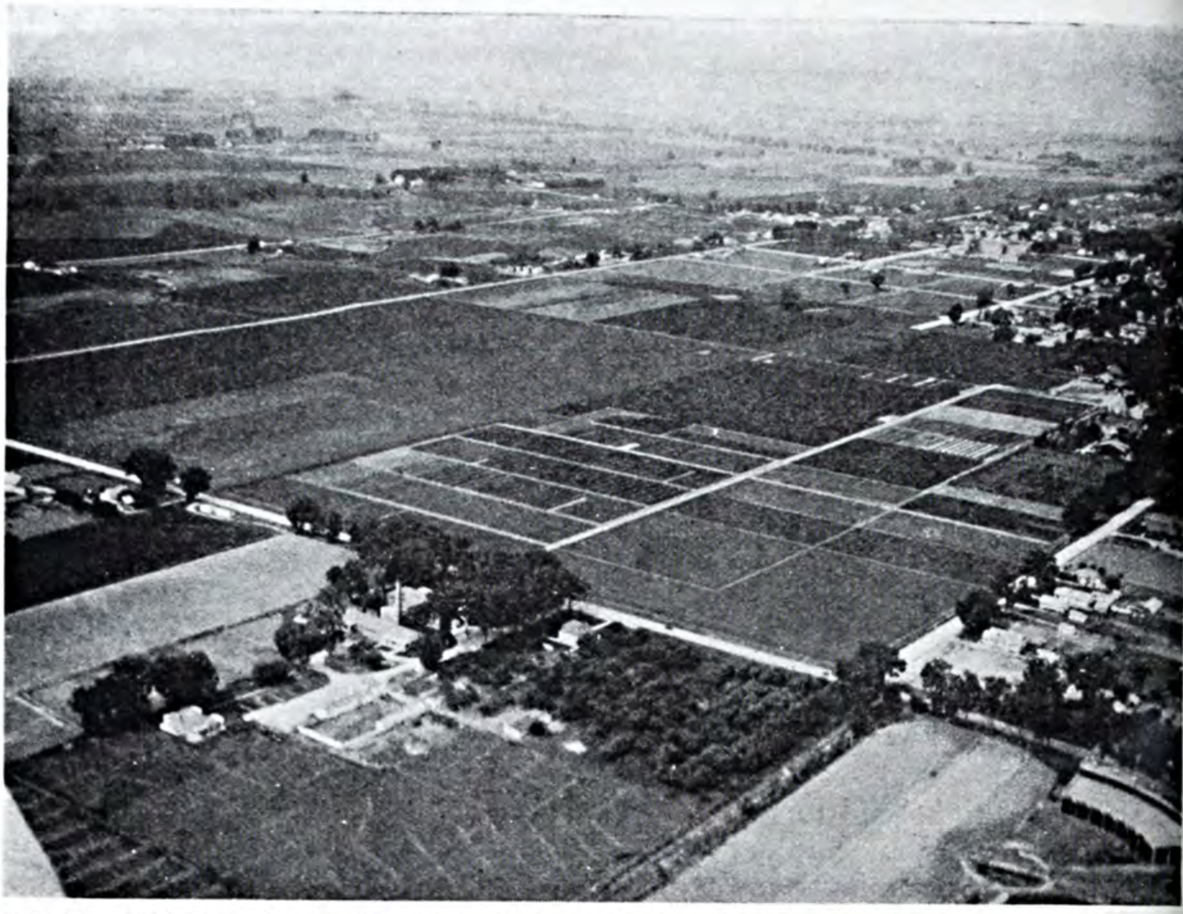


A bird's-eye view of the experimental plots, agronomy, and chemistry sections of the Colorado Agricultural Experiment Station.

COLORADO
Agricultural Experiment Station

By I. G. Kinghorn

Editor, Colorado Agricultural College

COLORADO has been and still is a paradise for scientists.

Ranging in altitude from 3,400 to 14,420 feet above sea level, this State presents conditions similar to those from the corn belt all the way up to the arctic.

In that wide range of climatic conditions, variations as great exist in crops, soils, livestock, plant and animal diseases, and the everyday cooking duties of the housewife.

With the western third of the State cut off from the eastern portion by the Continental Divide, workers have had difficulty in serving both areas. Agricultural conditions vary widely. In that stretch of rough country between the two regions there are 43 mountain peaks over 14,000 feet above sea level. Among them are many beautiful valleys, mesas, and plateaus where various types of agriculture flourish.

The stories of the research workers of the Colorado Experiment Station who have crossed those Rocky Mountains, back and forth and in and out among the numerous ranges, are interesting. They are dramatic in many cases, but the modesty of those men and women has prevented them telling their most dramatic experiences.

Colorado is renowned as a mining State, and it was mining that gave agriculture its start in this mountainous territory. With the influx in the 70's and 80's of miners and prospectors by the thousands, the demand for food increased in proportion. Every little strip of land in the mountains that gave promise of raising a crop was cultivated.

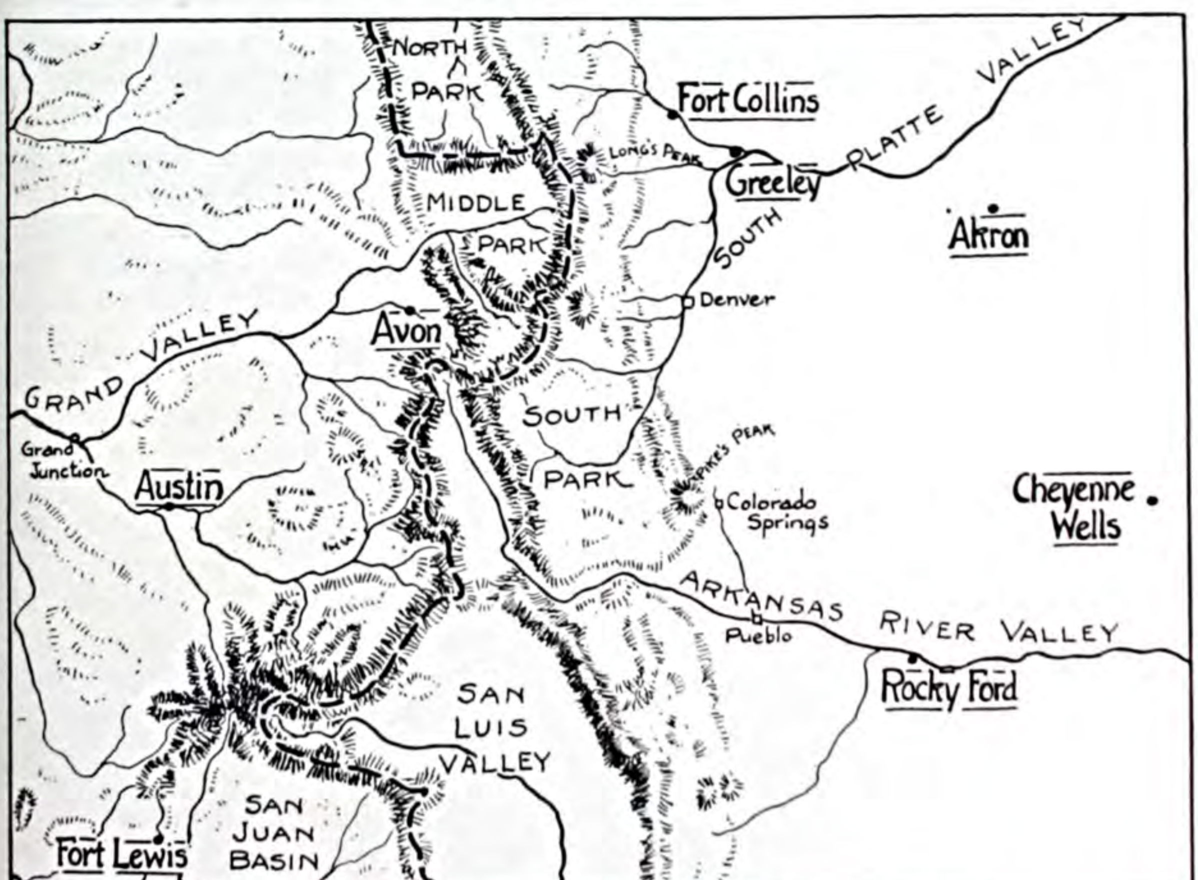
Costly transportation emphasized the necessity for lower costs of production or higher yields. The experiment station at Fort Collins, established in 1888, with branches in different sections of the State, is still solving these and other economic problems.

No sooner had the stations begun their work in earnest than the mining industry started on the decline. Then, more than ever, was there a call for help in agriculture. The plains region east of the Rockies was gradually settled, the western slope fruit industry developed, and both cattle and sheep growing thrived in the mountains and more arid sections of the State.

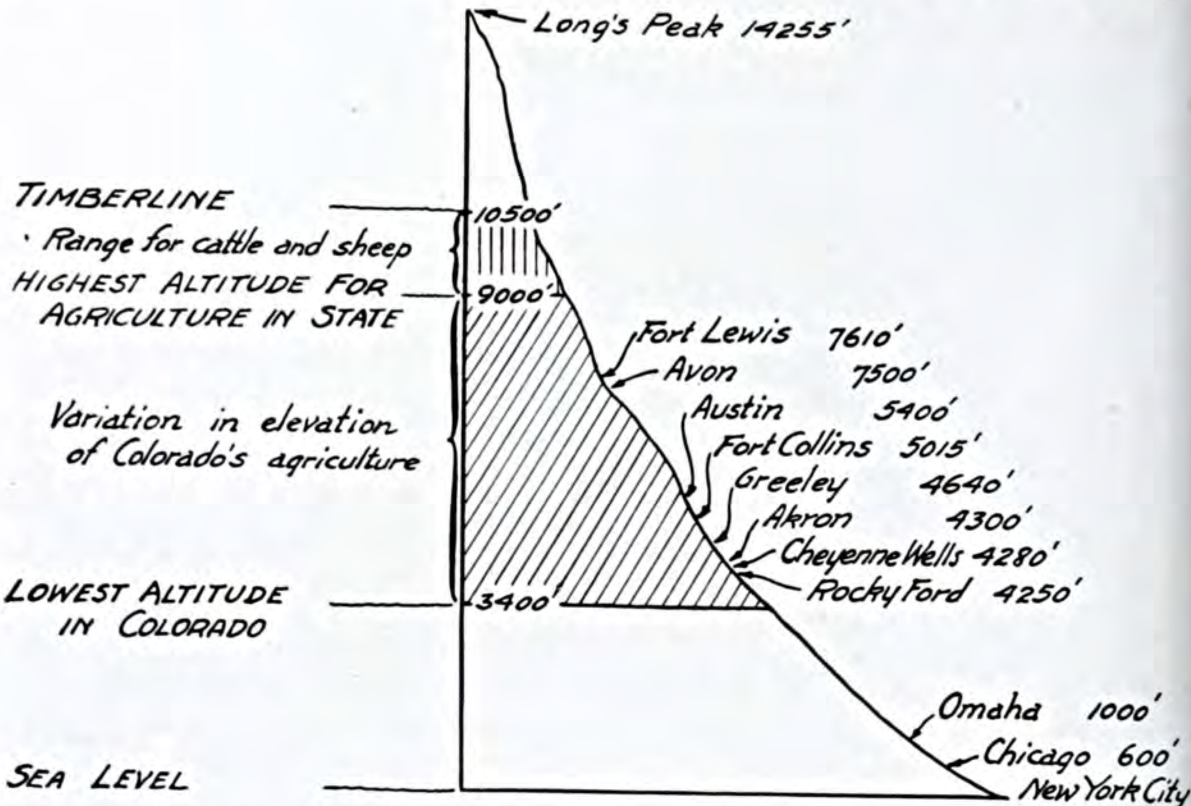
Because Colorado's rainfall is so sparse, irrigation is practiced whereever possible. This has complicated the problems of station workers, since it is necessary to select plant types for dry lands, irrigated lands, and for the different mountainous sections.

To care for various regions, substations have been established in different parts of the State. The home station at Fort Collins is devoted to work that will be generally adaptable over the State. The potato sub-station, maintained in cooperation with the U. S. Department of Agriculture, is at Greeley. Plains sub-stations are located at Akron and Cheyenne Wells, the former maintained in cooperation with the U. S. Department of Agriculture.

High-altitude vegetable growing is carried on at Avon; orchard management is studied at Austin; and crops



This sketch of Colorado shows the location of its main and branch experiment stations. Note how the Continental Divide and other mountains cut up the State.



and livestock for the San Juan Basin are chief projects at the high-altitude station at the Fort Lewis School. The Rocky Ford station covers work for the Arkansas valley, more nearly typical of corn belt conditions than any other. Several other sub-stations have been maintained temporarily at different places for emergency and special work.

Crops Came First

The agronomists were first to take improvements to the farmer, largely due to the fact that Professor A. E. Blount, in his development of the college farm, for six years prior to the establishment of the station had been conducting experiments with "grains, grasses, and vegetables, 460 separate plots being cultivated." He had tested 221 kinds of winter and spring wheat and his introduction of Defiance wheat for the irrigated districts increased the yields from 15 to 25 per cent. A prominent Colorado miller estimated a few years ago that Defiance wheat, up to 1917 when it was practically replaced by improved varieties, increased wheat profits to farmers by over $14,000,000.

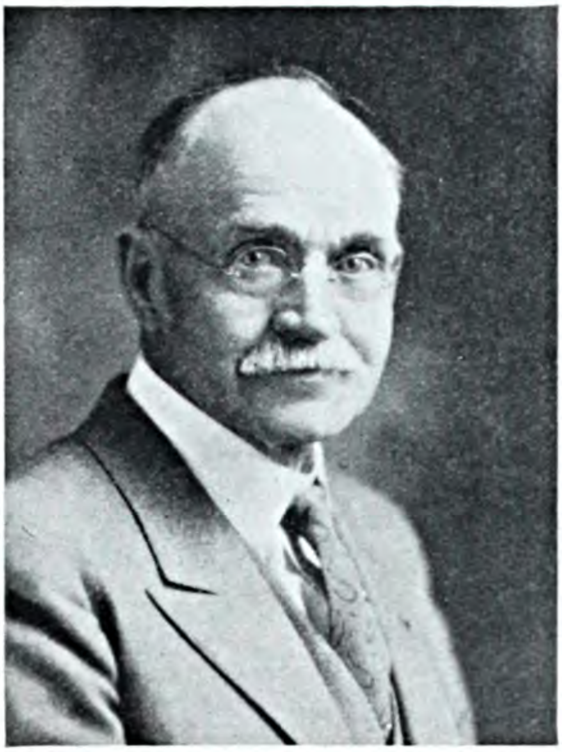
Since that time the agronomists have developed Colsess barley, Colorado 37 oats, and other crop varieties and strains suitable for the great diversity of conditions.

Sugar beet investigations by station employees were the beginnings of what is today one of Colorado's greatest industries—the manufacture of beet sugar. Investigations with alfalfa and other legumes helped to develop the extensive cattle and lamb-feeding industries of northern Colorado, the Arkansas valley, San Luis valley and parts of the Western Slope.

Discovery of the hardy and non-hardy strains of alfalfa by P. K. Blinn at the Rocky Ford station did much to improve the hay-producing industry. It was also at the Rocky Ford station that disease-resistant canteloupes were developed years ago. The Arkansas valley today produces an important part of the country's supply of canteloupe, cucumber, and red-clover seed, due largely to station activities.

Forestry Is a Problem

Growing trees is a problem on the plains of eastern Colorado. In addition to determining field crops adaptable to that section, and demonstrating the soundness of balancing the farm program with livestock production, the Akron Plains Station has successfully grown over 5,000 trees of several varieties which stand as living reminders to plains settlers of the possibilities in shelterbelts, windbreaks, and home landscaping. The annual rainfall there averages less than 18 inches.



Dr. C. P. Gillette, Director of the Colorado Experiment Station, is also the State Entomologist.

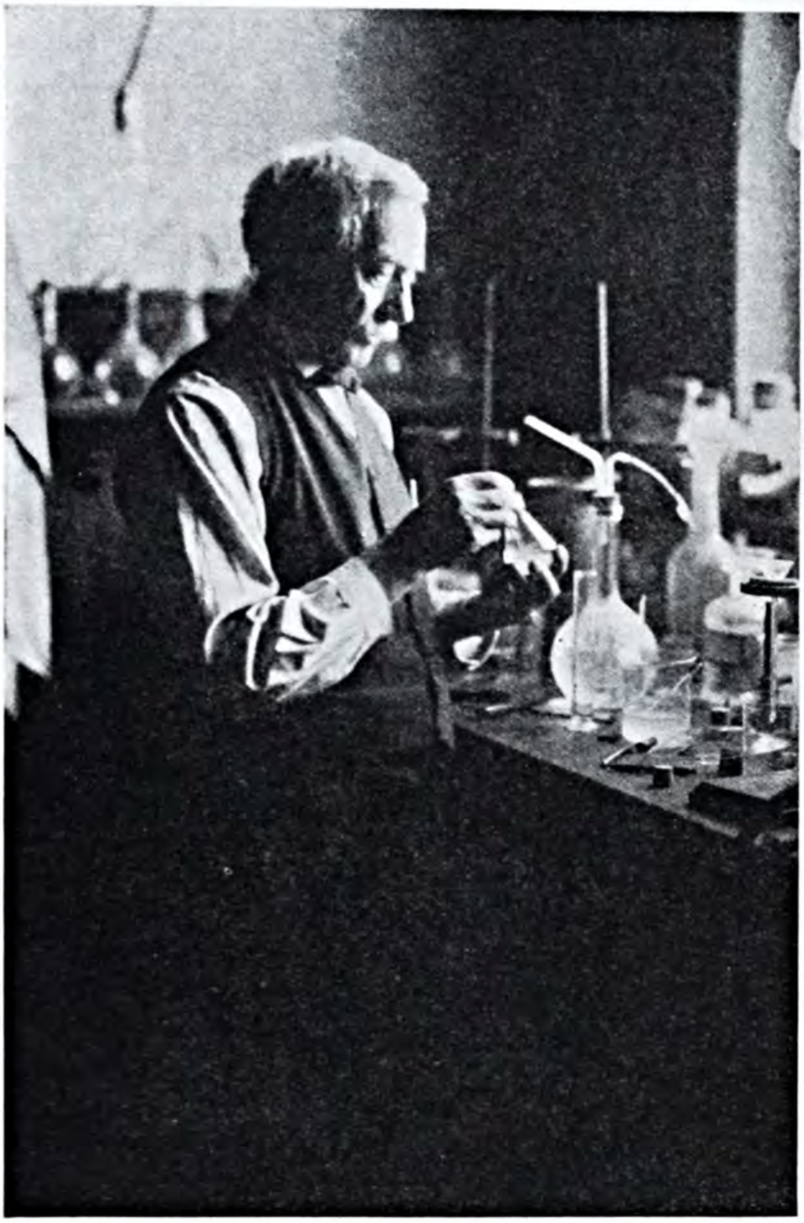
At the Fort Lewis sub-station, 7,610 feet above the sea, extensive investigations with field and horticultural crops for the higher regions have been carried on. Seed from many promising strains and varieties have been distributed among mountain farmers for field testing and several are showing favorable results.

