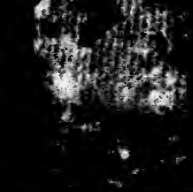

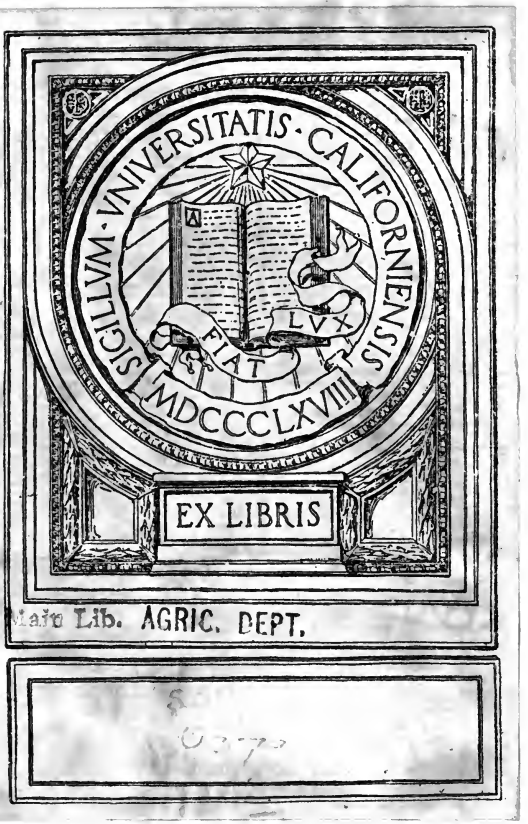

ADDRESSES

DELIVERED AT THE
ANNUAL MEETING

OF THE

Ohio State Board of Agriculture

COLUMBUS
JANUARY 10 AND 11

1912

COLUMBUS, OHIO
THE F. J. HEER PRINTING CO.
1912

Boost Ohio.

The Ohio State Board of Agriculture held its most successful annual meeting, at Columbus, January 10 and 11.

The Central Idea of the entire program was an appreciation of the virtues and resources of the "Buckeye State."

In talent and personality, those persons on the program, are not excelled. Their enthusiasm in a good cause is easily a virtue.

Governors, Ambassadors, College Presidents, and other great leaders of thought, helped to fling more widely the Battle Line of Agriculture.

The onward march of the Ohio Farmer was given added momentum, by reminding him, that not far away, but right here at home he can shake hands with "Golden Opporunity."

"Stay in Ohio" and "Boost Ohio" are to be the texts of the future, for all who love their native state and ever called Ohio "Home."

The attendance was an inspiration to all the speakers. The addresses of such merit as to justify the State Board of Agriculture in complying with many requests for publication, and which are herewith submitted.

Respectfully,

A. P. Sandles

Secretary.

ANNUAL ADDRESS.

By President C. H. Ganson,
Urbana, Ohio.

At our annual meeting it is customary for the President to make an adrress, stating the condition of affairs pertaining to past and present work of the State Board of Agriculture. The President would not be able to do this except for the kindness and help of the Secretary. I have asked the Honorable A. P. Sandles, our very efficient Secretary, who has at his comand the data of all work of our Board, to briefly outline what we are attempting in the interest of agriculture. He is an inveterate as well as an earnest worker; has the interest of the farmers at heart; and has kindly consented to prepare and present a statement which will be much more to the point than I can make. He understands the business and is today one of the best State Fair Secretaries in the United States, is all wool and a yard wide. It is a pleasure for any Board to have the services of such a Secretary. Close attention paid to his remarks will inform this convention of our work.

With the assistance and advice of the farmers' friend, Governor Harmon, A. P. Sandles and other broad minded men, agriculture has made rapid strides, and today the farmer need not take a back seat. He is not called the "Old Hay Seed," but a man of affairs with a profession second to none. The successful farmer, and all can be successful (as the word "can't" should not be in the farmer's dictionary) should and does feel that his calling is the best and most useful of all professions as well as the most independent. The farmer need play second fiddel to none, especially the Ohio farmer, as Ohio is one of the best agricultural states in the Union. It is the garden spot, with its good roads, good water and diversity of first class soils. We should be proud of our grand old state. Let us BOOM OHIO.

