

Enter the Agrobiologist

By Henry Kittredge Norton

From *Al Smith's Outlook*

This is the first of a series of articles by Henry Kittredge Norton, co-author of "Investing in Wages." It will treat of the findings of the agrobiologists, which indicate the coming of a scientific revolution in our farming establishment.

The farmers of this country have little room for complaints on the ground that the Government has not tried to help them. The Farm Board under the Hoover régime made a number of valiant and expensive efforts to alleviate their sufferings, even though it did little more than demonstrate that its methods were not adequate to solve the problem. The present Administration is making heroic endeavors to assist the agricultural population by artificially raising the price of the principal farm products and charging the difference to the rest of the country. It has done more: it has introduced a note of humor into the proceedings. It has appropriated many millions of dollars to increase farm prices and to find additional markets for farm produce, even going to the length of paying the farmers to plow under substantial portions of their crops. Then, having extended itself in this direction, it has become active along other lines. It has appropriated more millions of dollars to finance a "back-to-the-land movement." Thousands of the unemployed in the cities are to be given plots of ground and enabled to raise their own food-stuffs. This will, of course, further restrict the market for the farmers, and will logically require the plowing under of an additional section of their crops. But this is not all. In the eager search for available "public works" through which government money may be distributed to potential consumers, three projects have received executive approval. Two of these three are irrigation projects designed to make more land available for cultivation. Consistency thou art a jewel: but the Administration is apparently not interested in jewelry.

If we may judge by the activities of the past five years, there lingers in the official mind the idea that the distress of the farmers is a purely temporary phenomenon which will pass with the Depression, and that in some dim, but rosier, future agricultural America will be able to dispose of its whole product at handsome prices—sufficiently handsome, it is hoped, to repay some part at least of the generous grants-in-aid which it has received.

There is considerable reason to doubt the validity of this assumption. The only basis for it would be that the only reason that the world cannot now buy the American surplus above what we need for our own consumption is because it is temporarily impoverished by the Depression. The figures of production indicate that this may not be so. Take wheat as an example. Between 1900 and 1930 the world increased

its production of wheat from 2,633 million bushels to 4,950 million bushels. It has fallen off some 200 million bushels in the last two years, but still remains at nearly double the 1900 figure. American production has contributed to this development. It was 603 million bushels in 1900, and 858 million in 1930.

Even more momentous have been the contributions of Canada, Argentina, Australia and Russia. The enormous increase in the yields of these comparatively new countries poses the

very serious question as to whether the American wheat farmer can continue to compete with them in the world market. The sentiment of the country is probably overwhelmingly in favor of reserving the domestic market for the American farmer. But how long will the public be willing to recoup the losses of the farmer incurred in attempting to compete in a world market where all the factors are against him?

The situation with regard to other major crops is not unlike that of wheat. Our cotton production has increased from 10 million to 17 million bales in the last thirty years. Tobacco production has more than doubled. Oats have increased about 30 per cent and rye 50 per cent. Corn alone is produced in about the same volume as thirty years ago.

In short, on the present showing, it is time to give serious consideration to the question whether the future of American agriculture will not be restricted in a much greater degree than heretofore to supplying the domestic market, whether we must not reconcile ourselves to the prospect that other countries will increasingly fill their own requirements and such a "world market" as may be left be supplied by competitors whose cost of production will be well below ours.

Such a prospect demands a far different treatment of the agricultural problem than any which has yet been attempted. We cannot indefinitely maintain at public expense a food producing establishment with a capacity far in excess of its possible market. We shall be forced to recognize that agriculture is a relatively limited field of economic activity. People will not eat a great deal more than they do now no matter how great the production, nor how much the consumer buying power is raised. Manufacture and the service occupations are expandable almost without limit. The problem begins to take shape as a search for the means to transfer a large percentage of our farmers into other lines of activity.

Sentimentalists may recoil in horror at the mere suggestion of removing farmers from the farms. Farming, they hasten to plead, is not only a means of gaining a livelihood, it is "a way of life" in which its devotees should be allowed to continue. Many of us who are not farmers, however, can think of "a way of life" we should like to pursue if the rest of the nation would only be kind enough to subsidize us therein. The migration from the farms to the cities has continued during all the later decades of our history regardless of "back-to-the-land movements," officially sponsored, or otherwise. This pressure away from the farms will continue in spite of the fact that a temporary cessation in the expansion of our industrial activity has set up a momentary backwash.

Sooner or later we shall have to meet the essential problem and find a means of absorbing in industry and the service occupations that portion of the population which constantly improving agricultural methods makes superfluous in agriculture.