At Austin, in the heart of the fruit district of the Western Slope, the experimental and demonstrational orchard is maintained. Although it is one of the oldest and best-established fruit sections of the State, growers in the Grand valley have their problems and make constant use of the station orchard, both for specific information and to watch results with different methods. The entomological section of the station, in cooperation with the state entomologist, who is also director of the Colorado Experiment Station, has a summer field agent at Grand Junction, where extensive work has been done for years on the control of codling moth and other fruit and farm pests.

The growing of vegetables for the late summer and fall markets was introduced in the mountainous sections several years ago. Head-lettuce production attracted hundreds of growers within a very short time but seed and disease problems, as well as marketing troubles, brought disaster to many. It was then the experimental farm at Avon was purchased and a series of tests and long-time demonstrations started.

Under the supervision of Dr. E. P. Sandsten, horticulturist, several hun-

A livestock feeders' day is held at the United States Dryland Station, Akron, Colorado.



Dr. William P. Headden has been chemist for the Colorado Experiment Station for thirty-six years.

dred varieties of pod peas have been tested. All but a very few kinds have been eliminated and the station will soon be able to recommend the best for both the canning and pod-pea industries.

Strains of New York or Iceberg head lettuce also have been tried out but the difficulty of getting pure seed is still quite a problem since the seasons are not long enough in the mountains for the production of seed. Several crosses have been made with the idea of developing a tipburn-resistant variety. This work alone, if successful, would almost revolutionize the industry for seed of the crosses can be produced readily in the State. Suitable strains of cauliflower, carrots, spinach, and other mountain vegetables are also being selected on the plots at Avon.

All this work at Avon is run in connection with a general farming program which is intended to demonstrate that the safest and most practicable system of agriculture for what has been a cattle and sheep-raising country for years is a balanced form of farming. Men who have raised livestock exclusively all their lives are slow to see the advisability of balancing their operations. Ranchmen come from all over the Western Slope each year when Farmers Day is held at Avon, and the demonstration is gradually having its good effect.

In 1915 the Potato Experiment Station was established at Greeley through joint action of the Colorado Experiment Station, the country commissioners of Weld county, and the U. S. Department of Agriculture. Federal workers are in charge of the investigations which include, principally, irrigation studies, value of different seeding methods, diseases, and the testing of several new seedlings.

Many trials have been run with commercial fertilizers in different parts of the State. All Colorado soils are well supplied with calcium, most of them are amply provided with nitrogen, but many can be improved by the use of phosphates and potash. The addition of both to the soils in some form must come sooner or later.

In several areas over the State the

problem is not one of needing more nitrogen but one of getting rid of it, so to speak. "A sick melon patch" in the Arkansas valley years ago gave the first clew to what has proved to be a terrific problem for the chemists, agronomists, bacteriologists, and irrigation engineers.

Dr. William P. Headden, who has been chemist for the Colorado Experiment Station for 36 years, found this peculiar soil trouble in scattered sections over 20 years ago. As cultural practices were improved the condition seemed to get worse. Finally, when dead spots were found in an alfalfa field just below an irrigation ditch, the trouble was attributed to seepage. An analysis of the soil showed that it contained nitric acid in great excess. In the four surface inches of soil there were over 10 tons of nitrate per acre.

Further tests were run which verified the original discovery and it eventually was found that the nitrifying bacteria, Azotobacter, were the direct cause of these excessive quantities of nitrates.

Dr. Headden, with the aid of other station workers, has worked out control methods which include the use of uncultivated crops interspersed in the rotation system with cultivated crops. It was definitely proved that cultivation and sunlight greatly increased the amount of nitrates in the soil. Cover crops in orchards were also found necessary in many districts to prevent excessive development of nitrates in the soil.

The "black alkali" problem in the San Luis valley has also been partially solved by Dr. Headden. There are over 400,000 acres of land in that valley, at an altitude of 7,200 feet, which geologists say was formerly the bed of a great inland lake. The practice of subirrigation gradually raised the watertable until today it is within a few inches of the top of the land in many places. Capillarity and evaporation gradually caused heavy deposits of sodium carbonate on the surface of the land with the result that land, where bumper crops once flourished, is today covered with chico and greasewood.

Dr. Headden and his assistants, Earl Douglas, J. W. Tobiska, and C. E. Vail, have worked for years on the problem but the only satisfactory solution found has been gypsum, which, when added to the land in sufficient quantities, turns the "black alkali" into a harmless substance. The difficulty lies, however, in the fact that there is no gypsum in the valley and it would have to be shipped in over the mountains at prohibitive cost.

Much work has been done in livestock feeding for both irrigated and plains sections by G. E. Morton, Dr. C. I. Bray, and E. J Maynard; in ani-

(*Turn to page* 50)

A part of the crowd and some of the cattle at the Fourteenth Annual Feeders' Day held last June at the Colorado Experiment Station.

300 Bushels *Per*

By A. E. Wilkinson

Professor of Vegetable Gardening, Connecticut Agricultural College

DURING the last few years 300-bushels-per-acre potato crops have become common in a number of States and Connecticut has been included as one of the leading States in this enterprise.

During the year 1928, all of the growers in this 300-bushel crop work were requested to give various statements in regard to their production methods. It was thought that by obtaining this data that some reasons why these large yields were obtained could be discovered. It was also wondered if some of these reasons were not those which had been proved by experimentation or practice.

In studying the results of the collected data, it is quite evident that one or two points are outstanding enough so that a clear-cut statement can be made.

Success Due to Fertilizers

Much of the success in potato raising rests in fertilizers. In the majority of cases a high-grade fertilizer is the only type used, in fact in some of the counties in Connecticut none of the growers use anything weaker than a 5-8-7 and some have gone so far as to use the double strength 10-16-14 fertilizer. In the state as a whole, 82 per cent of all the growers use the 5-8-7 as the leading formula for potato growing. To discover just what I mean by the 5-8-7, I will give details: 62 per cent used a straight 5-8-7, 20 per cent used 10-16-14, which is nothing more than a double 5-8-7, 2 per cent used a 4-8-7, 2 per cent used 5-8-8, 2 per cent used 5-8-10, 2 per cent used 5-8-5, and 4 per cent used 5-10-10. These are all good fertilizers and all should give results.

One of the most interesting points to study is what relationship yield has to the fertilizer used. The results obtained from the data are not entirely conclusive, but are conclusive enough so that the following ideas can be worked out.

Where one used only 1,000 pounds of fertilizer even, 5-8-7, the average yield was only slightly over 100 bushels. Where approximately 1,500 pounds of fertilizer were used, the yield was increased more than 75 bushels. Where 2,000 pounds of fertilizer were used, the yield was approximately 250 bushels; and where 3,000 pounds of fertilizer were applied, the yield was approximately 300 bushels per acre. There was some variation in the figures which may be traceable to other causes, but in general these are the results that were obtained.

To discuss this question a little further, the average amount of fertilizer used in Litchfield county was only 1,100 lbs. and the average yield from that county on which records were obtained was approximately 162 bushels. The men in Tolland county used 2,300 lbs. of fertilizer per acre, or approximately twice that used in Litchfield county, and the yield per acre in Tolland county from the data received amounted to 273 bushels per acre. This, of course, may not be entirely due to the amount of fertilizer used in the particular season, as perhaps the soils used in Tolland county were in a much higher state of cultivation than those in Litchfield county, but there was some difference un-

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Each year, Indiana's onion crop sells for millions of dollars.

Fertilizing Onions

By

E. R. Lancashire

Extension Specialist, Ohio State University

SOME $15,000,000 worth of onions are grown for shipment in the principal onion-producing States annually. It is easily possible that another $15,000,000 worth of green onions also are produced each year in the United States. Supplying a $30,000,000 crop with fertilizer is a real job. Without care and planning, the onion grower can easily come out on the short side of an honest full measure return from the use of onion fertilizers.

First it might be well to consider the soil requirements of the onion. Onions grow best on a slightly acid to neutral soil. One of the first steps in answering the questions as to how much and when fertilizer is best applied lies in testing the soil. Any county agent can arrange to test a soil for acidity. If the test reveals the need of lime, it can be applied in the amount needed sometime during the fall so that it will have time to become well mixed with the soil. Some benefit may also be secured from a spring application.

Muck soils are well adapted for onion production. When such muck soils are located in a cool climate like that of northern Ohio, the onion crop does exceedingly well. One grower has become accustomed to expecting 6,000 bushels annually from his 6-acre field.

One reason why muck soils are well adapted lies in the fact that they are loose and friable in texture so that young seedling onion plants can push their way to the surface. Clay soils sometimes prevent the seedlings from reaching the surface by crusting over them. In such a case extra heavy seeding and the resulting necessity for thinning the seedlings make onion production on such land expensive. Muck soils allow the onion plants some lateral displacement of the growing bulbs which the heavier soil types do not permit. Less thinning is required on the muck soils.

Good drainage is absolutely necessary for onions, as it is for most other vegetable crops. A water level two to three feet below the surface of the soil is ideal for onions. Given such a soil, in such a climate, the onion grower is ready to consider the fertilizer problem.

Mucks Lack Plant Food

It seems strange that muck soils which are so well adapted to onion production in many ways should be so poorly supplied with the proper balance in the several needed plant foods. It has been noted that a profitable crop of onions can hardly be produced on a muck soil without the addition of fertilizer. The crop is an intensive one, and considering the heavy per acre cost of production, it would be more or less poor business to neglect the supply of needed plant foods.

Of the several needed plant foods, potash is by far the most important, where a good onion crop is desired. Applications of 200 to 400 pounds per acre of muriate of potash are usually needed.

There is some tendency to delay the maturity of the onion crop when potash is applied alone and to overcome this it is always advisable to use some superphosphate with the potash. Superphosphate is usually needed for onion fertilization, especially on acid soils. The use of this plant food speeds up the maturity of the onion. However, superphosphate is best used only in conjunction with potash because when used alone the superphosphate tends to reduce the yield of onions, especially on sweet muck soils. Because of this tendency, it is usually best to limit the amount of superphosphate to 12 per cent or less.

Muck soils often lack a sufficient supply of readily available nitrogen. The onion is a cool season crop and as such, in the vicinity of northern Ohio, is planted early in April. At that time the organic forms of nitrogen usually present in a muck soil are dormant and unavailable to the growing onion. The addition of nitrogen in a readily available form is practical during the early part of the season before bacterial activities in the soil make available the organic nitrogen supply.

The alkaline nitrate of soda form of nitrogen is used on acid soils, and the acid form (sulfate of ammonia) is used on the sweet soils. In either case they are applied just before the seed is planted or just after the seed-

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A yield of 20,000 crates of onions from 14 acres was obtained on well-fertilized muck at Elba, Genesee county, New York.

Ruination of pastures by gullying is what happens in rolling country when provision to insure a good stand of grass or legumes is neglected.

Green Pastures

By C. A. Le Clair

St. Louis, Missouri

THE Illinois Agricultural Experiment Station, on America's oldest soil test plots, shows that clover in a rotation is capable of increasing the annual average acre value of crops more than 50 per cent. It does this through the plant food and improved physical condition which the residues of the crop supply to the soil. Is it any wonder, therefore, that farmers are willing to go to any reasonable trouble and expense to grow a healthy sod crop in their rotations?

Farmers know that if their land can be kept sufficiently fertile to consistently grow fine stands of legumes and grass, all other crops of the rotation will succeed. However, nearly everywhere in the United States east of the Great Plains, where the land has been farmed as much as a generation or more, it is now becoming increasingly more difficult to get consistently thrifty stands of grass and perennial legumes.

The cost of seed for sowing an acre of alfalfa, clover, or grass is greater than is required to plant most other staple crops. Therefore, when seedings fail to catch, it means not only a total loss of the sum invested in the seed, but in addition the farmer is deprived of the anticipated revenue from the land for a period of at least six months.

Now, it has been estimated that fully 90 per cent of new seeding failures are traceable to inability of the crop to get enough plant food. In this connection it should be remembered that rest crops are ordinarily planted with a small grain nurse crop which gets first chance at any plant food available and, hence, the grass or legume seedlings often have to go hungry. Farmers, who wouldn't think of trying to fatten hogs with an empty trough, frequently fail to see that they are expecting their sod crop to grow luxuriantly without being supplied with enough plant food. To be sure legumes, when inoculated and established, are able to get a part of their nitrogen from the air. However, to make their nitrogen synthetic factories operate, clover and alfalfa require favorable seedling conditions. Providing a new catch of clover or alfalfa with a complete plant food ration has been found to hasten inoculation and induce a continuous healthy growth which is essential to a maximum synthesis of atmospheric nitrogen.

When clover and grass are sown with a nurse crop, as is usually the case, no special plant food treatment is necessary other than a generous application of a complete fertilizer at the time the grain crop is sown. Experience reveals that the cost of the fertilizer ordinarily is more than paid for in the increased yield and better quality of the grain resulting, so that the residual benefit from the treatment is clear gain. Hence, the expense of clover and grass crop insurance provided by applying plenty of plant food when seeding down is insignificant.

Mr. Giddy Experiments

The extent to which fertilizers can be relied upon to make grass and clover grow, where the land formerly consistently failed to produce it, is typically illustrated by the experience of Mr. Giddy, of Malvern, Iowa. This man took over an estate of 900 acres which had been farmed so hard that his wheat yields had dropped to from three to four bushels to the acre. He found that to sow clover and grass seed on such run-down land was just a waste of money. Realizing that his soil had to be rebuilt, he began liming his fields at the rate of two tons to the acre with ground limestone and then applied a dressing of 300 pounds of commercial fertilizer to the acre, having a high percentage of phosphoric acid and a moderate amount of nitrogen and potash. He then sowed his grain and seeded down to sweet clover.

As a result of this treatment he reports, "My wheat even on the poorest fields averaged above 20 bushels to the acre and I've got the finest stand of sweet clover anyone could desire." The discovery of Mr. Giddy is becoming so common that farmers everywhere will soon learn to eliminate the toll of catch crop failures by using fertilizer to insure success against the hazards of unfavorable weather and insect pests.

Field tests in Missouri reveal that from seven to eight-bushel increases in yield of wheat and at least one-half a ton more hay to the acre usually follow a moderate application of commercial fertilizer. In other words, \$2.25 worth of fertilizer often yields \$16. and more, profit.

Practically a fifth of the total land acreage of this country is too rough or too stony to be tilled and is, therefore, adapted most economically for pasturage. There are more acres of pasture land on the average farm than are employed for all other purposes. Yet on a per acre basis the returns that most farmers have been obtaining from pasture land are far less than they get from the remainder of their improved acres. On the other hand, wherever permanent pastures are kept in a highly productive condition a prosperous agricultural community invariably exists. This is true whether the topography of the countryside is flat or rolling.

However, it is only within the last year or two that farmers generally have become what might be termed pasture conscious. With greater efficiency constantly being applied to the business of farming, it is now being appreciated that the acres of the farmstead which only are suited for grazing purposes have in many cases more

The grain nurse crop, grass or legume seed, and fertilizer can be sown in one operation with a combination grain drill.

supplementary feeding is avoided.

When we see a so-called pasture covered with weeds and bushes, the difficulty is usually traceable to either too many animals being grazed on it or to the fact that the cattle have been turned into the pasture too early. In connection with pasture improvement, it should be remembered that the modern dairy cow is a far better producer than her predecessor of a decade or more ago. Therefore, in proportion to her producing capacity, the present day dairy cow requires correspondingly more food. This is illustrated by the fact that in some Mississippi Valley States, where two acres formerly supported a cow, as many as five acres are now required.

Often livestock are permitted to crop the pasture excessively. Pasture management, or better mismanagement, with too few exceptions has developed into the habit of taking away and returning but little of the virgin soil nutrients to the grass lands of the farm. Fortunately the most intelligent livestock husbandmen of

potential profit possibilities than the tillable acres. Of course, bigger gross returns are forthcoming from a corresponding acreage of grain, corn, cotton, or potatoes than are usually obtained from meadowland, but when the respective cost of production is deducted, the net returns from tilled ground rarely exceed those obtainable from properly managed pasture or hay land.

Undeniable proof of the need of pasture improvement rests in the fact that dairy cattle almost invariably are thinner in the fall when they leave pastures than in the spring when first turned upon them. Dairymen know that when cows become thin it is practically impossible to get them back into maximum milk production. Again, animals that are stunted by insufficient pasturage rarely make normal growth regardless of how well they are fed thereafter. On the other hand, if a nutritious pasture is available, not only the expense but the labor of

The grower of this 35-year-old stand of alfalfa in Missouri attributes its productive life to the generous use of plant food.

the country are beginning to appreciate the big opportunity for greater profit from pasture improvement that better management offers.

Too frequent or too close grazing or cropping of grasses and legumes after they are established, however, is just as fatal to their productive life as is lack of nourishment. An automobile without an engine won't carry anybody far. Similarly, excessive cutting of a perennial such as alfalfa or timothy means sure injury or complete destruction of the stand. This is especially true in the northern States. It was found, for example, at the Minnesota Agricultural Experiment Station that three seasonal cuttings of alfalfa resulted in winter-killing of the stand the following season in 95 per cent of the cases, while where only two cuttings of the crop were made and enough foliage for winter protection was provided, no frost injury resulted.

Pastures Must Rest

Pastures with gates always open are usually the poorest ones. All pastures should be given the opportunity to recuperate. Never should the grass be grazed in the spring until it has reached the height of four or five inches at least. For the same reason grazing should be reduced in times of drought. In other words, temporary pastures should supplement permanent pastures on every dairy farm.

The type of pasture is an important consideration when it comes to securing best returns. Few farmers today baby their pasture land enough. Most of them do little else than perhaps mow down the weeds that accumulate. Since it is perfectly possible even in a permanent pasture to change the flora by applications of fertilizers, it will readily be understood how economical is this means of increasing the feed it will produce. Customarily, the price charged for pasturage is $1.50 per month, per head. This is about equivalent to from $5.00 to $7.00 per acre. Comparing this acre return with that usually obtained from the cultivated acres, it can be seen how far the income from pasture lands falls short of what is obtained from tilled acres.

European farmers have shown the way to use fertilizers to increase pasture carrying ability. They have discovered that no where does the dollar invested in commercial fertilizers pay bigger returns than on pasture land. Without the necessity of the expense of cultivation or investment in seed, it is possible with an application of a few hundred pounds of fertilizer to change the flora from a spindling growth to a most nutritious forage. Thus a pasture can be transformed from an exercise lot to an area of abundant roughage for the herd. Instead of requiring five acres of pasture per steer or cow, by proper care the acre carrying capacity through fertilization easily can be doubled and even quadrupled.

New England farmers years ago found the way to make timothy meadows yield profitable hay crops for as many as five and six years without the necessity of plowing them up and reseeding. They accomplish this result by annual top-dressings with commercial fertilizers, which keep their hay fields yielding good crops year in and year out. Kansas farmers are doing the same thing with alfalfa. Similarly, Wisconsin dairymen are using commercial fertilizer to insure stands of clover. Thus it has been demonstrated everywhere that legumes and grasses can be made to thrive providing they are well fed.

In the case of temporary pastures in rotation with other crops, the fertilizer can best be applied with a fertilizer attachment to the grain drill as the nurse crop is planted. Early the following spring as soon as the grass or legume crop shows sign of growth, another application of plant food broadcast with an end-gate distributor can be profitably made. Two to three hundred pounds of a high-

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A part of the prune orchard of Charles Trunk, Dundee, Yamhill county, Oregon.