We have one of the best and grandest State Fairs in the Union. The past year was it banner year. Profit certified into the state treasury amounted to approximately $20,000. It is conceded by those who know that the Ohio State Fair grounds excel in buildings and beauty any fair grounds in the United States. The State Fair is second to none in exhibits. It is educational as well as attractive. The "No Pass System" was inaugurated at the last State Fair, and the attendance and receipts are the proper answer to its workings. Complaints were not had from people who patronize the Fair from year to year and pay their admissions. It is admitted that the pass question may have two sides and be hard to adjust, but to be fair with the people all should be placed on the same footing. The Ohio State Fair is being well patronized, and the management hopes to make it worthy of commendation and patronage.

We should have nothing but praise for Ohio and her agricultural institutions, which include the Ohio State University, the Ohio Agricultural Experiment Station, the Farmers' Congress, Farmers' Institutes, County Fairs and the different branches of the State Board of Agriculture. Running of agricultural trains by the differert railroads is to be commended and the service of the railroads appreciated. The service rendered by speakers on the trains has been very useful. More than forty thousand farmers have attended the train meetings and have been benefited by the talks. It is an education along the lines of the best methods in agriculture.

Farmers' Institutes and schools are working wonders in the way not only of education, but in exchange of ideas and a closer relation of friendship between our citizens. The state law authorizes four institutes to each county. They have been so useful and popular that counties are wanting more and many counties have independent institutes.

The State Board of Agriculture has been pushing work on the Serum Farm, and in another year expects to be in position to handle the output of serum to the satisfaction of the farmers. From the good work the serum has done in the past, we have no doubt but that hog cholera will be so much lessened that the breeders and dealers will have little fear of this plague. They will know that a proper treatment with serum will make the pigs immune. Dr. Fischer, State Veterinarian, has the serum proposition in charge. He understands his occupation thoroughly. There is no harder student than he, and no veterinarian his superior.

Fertilizer inspection has been satisfactory during the past year. The Nursery and Orchard Division has been doing good work. The Live Stock Division — in fact all divisions of the State Board of Agriculture are doing a good work.

The farmer is the bone, sinew and muscle of the country. Agriculture as a profession is the most useful of all the professions. As a class, the farmers are the most independent and as a rule enjoy life most. When it comes to an election on important questions, the rural districts are generally on the right side and often turn the tide for the betterment of the country. The agriculturist is on top. He has learned the lesson of his position and learned it well. He has gained in knowledge of soil fertility and rotation of crops and in the breeding and care of stock until today the farmer is, indeed, to be envied. Our soil, with the knowledge we are gaining and putting into practice, will support our growing population. Let us keep abreast of the times and improve our chances.

The lessons that we may learn by a careful study of such institutions as the Ohio State University, the Ohio Experiment Station, the Ohio State Fair, the county fair, as well as other useful state institutions, will be very useful to us all. We should lend our aid to all institutions connected with agriculture. We should boom Ohio; boom agriculture; boom your State Fair and other agricultural industries. While we are gaining knowledge in our vocations on the farm and putting our knowledge into practice by raising better crops, better stock and by improving our condition in many ways, we must not forget the importan part of farm life — our homes. Our good wives, who make our homes pleasant, must be thought of, cared for and appreciated. They are interested. To them we may largely credit our success. Let us make our homes what they should be in doing our duty by our families, who, as a rule, will prefer the country to the city. Let us remember the old saying, "Woman's work is never done." We can materially lessen their labors by appreciating their service with help and kindness, and with beautifying home and its surroundings.

THE IMPROVEMENT OF FARM LIFE.

By President Charles William Dabney,
University of Cincinnati.

This is not to be a sermon, although I shall take as a text these words of the "Father of his Country":

"I know of no pursuit in which more real and important service can be rendered to any country than by improving its agriculture."

Soldier and statesman, though he was, George Washington was first of all a farmer. Founder and builder of the nation he, taught that agriculture was to be its chief support through all the ages. He says: "In proportion as nations advance in population and other circumstances of maturity, the primary importance of agriculture becomes apparent and renders the cultivation of the soil more and more an object of public patronage."