Wheat again suggests the nature of the trend. In 1929, 1930 and 1931 the acreage planted to wheat was respectively 63, 61 and 55 million acres. The yield in the same years was 813,858 and 892 million bushels. It is easy to say this was due merely to weather conditions and need not be regarded seriously. The falling off in many of the principal crops this year, through the happy interposition of drought, grasshoppers and a prolonged hot spell, seemingly adds weight to this view. But it will be as well to look further into the situation and to note the entrance upon the scene of the agrobiologist before lightly dismissing the possibilities of increased yields on smaller acreages.



Our increasing technical specialization has evolved a new type of specialist known as an agrobiologist. He has made it his special business to study the possible and practicable yields of our principal agricultural plants and to forecast the course of our agricultural development. He has worked out the laws of plant growth to the point where he can say with a high degree of accuracy what the yield will be if properly selected seed is given the necessary amounts of fertilizer and an appropriate quantity of water.

The question of suitable soil no longer bothers him. Soil, after all, is merely a vehicle by which certain chemicals and moisture are brought to the growing plant. When the world was young and fertilization was but little understood, rich virgin soil which would itself supply the necessary chemicals and climates where the rainfall was enough, without being too much, were invaluable assets to farmers. In an age of scientific fertilization and irrigation there is an ample sufficiency of suitable soil in appropriate climates to meet the requirements of the agrobiologist.

One of the pioneers in this field, Dr. O. W. Willcox, has collected the results of numerous studies on the theoretical possible yields of our principal crops. These he gives as follows:

Kind of Crop	Possible yield per acre
Corn	225 bu.
Wheat	171 bu.
Rye	193 bu.
Oats	395 bu.
Barley	308 bu.
Potatoes	1330 bu.
Cotton (lint)	4 6 bales
Sugar Beets	53 tons

In 1930 we had 241 million acres devoted to these eight crops. With the yields given above we could have produced the same harvests on less than 20.6 million acres.

"If," says Dr. Willcox, "what was harvested on 241 million acres could really have been obtained from 20.6 million acres, then the overall efficiency coefficient of American agriculture as regards these crops in that year was $8\frac{1}{2}$ in a possible 100. That is to say, more than 9 out of 10 of these 241 million acres might have lain fallow. Not only that, since little more labor per acre is required to plant and tend a good crop than a poor one, when, if and as farmers achieve 100 per cent efficiency in their operations perhaps 80 per cent of the farm labor now busy in the United States might become superfluous. To such a small dimension may the march of progress eventually reduce the great American agricultural establishment. In sound theory it is not at all impossible to obtain 225-bu. corn crops, 4.6-bale cotton crops, etc., and without for the moment inquiring whether there may be a gap between what is theoretically possible and what is practically obtainable, it will be readily understood that since the consuming markets cannot even now comfortably absorb the produce of our present theoretically very inefficient agricultural establishment, if this establishment should suddenly acquire even 50 per cent efficiency and attempt to market five times its present output the farm problem would assume incalculable proportions."

This sounds a bit like technocracy applied to agriculture. Before we become unduly excited about it we shall want to know how much of this theoretical yield is practically possible. Indiana furnishes us some interesting light on the corn situation. That state has a Corn Growers Association which, under the supervision of Professor K. E. Beezon, of Purdue University, furnishes the details of experiments on tracts of not less than five acres. According to the reports of the association, in the four years 1928-1931, in which there was a marked variety in the rainfall, 472 members obtained more than 90 bushels per acre. Highest yield among these members was 156.2 bushels per acre.

These demonstrations covered sixty-four of the ninety-two counties of the state. And, given the necessary fertilizer and control of the water supply by irrigation, there is reason to believe that the whole corn belt of Indiana could produce between 90 and 156 bushels of corn per acre per year. The significance of these figures will be appreciated when they are compared with the present average yield of twenty-six to

thirty-five bushels per acre. If this average yield were raised to 150 bushels, Indiana alone would produce about a third as much corn as was produced in the whole of the United States in 1930. What would happen if the farmers of other states should likewise multiply their yields five or six times may readily be imagined.