Potash *for* Prunes

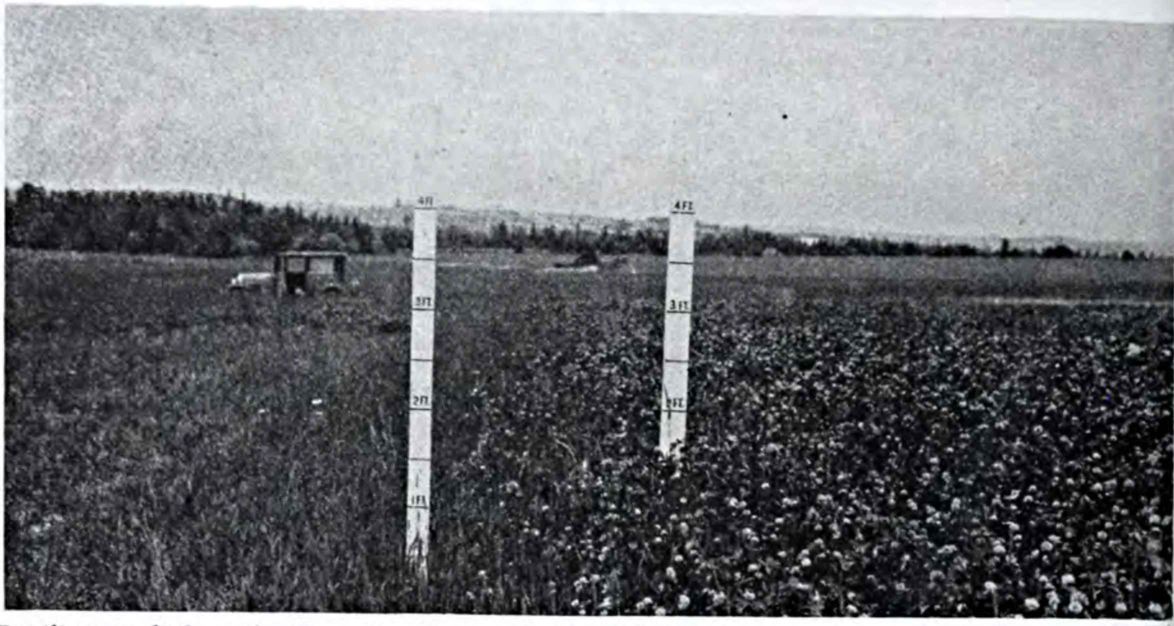
By William L. Teutsch

Assistant County Agent Leader, Oregon Agricultural College

POTASH-carrying fertilizer increased the yield and quality of Italian prunes in a one year's test conducted on the farm of Charles Trunk, a veteran prune and walnut grower, Yamhill county, Oregon.

The demonstration was a direct-tree fertilizer trial arranged by S. T. White, Yamhill county agent. It included applications of four pounds of sulphate of ammonia per tree; four pounds of sulphate of ammonia and two pounds of potash per tree in combination; four pounds of sulphate of ammonia and seven pounds of superphosphate per tree in combination; a complete fertilizer consisting of four pounds sulphate of ammonia, seven pounds superphosphate, and two pounds potash; and an application of seven pounds of superphosphate and two pounds of potash in combination. Direct application was made to each of 10 trees. The crop from each 10-tree block receiving fertilizer was harvested separately, weighed, and then dried.

The outstanding feature of the test was that all of the potash plots produced prunes which dried out heavier than did the prunes from the check plot and from the plots which received no potash. Three hundred prunes selected at random from the check row of trees when dried weighed nine pounds while the same number of prunes selected from the plot receiving superphosphate and potash weighed ten pounds and seven ounces.



Fertilizer applied at the time of seeding made the difference between these two plots. At the left, there was only the residual effect of fertilizer from two years' planting of potatoes; at the right, 400 pounds of a 5-7-10 were applied. No comparison between yields could be made other than to say that the yield on the unfertilized area could be called nothing. (Roy S. Libby Farm)

Giving "Life" *to the* Potato Rotation

Clover, its essential component, needs boosting with lime and fertilizer.

By R. F. Thomas

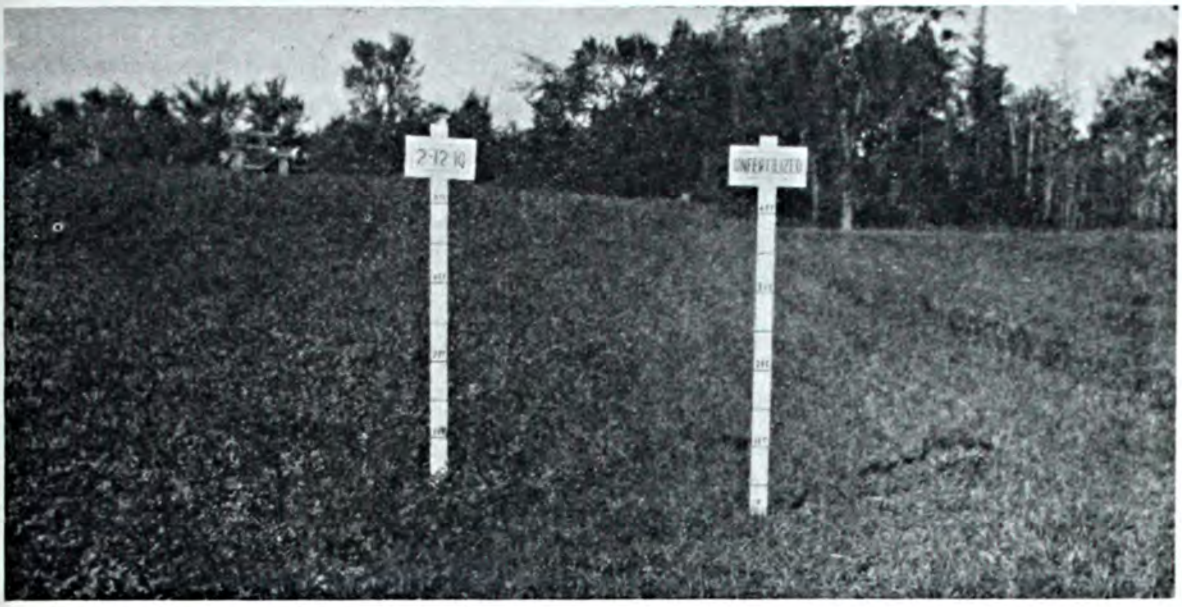
Houlton, Maine

(Reprinted from *New England Homestead*, November 30, 1929)

"THE soils of this county are becoming harder," stated an Aroostook county, Maine, farmer who has followed the plow for 25 years on the same farm. "It used to be fun to plow second-crop land, but now I had just as soon plow sod."

There are many others who have noticed this same thing. Aroostook is facing the same problem which has faced every other section as it gets older—clover is not what it used to be. And clover is the "life" of the Aroostook rotation. Without clover Aroostook cannot compete with other potato-producing sections nearer important markets.

Many soils, particularly in the southern part of the county, have become too acid to grow real crops of clover. On these lime must be applied, not as heavily as for alfalfa, but in smaller and safer amounts. Even in the northern section of the county where the soils are only slightly acid, some lime is being applied for clover, and when a potato grower uses lime for clover on potato land, he must recognize the value of the clover crop or he would not risk scab. The only safe procedure in using lime is to have the County Agent test the soil and then apply lime to bring the soil to what is known as a pH of about 5.5. Many soils from Presque Isle north will be found to need less than 500 pounds of lime per acre, while south of Presque Isle many fields

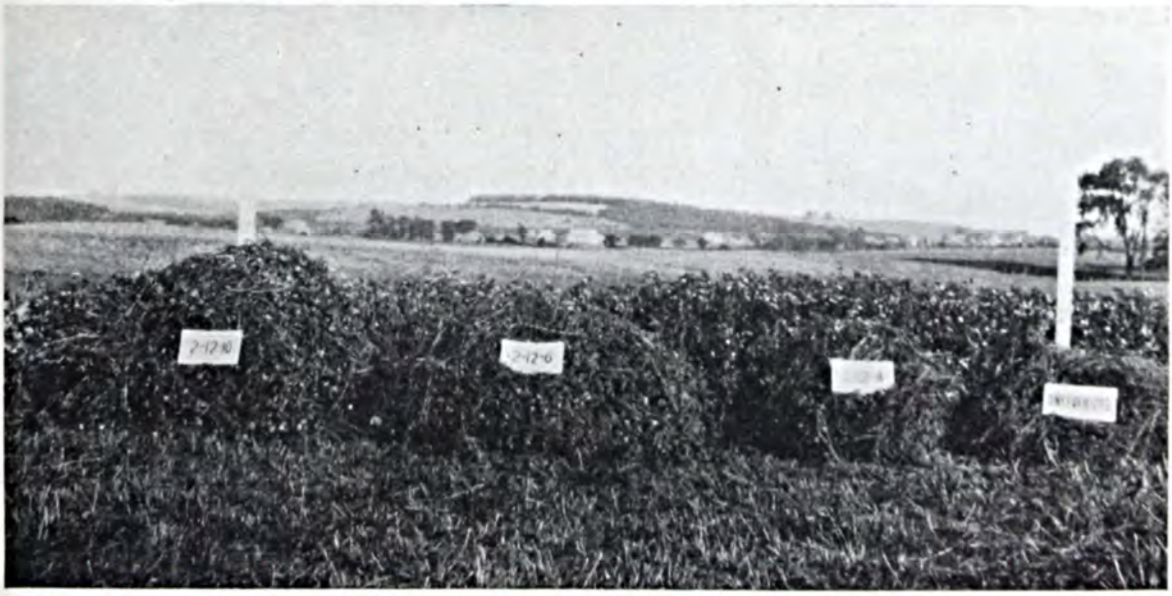


This rowen or second crop demonstrates the difference between success and failure with clover. At the left, a 2-12-10 was applied at seeding; the plot at the right was seeded without fertilization.

could use twice as much per acre.

Yet there are many in the northern section where little or no lime is needed who are not satisfied with the clover in the rotation. Roy S. Libby, prominent potato producer of Caribou, maintains along with others that the lack of potash during the war has greatly contributed to the failure of clover. While clover adds nitrogen and organic matter to the soil, it draws heavily on lime, phosphorus, and potash. All of these must be in the soil in large amounts, or clover will not succeed. This year Mr. Libby demonstrated to his own satisfaction that while lime helped, he had his best clover where fertilizer alone was used when seeding down.

In the past, oats and clover in the rotation have been on a scavenger basis. Like garbage-fed hogs, they have been expected to live and do well on what food the potato crop left in the soil. The following table, using data from "Fertilizers and Crops" by Van Slyke, shows what the average crops in a rotation remove from the soil and how one ton per acre of 5-8-7 fertilizer balances this removal:



Fertilized—500 lbs. per A. at seeding. Yields in field-cured clover hay per A., (2-12-10) 6,720 lbs.; (2-12-6) 5,813 lbs.; (2-12-4) 4,107 lbs.; (unfertilized) 2,613 lbs. The 6 and 10 per cent potash plots had excellent clover and practically no weeds or grass. The unfertilized and the 2-12-4 plots were mostly grass and weeds. (E. L. Cleveland Co. Farm.)

CROP		N	P_2O_5	K_2O
Potatoes	109 bbls.	63	27	90
Oats	50 bu.	48	18	40.8
Clover	2 tons	80	22.8	61.6
Total Removed		191	67.8	192.4
Appl'd 1 ton 5-8-7		82	160.0	140.0
Balance		—109	+92.2	—52.4

The table shows that one ton of 5-8-7 fertilizer for potatoes and nothing on the other crops in the rotation leaves a deficiency of 109 pounds nitrogen, 52.4 pounds potash, and a surplus of 92.2 pounds of phosphoric acid. In the case of nitrogen, the clover crop makes up a large part of this deficiency for itself and for the potatoes that follow. Demonstrations show that oats can use more nitrogen than they are getting. The deficiency of potash must either come from the soil or from fertilizer. The drain on the available soil potash during the war practically exhausted the available supply in the soil. On land cropped from 1918 to 1926 without commercial fertilizer so as to get plots of uniform fertility, the Main Experiment Station showed that "potash has been depleted more than nitrogen and phosphorus," all of which lends strength to Mr. Libby's assertion.

On clover seedings following potatoes, it is a common experience to see the old potato rows clearly outlined by a heavier stand of young clover plants. Since oats have responded to more nitrogen than is left by the potatoes, this must be a result of the residual phosphorus and potash. Experimental work has shown that clovers are highly responsive to both phosphorus and potash.

As a result of 40 years of experimental work on a silt loam at the Pennsylvania Experiment Station, the following average acre yields of clover hay have been secured by fertilizers:

No fertilizer	2198 lbs.
Phosphorus	2899 "
Phosphorus and potash	3900 "

These are typical of results secured at other experiment stations with even more striking results for potash on lighter soils.

From observation and experimental evidence, it is believed that a fertilizer carrying sufficient phosphorus and potash will benefit the clover crop in Aroostook. In 1928 two demonstrations to show this were started on widely separated farms. One was on the E. L. Cleveland Company's farm in Houlton, Maine, while the other was on the farm of Chas. E. Hussey & Sons, Presque Isle, Maine. The soil on the Cleveland Company farm was

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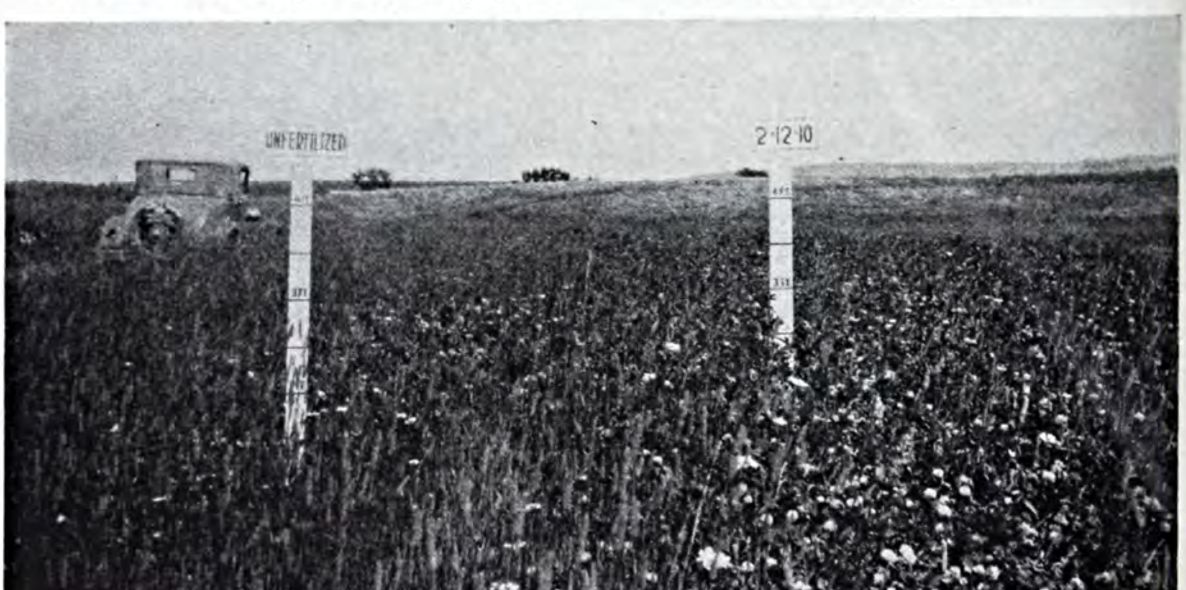
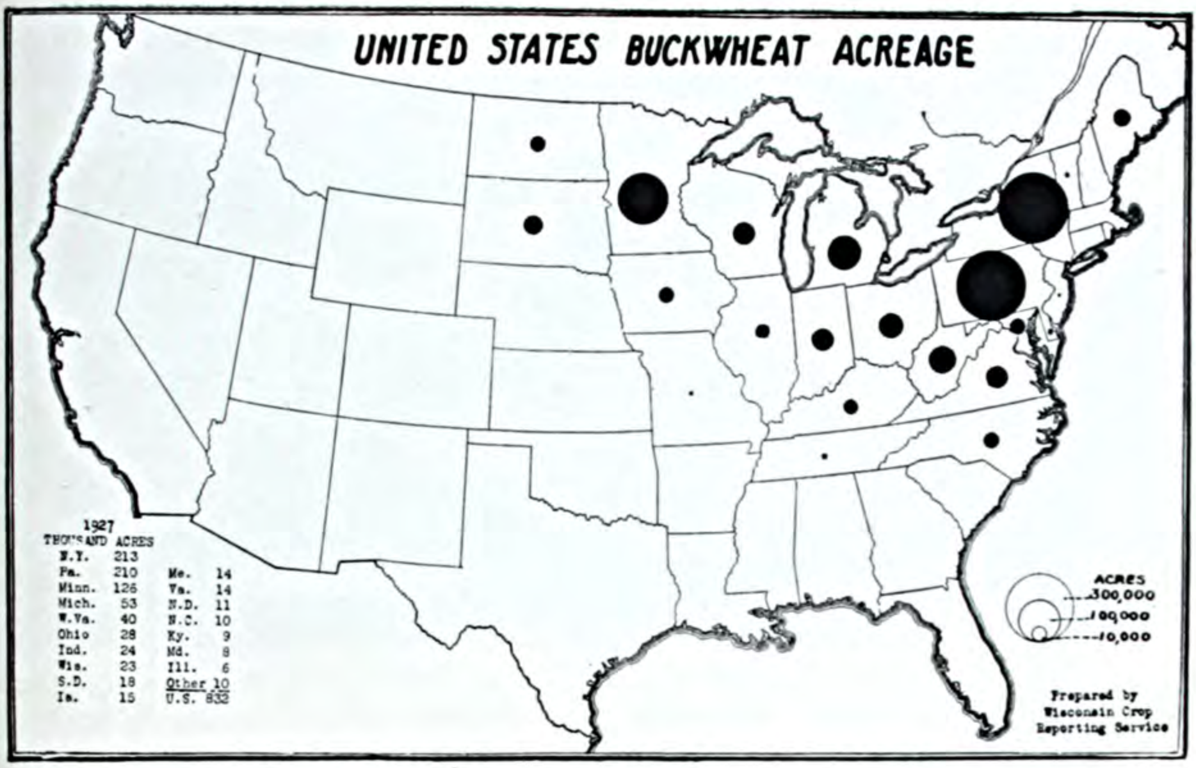


The unfertilized plot at the left yilded 2,613 lbs. of hay per acre, practically all weeds. The 2-12-10 plot at the right yielded 6,720 lbs. practically all clover. (E. L. Cleveland Co. Farm.)



Buckwheat

Thirteenth in this series

By Walter H. Ebling

Agricultural Statistician, Wisconsin

WHEAT cakes for breakfast, nationally known in America, are quite commonly buckwheat pancakes. In fact, most of the buckwheat flour produced in this country is used in the making of pancakes. Buckwheat shortcakes, once probably well known, are now little used.