Believing this, what would the "Father of his Country" think if he came back to us today and learned the ratio of our agricultural population to our other populations? What would he think if he found that the agricultural population of the country, which was 96 in 100 in his day, had dwindled to 52 in 100 in qualities the case is quite different.

our day? Even in this great agricultural state of Ohio, the rural population, which in 1890 amounted to 50 per cent of the total population of the entire state, decreased in 1900 to 42 per cent, and in 1910 to 35 per cent. To put it another way, whereas the total population of Ohio increased about 15 per cent and the urban population increased 30 per cent for each decade above, the rural population actually decreased 4 per cent the first decade and 6½ per cent the second decade. The census brings us the same story from all the older portions of the country. Everywhere the urban population is increasing ahead of the rural, and in most of the old states the total rural population, just as in Ohio, is steadily decreasing. More ominous than the trust menace, the currency question, or the labor problem, is this drift of the people away from the farm; for, as Mr. James J. Hill puts it, "Land without population is a wilderness, and population without land is a mob."

The resources of our soil and climate are limitless and unsurpassed by those of any other country in the world, yet, for some reason, the young people in all the older states are escaping from the farm Why? — because the attractions of the town are greater than those of the country. How to change this condition is the question of the hour. Even if there are still enough people in the country to produce all the food needed, and although the relative size of the two classes of population does not as yet disturb our national life very seriously, still we must be deeply concerned to ascertain the causes which have thus upset the economic and social co-ordination of these two important parts of our civilization.

Daniel Webster once said, "Farmers are the founders of civilization and prosperity"; and it has been the proud boast of America that the farmer occupied the highest position of independence. Is the farmer now to become submerged in the social order and form only an underlying stratum? He must always be the foundation, but is he to be rammed down below the surface and become a mere mud-sill? This, and not the matter of his relative numbers, is the crux of this question.

It has always been true that one type of men gathers in the cities, while another grows up in the country. There have always been two classes in human society: one the collective and the other the individualistic. Heretofore, in our civilization, the farmer, the representative of the individualistic class, has steadily developed the greatest power, and has, therefore, maintained his own in the republic. Have the city men, the representatives of the collective class, now combined to put him down? What's the matter with the farmer?

If the city lives on the country, the country should logically be able to control; but, as our life is organized today, our cities, like cuttlefish with their great tentacles spread out in every direction, are sucking the life out of the regions around them. The weakness of our civilization lies in the fact that the city and the country seem to be, temporarily at least, opposed in their economic interests.

Thus it is coming more and more to be a story of fat cities and lean country. Must this be so necessarily and always?

The relative loss of population by the country threatens every business and every interest. Land values decrease, other farmers move away, the young people drift to the cities, stores and dwellings become vacant, schools and churches dwindle, until finally all life and enterprise drop into decay. Witness the abandoned farms in New England and in New York; witness the rural schools with their diminishing attendance; witness the pastorless churches in the country; and, worst of all, witness the decay of manhood itself in some of our country districts!

This, I say, is the question of the hour. How shall we restore the balance between the urban and the rural forces? Why have men nowhere worked out a perfect relation between town and country? A fair adjustment must be found before we can have a permanent, happy civilization. Is it not true that we have developed the city civilization far beyond that of the country? Both are necessary adjuncts of human life. "All political economy," Mr. Hill says, "rests upon the ratio of population to land area, the abundance and value of the products of the soil, and the proper balance and inter-relation of different industries." If this be true, surely our manufacturing and agricultural industries are out of balance. Why — Because, says Mr. Hill again, "We have been busy as a nation helping the so-called industrial interests of the country — in fact, everybody except the man on the farm." No matter how high our culture may rise in its various aspects, until a proper balance between the agricultural and the other industries is established, civilization in America certainly cannot be perfected, nor peace between the classes be long maintained.

This ominous charge is not explained by any falling off in agricultural production. The farmer is doing his work. Our total agricultural exports keep up. We still hold our own in the world's markets of the great staples. With only 6 per cent of the world's population, we produce 45 per cent of the world's wheat supply and this year 72 per cent of the world's cotton — the greatest crop ever produced. The American farmer's total contribution to the wealth of the nation this year is nearly ten billions of dollars. The trouble is not with the totals of production, but with the conditions and costs of production in relation to prices.

What, then, is the matter with agricultural production and why are farm prices not satisfactory? All prices are relative, and if the agricultural industry drags in a given community, it is evident that there is something wrong either with the conditions surrounding the farmer and his family, or with the costs of what he sells, as compared with the prices of what he has to buy. What is wrong?