Indiana has not made the highest record in corn production. The theoretical yield of 225 bushels per acre has actually been obtained. And numerous 200 bushel yields have been verified. Nor is corn the only crop where such records have been made. Actual crop yields have been verified by the



Kind of Crop	Actual Yield per acre	Percentage of possible yield
Corn	225 bu.	100
Wheat	117 bu.	68.5
Rye	55 bu.	27.5
Oats	245 bu.	62
Barley	124 bu.	40.4
Potatoes	1070 bu.	80
Cotton (lint)	2.1 bales	43
Sugar (beets)	35 tons	66
Sugar (cane)	155 tons	94

Dr. Willcox's comment on this situation is stimulating. "Given that corn can actually yield at 100 per cent of its theoretical ability, potatoes at 80, wheat at 68, sugar cane at 94, etc., and supposing that even master farmers could not succeed in approaching these visible maxima closer than 70 per cent, a little figuring will show that to produce all the corn, wheat, rye, oats, barley, potatoes, sugar and cotton normally produced in this country both for domestic consumption and for export would require not more than 47 million acres of well fertilized, well watered and otherwise well managed lands: this acreage is about equal to the area of land now actually under the plow in the single State of Kansas."

Accepting these figures as correct, or even as sufficiently accurate to indicate the possibilities ahead of us, the next question is whether the farmers will increase their efficiency in anything like the degree indicated. This question almost answers itself. Competition will drive the farmers to a continued effort to reduce their costs and the surest way to reduce costs is to increase the yield per acre. No government subsidy for plowing under a part of their acreage will deter the farmers from attempting to increase the yield on their remaining acres. In fact the subsidy policy will furnish them with additional time and money to devote to this purpose. Since 1914, Indiana farmers have been increasing the maximum growth of corn at the rate of about two and a quarter bushels per acre per year. The bulk of this was during a period of strong demand and comparatively easy returns. At this rate they would reach the theoretical limit of 225 bushels in thirty years. Under the urge of depression, however, progress in agricultural efficiency will inevitably be more rapid and they may well reach the goal in 20 years or less.

If the process is carried to its logical conclusion, the surviving corn growers in Indiana will be those who can most easily produce 200 bushels of corn to the acre. These could raise the same amount of corn that is raised today on about one-seventh of the present acreage and in number they would only be about one-seventh of the present total of Indiana farmers, say 25,000 as against 181,000.

This would mean that some 155,000 men who now gain their living by agriculture in Indiana alone would have to find some other means of livelihood. Applying the same ratio to the United States as a whole it would mean that about 2 million farmers could supply all of the foodstuffs and raw materials, the growing of which now furnishes occupation to some 12 million men.

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Pioneers Club in Manila Uniquely Helpful

The invincible volunteer and regular soldier "of the days of '98" has made his last stand in Manila in a curious place called the Pioneers Club in a backstreet of the downtown district. In the absence of old soldiers' homes in the islands, this is the best he can do. One or two "Dewey" men, who were with the fleet in the Battle of Manila Bay, and hundreds of volunteers who helped with the occupation of Manila August 13, 1898, then garrisoned the city and took part in the drive against Aguinaldo under Lawton, Wheaton and MacArthur, are members.

"We are only half-Americans now," they say. "Because we are in the Philippines we only get half-pensions."

Most of the members, after the Philippines were pacified, did all their remarkable native ability allowed them to do in the tasks of the civil government that followed the military régime. They were linemen, they were small post-masters in dangerous points in the provinces, they were foremen in the building of roads and bridges. Not for a full enlistment only, but perhaps two, many going from the volunteer state regiments that came to the islands first, to the regular ones organized later, did the United States have their services as soldiers; and after that their services in civil life. If they remained in the Philippines, it was because they had established families here that honor bound them to look after.

After 30 years they found themselves, one by one, out of employment. What they were able to do, they had taught Filipinos to do; in small their lugubriously tragic lives illustrate Spengler's doctrine of the "decline of the west."

It was in May a year ago that they organized their club. It costs a dollar to join, 25 cents a month for dues. Meals cost a quarter too, if you have it, and if not, no matter—the invitation is, "Sit in and help yourself." On the club walls, a room about 40 ft. by 50 ft., are lithographs of Washington, front wall, under the flag and the bunting, Lincoln and Roosevelt, side walls, McKinley, back wall; and another chromo shows all the presidents down to McKinley, he effulgent in the center.

There is a Filipino boy to keep the place clean. There are partially filled shelves of worn books, others of old magazines.

P. E. McGuire, of Robinson, Ill., was a leading organizer of the Pioneers Club. He has a little clothing factory, McGuire's Shirt Factory. He came to the Philippines in 1899 with the 6th U. S. Artillery. For disability incurred in service he has been drawing a pension of \$60 a month.