The buckwheat crop is a native of China, but it has been grown in America since the earliest colonial days, particularly by the Dutch colonists along the Hudson river in New York. It has always been a minor bread grain crop, but the first United States census in 1840 showed a production of more than 7,250,000 bushels which compares with a production of 15,755,000 bushels in 1927 and 13,163,000 bushels in 1928.

The United States production in recent years has fluctuated between 12,000,000 and 16,000,000 bushels, the important producing region being the northeastern United States. The crop has always been a northeastern crop so far as the United States is concerned, though in recent decades the Lake States have become of some importance. Pennsylvania has for a long time been the leader, with New York ranking second. Together these two States formerly grew about two-thirds of the United States acreage, but now they grow only a little over one-half.

In recent years there has been a tendency for the acreage to move westward into the Lake region and

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The transfer of grain standing in the field to the wagon or truck box, cut and threshed in one operation, is the capacity of this harvesting outfit.

What's Ahead?

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

¶ Number Two

By Frank George

THE manless farm which will be operated by radio from the front porches of America's farm houses may appear to be the figment of a wild imagination. But what prediction is too wild when it is considered that within the span of two lifetimes, a strong man with a cradle could just about manage to harvest two acres of grain a day whereas now a man with a modern tractor and a 10-foot tractor binder can harvest 35 acres a day?

Wheat production in the United States began at least as early as 1618 in the Virginia Colony, but it was not until nearly 250 years later that the mechanical reaper enabled men to produce more than their family requirements. It took nearly 200 years to reach a production of 85,000,000 bushels in 1838, but in the next 90 years production increased to nearly 1,000,000,000 bushels

Twenty years ago I met a man who had personally attended the first demonstration of the McCormick reaper in Virginia in 1831, nearly 100 years ago. Young Cyrus McCormick had hammered out his rude implement in a little farm blacksmith shop in the back-woods. When the machine was finished, McCormick hitched his horses to the cumbersome apparatus and clattered out into a nearby field of wheat. Horses shied at the absurd object. Farmers gazed upon it with contemptuous curiosity. They followed the outfit up and down the field, but the field was hilly and the reaper worked badly. The crowd jeered as the machine slewed and jolted along cutting the grain very irregularly.

The owner of the field rushed up to McCormick and shouted:

"See here! This won't do Your machine is rattling the heads off my wheat."

A man in the background came forward. He was the Honorable William Taylor, a conspicuous public figure of that day.

"I'll give you a chance to try your machine," he said to young McCormick. "Pull down the fence and cross over into my field."

McCormick accepted the offer, drove into Taylor's field, and cut the grain successfully for four or five hours. The demonstration was a success, but young McCormick's problem was not so easily solved. He found difficulty interesting capital in the machine, and it was not until more than 20 years later that the reaper came into fairly general use.

Farmers then began to appreciate the possibilities of growing wheat for the foreign markets, and production was increased amazingly. Agriculture pushed farther and farther west, and transportation systems had to be developed to carry the grain to market. Then came the twine self-binder in the 80's, followed by better plows, harrows, and seeders. Spring and peg-tooth harrows were invented, disk harrows, grain drills, and seeders. Threshing machines were the next development. Gasoline tractors were manufactured as early as 1901, and were purchased by several thousand farmers during the next decade, but the earlier models were of crude design and added more to the farmer's mechanical troubles than they contributed to the solution of his power problems.

The tractor did not become a really important factor in the farm power situation until about 1917, when the World War had begun to withdraw men from the fields in large numbers. The next year there were approximately 80,000 tractors in use on American farms. By 1920 there were 246,000 tractors in use, by 1925 there were more than 500,000, and in 1929 there were 853,000. There will be approximately 1,000,000 tractors in use on American farms next year.

Now the combine harvester has created practically as great a revolution in American agriculture as did the first reaper in the days of comparatively primitive farm methods. I am

Cutting 25 to 30 acres of hay per day is possible with a tractor and 7-foot mower. When pulling an additional 7-foot trailer mower, the acreage is increased to from 45 to 60 acres.

told that in 1926, approximately 30 per cent of the wheat in Kansas was cut with combines. A group of 10 counties in central and southwestern Kansas, having 11,453 farms, had 5,183 combines on January 1, 1928. It is a fair guess that there are now more than 50,000 combines in use throughout the country.

A study by the Texas Agricultural Experiment Station shows costs of harvesting with the combine as ranging from 14.7 cents per bushel with an 11-bushel yield down to 7 cents with a 23-bushel yield, and average costs of harvesting with the binder and stationary thresher at 33 cents per bushel. Nebraska studies show combine costs of 9 to 12 cents per bushel with yields of 11.8 to 13.4 bushels, and estimate the cost of the binder method at about 31 cents per bushel. Montana observers declare that the combine has reduced production costs by about 15 to 20 cents per bushel.

The quantity of wheat which can be cut with a combine in a 10-hour day varies from 16 acres for a machine with an 8-foot cut to 48 acres for a machine with a 20-foot cut. The most commonly used 15- and 16-foot machines will cut from 35 to 40 acres a day. For a 7-foot binder, with a crew of two men, 15 acres cut and shocked is considered a day's work.

Considerable interest centers just now in whether the future of agriculture will be one of small or large farms. It might have been expected that a great increase in machine farming would be accompanied by a wholesale enlargement of farms. On the contrary, the figures show that between 1920 and 1925 the average size of farms in the United States decreased from 148.2 acres to 145.1 acres per farm, and that farms on the average were smaller in 1925 than in 1920 in all but nine States.

The average size of farms increased appreciably between these two census years in only five States—Montana, Wyoming, New Mexico, Arizona, and Nevada. The increase in the use of tractors and large machinery probably has contributed to the increase in the size of farms in Montana, but in the other four States only a small proportion of the farm land is in crops, and it is considered as likely that the increase in the acreage per farm has resulted largely from the addition of grazing land to large ranches, through purchase or lease from homesteaders.

A recent survey indicates that in most farming areas, the tendencies toward enlargement of farms resulting from the ability of farmers to take care of larger crop acreages have been

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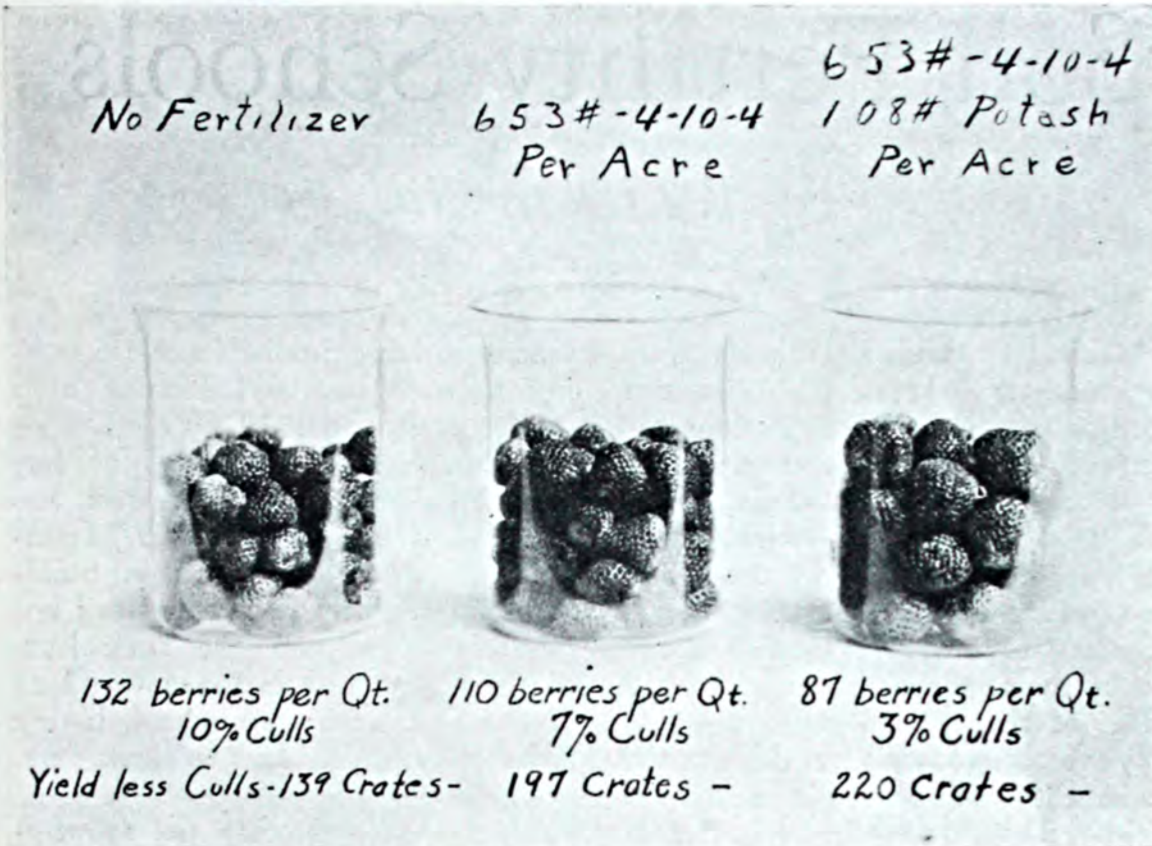
A 4-row planter and tractor can cover from 40 to 60 acres in a day.



"Quality" Berries

By Charles Kilpatrick

Fort Smith, Arkansas

FOUR years ago Mr. F. S. Howard, Baron, Oklahoma, bought a 50-acre rocky hillside for $170.00. Even at this low price his friends and neighbors laughed at him, as the timber on it was of no value and it was too rocky for grass land. However, Mr. Howard, along with Mr. George A. Remund, County Agent at that time, had a vision of developing Adair county and eastern Oklahoma into a strawberry producing section.

It took considerable effort to clear and prepare the land for the berries, but through hard work, 10 acres were set out the first year. Since that time Mr. Howard has been increasing his acreage, until this year he had 30 acres of producing berries, and as some of his neighbors now put it, "Howard has turned those rocks to gold dust," for he is now rated the "Strawberry King of Oklahoma."

The problem of marketing the berries was solved in a large measure by the leadership of Mr. Howard in forming a shipping association at Westville, but the yield and quality of the berries were not satisfactory to Mr. Howard. He had never used any fertilizer. The County Agent, Mr. Harry Hayman, was consulted, and through his efforts fertilizer for demonstration purposes was secured.

Three uniform plots were selected and to one plot 653 pounds of a 4-10-4 (N-P-K) fertilizer per acre

(*Turn to page 54*)

Soil Fertility Schools

By Rensselaer Sill

Wisconsin College of Agriculture

COUNTY fertilizer schools were recently held in 20 Wisconsin counties by county agents in cooperation with the soil extension service of the Wisconsin College of Agriculture, Madison. The schools, which were the first of their kind in the State, have proved exceptionally successful, according to Professor Griffith Richards of the soils department, who had charge of the project.

By teaching fertilizer dealers the fundamentals of soil improvement work, the uses and misuses of fertilizers, and the requirements of local soil conditions, the schools help them to become of considerable use to the farmer. And as dealers are keenly interested in finding out ways to make their products serve farmers to the best possible advantage, it is not at all surprising that they attended the schools in large numbers and are looking forward to the launching of a similar project in 1930.

Professor Griffith Richards, ready for school.

Although held primarily for fertilizer dealers, the schools were also attended by local "soil leaders," farmers, and others interested in building with the help of a sound soil improvement program the agriculture of their respective counties. In each of the 20 counties one school, lasting from nine until four o'clock, was held.

Plans for conducting the soil fertility schools were worked out at the county agent and extension workers conference held in October at the College of Agriculture. Here, a schedule for the meetings was decided upon, the topics to be discussed in the school considered, and the part that county agents were to play in the teaching work outlined.

Soon after the conference, Professor Richards started out to cover the 20 county schools and to teach with the help of county agents the good gospel of sound soil improvement programs.

Piled high in the rear of his car were county and State soil maps, samples of various kinds of soil, pictures of the results obtained by applying fertilizers to crops on different kinds of soil, fertilizer samples, a lantern and slides, and in fact, complete equipment for a day's course in soil fertility.

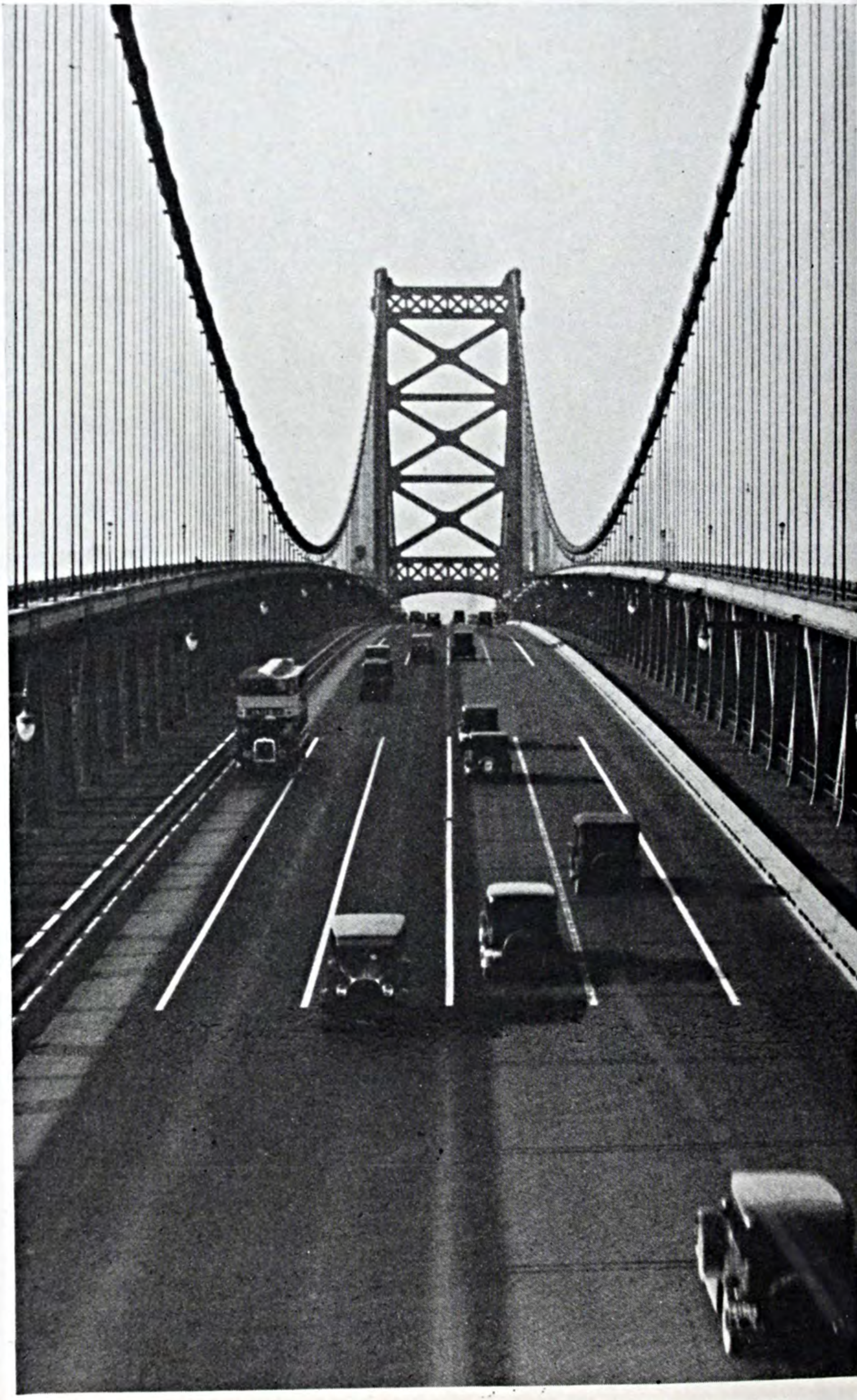
Richards' way was carefully paved for him by press publicity, direct mail from county agents to fertilizer dealers and others, and correspondence with extension workers in the counties visited.

(Turn to page 53)

Pictorial

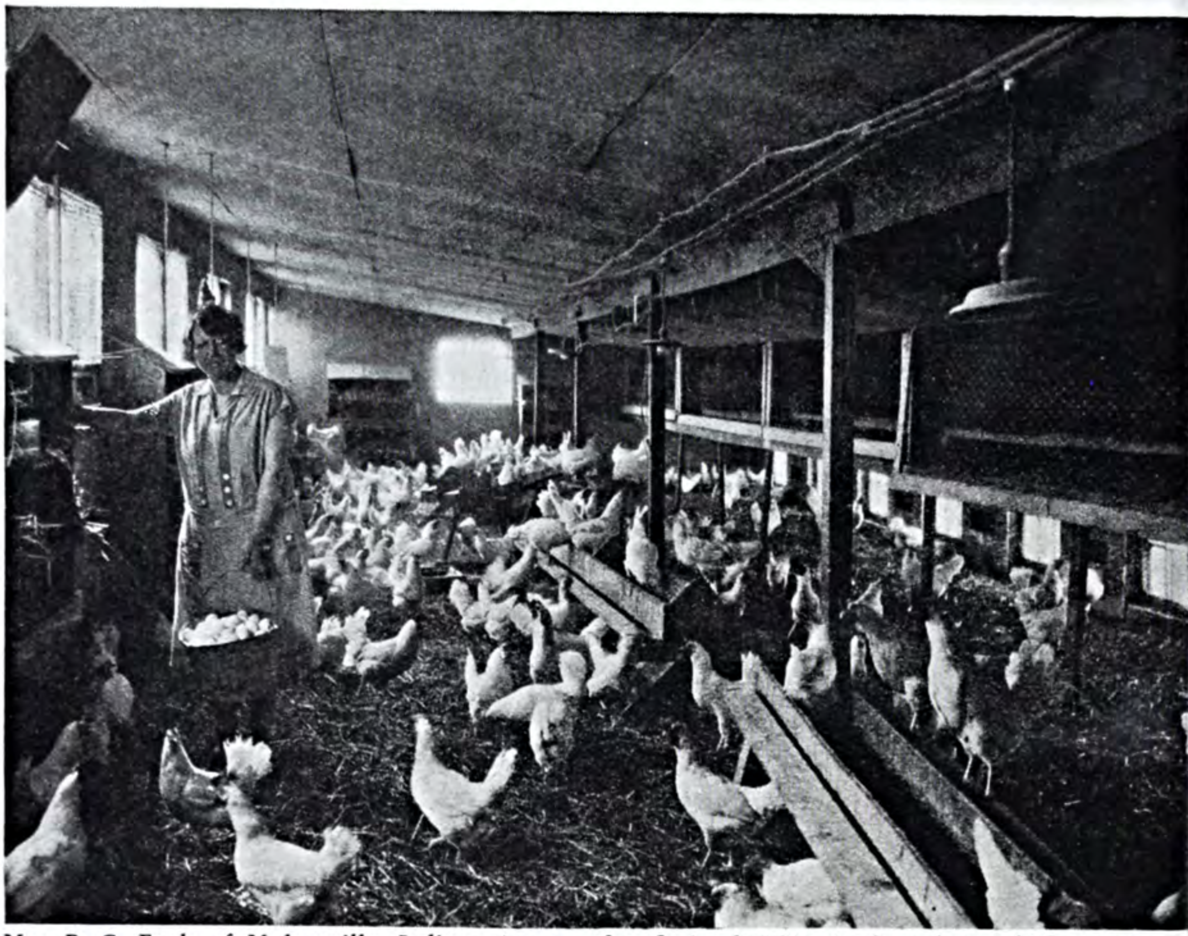
It's butchering time. Cold weather means sausage with wheat cakes, savory ham, and crisp bacon.