In the opinion of the best authorities, like the Country Life Commission, things are wrong, both with the conditions of rural life and with the farmer's methods, his costs, and the rewards of his labors. Let us begin our study with a consideration of the last of these, the farmer's rewards, as compared with his costs; then take up his methods, and, finally, the surroundings of his life.

In our opinion, one cause of country depopulation is the meager share the farmer actually receives, or is allowed to keep, of the tremendous wealth he produces. The cotton planter receives, we are told, a larger share of what the consumer pays for his product than any other farmer — he gets nearly 70 per cent of the consumer's money. This is because cotton is handled in the farmer's original package and passes directly through the hands of the fewest number of middlemen to the manufacturers. The vegetable and fruit grower gets the smallest part of the consumer's money — only 20 per cent. The patient calculations of the agricultural experts show that, upon an average, the farmer gets

only 35 cents of the consumer's dollar. The consumer pays today a higher price for beef than ever before, but, according to Secretary Wilson, the packers pay the farmers for their cattle barely as much as they did ten or fifteen years ago, when butcher's meat was comparatively cheap. It is true, no doubt, that for most products, farm prices are now higher than for many years past, but it is universally recognized also that everything the farmer buys, including his clothing, tools, and implements, is proportionately higher. The standard of living of his family has advanced greatly during recent decades, making both the volume and grade of his purchases of manufactured goods and luxuries much larger and higher. Owing to our excessively high tariff, the American people are living and working on an abnormally high level of costs. In the last twenty years, the costs of most things have been artificially lifted; the manufactured goods used by farmers most of all, and the farmer's products least of all. The farming class, being imperfectly organized, is thus being made to pay tribute to every other class, especially to the manufacturer, the middleman, and the financier. This is shown clearly in the case of wool by the report of the Tariff Commission, and is acknowledged by all schools of economists, except the representatives of the favored interests. It is most unfortunate for the workers of America that these questions have always been decided by political methods. They are not political, in any sense, but economic. They can not, therefore, be omitted from any discussion of agricultural depression. Having stated these facts in our diagnosis of the disease, it will not be necessary in this company to discuss further the remedy. All present, I am sure, believe in a fair, if not a low, tariff.

In the above statements we have, I think, presented to you the darkest side of our farmer's life, and may turn now to look upon the bright side of life in Ohio, and consider the measures destined, as I firmly believe, to make our farmer's life happier and still brighter every year.

The first great truth to be noted is that Ohio is near the centre of gravity of the population, of the manufacturers, and of the wealth and trade of this country. The centres of gravity of all these things, as shown by the census, of the state, its climate and resources, make it forever a great field of commerce.

One conclusion to be drawn from this situation — a conclusion as certain as that growth follows sunshine — is that whatever the economic conditions in the country at large may be at any given time, their results are bound to be most favorable in a state located like ours. If railroads and trusts oppress the farmers throughout the country, conditions being equal all over, they can hurt them less in Ohio, where the markets are near at hand, than in the Dakotas, for example, where all the farmer's products have to be shipped a thousand miles to market and all his goods, hauled back again over the same hundreds of miles. So also, if the tariff takes his little remaining profits, or the money trust wants his last cent in interest, you may be sure that he has, thanks to these same favorable conditions, a good deal better chance in Ohio than in the Northwest. Whatever the advantages from these general economic conditions and laws, the Ohio farmer is certain to get a little more good out of them, and whatever the disadvantages, they are sure to bear less heavily upon him than upon his brother in those distant states. All economic laws are bound, in the very nature of things, to favor you here for many years to come. This is as certain as the laws of nature. Then stay in Ohio!

This great central trade state, with its urban population constantly increasing, with its large mining and manufacturing interests, and its thousands of miles of railroads running through it in every direction, also offers many opportunities, scarcely dreamed of as yet, for agricultural development. By way of illustration, let me speak of the opportunities for co-operation, especially for

co-operative marketing of products, offered the farmers of Ohio by these very trade conditions. Why has not the farmer taken advantage of the facilities for communication and transportation to make them serve his interests more perfectly, as the manufacturer and the middleman have done? For example, the either fall in Ohio, or just to the southwest. Our state is now, therefore, the central state of the Union commercially, in the sense that a large part of the trade of the country must pass through or over Ohio. The geographic location manufacturer is using the telephone, the mails, the express and freight lines, more and more each year, to sell directly to the farmers and so increase profits. Why does not the farmer organize in similar manner to sell directly to the manufacturer and his other consumers? These facilities are just as good for the one as the other. When one observes the losing way in which most farmers do their business with their city consumers, one would think that the telephone, the mail, and the railroads did not work both ways, or, at least, that they did not work backward towards town for the farmer, but only for the commission merchant. The trouble, of course, is that the farmers are not organized for co-operative marketing.