But who is this, clumping up the stairs with two rough canes? Is it not a man you knew a few years back as rather a well-to-do contractor and builder? It is, sure enough! But how changed! They help him to a chair, facing a broad open window. He sits still, statuesque . . . "the broken soldier, kindly bade to stay." He looks straight out of the window. There is nothing to see, save with the mind's eye.

But here is a man of "First Expedition" fame, one of the men who arrived at Cavite June 30, 1898, who as a civilian first tried pearling, then lost all he made in pearls and shell in an effort to modernize the Philippine fish industry. Not one of these oldtimers could ever be anywhere in the islands without taking hold of something to better it.

There is little but cheer at the Pioneers Club. E. B. Bartholomai, one of the organizers, has volunteered as the cook. Of French ancestry, he is a natural cook. He came to the islands in March, 1899, with the 22nd U. S. Infantry. After the campaigns he traveled the islands as an optician and did well enough until his health failed and he couldn't get around any more. He has sprue aggravated by diabetes, or perhaps diabetes aggravated by sprue. He can't, of course, eat the meals he cooks; he keeps up on milk and cooks for the others—about the most wholesome and appetizing meals in town.

No center of patriotism under the flag glows brighter than this. Age has made monks of these men, necessity has made them a monkish community sharing what they have in common. Their resourcefulness amuses, the base of a chandelier converted to the purposes of a cuspidor.

The club has an old-fashioned "pitch" game, in which the winner takes a nickel from all the losers—2½ cents more for every "set". A game usually involves 7 or 8 men and consumes at least 2 hours. The chief subtlety in playing "pitch" is to throw the "game" point to the bidder, if he is already set, away from him if he still has a chance to make his bid, and generally, to the low man; and in every "pitch" game, in this game it is old Parker, there is some cunning fellow who usually preempts the "game" point and therefore wins most of the time.

Parker's twinkling eye is one thing you remember about the Pioneers Club. He scans the newspapers carefully and arbitrates disputes: when Cleveland's second term ended, how much Fitzsimmons weighed when he beat Jim Corbett at Reno, everything rather recent and important. Parker even knows that Cleveland was a gold-standard man. "And I am, too," he says. "And we'll get the worst of it at London, too—we never lost a war nor won a conference." You watch and see.

"We!" And such a sentiment, in such a place! "We never lost a war." The man they seated toward the window hears, shifts his eyes but can't, being paralytic, turn his head; his eyes go back to the vacant window. Oldtimer A. W. "Deacon" Praultch is the Pioneer's president. The club is careful of its treasury and husbands the common hoard to the best advantage. Praultch would of course see to that, and so would the others.

Enter the Agrobiologist

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Here then is a problem looming in the all too near future which has received little or no attention from the Government or the public—or from the farmers themselves. The result of an enormous governmental effort to put our industrial workers back into jobs has been thus far but fractionally encouraging. Our industrial producing capacity still easily outdistances our power to consume. There is serious doubt as to whether a 35-hour week with a \$14 or \$15 minimum wage, will prove to be anything more than a preliminary step in restoring 12 million or 15 million industrial workers to adequate consuming capacity.

Many things may happen in twenty years. But one of the things that seems least likely to happen is that we shall develop appetites which will demand anything like the quantity of foodstuffs that our agricultural establishment will be able to turn out before that time. And it is perfectly obvious that the transfer of 10 million men—or even half that number—from the farms to the cities may produce an unemployment crisis far more serious than anything we have yet contemplated.

The progressive shortening of the week in industrial pursuits would naturally lead to an insistence upon shorter hours on the farms. But when it is realized that one-seventh of the effort now going into agriculture could produce all we are producing now, and further, that we are already producing far more than we can use, it is clear that a very substantial percentage of our farm population must seek other pursuits unless an unwontedly generous public is willing to support them indefinitely in their chosen "way of life."

The fact that we can supply our agricultural needs with a fraction of our present effort should not cause apprehension any more than the fact that our industrial capacity is far greater than our present ability to consume its products. Both developments indicate a rapidly increasing control by civilization over the natural environment. But these developments are a challenge to our ability so to organize our economy that we may secure their advantages. We are not meeting that challenge by sitting around and waiting for a drought or some other destructive event to bring cheer to the farmers not affected, or to inject new life into the commodity markets. Nor does it seem altogether sensible to attempt to achieve the same ends by deliberately destroying a substantial portion of our crops.

To meet the challenge intelligently we must consider what steps must be taken by the farmers to approach the larger yields suggested, the part of the government in helping or hindering this development, and the various means of meeting the human problem involved in such a reorganization of our agriculture as seems inevitable. These aspects of the matter will be discussed in a later article.