Winter days are long and lonely for the ranger making his rounds over desolate trails.



The Delaware river bridge between Camden, New Jersey, and Philadelphia, Pennsylvania.

A cold night in the yards is a "find" for the camera man with artistic instinct.



Mrs. P. C. Engle of Medaryville, Indiana, keeps a fine flock of White Leghorn hens which average a 60 per cent egg crop during the cold winter months.

This is a part of the crowd of Cuban baseball fans in Havana who gathered daily to watch the score board of the 1929 World Series. In the background is the new Cuban capitol which has just been completed at a cost of about $16,000,000.

The Editors Talk

Crop Changes in the South

Economic conditions generally right themselves in time, if in no other way than by the operation of the law of the survival of the fittest. Monumental changes are taking place in the South today as a result of this law. Twenty-five years ago, by far the greater part of the cotton grown in the South was produced east of the Mississippi River. Today half or more of it is produced west of this river.

Generally speaking, rainfall grows less as one goes west from the Mississippi, and large parts of Texas and what is now Oklahoma were thought for a long time to have too little rainfall to meet the requirements of the cotton crop. Cotton, however, is a tap-rooted plant and really does best in the older parts of the South in years of least rainfall, or when we think it is suffering for moisture.

As a result of such opinions and the fact that many other influences have operated to determine the agricultural history of the South, some serious mistakes have been made in crop adjustments which must gradually right themselves. Population spread from the east toward the west, and because of fewer people in the West, a type of farming was undertaken in which the labor of a few men could utilize many acres. On the contrary, labor was more plentiful farther east and land had to be utilized in a more intensive way.

Cotton is king in the South and doubtless always will be. It is the favored crop of almost every Southerner. As all know, it demands clean culture and almost of necessity leaves the land bare in winter. In regions of heavy rainfall, this is conducive to much leaching and erosion which, of course, is much less likely to occur in regions of lighter rainfall.

We boast in the older parts of the South of our abundant rainfall. It is more likely a curse than a blessing, especially with cotton as a major crop. With other crops such as grasses and timber, more moisture is a blessing because these crops require more, and an excess will not result in leaching and erosion.

Much has been said about European farmers who have not only maintained but increased the productiveness of their soils after hundreds of years in cultivation. They are actually producing much more now as a result of the use of legumes, manures, and fertilizers than ever before when the lands were virgin. American farmers may learn much from them in this regard, but the fact remains we must use discretion in applying such lessons. The average annual rainfall of the six countries of Europe that have done most in this regard is not much more than half that of our older Southern States. In fact, it is only about 30 inches as compared with more than 50 inches in the southeastern States as a whole. Too, it comes in the warmer months as gentle mists and showers, and in the colder ones partly as snow, nowhere resulting in erosion, though straight, rather than contour, rows are the rule. This is the reverse of what happens in the South.

The writer was for 25 years a voluntary weather observer in South Mississippi. The average annual rainfall for all these years was 63.5 inches. For 10 successive years of this period it was 68.48 inches and for four years, exceeded

80 inches. Surely, farm methods with such a rainfall should differ materially from the ones now prevailing, of planting so large a part of the lands used to clean cultured crops. A single day's rain on bare soils, if subject to erosion, will occasionally remove more plant food than can be restored under natural methods in a year.

So there is a reason for the movement westward of cotton production, as well as for the increased interest in all parts of the Southeast in better livestock, pastures, and the growing of trees. Other things have hastened the change on both sides of the river, namely, the greater ease with which the plains soils may be prepared, cultivated, and harvested with labor-saving implements and machinery, the coming of the boll-weevil, and the fact that this enemy can be better controlled in large fields and in a dry climate.

Acre for acre, much more grass or timber may be produced in the Southeast than in the Southwest because they require more moisture and maintain soil fertility better. So the wise farmer in the humid regions will do well, as fast as he can, to plant at least his marginal lands to pastures and trees, using only his better lands for cultivated crops. This need not result in the growing of any less cotton, only growing it on fewer acres better prepared, fertilized, and cultivated. Only in this way may he expect to compete with the more favored portions of the Southwest.

Twenty-five years ago it would have been impossible to compete with the western ranches in the growing of beef cattle; now these large areas of land are fast being converted into cotton and grain farms, and such cattle will have to be grown on smaller units. At that time, the matter of growing timber was out of the question because it was so plentiful in virgin forests and could be had almost for the asking; now it meets with ready sale at fancy prices, and overproduction is unthinkable. Then, the dairy farmers of Wisconsin and neighboring States were glutting the Southern markets with butter, cream, and condensery products; now they can scarcely supply their own cities, and the condenseries are being forced to get their milk supplies away from populous centers, and largely in the South.

Surely, the future seems bright for the Southern farmer if he will only use discretion in the selection of his crops and maintain and build up the fertility of his soil, which above all things makes the difference between success and failure.

Getting On

A great preacher said the other day that the way to get on in this modern age and to attain happiness is to specialize and cooperate. Further, he said that there is just as much need for the administrations of the church in this very much work-a-day world as there ever was.

Without doubt, this is true. The developments of science and invention, together with added facilities in the world of financing, all tending towards mass production, have made it very necessary that a large part of the nation's work can best be accomplished when work is divided up, each worker specializing in a definite field. Our whole tendency is in this direction. But it means that each worker becomes a part of a larger whole; that to accomplish anything he must fit in; that he must be able to work with others and cooperate, with the result that some of the best work in the world is done by people known to only a small and intimate group.

Witness, for instance, the editorial page of the great newspapers of the world, much of the work in new buildings, and in a variety of other fields; all done by specialists in one field, working in the group as a whole. Only the group is known to the general public.

To specialize is not difficult, if one makes up one's mind to do it; but to cooperate is harder, because it means the suppression of self. This is the hard lesson that the modern worker has to learn if he is going to get on and be happy.

The Three C's

Someone has said that the only permanent thing is change. At least change is always with us. It may be all wrong and disastrous to try to keep up with the Jonses, but equally so, if we do not keep up with changing conditions, then we are lost. The far-sighted make adjustments in advance and profit with every change, while others merely follow with their heads just above or below water, according to the state of the tide.

It is, therefore, important now and again to try and find out what changes are taking place. In the fertilizer industry there seem to be three outstanding major changes that might be called "The Three C's." First, on the production side, the change from a by-product to a chemical industry, or as some people call it, the "chemicalization" of the fertilizer industry; second, on the distribution side, the trend towards cooperative buying and selling; and third, from the point of view of policy, the very strong trend towards coordination. All these changes affect not only the industry but organized agriculture, both in its scientific and practical fields, so that no one can afford to overlook or disregard these changes that are taking place.

TAKING THESE THREE CHANGES IN ORDER, first, the fertilizer industry started largely as a by-product industry. It then started the manufacture of chemical compounds that supplied single elements of plant food. Now research work is going on with concentrated fertilizers, that supply more than one of the necessary elements. Along with this, highly technical processes to recover nitrogen from the air are being elaborated and commercialized. Research workers are studying such matters as the segregation of fertilizer material when mixed together and the angle of repose of such materials. It is quite within the realm of possibility that these two factors alone will some day cause a revolution in the dry mixing methods of manufacture that are now largely in use.

Regarding the second change, the cooperative movement is coming of age. The fact that government agencies have been authorized to make funds available to assist in cooperative buying and selling will undoubtedly act as a stimulus to this movement and give the cooperative idea an emphasis and power that will make it a force to be reckoned with.

The vital practical problem that this brings up is how can established channels of trade and the cooperatives work together. Undoubtedly this is already a serious problem with many manufacturers of farm supplies. Certainly the problem will not be solved by merely ignoring it. There is little doubt that eventually leaders in the different fields involved will have to get together and formulate some practical policy of working together.

The third change—the trend towards coordination—is perhaps the one that affects the colleges and experiment stations, as well as industry, more than the first two. There is a growing consciousness both in the industry and among research and experiment station workers that there is far too much confusion and duplication of work in the broad field of agricultural industry that provides the farmer with his needed supplies of fertilizers, feeds, seeds, and other materials. The farmer feels this very keenly. As a leader said to us the other day, "We are told so many different things that we do not know which to follow, with the result that we are more apt to do as we think best and let all advice go."

THIS CONFUSION is especially noticeable in the fertilizer field. It is largely explained on the basis that crops and soils are two variables which require different fertilizer and crop management methods to suit individual localities. Therefore, our national habit of trying to simplify and standardize on a state-wide and nation-wide scale inevitably comes in conflict with local areas where such simplified advice does not fit. In addition there are a large number of educational agencies in the field, each with its own story to tell.

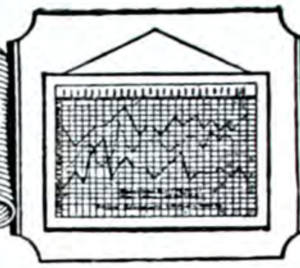
While it is easy to define the problem and state the causes, it's quite another matter to draw up a program that will do away with the confusion that now exists. Certain it is, however, that while the present confusion continues, all the agricultural industries that serve the farmer are losing money; the advisors whose work it is to advise the farmer are losing a great deal of credit to which their work entitles them; and the farmer himself is not getting the full benefit that he should get from his advisors and the workers in industry, and, too, he is losing his confidence in everybody.

Did we but have the courage to do it, it would probably be best in the long run if everybody stopped talking to the farmer for awhile and found out among themselves what they were talking about. But as this cannot happen, everybody who is making any effort to get together and simplify and coordinate the advice and recommendations that are given the farmer should be congratulated and encouraged.

For these reasons it is very gratifying to note the several moves in this direction that have taken place lately. One is the cooperative work with fertilizers on pastures that is being done by several of the groups interested. Another is a very interesting and instructive paper which was read at the meeting of the Association of Land Grant Colleges on the subject of the policy of such institutions towards agricultural workers in industry. This paper was read by Dean Dan Gray of Arkansas and should be studied by everybody interested in the problem. Another move in the same direction was the very sympathetic remarks along the line of coordination in the speech of the President of the National Fertilizer Association at the recent convention in Atlanta, which clearly recognized the problem and offered suggestions for its solution.

Certainly every organization within industry, every farmer's organization, and the Association of Land Grant Colleges should keep this subject prominently to the front on every program, in spite of all difficulties or opposition, until some measure of agreement in the advice given the farmer is attained. The farmer is paying the bill and he expects this—later on, who can tell, if it is not done, he may demand it.

AGRICULTURAL DEVELOPMENTS



By A. M. Schreiber

EL TORO TRADE-MARKED

Dairy bulls that have been "tagged" or "trademarked" will soon be a well recognized product of Clark county, Wisconsin. The dairy farmers in that locality have decided to eliminate the bothersome haggling over prices by having a committee pass on all bulls offered for sale for breeding purposes, giving each a definite grade and putting a price on him. The price agreed upon will be largely determined by the animal's type and the production record of the dam. This is, perhaps, the first attempt to standardize the marketing of bulls. It is announced by the breeders of the county, to insure fair dealing, that the range of prices for the bulls will be from $90 to $300. The animals sold at these prices will range from those of fair type out of cows producing up to 350 pounds of fat to those of excellent type out of cows producing more than 500 pounds of fat a year.

BEET SEED IN ONE YEAR

In the future the laborers in the sugar beet fields will not be the only ones doing a lot of hard work to hurry the sugar making process. The beets themselves are now being made to do their utmost, and instead of taking a leisurely two years to produce seed they do the job in one year. Prof. George Stewart of the Utah Agricultural Experiment Station reports the high-pressure method. In the late fall he plants the seed in the greenhouse, and as soon as the plants are up he increases their working hours by giving them bright electric light until nearly midnight. They make considerable growth by spring, and when danger of frost is past they are set out in the field. They bloom that same summer and produce seed. The old method, which is Nature's, consists in planting the seed in the spring, taking the beets into safe storage in the fall, planting these beets the next spring, and harvesting the seed crop the second fall. Mother Nature is putting on speed.

MEAT INDUSTRY'S "CODE"

The tumult and shouting having died away, American meat packers and wholesalers are turning to the very serious business of making their new "Code of Trade Practices" work.

In effect, they have agreed to quit hitting in the clinches. There are to be no more secret rebates, concessions, or allowances for the purpose of taking business away from a fellow packer. The industry agrees against false or misleading statements concerning the grade, quality, condition, quantity, nature, origin, or preparation of any packing-house product and against defamatory or untrue statements concerning a competitor, his business, his policies, or his products.

The code is a voluntary move on the part of 95 per cent of the industry and the applause, led by Secretary Hyde of the U. S. Department of Agriculture, is heartily echoed around the country. Meat packing is the largest industry in the United States as measured by value of output. It is estimated to exceed three billion dollars annually.

Other things set out as unfair by

the code include attempts to obscure prices at which goods are sold, undue discrimination among buyers, "guaranteeing" a customer against market declines or advances, selling goods below a reasonable market value, and unwarranted attempts to evade fulfillment of an agreement to purchase or sell or to receive or deliver goods.

Of particular interest to the producer, the code forbids an option of more than one day's market. The shipper must take either the price quoted on the day he ships or on the day his shipment arrives. No secret allowances are to be made for weight, price, or shrinkage. Buyers are not to show favoritism or price discrimination to any individual or organization selling livestock. The code holds it unfair to engage livestock at any public market prior to the opening of the market or buying livestock at any public market without divulging the purchase price at the time sale is effected.

SOME FRUITS UNUSUALLY PARTICULAR ON POLLEN

Most tree fruits are benefited through cross pollination, and some will not bear fruit if not cross-pollinated. At the New York State Agricultural Experiment Station investigators have shown that nearly all sweet cherries and Japanese plums and most pears cannot set fruit to their own pollen. But in some cases, they say, pollen from other varieties is no better. Therefore, it is important to the fruit grower that before he sets out his trees he find out just what varieties of these fruits are necessary to supply the pollen for cross-pollination. Bartlett and Seckel pears, for instance, don't do each other any good. They might as well be in solid plantings. But their pollen is all right for other sorts. Peaches and sour cherries, as a rule, will set fruit to their own pollen. Some of the European plums are self-unfruitful. Apples vary in this respect, but as a rule do better when fertilized by pollen from other varieties.

FARM-TO-MARKET ROADS

The farmer who lives in sight of a paved road but can't get to it for the mud has a friend in the American Farm Bureau Federation.

At its annual convention in Chicago it recommended "generous use" of public funds to build a secondary highway system, or farm-to-market roads. There are 5,000,000 farmers in the United States, it says, who find it impossible at some time during the year to get from their homes to market by automobile. Farmers long have sought aid for improvement of rural highways connecting with arterial routes.

THE SILO COMING BACK

Illinois beef calf feeders are changing their attitude on silos. When they turned from heavy cattle to calves, they considered silage too bulky. Now, they believe it was a matter of overfeeding and have decided to give small allowances during the winter and spring to calves on full grain feed.

Silos have been filled this fall where empty silos have been common for several years. The University of Illinois has been turning out market-topping beef calves on silage rations.

SIMPLE MEAL AND REST

The great big Sunday dinner, which began with exclamations and ended with sighs and wheezes, is giving way before the determination of the housewife to have a little rest and recreation on the weekly day of rest, so-called. The home "ec" specialists at Iowa State College say the simple Sunday meal, prepared on Saturday (like the Sunday papers), is becoming popular. This move should make Sunday a success for everybody, except, possibly, the pedestrian.

Foreign and International Agriculture

Cooperative Consciousness

By Charles A. Lyndon

Lyndon, Alberta

THERE is a distinct psychological effect in the success of failure of cooperative enterprises that does not obtain in the realms of other forms of business. In a community where the failure of an ordinary business receives scant notice, the failure of a cooperative brings out the pent-up misgivings of every single soul, and we hear a furore of pros and cons. It takes a veritable flood of business failures to arouse the national business groups to start investigating; even then there is no immediate and vociferous clamor that the business fabric is unsound. On the other hand the failure of one large "co-op" will bring forth columns of comment in the anti-cooperative and even the neutral press, to the tenor that once more the bauble of this cooperative theory has been burst.

Conversely, the eminently successful operation of a large cooperative undertaking draws the attention, not only of those interested in, or friendly to the organization, but of every type of business; marks the men who direct it as super-executives; and, what is still more important to us in this resume, binds the cooperators together in a sort of "esprit de corps" that is born of a common pride in their achievement. The very nature of cooperative business forces it to rely on the element of loyalty in its members to such an extent that it seems to act as a binding force that reaches out into fields of endeavor other than merely that of marketing farm produce.

This is probably a little longer way of saying that the world in general has been reared to the belief that farmers, or however you may wish to classify the agricultural producer, is unfitted to attend to his own business efficiently, and with profit to himself. It is this deep-seated inferiority complex that has caused the agricultural class in many older lands to drift gradually into a state of peasantry. The same complex is still the real basis for most of the opposition of well-meaning persons and bodies of men to the cooperative organizations today. The agricultural cooperatives are finding that it is their greatest obstacle.

Advocates of the cooperative plan have often reiterated that the successful operation of the plan meant increased return. The first and foremost thought of Man must always be return for his labors. This is the logical way to attract the attention of the prospective cooperator. It is harder to sell cooperation to farmers by saying that the adoption of this method of disposing of their produce would react on their viewpoint of life, because this is getting deeply into intangible things. It is, however, the relation of these two types of benefit from cooperation, showing how the latter has automatically developed from the former, that stands out most clearly in a survey of the first five years of operations by the vast wheat pools of western Canada.

Close contact with the Canadian pools over a period of five years, since that day in 1923 when the Canadian press, assisted by American cooperative experts, preached the gospel of wheat pooling to the Prairie Provinces, has caused a good many to sidetrack the old belief that farmers could neither work together in harmony, nor conduct business. This was merely a state of mind engendered by ages of repetition. As the proverbial "drop-drop" of water wears away the stone, so had this "cant-cant" of others destroyed the faith of farmers in their ability to conduct the selling end of their business. Even on the farms of western Canada there are large numbers who still believe the older "take-what-you-get and be-satisfied" plan is safest and best. The pools are the targets of both their trade rivals and the non-member growers, though many of the latter are heard to say they feel the pools have done them a service by raising the level of prices. Underneath all the trade rivalry, though, there lies a story of achievement by these cooperatives that is not even questioned by the men who "do not belong." Even the salient points in pool growth, picked out from the lesser ones, constitute a volume.

Simple Organization

Any attempt to understand what these western wheat pools have accomplished must necessarily be based on a knowledge of how they are organized. This is easy to grasp, as it is simple business organization. The three wheat growing provinces, Alberta, Saskatchewan, and Manitoba, known collectively as the Prairie Provinces, each have their own separate and distinct wheat pool, with members under contract for a stated period. These three pools have cooperated in the formation of the Central Selling Agency, which contracts to sell the wheat pledged to the three pools. This selling agency is controlled by a Board of Directors made up of delegates from the provincial pools. It controls what is perhaps the most outstanding organization of grain salesmen in the world, composed of men taken from the old line grain companies, now engaged in selling in every corner of the globe. The Agency sold its 1927-28 crop direct to 26 countries, through the medium of this sales staff.