There are no better illustrations of the gains of small farming and of co-operation among producers than those found in the experiences of the farmers of Denmark. After the Germans robbed them of their province and took away their markets on the continent, the Danes sank rapidly, you will remember, into a condition of extreme poverty. Necessity drove them to adopt new methods. After a half century of scientific farming and co-operation, they are now the wealthiest farmers per capita in the world. This remarkable change, which, by the way, has been accompanied by great industrial development in all other directions, is attributed directly to the improvement of agriculture through educational methods and its increased gains through co-operation.

The Danes have, for instance, developed scientific dairying and stock raising in all its branches. The government employs many experts to instruct the people in the breeding of live stock. If a group of farmers wish to purchase a bull, for example, for its co-operative society, it first consults the government man. Even in the breeding of single hogs the individual farmer will consult the expert. These experts furnish their services readily to the farmers who ask them. The result of this has been the rapid improvement of live stock and a steady increase in the quantity and quality of the milk and the character of all dairy products. In many herds the quantity of milk annually given by each cow has been increased over one hundred gallons. The Danes attribute much of this increase to their scientific methods of milking, as well as to this scientific breeding. The creameries impose severe rules upon the farmers as to the methods of feeding the cows and of handling the milk, and the loyalty of the men to their organizations is remarkable. The Danish trade in butter alone — and their butter is considered the best that reaches the London market — has multiplied ten times in twenty years.

Severe economy is practiced in all matters, with remarkable results. This economy extends even to the cows, which are hitched and required to graze a portion of the pasture until it is eaten clean. They milk three times a day, milk tests are systematically applied, and the cows with poor records are discarded, while the calves of record mothers are kept for the farm.

The Danish co-operative methods of producing and selling are also most interesting. The co-operative dairy movement now includes one thousand societies with two hundred thousand members, and it delivered last year over five billion pounds of milk, which produced two hundred million pounds of butter worth sixty millions of dollars.

The increase of wealth in our cities insures markets at the highest price here at home for milk products of fine quality, such as can only be produced with the help of modern science. As Director Thorne of the Ohio Agricultural Experiment Station testifies, "The dairyman who can furnish evidence that his cattle are free from disease, and whose product shows that strict attention has been paid to every essential of cleanliness in production, is able to command very remunerative prices."

Similar co-operative societies market the eggs, bacon, and lambs of the Danish farmers. There are two poultrymen's associations, one with four thousand, and the other with six thousand members. Each has some forty centres for experimentation and distribution of pure-bred stock. Each week the association's collector gathers the eggs, which must be marked with the producer's name, and pays on the spot the market price for them. The man who delivers stale eggs is severely punished. After selection and careful examination, the egg is then stamped with the association's stamp. This simple guarantee has raised the price of hen's eggs in the English markets until the industry now brings Denmark ten millions of dollars a year. Eggs are now (January 10, 1912) in demand in Cincinnati and Cleveland at 40 cents at retail, and Director Thorne tells me that the Ohio station is selling eggs by the case in Pittsburg at 45 cents a dozen, and hot house lamb at 35 cents per pound dressed. He says: "The demand for such products is steadily increasing, as is also our knowledge of the methods by which they may be produced." Is there not a larger business to be found here?

Other market products are handled by co-operative creameries of Denmark in a similar manner. The Danes no longer send their live hogs abroad, but kill, cure, and manufacture every scrap at home, with the result that pigs which brought Denmark only $7,500,000 a few years ago, now bring $25,000,000. The Dane believes in manufacturing the farm products to the highest degree before he lets them leave his farm or co-operative factory. He sells the finished product and not the raw material, for he believes that the nation which sends away its raw material for a more skilled people to finish is ruined. The factory farm and these co-operative methods are needed in Ohio.