The three pools are organized practically alike. The province is divided into districts, and these again into sub-districts, so that the control of the directorate goes down through this sub-district to the producer-member. In these sub-districts are the Wheat Pool Locals, in which the farmers in a neighborhood club together to conduct pool business. Beginning with this as a base, sub-district delegates are elected each year to meet in conference to carry on the pool business of the district, and to proceed with the selection of a member for the board of directors for the pool, each district being represented on the board. The board elects one of its members chairman, and proceeds to operate the pool, direct the head office, select and employ grain experts and salesmen, and send two of its number to the board of the Central Selling Agency,—all as any other board of directors would do. Each pool has its manager and secretary, responsible to the board for the conduct of pool business. It is well to emphasize that this board of farmers, while overseeing every phase of pool business, does not meddle with the technical details of the business. This is left in the hands of the men who have been selected for the various work—salesmen to sell, collectors to collect, attorneys for the legal work, research men for investigational work.

This gives us the pool structure. Now let us see briefly the methods by

(*Turn to page* 48)

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

Considerable progress is being made in the matter of fertilizing bearing orchards. A most interesting treatise on this subject is Extension Circular No. 264 from the University of Arkansas. Results of eight years' experimental work on two orchards are ably presented in this circular. The basic analysis used was a 4-8-4 (N-P-K) applied at such a rate as to supply an amount of nitrogen per tree as is carried in four pounds of nitrate of soda. In the experiments reported, the different elements were varied and a comparison made with nitrate of soda alone. The rating of the several treatments is as follows:

1. 4-8-0
2. Nitrate of Soda alone
3. 4-8-2
4. 4-4-4
5. 4-0-4
6. 4-8-4

After viewing critically with special regard to soil type, the results obtained would seem to indicate that there is need for complete fertilization. This, as pointed out by the authors, is probably more often true on the lighter types of soils, which contain little or none of the mineral elements, phosphorus and potash.

The Division of Feed and Fertilizer Control of the Minnesota State Department of Agriculture has recently issued its first bulletin giving analysis and registration of fertilizers. This bulletin should prove of particular interest to Control Officials in other States, as well as to people engaged in the manufacture and sale of fertilizers. Anyone wishing a copy of this bulletin should write Honorable N. J. Holmberg, Commissioner of Agriculture, St. Paul, Minnesota.

One of the most interesting bulletins in recent years discussing fertilization of the rice crop is Bulletin 398 of the Texas Experiment Station, "Fertilizers for Rice in Texas." The results reported in this bulletin cover a period of five years and show quite convincingly that the rice crop, like all other farm crops, is benefited by proper use of complete fertilizers. In their tests, nitrogen, phosphoric acid, and potash were used separately and in various combinations on a series of plots. For the period referred to above, the highest yield per acre was from a treatment of 300 pounds of acid phosphate, 200 pounds of sulfate of ammonia, and 100 pounds of sulfate of potash, this application being the approximate equivalent of 600 pounds per acre of an 8-8-8 (N-P-K) analysis. The next highest yield was from 600 pounds per acre of an 0-8-8 analysis. From the standpoint of net gain, however, the treatment of 100 pounds of sulfate of ammonia ranked first, the 0-8-8 ranking second. Viewing rice fertilization from the standpoint of a long-time program, it would appear inadvisable under ordinary conditions to practice one-sided fertilization. Rice growers and agricultural leaders should be interested in securing a copy of this bulletin.

Soils

"Soil Survey Lamar County, Georgia", U. S. D. A., Washington, D. C., Bul. 1, Series 1925, S. O. Perkins, F. A. Hayes, A. M. O'Neil, Jr., and C. E. Deardorff.

"Soil Survey of Muskegon County, Michigan", U. S. D. A., Washington, D. C., Bul. 22, Series 1924, L. C. Wheeting and A. E. Matthews.

"Soil Survey of Olmstead County, Minnesota", U. S. D. A., Washington, D. C., J. Ambrose Elwell, G. B. Shivery, B. H. Hendrickson, Mark Baldwin, and A. T. Sweet.

"Soil Survey of Garden County, Nebraska", U. S. D. A., Washington, D. C., Bul. 17, Series 1924, Louis A. Wolfanger, A. W. Goke, H. E. Weakley, and E. H. Strieter.

"Soil Survey of Butler County, Nebraska, U. S. D. A., Washington, D. C., Bul. 20, Series 1924, A. W. Goke, and G. E. Bates.

"Soil Survey of Adams County, Nebraska", U. S. D. A., Washington, D. C., Bul. 41, Series 1923, F. A. Hayes and D. F. Hyde.

"Soil Survey of Platte County, Nebraska", U. S. D. A., Washington, D. C., Bul. 42, Series 1923, L. S. Paine, F. A. Hayes, and G. E. Bates.

"Soil Survey of Lake County, Ohio", U. S. D. A., Washington, D. C., Bul. 3, Series 1925, Arthur E. Taylor.

"Soil Survey of Summers County, West Virginia", U. S. D. A., Washington, D. C., Bul. 21, Series 1924, J. A. Kerr.

"Soil Survey of Monroe County, Wisconsin", U. S. D. A., Washington, D. C., Bul. 40, Series 1923, W. J. Geib, A. C. Anderson, M. J. Edwards, E. H. Bailey, Homer Chapman, Robert Bartholomew, and O. L. Stockstad.

"Soil Survey of Pierce County, Wisconsin", U. S. D. A., Washington, D. C., Bul. 43, Series 1923, W. J. Geib, M. J. Edwards, H. R. Lathrop, M. J. Edwards, and E. H. Templin.

Crops

Four annual reports have come into distribution during the month. All of these contain interesting reviews of important work done in the respective States and are well worth the careful attention of anyone interested in the progress of agriculture.

The Illinois Agricultural Experiment Station in its 1928-29 Annual Report has something of value for every Illinois farmer and all others interested in the State's vast agricultural industry. Of particular interest is their discussion of soils and crops. Reviewing the results of the old Illinois plots in contrast with more recent experimental work with fertilizers, special emphasis is placed on rotations, manure, lime, legumes, phosphate, and potash, all being treated with special relation to larger farm incomes.

An extremely attractive publication in the nature of an annual report received this month is the 9" x 12" size Vol. 1—Part 1 of Vegetables of New York—Peas of New York. This publication contains 132 pages and many illustrations in color of the varieties of peas grown in the State. Full description of all of these varieties is given as well as a valuable history of the garden pea. This series of publications, of which the above seems to be the first number, will be extremely valuable for library and reference use. The series is issued by the New York State Agricultural Experiment Station, Geneva, N. Y.

"Agricultural Extension Work in Arkansas," Agr. Exp. Sta., Little Rock, Ark., Extension Cir. 265, Jan., 1929, T. Roy Reid.

"Monthly Bulletin of the Department of Agriculture, State of California," Sacramento, Calif., Vol. XVIII, No. 9, Sept., 1929.

"University of Florida Agricultural Experiment Station Report for the Fiscal Year Ending June 30, 1928," Agr. Exp. Sta., Gainesville, Fla.

"Report of Moses Fell Annex Farm, Bedford, Indiana," Agr. Exp. Sta., Lafayette, Ind., Cir. 164, June, 1929.

"Better Lawns," Ohio Agr. Exp. Sta., Wooster, Ohio, Spec. Cir. 18, June, 1929, F. A. Welton and Robert M. Salter.

"Work and Progress of the Agricultural Experiment Station for the Year Ending December 31, 1928," Idaho Agr. Exp. Sta., Moscow, Idaho, Bulletin 164, June, 1929.

"Quality in Celery as Related to Structure," Agr. Exp. Sta., Urbana, Ill., Bul. 334, C. B. Sayre.

"The Inoculation of Non-Legumes," Agr. Exp. Sta., Ames, Iowa, Bul. 262, June, 1929, L. W. Erdman and P. E. Brown.

"Growing Sweet Corn for the Canning Factory," Agr. Exp. Sta., East Lansing, Mich., Ext. Bul. 84, May, 1929, G. E. Starr.

"The Young Vineyard," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 124, Apr., 1929, N. L. Partridge.

"Agricultural Experiment Station Report—Two Years Ending June 30, 1928," Agr. Exp. Sta., East Lansing, Mich.

"American Potato Journal," Potato Assoc. of Amer., East Lansing, Mich., Vol. VI, No. 10, October, 1929.

"Mississippi Agricultural Experiment Station, Forty-First Annual Report for the Fiscal Year Ending June 30, 1928," Agr. Exp. Sta., A. & M. College, Miss.

"Progress in Agricultural Investigations—Thirty-Fifth Annual Report of the Agricultural Experiment Station, July 1, 1927, to June 30, 1928," Agr. Exp. Sta., Bozeman, Montana.

"Asparagus Culture," Univ. of New Hampshire Extension Service, Durham, N. H., Ext. Cir. 99, Mar., 1929.

"The Composition of the Cottonseed Produced in New Mexico," Agr. Exp. Sta., State College, N. M., Bul. 175, April, 1929, C. W. Botkin.

"Crop Production at the Tucumcari Field Station," Agr. Exp. Sta., State College, N. M., Bul. 176, May, 1929, Donald R. Burnham and Harry J. Clemmer.

"Grapes in Oklahoma," Oklahoma A. & M. College, Extension Div., Stillwater, Okla., Cir. 254, Gen. Ser. 93, Feb., 1929, Frank B. Cross and L. F. Locke.

"Rape," Ore. Agr. Col., Ext. Serv., Ext. Bul. 414, July, 1929, G. R. Hyslop and H. A. Schoth.

"The Guide Post"—Proceedings of the Potato Exposition Held at the Pennsylvania State College, State College, Pa., Aug. 19-22, 1929," Penn. Potato Growers Assoc., Harrisburg, Pa.

"Development of Runners and Runner Plants in the Strawberry," U. S. D. A., Wash., D. C., Tech. Bul. 122, Aug., 1929, George M. Darrow.

"Wild Garlic and its Control," U. S. D. A., Wash., D. C., Leaflet 43, M. W. Talbot.

"The Loco-Weed Disease," U. S. D. A., Wash., D. C., Farmers' Bul. 1054, June, 1929, C. Dwight Marsh, A. B. Clawson and W. W. Eggleston.

"Production of Late or Main-Crop Potatoes," U. S. D. A., Wash., D. C., Farmers' Bul. 1064, William Stuart.

"Important Cultivated Grasses," U. S. D. A., Wash., D. C., Farmers' Bul. 1254, C. V. Piper.

"Oats in the Northcentral States," U. S. D. A., Wash., D. C., Farmers' Bul. 1581, T. R. Stanton and F. A. Coffman.

"How Fast Do Northern Hardwoods Grow?" Agr. Exp. Sta., Madison, Wis., Res. Bul. 88, Jan., 1929, Raphael Zon and H. F. Scholz.

Economics

The Illinois Agricultural Experiment Station in Bulletin 329 brings to the farmers of the State a most comprehensive analysis of the farm management problems of the corn-belt farms. The bulletin, entitled "Organize the Corn-belt Farm for Profitable Production," stresses particularly, crop yields, high profit crops, livestock, volume of business, labor and power efficiency, diversity of production, the farm layout, market demand, and above all the importance of maintaining a high level of soil fertility. In brief the bulletin is directed at the economics of crop production and should prove a treasure to farmers and agricultural leaders the country over. The authors are H. C. M. Case, R. H. Wilcox, and H. A. Berg.

"Walnut Supply and Price Situation," Agr. Exp. Sta., Berkeley, Calif., Bul. 475, Sept., 1929, H. E. Erdman and W. U. Fuhriman.

"Buying Tomatoes on Grade—1928," Agr. Exp. Sta., Lafayette, Ind., Bul. 328, Feb., 1929, Fay C. Gaylord and Harry M. Cleaver.

"Potato Production Costs in New Hampshire," Agr. Exp. Sta., Durham, N. H., Bul. 239, May, 1929, M. F. Abell.

"Types of Farming in South Dakota," Farm Economics Dept., Agr. Exp. Sta., Brookings, S. C., Bul. 238, June, 1929, R. H. Rogers and F. F. Elliott.

"Farm Grain Storage," U. S. D. A., Wash., D. C., Leaflet 46, July, 1929, E. G. Boerner, M. C. Betts and T. A. H. Miller.

"A Study of Farm Migration in Selected Communities in the State of Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 233, June, 1929, A. A. Smick and F. R. Yoder.

"Making the Most of Marinette County Land," Agr. Extension Service, Univ. of Wis., Madison, Wis., Special Cir., May, 1929.

Diseases

"The Rhizoctonia Damping-off of Conifers, and Its Control by Chemical Treatment of the Soil," Agr. Exp. Sta., Ithaca, N. Y., Memoir 124, Apr., 1929, James Stewart Wiant.

"Varietal Resistance of Spring Wheats to Bunt," Agr. Exp. Sta., Fargo, N. Dak., Bul. 231, July, 1929, W. E. Brentzel and Ralph W. Smith.

"Plants Susceptible or Resistant to Cotton Root Rot and Their Relation to Control," Agr. Exp. Sta., College Sta., Texas, Bul. 33, Feb., 1929, J. J. Taubenhaus, B. F. Dana, and S. E. Wolff.

Insects

"The Cotton-Square Borer," Agr. Exp. Sta., College Sta., Texas, Bul. 401, Sept., 1929, H. A. Reinhard.

"Tobacco Cutworms," U. S. D. A., Wash., D. C., Tech. Bul. 88, May, 1929, S. E. Crumb.

Cooperative Consciousness

(*From page* 44)

which the pools do business. This centres chiefly around two things: the pool contract, and the pool elevator, one to secure the grain, the other to handle it.

The three pools have all adopted the five-year contract, the Alberta and Saskatchewan form being in series, that is, all ending on a certain date, regardless of whether signed at the beginning or near the end of the period. The Manitoba contract, on the other hand ends five years from the day it is signed, so that old ones are becoming invalid, as new ones are added, every day. These contracts guarantee the volume necessary to success, and three rapidly growing elevator systems care for it. Alberta and Saskatchewan have already developed really enormous elevator holdings. Alberta Pool Elevators owns 308 country elevators, and is building new ones continually, as size of membership warrants one in any locality. Saskatchewan Pool Elevators owns 967 country houses, and is adding to the number. Manitoba has gone at the elevator problem in a little different manner, by arranging with other agencies to handle their wheat, and by chartering local organizations and supporting them in building grain houses. This plan now controls 150 elevators.

In addition, the pools control 10 terminal houses with a capacity of 37 million bushels.

This constitutes a bird's-eye view of the pool structure. The rest of the story is a tale of five years' labor—labor in the face of unforeseen obstacles and the keenest of competition—with the facts to show what has been accomplished. It is true that even figures may be misused, but the figures available in Canadian wheat pool history all lead steadily toward higher attainment, until they show today a pool membership of close to 145,000 farmers who think their plan is destined to stay in the wheat marketing sphere.

Canadian farmers disposed of thei war-year crops through the mediun of a government Wheat Board whicl virtually set the price in order to kee wheat within the reach of Allie mills. With the Armistice the Whea Board ceased to function, and th wheat growers were thrown with great grain surplus on a world marke that had no money. So insistent be came the demand for a continuatio of the Wheat Board, and so apparen the fact that a government boar could not solve the problem, that section of the Canadian press bega the agitation for a farmer-organize and farmer-controlled pooling systen for grains. The pools were born ou of this distress of the prairie farmers The leading cooperators of the Unite States were brought to Canada in th summer of 1923 to preach the gospe of cooperation. The same fall th Alberta pool became a reality, havin signed up 50 per cent of the whea acreage of the province, which was th initial objective. Saskatchewan was little short of the 50 per cent mar when the wheat started to come t the elevators, and in line with the or iginal plan, its pool did not go int operation until the season of 1924 The Manitoba pool also commenced t function with the harvesting of th 1924 crop.

It is safe to say that the trend o membership, and the steady growth i wheat acreage contracted, have con stituted two of the greatest joys o this first period for the poolers.

The Alberta pool commenced op erations with 25,061 members; in tw years this had increased to 36,000 and today it has over 38,400 names o its rolls. The Saskatchewan pool i the colossus of the trio. It starte with 46,509 members, increased i two years to 72,000, and today boast 85,000 farmers on contract. Mani-

(*Turn to page* 50)

Pages From A Field Note Book

Seven Dollars for One

By Hubert E. Cotton

Hancock, Wisconsin

EMIL STORZBACH, who farms 160 acres of land in the potato-growing section of Wisconsin, near Plainfield, declares that a high-potash fertilizer returned him seven dollars for each dollar spent. The part of his potato field to which he applied a 3-9-18 commercial fertilizer in the row, or rather beside the row, before the seed sprouted, yielded double the number of bushels grown on the same acreage which was unfertilized.

In addition, a larger percentage of the crop from the fertilized land will be salable potatoes, while those which did not receive the fertilizer will run considerably smaller in size with more to be sorted away.

At the prices this year, the increased yield pays for the fertilizer seven times over. "And," Mr. Storzbach adds, "there is some fertilizer left in the ground to help me raise some alfalfa there next year."

Application was made with a cultivator attachment at the rate of about 300 pounds of the 3-9-18 to the acre.

Side-dressing Sweet Potatoes

By R. E. Miller

County Agent, Lowndes County, Valdosta, Georgia

AN experiment on side-dressing sweet potatoes with muriate of potash was conducted in 1928 on the farm of McLeod Brothers, three miles east of Valdosta, Georgia. Two acres of Porto Rica potatoes were used with 400 pounds of an 8-3-5 factory-mixed fertilizer per acre, applied in the drill at setting time. The vines were just beginning to run when 200 pounds of muriate was applied in the middles on one acre; the other acre was left with only the original fertilization. The cultivation, time of setting, and the type of soil were the same.

Both acres were harvested on November 22, and each basket weighed. The acre having no side application of potash yielded 4,100 pounds of No. 1 potatoes and 2,348 No. 2 potatoes, or a total of 107.5 bushels. The acre side-dressed yielded 5,032 pounds of No. 1's, and 3,248 No. 2's, or a total of 138 bushels, showing an increase of 30.5 bushels due to the application of the muriate of potash.

The 200 pounds of muriate cost $4.50, and allowing 50 cents for applying made the increase in yield cost 16 1-3 cents per bushel.

Terrace Before Fertilizing

By W. H. Darrow

Extension Editor, A. and M. College of Texas

TERRACING to save the soil from erosion is an essential step to be taken before applying fertilizers, so the results of 15 demonstrators in Polk county, Texas, show. One upland field with sandy-gravelly soil made a yield of close to a bale of cotton to the acre from an application of 300 pounds 12-4-4 fertilizer after being terraced two years. The best yields of previous crops on this land had never exceeded half a bale to t acre, even when the same amount fertilizer had been used. The rap increase in use of fertilizer in Po county is credited by county age J. L. Walker to terracing, for demo strations have repeatedly shown th the purchase of fertilizer for use unterraced land is often financial hazardous.

Cooperative Consciousness

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toba grew similarly. From an initial charter group of 7,856 producers, it passed its second birthday with 16,000 members, and now markets wheat for 20,300 signers. If steady growth is in any way connected with health, then surely this membership statement shows the pools to be healthy bodies.

The acreage lists are no less impressive. Alberta farmers originally placed 2,416,413 acres under pool contract, and today they have extended this past the 4,000,000 acre mark. Saskatchewan has grown from the original 6,433,000 acres, to a prese total of 11,000,000. Last year th pool marketed 56 per cent of t grain grown in the province. Man toba opened pool history in '24 wi 711,000 acres under contract. Tod it shows 1,236,000 acres contracted.

It has been estimated by authoriti who should know, that the Saskatch wan pool contracts now cover abo 75 per cent of the wheat land of t province; Alberta about 60 per cen and Manitoba around the 50 per ce mark. So much for size!

(*To Be Continued*)

Colorado

(*From page* 13)

mal diseases, by Doctors Geo H. Glover, I. E. Newsom, W. H. Feldman, and Floyd Cross; in botany with plant diseases and controls by Dr. L. W. Durrell, E. L. LeClerg, and E. A. Lungren; in agronomy by Alvin Kezer and Dr. D. W. Robertson; in bacteriology by Dr. W. G. Sackett; and the work in entomology is outstanding in the West.

Dr. C. P. Gillette, who became entomologist at the experiment station in 1890, pioneered in his fiel here. His first work was with t Mexican bean-beetle, the fruit-tr leaf roller, and the codling mot Working out life histories, he has bee able to evolve control measures f most pests that have been found i the State. Sprays for the codlin moth have been developed, but his d partment is still working on mo satisfactory methods for some se ons of the State.

Probably Director Gillette's most otable work, in addition to his adinistration of the Colorado Experient Station for the past 19 years, is been with plant lice. He and his sociate, Miss M. A. Palmer, have deribed 69 different new species in rent years and they are still active in e work.

Distinctive in the work of the Colodo station are the improvements in rigation practices and devices that ive been made by the engineers, G. Carpenter, V. M. Cone, R. L. irshall, and Carl Rowher. Professor arpenter made marked improvements measuring devices in the early days, id Professor Parshall's development the Improved Venturi Flume in rent years has added much to the inistry. This flume is now in use in any foreign countries as well as in l irrigated regions of this country. s main advantages over other devices e that it will measure heavily siltladen water accurately and without loss of but little head.

Professor Parshall proved that the use of water for irrigation near the upper end of a valley increases the amount of water available in the lower portions of the valley because of the return flow. This discovery has served to settle amicably several disputes between States, irrigation companies, and individuals, to the ultimate benefit of all.

It is safe to say that millions of dollars have been saved and earned for farmers of Colorado and other States by the scientists of the Colorado Experiment Station. These men and women work patiently, often for years, to accomplish their purposes.

It is a story of earnest toil, close observation, supreme love of service, perhaps important discovery.

Romance?

Service! Accomplishment! Another addition to the sum total of human knowledge.

Buckwheat

(*From page 25*)

entral States. Minnesota now ranks ird in production with 88,000 acres 1928. The Minnesota, Iowa, and ikota acreages are a relatively rent development. These western ates, with their vast soil resources, uld easily become the leaders in the oduction of this crop if they should oose to substitute it in part for her grains. Yields per acre have eraged highest in the northeastern ites, the United States average for 28 being 17.6 bushels.

World data on buckwheat producn are very unsatisfactory, particuly in post-war years. In the period fore the war, however, the United ites, with an average production of out 17,500,000 bushels, was surssed only by Russia with a producn of over 55,000,000 bushels. Cana produced about one-half and Japan about one-third as much as the United States.

Buckwheat may be looked upon as a bread grain which has been grown in areas not well suited to the production of wheat and rye. It thrives relatively well on light and thin soils as well as under acid conditions, thus extending the bread grain production beyond the boundaries established by the better known bread cereals. The crop seems to be especially well adapted to new lands, such as recently cleared timber lands or newly drained marshes. Like flax, its culture has sometimes had the aspects of a pioneer crop. Because of its short growing season it also frequently is used as a catch crop after other crops have failed or as a second crop to follow early harvested crops, such as canning peas.

Climatically, it may be said that buckwheat thrives best in regions of cool, moist summers, very little being grown where the summer temperatures average over 70 degrees Fahrenheit, and practically none where they exceed 75 degrees. It is well adapted to high altitudes since its growing season under favorable conditions is from 10 to 12 weeks. This accounts in part for the location of the acreage in the more hilly and mountainous parts of such States as Virginia, Carolina, and Kentucky which grow most of the southernmost American acreages. The crop is very sensitive to cold and the growing period must be free from frost.

The consumption of buckwheat widespread, little of it being milled the particular localities where it produced. The production enters, a large degree, into interstate trad and our exports are only a very sm percentage of the total. It is ve largely used as human food, its har angular kernels being less well suit for livestock feeding than the oth cereal grains. Its by-products, suc as buckwheat, bran, and middlin are commonly used for stock feedin though the pure bran is of low valu A mixture of the bran and middlin is used commonly in mixed feed much of it being consumed in scratc feeds for poultry.

Green Pastures

(*From page* 20)

grade, complete fertilizer to the acre at seeding time, followed by a broadcast application of a top-dressing mixture at approximately the same rate the following spring, constitutes a good practice.

In the case of permanent established pastures if there exists a sufficient stand of the desired grass to give the fertilizer a basis to do its work, profitable results from applications of the plant food are practically certain. Top-dressings of permanent pastures must be made timely, however, to get best results. As soon as the frost is out of the ground in the spring and again in the early fall, the plant food can be best applied.

In the improvement of permanent pastures, considerable work has been done in the New England States by the National Fertilizer Association in cooperation with the agricultural colleges, county agents, and farmers. Results of their extensive demonstrations and experimental work show that fertilizers pay when the plant foods are in the right ratios and are applied in sufficient quantities.

Some idea of what is being recom mended is shown in the followin quotation from John Abbott, Ne England Agronomist of the Nation Fertilizer Association. "In the case c sods which are of satisfactory botani cal composition, we suggest using an standard grass top-dressing fertilizer c approximately a 1-1-1 (N-P-K) rati in an amount sufficient to supply a least 30 and probably 50 pounds o each plant food per acre. In the cas of sods which are deficient in th clovers and blue-grass, we suggest in creasing the minerals in the fertilize to a 1-2-2 (N-P-K) ratio because o the demonstrated influence of mineral in bringing in white clover and blue grass, the amount of fertilizer pe acre remaining the same."

The fertilizer should be evenly dis tributed and for this purpose, a lim sower or fertilizer attachment to th grain drill can be used. The plan food should be applied generously, an after the first initial application t supply existing plant food deficiencies top-dressings of about 300 pounds pe cre of a suitable analysis should be ıade annually.

Commercial fertilizer applied to hay nd pasture crops produces the cheapst and best quality feed available to he American farmer today. An exension of the use of fertilizers in livestock farming sections is making the most profitable production of meat and milk. In some localities fertilizers have actually extended animal husbandry when otherwise it could not exist owing to inherent deficiencies of the soil.

Soil Fertility Schools

(*From page* 30)

Let's, for a few moments, visit one f the soil fertility schools and see or ourselves precisely how they are ıelping dealers to serve the farmer in olving some of his soil puzzles.

Perhaps the school, as is usually the ase, is being held in a room in the ounty court house. There, seated round a large round table, are 19 lealers. Not a large number, you say, et every dealer in the county is presnt, all with pencil in hand ready to lo some hard thinking and note takng. There is also a liberal sprinkling f farmers.

Around the walls of the room are oil maps of the county, pictures of lfalfa with and without lime, diagrams showing the results obtained rom various fertilizer mixtures on lifferent kinds of soils, and other picures and charts.

The school is just about ready to tart. We had better find our seats nd pay close attention. The local ounty agent opens the course with a ittle talk on the importance of a soil program to the county's agriculture nd the part the fertilizer dealer can play in putting it across with benefit o both himself and his customers. He llustrates his talk with a few pictures f demonstrations he has staged in the county, cites some of the results local armers have secured with various fertilizers, and goes into considerable detail in talking about local soil types nd crop needs.

After he has finished, a few questions are asked, notes taken, and Professor Richards begins his talk on State and county soil types. By illustrating his discussion with maps and by passing around trays containing various kind of soils for the inspection of the dealers, he quickly shows them the difference between a clay, a silt, fine sand, medium sand, sandy loam, etc. The colors of the soil types are noted, and Richards pauses while questions are fired at him on the entire talk.

His next subject is lime. Here, he talks about the need for testing soil to find out how much, if any, lime is required. If a test demonstrates a need for lime, he urges that it be applied one year in advance for the alfalfa crop. He also tells how the services of the State Soils Laboratory and the Soil Improvement Association help the farmer to know the needs of his soil. Both of the services include an analysis of the farmer's soil and recommendations on how it can be improved. The State Soils Laboratory, he explains, employs a specialist to make field surveys of farms and to analyze in detail their specific soil requirements. The work of the State Soil Improvement Association, on the other hand, is largely done by mail. Soil samples are mailed in from farms to the soils department at the State College where an analysis is made and a report recommending the most practical soil improvement practices suggested. Both services, Richards believes, can be of great help in solving the farmer's fertility problems and fertilizer dealers can well use them.

After this last talk we have lunch.

Piping hot coffee, weenies, buns, and perhaps apples, are tucked away with marvelous rapidity. The topic of the hour is soil fertility programs, how they fit into local conditions, how they can be put across, and where the dealer comes into the picture.

However, lunch is soon over and serious business again confronts the school. This time Professor Richards talks about commercial fertilizers and their place in a county fertility program. He discusses at some length the function each plant food element plays in plant nutrition and illustrates his talk by passing around samples of potash, phosphoric acid, and calcium, and by explaining pictures of crops grown with and without a vital element.

The next discussion is on soil fertility programs. Here, Richards emphasizes the need for the proper ca of manure, the growing of legum on a third of the tilled area of t farm, the use of phosphate fertiliz on heavy soils, the use of both pho phate and potash on sandy land, a various methods of applying fertilize

After the last talk the coun agent rises and summarizes this o day school in soil fertility. He sho how the subjects discussed during t day can be profitably applied to loc conditions and cites the results loc farmers have secured by applying v rious kinds of fertilizers. Questio are asked. The students depart.

County soil fertility schools, Ric ards believes, will prove unusual helpful in teaching fertilizer deale farmers, and others, the great adva tages to be had by planning and fo lowing a soil improvement progran

Quality Berries

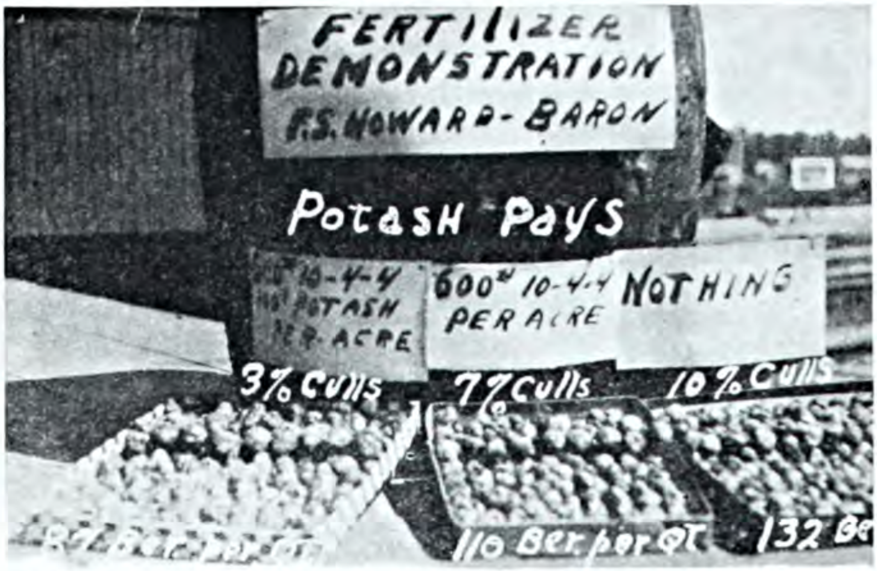
(*From page* 29)

were applied in February. To another plot 653 pounds of a 4-10-4 plus 108 pounds of muriate of potash were applied; and to the third plot no fertilizer was applied. There was a marked difference in the yield and quality of the berries. The plot receiving the extra potash produced 220 crates of marketable berries and require only 87 berries to make a quart, wit only 3 per cent culls. The plot re ceiving only the 4-10-4 produced 19 crates per acre of marketable berrie requiring 110 berries to make a quar with 7 per cent culls. The plot re ceiving no fertilizer produced onl

Mr. F. S. Howard standing between the unfertilized and fertilized strawberry fields. The field at th right and in front of him received 653 pounds of a 4-10-4 plus 108 pounds of muriate of potash pe acre. Note the difference in growth.

39 crates per acre, equiring 132 berries per quart, with 0 per cent culls. Berries were graded or culls at the niddle of the harvesting season by Mr. C. B. Shelton, ield agent for the Oklahoma State Market Commission.

The keeping qualities of the berries were tested, as Mr. Hayman sent berries from each plot to the Home Economics Department of the A. & M. College unidentified. At the end of five days, Miss Grace Steininger, food specialist, reported only 29 per cent edible berries from the no-fertilizer plot, 31 per cent from the 4-10-4 plot, and 46 per cent good berries from the plot receiving the potash in addition to the regular fertilizer.



This exhibit of berries from the fertilizer demonstration on Mr. Howard's farm was made at the shipping sheds at Stillwell and Westville, Oklahoma.

Giving "Life"

(*From page* 24)

tested for acidity and was close to the danger point as regards potato scab, (pH 5.6). The soil on the Hussey farm was also near this point, yet 500 pounds of lime per acre were used. The fertilizer on both demonstrations was applied when seeding with oats and clover. On the Cleveland Company's demonstration 500 pounds per acre of fertilizer were used, and on the Hussey plots 400 pounds per acre.

The following gives the analyses of the fertilizers used on the different plots and the yields per acre of clover hay resulting from these treatments:

Analysis	*Cleveland Co.* Pounds Clover Hay	*Hussey* Pounds Clover Hay
None	2613	6293*
2-12-2	2720	7406
2-12-4	4107	7527
2-12-6	5813	8050
2-12-8	5493	9226
2-12-10	6720	7360

* Lime alone.

From the foregoing data it can be seen that the highest yield on the E. L. Cleveland Company's farm was secured with 500 pounds of 2-12-10 fertilizer. This is an application of 50 pounds per acre of actual potash. On the Hussey farm the biggest yield was secured with 400 pounds of a 2-12-8, or 32 pounds of actual potash per acre. These two demonstrations are typical of varying degrees of fertility in Aroostook and indicate that for clover the fertilizer for seeding down should carry from 32-50 pounds of actual potash.

The foregoing pictures the soil problem of the Aroostook county potato grower. When soils are extremely acid, lime should be used in the amounts indicated by testing the soil. It will be found that on soils only slightly acid, it will be better to depend on fertilizer to give real stands of clover rather than to apply lime. While plant food is not a substitute for lime, neither does lime replace plant food. It will be from the intelligent use of both of these that better stands of clover will result.

On the soils where grain does not lodge badly, the oat crop can be materially increased by using more nitrogen than was used in the two demonstrations given above. To provide for the extra nitrogen which the oat crop can use profitably and at the same time to supply the phosphorus and potash so essential for good clover following the oats, 400-500 pounds per acre of a 5-8-7, 5-7-10, or 4-12-1 or 200-300 pounds of a 9-18-18 w assure results. On soils where oa have a tendency to lodge, it probab will be better to use a fertilizer carr ing a lower percentage of nitroge but carrying as high percentages both phosphorus and potash. It certain that by fertilizing the oats an clover when seeding down, life ca be put into the clover, which in tur means life in the whole rotation.

Plant Less—Make More

(*From page 7*)

meeting at Norfolk, Virginia, in the fall of 1928. This meeting was attended by farmers, bankers, seed dealers, fertilizer dealers, managers of cooperatives, independent dealers, and extension workers. Every phase of the potato growing industry was discussed and there was a unanimous demand for the setting up of an interstate potato committee to handle every detail. Such a committee was set up immediately with the director of the extension service in Virginia as temporary chairman. Associated with him were the directors of extension work, managers of cooperatives, dealers, bankers, and farmers from the other early potato producing States.

This interstate committee began work immediately and set up subcommittees in each State to work along the following lines:

(1) Advance market information and acreage stabilization.
(2) Speculative credit stabilization.
(3) Substitute crops and enterprises.
(4) Wider market coordination and improved market practices.

The State extension services and the United States Department of Agriculture cooperated in employing A E. Mercker as executive secretary o the committee to work actively fo acreage stabilization from Florida t New Jersey.

The committee did not put on a *acreage reduction* campaign, but go all facts in regard to the prospectiv carryover of the old crop, intention to plant and outlook information, an put these in the hands of growers bankers, and dealers through news paper articles, mass meetings, persona letters, and personal contacts. Virginia growers visited North Carolina North Carolina growers stumpe Maryland; and Maryland grower talked to South Carolinians. Unti the click of the first potato plante was heard, constant and insistent publicity was given to every detail by th various sub-committees.

Cooperation was almost 100 pe cent since everyone connected with the early potato industry had lost money the previous year. The propaganda and publicity went over. Bankers, small and large, carefully watched applications for money for production purposes and, where these applications seemed excessive, gently but firmly vetoed the same. Dealers rho had been in the habit of adancing large sums for the purchase f seed and fertilizer cut such down rom 30 to 50 per cent, and growers greed to cut their plantings from 0 to 50 per cent.

There were, of course, some inividuals, business men and growers, ankers and fertilizer men, barrel nanufacturers and seed dealers, who ook this opportunity to profit at heir neighbors' expense and operated n a large scale. But these men were small minority and, as they were nder the critical eyes of their neighors, their lot was not a happy one. t will be worse in the future.

The net result of the activities of ll concerned was that potato production was cut at least 30 per cent ll the way from South Carolina to Maryland. The price paid to growrs in 1929 averaged about $3.75 per arrel instead of $1.25 per barrel, which was paid them for their crop n 1928. The early potato section as whole had the most prosperous year ince 1920.

It is not claimed that the work of he early potato committee was enirely responsible for this decrease in creage which resulted in good prices. Low prices the year before, resulting n restricted credit, had more to do with the reduced planting than any ther one thing. However, everyone oncerned gives the committee credit for teaching the farmers more about the law of supply and demand and the use of "outlook information" than they had ever known before.

The members of the committee realize that its biggest job is to prevent over-production in 1930, after a year of good prices. For the past two months it has been actively at work trying to check any undue stimulation of planting. With the background of experience gained this year, the committee has arranged numerous meetings in the potato growing sections of each State and is laying before farmers, bankers, and dealers the valuable results from concerted action in accomplishing stabilized production. Farmers have seen that *more* potatoes usually mean *less* money and *less* potatoes *more* money, but they do not yet know just *how many* potatoes will bring the *most money* to the growers in each section. The committee is making every effort to give them this information through studies made by the Bureau of Agricultural Economics and the agricultural colleges.

It is, of course, too early yet to predict the ultimate outcome of this movement, but it has gone far enough to show that bankers, growers, and sellers of a perishable agricultural commodity can, through intelligent cooperation, *stabilize production*, which is the first step in successful marketing.