Another lesson we can learn from the Danes is intensive farming of smaller areas. We are still trying in Ohio to cover too many acres with our poor culture. We should farm only as many acres as we can cultivate in the best way, and no more. There is, as we know, scarcely a limit to the value each acre of ground may be made to produce. Scientific methods and intensive agriculture are these days within the reach of the poorest farmer, whether they include the study of the soils, the testing of seeds, the rotation of crops, or the raising of live stock. Intelligent fertilizing with chemical manures, or by growing leguminous plants, the use of improved grains and fancy stock — such methods are today within the reach of all. These methods increase the interest in farming, as well as make room for new population, whose presence and added product increase the opportunities for co-operation and all forms of social improvement. The fruit farmer, the dairy farmer, the poultryman, and every cultivator who has specialized in his work have already learned these principles. Our problem is to find a way to teach them to the half million or more farmers in Ohio still engaged in general agriculture. Take corn culture in Ohio as an illustration. Corn is still our greatest crop, but it does not pay very well to produce it at the rate of 38 bushels per acre. The Experiment Station has shown that if we used tested seed only and so secured a better stand, we might increase this yield to an average of at least 76 bushels per acre, while a perfect stand of plants, each yielding a one-pound ear of corn, would produce 152 bushels per acre. A little South Carolina boy raised over 200 bushels of corn on one acre. Can

not the Ohio farmer make at least one-half as much? Ohio cultivates some three million acres of corn annually. Supposing we added 20 bushels only to each acre, the result would be 60,000,000 bushels more corn in Ohio each year, which at 40 cents a bushel, would yield a return of $24,000,000. Think of the gigantic waste resulting from the careless cultivation of too many acres!

The same can be said in regard to the waste in raising poor stock. Every farmer must keep some cattle, sheep, and hogs. Why not the best? No farmer can prosper until stock raising becomes a considerable part of his agriculture. The natural increase of animals, the butter, milk, lambs, pigs, etc., sent to market add materially to his income. A few forage-fed live stock leave at least one-third of their value on the land in the form of manure that results in fertility and keeps the farm from running down. Only by keeping stock can the farm be made and kept the permanent source of wealth it should be. The keeping of good stock throughout the country creates at once a great industry and makes opportunity for specialists in various lines of stock-breeding to do good business. That we are making progress in this line is well illustrated by Greene County, which already claims to have a larger number of different breeds of pure bred stock than any other equal area in the world. If all our farmers went to work to improve their stock, we would have in Ohio at least a half dozen Greene Counties.

It is a narrow view of agriculture, however, which regards this great art only as a means of providing men with the simplest means of existence. We are interested in the progress of agriculture, not only as a means of supplying the food necessary for the increasing peoples of the earth, but also as the art which chiefly supports man's advancement along all lines, intellectual and spiritual, as well as physical. "Man shall not live by bread alone." It is a condition of civilization that man is not satisfied with a mere subsistence, but that his wants increase with his development. The modern man is not satisfied with the simplest food, or the plainest raiment, or the barest shelter. Because such food promotes health, happiness, and the development of his finer nature, he wants attractive and delightful food. Hence there have been developed the various special branches of agriculture and horticulture, and the many arts of milling, manufacturing, preparing, and preserving the products of the soil which make food substances tempting and delicious, as well as convenient for use. Americans owe much of their success as purveyors to their excellent methods of preparing food materials of all kinds, and to their skill and taste in presenting them to the public. It is not enough that quantity alone should be considered, for, in these days, quality plays, increasingly, a part in food production. Hence the arts of producing choice meats, cereals of greater attractiveness, etc., which arts may properly be termed the "higher agriculture"; hence also the practical arts of wine-making and canning and preserving fruits, which may be considered a "higher horticulture." These arts have all been developed in response to man's demand for more refined and delicious food, a demand which is certain to grow more exacting with the progress of civilization.

It does not pay any longer in the older states to grow the staple crops exclusively and to sell only the raw materials of food. It may still pay on the great rich prairies, or in new agricultural regions, but the highest profits in the future will come to those who produce a specialty, or manufacture their products into the highest form before putting them on the market. The profits of the future will be in the dairy business, the canning business, or the business of preparing delicate meats for the richer markets. Through these and similar special industries, farm products are greatly advanced in value, while the women and the girls take a part in productive work.