What's Ahead

(*From page* 28)

ieutralized by other factors, such as he growth of small truck farms round large cities, division of land ioldings among heirs, and abandonnent of poor land during periods of ow prices for farm products. In a 'ew areas, however, where conditions iave been particularly favorable to the ise of modern farm machinery, there s a definite trend toward larger farms.

There is an unmistakable tendency toward larger farms in the wheat growing sections of Montana. In 1924 a group of successful tractor wheat farms studied by the Montana Agricultural Experiment Station averaged 598 acres; in 1925 the average size of farms had increased to 670 acres; in 1926 the average was 812 acres; in 1927, it jumped to 998 acres, and in 1928 to 1,265 acres. Assessors' rolls for townships in southwestern Kanas, where the combine in in general use, show that since 1924 the size of typical farms in that section has been doubled.

Government engineers and chemists now are working on the problem of improving implements used in the application of fertilizers to the soil and of improving the drilling qualities of fertilizers. Progress is reported by the Bureau of Chemistry and Soils in combining the ingredient materials of fertilizers into forms which drill with much greater uniformity than will the average commercial fertilizers now available. Bureau officials believe that the perfecting of processes and the eventual adoption of them by fertilizer manufacturers will result in large savings to farmers.

"The difficulty of getting exact delivery rates and uniform distribution of fertilizers with present implements," according to A. L. Mehring, a chemist of the fertilizer and fixed-nitrogen unit of the bureau, "is due partly to design and construction of implements and partly to the variability of fertilizer properties. Recent experiments have indicated that the principal properties of fertilizers that affect their distributing qualities are the tendency to absorb moisture, fineness or coarseness of particles, the degree of physical uniformity, apparent specific gravity, and friction and cohesion between particles. The mechanical condition of the fertilizer at any time also depends largely upon the weather to which it has been exposed.

"Nitrate of lime which was dry and drilled very well in an atmosphere of 40 per cent relative humidity, in these experiments, became soggy with moisture and drilled very poorly in an atmosphere of 50 per cent relative humidity, and at 60 per cent it was liquid. Sodium nitrate which drilled excellently at 40, 50, and 60 per cent relative humidity could not be handled in the fertilizer distributor whe the humidity was 70 per cent c higher. Certain of the new concen trated nitrogenous fertilizers—ure ammonium nitrate, and leunasalpete —behaved much like nitrate of sod although urea, like ammonium sul phate, could be drilled at humiditie 10 per cent higher than could nitrat of soda. Superphosphate was to dusty at 40 per cent relative humidit and too damp at 90 per cent for goo results, but could be distributed a any humidity below 90 per cent. Th concentrated phosphates, ammopho mono-ammonium phosphate, an mono-potassium phosphate drilled we at all humidities up to 90 per cent.

"Although the delivery rate varie tremendously with the shape of par ticles, fairly uniform distribution wa accomplished in nearly every cas when the materials were coarse an dry. On the other hand, when th rate of distribution is reduced by co hesion, which occurs when materia is finely powdered or becomes dam through absorption of water, uniform ity of distribution becomes increasing ly difficult, if not impossible.

"Some mixed fertilizers tend to sep arate more or less into their compon ents during distribution, due to th vibration and jolting of the distribu tors in operation in the field. It wa found that the finer and heavier par ticles accumulated at the bottom o the hopper and tended to be delivere first, whereas the coarser and lighte particles worked to the top and a larger proportion of them were delivered when the hopper was nearly empty."

These fertilizer experiments have lead to the conclusion that the mixing of fertilizer elements in proper proportions in small, readily drillable particles, can eliminate part of the present enormous wastage of fertilizer material due to poor drillability and irregular delivery in improper proportions, and that some of the present difficulties can be eliminated entirely n the process of manufacture by making a slurry of the components to be mixed and then graining or spraying them all together.

Accompanying the increased use of power machinery, there has been a considerable shift in the acreage of various crops from older producing centers to other regions better suited to the use of such machinery. The wheat acreage has shifted westward during the past 10 years. Between 1918 and 1928 the wheat acreage in North Dakota, South Dakota, Montana, Nebraska, Kansas, Oklahoma, and Texas increased from 27,861,000 acres to 38,438,000 acres. During the same period the wheat acreage in Ohio, Indiana, Illinois, Iowa, and Minnesota declined from 12,402,000 to 5,317,000 acres.

Even within some of the Wheat Belt States the wheat acreage has been shifting from east to west. In the eastern third of the State of Kansas, the average area seeded to wheat during the years 1917-19 was 1,685,000 acres, and in the western third of the State, 2,705,000 acres. In 1928 the area seeded to wheat in the eastern third of the State had been curtailed to 1,205,000 acres, but in the western third it had been expanded to 4,660,000 acres.

Fertilizing Onions

(*From page* 16)

lings appear above the surface of the ground. Usually from 200 to 300 pounds per acre is an amount sufficient to tide the onion plants over until the organic forms become available.

Next comes the question as to an exact fertilizer analysis and the exact amount to apply per acre. At this point it becomes necessary for the onion grower to do some experimenting. It is not practical to definitely recommend exact analyses. The conditions of the soil and climate are too variable.

The good judgment and keen observation of the grower will tell him whether or not his onions are growing fast enough in the early cool part of the season. If such is not the case, he can apply 200 pounds or so of a nitrogen-carrying fertilizer per acre. He knows that potash will slow up maturity and that superphosphate will speed it up. The proper arrangement of the three plant foods based upon this knowledge and the past season's observation alone will determine what fertilizer to use and how much to use.

Experience and experiments show that an 0-8-32 formula will frequently give profitable yields on sweet soils where nitrogen is not a limiting factor. Where nitrogen is needed a 3-9-18 formula may produce better results.

For moderately acid muck soils an 0-12-12 formula is recommended where nitrogen is not needed and a 3-9-18 formula is used where nitrogen is needed.

The amount of fertilizer to use varies from 600 to 1,500 pounds per acre, depending upon previous experiences as to the particular fertilizer requirements of any field.

On sandy soils, a 4-10-6 gives excellent results for onions. The heavier types like silt loams, clay loams, or clays usually respond to a 2-12-6 formula. As in the case of muck soils, these sands and loams usually respond to nitrogen fertilizers best during the early part of the growing season or during periods of unfavorable weather.

The formulas which are suggested here as a sort of basic treatment upon which the grower of onions can begin his own fertilizer tests and are adaptable also to the other root crops such as beets and carrots.

Animal manures are rarely profitable on muck soils because of the danger of weed seed introduction especially when fresh manure is used. Then, too, muck soils do not need additional organic matter as do other soils.

Having arrived at some conclusion as to the kind and amount of fertilizer needed per acre, the next problem is that of methods of application. All organic fertilizers are best applied previous to the first of each year. Commercial plant foods, especially those containing nitrogen, are best applied just before the seed is sown. The practical place to have the fertilizer located is an inch or so beneath the seed. The root system will reach it almost immediately. Some danger results from this practice if more than 500 pounds per acre are sown.

Perhaps the more practical way is to broadcast from 500 to 1,000 pounds per acre just before drilling in the seed. A wheat drill with fertilizer attachment can be used for this job.

Whatever fertilizer program is selected will need to be constantly watched and checked. Variations from year to year are needed to meet the soil's changing plant food supply. The maximum yields are assured to those who study the fertilizer requirements of the onion crop; other factors considered as carefully. At all events it is not practical to attempt onion production without the liberal and intelligent use of commercial fertilizers.

300 Bushels Per

(*From page* 14)

doubtedly due to the increased amount of fertilizer per acre.

Just how the fertilizer was applied is interesting. For years many growers have believed that it should be applied entirely in the furrow. The records show that 60 per cent of the fertilizer was so applied, and on 60 per cent of the farms the fertilizer was applied that way and on 40 per cent it was applied broadcast. In studying a little deeper into this subject, it is interesting to note that some of the heaviest yields were obtained on farms where broadcasting was practiced, the largest yield of all, 559 bushels, being obtained on a farm where broadcasting is the practice.

Many growers believe that spraying is the whole "bag of tricks" in potato raising. In looking over the statements made by growers even if good spraying was practiced and not much fertilizer used, the yield was not so high as where an abundant amount of fertilizer was used and good spraying was practiced, so the answer will have to be that spraying is not the "whole works" in the potato game.

On the question—how many times has the field been sprayed—those who sprayed from five to eight times are more than 60 per cent of the total. Those who sprayed more than eight times are very small in number and those who sprayed for blight below five times are small in number. Those who sprayed once, twice, or three times in practically any instance sprayed only to control insects. This was particularly true in one county where blight seems not to have created as much loss as in some other counties.

When the number of times that a crop has been sprayed has been figured out as compared to the yield in bushels per acre, we have an interesting subject well worth finding out. There are those who sprayed only four times and had an average of 148 bushels per acre. Those who sprayed five times had an average yield of 178 bushels per acre. Those who sprayed six times had an average yield of 219 bushels.

hose who sprayed seven times had an erage yield of 240 bushels. Those ho sprayed eight times had an av-age yield of 320 bushels, and those ho sprayed nine times had an average yield of 341 bushels. These figures are indeed interesting and show plainly that spraying has a decided influence on yield per acre and must not be neglected.

Your Yule

(*From page* 4)

Standardization has also played its art along with the advance of scien-ific luxury. You can buy the same ew-gaws to trim a Christmas tree in Arizona or in Maine, just as you can ind the needful parts to a busted gas roncho anywhere on the great Amer-can grease trail.

Verily, the American genus homo as become so homogenous that no-ody can surprise him or give him the ncertain thrill of being unpampered r unprepared.

But deeper than the material and utward aspect of Christmas as an in-titution lies the inner spiritual essence f it. It often escapes some of the ameness and dullness of our much nechanized and duplicated lives.

This is what I mean: If you are orced as I am sometimes to join the anks of absentees from home—to herd vith the tired drummers and the veary book-agents, festering by night n some narrow hotel room beside the Gideon bible and the glass-top dresser —you will agree with this honest hought.

It's no matter where you spend the Fourth of July; they all have parks, pin-wheels, and perspiration. What difference where you while away a Sunday? The churches are all about as uninvitingly hospitable and the tenors only differ slightly in catarrhal range. And as for your own momen-tous birthday, it usually never occurs to you until somebody shoves a local newspaper under your door on the morning after. Then you note the date and shudder at the candles a natal cake would require.

Not so, my dears, with Christmas! I have talked with a disheveled pedler who opened his battered bag to me in the smoker to show a Raggedy Ann en route to a toddler he hadn't fondled for six months. I won't ever forget the happy notion seller who told me of the presents a few salesgirls in Seattle had thrust upon him for his baby in the Bronx whom he had never seen. The boys of the A. E. F. won't forget the trinkets secured in Cherbourg against the coming Christmas in Chicago.

The misery of the Man Without a Country finds company indeed in the Man Away from Home on Christmas.

Whether the doors of Home Sweet Home be wreathed in climbing roses or sparkling in icicles on December 25th—it's the only fit place for a normal chap to be as the curtain rolls down on another long year of striving.

It's the place to be lazy without self-condemnation. It's the place to read old dog-eared childish books and poke through old boxes of keys, mibs, jack-knives and stamp collections. It's the place to smile at Mother once more for just awhile, or else to hunt up her faded picture in the walnut dresser and lovingly smooth the quaint patch-work quilt, stitched by patient fin-gers, long since quiet and at peace.

It's returning to the old gate, yearn-ing for the old dog at the empty ken-nel, beckoning to old chums, now too fat or fashionable to follow you. It's winding the old clock and listening to its rasping chimes as you doze off in the little bedroom with the dormer window, trying to believe in fairies and to banish the bogies. (Just as you have been doing so often these forty years since.)

It's awakening to the creak of wagon wheels on the frosty snow, the blessed buckwheat batter aroma, and the vain wish to hear Father again at the staircase cheerfully calling, "Time to get up, Buckshot!"

Yes, surely, it's all this and much more to most of us who have been signally blest with a real American home and cozy domestic "holly days." No magnet ever forged and treated in the shops of science holds more power to draw us back home together than the compelling force of Christmas.

So now it's *your* turn to issue the breakfast call and see that the faces are washed and the shoes and overcoats are provided against a Christmas climate like ours. It's *your* turn to be the stage manager for a delightful but perplexing drama, which, I trust may be as an open scroll in the memories of those youngsters of yours when you have become an emancipated *pater emeritus*.

THUS do our generations pass on and off, each approaching perhaps a trifle closer to the idea we cherish of Christmas as the memento of the Kingship of God and the Brotherhood of Man.

It makes little difference whether we are orthodox or just ordinary and ornery. We all travel in the same manner along the same road headed in practically the same direction. In fact, the sonorous statisticians tell me that fifty-eight millions of us Americans do not belong to *any* church and that we send our children thereunto only a fortnight before they trim the trees and buy the crackerjack!

I know that neither salvation nor Santa Claus comes free, but it's easy to forget our debts to religion when we are paying such heavy rents to reality! Yet out of every hundred Christmas casuals there are a few who stick to the church all winter in spite of a long-armed deacon looking for donations. So mote it be!

SPEAKING of these things in no mood of levity, I wonder sometimes where the modern child receives most of its Christmas inspiration—from the church or the home? We see beyond the tinsel of some church festivals and find the congregation torn asunder between dogmas of fundamentalism and modernity. Carrying this same thought back with us we note likewise that many homes base their child training or lack of it upon tenets of fundamental methods or on vagaries of carefree modernity. Your fundamental parent will consider the effects of late hours and too much mince pie, while the modernist thinks that childish self-will should not be hampered in expression by such mundane things as hysterics and indigestion. But the medium course parents who remember that Christmas itself originated in the bosom of a family manage to get along fairly well even if marooned in China!

Everything that the church weaves gloriously around Christmas first came into being in a humble home, and it isn't always necessary to pay pew rent in order to pay homage. Yet every child is entitled to hear the Yuletide anthems, even if they reach us by radio. Sometimes a little organized worship recharges the storage battery of the soul. Radiant light through cathedral rose-windows often germinates the good seed sown in the hearts of children reared in a godly home.

Man is a gregarious animal and he often runs clear out of prayer material if left too much alone. This is why it's so nice to mingle with the crowds on Christmas. As long as so many of the multitude are headed for church, it might not be a bad idea to go there, too. If you want to be different, stay at home and shoot firecrackers.

I find it hard to believe, based on my own experience with Methodist ders, that John Wesley's followers ere the most persistent in breaking ie early Gotham laws in order to ·lebrate Christmas with good cheer ıd much whoopee. They had grown eary of the Calvinism and elastic onsciences of rock-ribbed New England. Puritans considered it the height f Christmas jollity to fasten a fellow ı the stocks, but they frowned on ıspended stockings. The followers f Cotton Mather and similar shrewd ankees were too busy manufacturıg wooden nutmegs to allow their pprentices a day off for Christmas. f those old codgers could have foreen the fortunes since made in sphagum moss and northern grown everreens, they would have introduced ıe merry Christmas idea long before ıe big German invasion began.

TOLERANCE finally got a toehold here and we all began to ok forward to winter with something cheer us up besides chilblains. The Massachusetts dissenters began to thaw ut gradually to the joy plans, and ven Calvin Coolidge hung up his best air of home knits. The Yankee learned ıat the Germanic tribes were as ırifty as they were, and yet found a ttle time in December for a day off.

It was not so hard, I imagine, to onvert the ingrown Puritan to admire he English customs of mince pie, oast beef, and plum pudding. There re a few records of people being fined or eating these delicacies, but the auhorities soon found that crime caried its own automatic punishment. rom this date we trace the rise of the ıedical schools in America.

Leaving out ecclesiastical consideraions and looking at Christmas purely s a bright period of warm human ympathy, how could we get along vithout it?

Suppose the joy crushing intolernts, or the calendar reformers, or omebody, had the power to remove Christmas from our experience. Pretend that we abandoned it like we did the torch-light parades, bicycle caravans, the one hoss shay, and the "protracted meetin'."

Two to one you'd not appreciate the presents receivable so much as the presents giveable.

PROBABLY drab affairs of an uninterrupted grubbing livelihood would atrophy your muscles of charity, tenderness, and reflection. It is likely that the thrall of the office, the laboratory, and the field would grow stale and hopeless because there would be no oasis at the end of the desert trail.

Most purchases would be material and commonplace, few packages would have an air of suspense and mystery about them, and no floorwalker would ever relax his wonted dignity.

Most smiles would be forced and hypocritical or mockingly derisive. All fun would be raucous, ill-timed and distasteful.

Courage would be perverted to warfare, strength would be shattered for greed, practicing decency and humility would be suicide, and the warp and woof of our national loom would be tattered and fragmentary.

America was built on the Christian basis, even though at times we view it as through the glass darkly. Independence and liberty sprang from forces set going by the Man of Galilee. "By their works ye shall know them." Ask an atheist how well he would like to live in a pagan land.

I am sure the most confirmed "free thinker" among the blasé non-conformists would miss the Christmas chimes.

Now I am not going to greet you all with "merry" Christmas, for not all of us can be merry; but I insist upon wishing you a calm and restful Christmas, a family-sized, roomy and hopeful Christmas—and your kind return favors of a like nature will be sincerely appreciated.

DIDN'T WANT 'EM ANYHOW

He was seated dejectedly on the curb, his feet in the gutter and his befuddled head in his hands. Suddenly a screaming fire engine tore by, followed by chemical and hook-and-ladder wagons. The inebriate raised his head. Moved by a sudden impulse, he got up and started down the street after the fire trucks as fast as his wobbly legs would permit. But the object of his chase quickly passed out of sight, so he stopped and disgustedly resumed his seat on the curb.

"Gwan," he said, "I (hic) didn't want any of your old peanuts anyhow."

The man was sent by his wife to a neighbor with a pitcher of milk, and, tripping on the top step, fell bumpity-bump to the bottom, hitting every stair. Then, while picking himself up, he had the pleasure of hearing his wife call out:

"John, did you break the pitcher?"

"No, I didn't," said John, "but I'll be dinged if I don't!"

WHAT'S KEEPING YOU?

"I can read your mind like a book," the Prof. droned on. "I can tell just what each of you is thinking."

"Well, why don't you go there?" remarked the cynic in the rear seat.

Little Boy (to father who has just returned from hospital after operation for appendicitis): "Well, where's the baby?"—*Tit-Bits* (*London*).

THE EDITOR'S OPPORTUNITY

"Dear Mr. Editor: Will you please read the enclosed poem carefully and return it to me with your candid criticism as soon as possible, as I have other irons in the fire."

"Dear Sir: Remove the irons and insert the poem."

She (to bridge expert): Now if you were in the same circumstances, how would you have played that hand?

He (icily): Under an assumed name.

Speaking of animals, do you recall the lady who when informed that the kangaroo was a native of Australia, remarked, "Ya don't tell me. My sister married wan of them!"

A Scotsman rang up a doctor in a state of great agitation.

"Come at once," he said, "Ma wee bairn has swallowed a sixpence."

"How old is it?" asked the doctor.

"1894."

EVERYBODY O. K.

Mrs. F. C.—, the very proud mother of a baby daughter, has returned from the hospital. The baby and mother and father are getting along fine.—*Portland* (*Ore.*) *paper.*

Her Suitor: "Sir, may I have your daughter?"

Real Estate Man "Yes, but you'll have to sign a two-year lease."

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