We come thus to consider the improvement of the educational and social conditions in the country as a means of keeping the young people on the farms. The physical discomforts of farm life have largely been ameliorated in the Central States. As the farm houses are rebuilt, modern comforts and conveniences are introduced. With cheap appliances now within the reach of every one, there is, for example, little excuse for the farmer who has not provided his home and barn with running water. Good roads, rural free delivery ,telephones, automobiles, interurban lines, co-operative reading circles, the new literature of nature and farm, — and soon, we hope, the parcels post, — will greatly improve the social conditions of the country people. But there is still much to be desired in the way of community spirit and of co-operation for the older people and of social life and amusement for the young. The towns, with their amusement parks and theatres, moving picture shows, and skating rinks, have become steadily more attractive, making the country appear bare and lonesome to the boy and girl. Their influence must be overcome by beautifying the home and farm and by establishing social centres in the country. Rural life must be made not only more profitable economically than urban life, it must also be made more humanly interesting, more richly enjoyable. The farm and the country possess all the elements to make it so; there resources need only to be developed.

We should remember that the farmers who desert the country, often the very best men, do so in search of the higher things in life for their families. They tear up their homes and make great sacrifices that they may provide better training in mind and in spirit for their children and better social privileges for their wives. So long as there are better schools, better churches, and better social opportunities in the cities, so long will men flock into them. So long as practically no literature, art, and music are to be had in the country, so long will men and women seek them where they are to be found.

Neither the state nor the church has done its full duty by the farmer. Though eight-tenths of the preachers and teachers are reared in the country, the state puts its best schools in the city and the church usually sends its dullest preachers to the country. And yet we look to the country to feed the city with its best blood, brain, and heart! We draw constantly upon its sources of physical and spiritual sustenance, but make few plans for renewing this fountain of our life. Let us, therefore, take stock of the country's educational and social resources, as we have of its economic resources, for the purpose of seeing how they may be reorganized and directed toward a happier and more profitable social end.

The country school is to be a large factor in the improvement of country life and the chief agency in keeping the youth on the farm. If the boys and girls are to be induced to stay on the farm, it will be done, not merely be making the farm attractive and remunerative, but by interesting the youth in the work on the farm. This can only be done by making that work intelligent. Until recently, all our elementary school courses were made by city people to prepare people for city occupations. Even general subjects are taught almost exclusively in the terms of trade. The readers and spellers are filled with stories of city life and the arithmetics are given up to problems of interest and accounts, with no reference to the business of the farmer. The rural school finds these courses largely unadapted to the needs of country life. So far, the school has not taken hold of country life. From the soil, out of which the children must make their living; from the animals they must rear and use; from the plants they must cultivate and the forests they should preserve; and even from the impressive phenomena of sky and weather, which so largely control the every-day life and success of the farmer, the school has not only stood apart, but has actually held the children away, while it stuffed them with antiquated formulas and useless rules, or with

facts about the history and geography of foreign countries. The varied resources and exhaustless charm of the country have small part in its teachings. Too often, when the teacher opens man's book before the eyes of the child, he closes to him, as far as he can, the book of nature. All schools should be related to the economic life of the people and prepare them to work under the conditions in which they must earn their livelihood.

It is very fine to talk about giving every boy and girl a liberal education — which means usually a mere smattering of a literary education — but the fact remains that the great majority of our children in cities, as well as country, leave school before they are fifteen, with little education of any kind and no training for real life. The result is we have thousands of industrially untrained boys going into the ordinary commercial callings, and few scientific farmers and engineers; and thousands of young girls eager to earn the pitiful pittance of a saleswoman, while none can be found for well-paid manufacturing positions. A gentleman in my city tells me, for example, that an advertisement for a typist at six dollars per week brought scores of applications, while one for an expert candy maker at fifteen dollars failed to find him a single competent person. With the sales positions and typewriting places always overcrowded, the wages of girls remain below the requirements of decent living, with sad results in too many cases.

If the rural school is to accomplish what we expect of it, it must not be a thing apart from the life of the people, as the old school was. We must take the life and the work of the people into the school and carry the teaching and influence of the school into the life of the people. The practical work of the farm and the home must go into the school, and the thought and knowledge of the school must go on to the farm and into the home. The new century found a large, growing body of new science related to farm and home vocations, and this science is gradually yielding to organization in text-book and in practice — work in gardens and fields, in barn and dairy, and in home and shop. That this immense body of new knowledge must have a place in the training of our country youth can not now be questioned; and that it will greatly increase the general and economic efficiency of the country people has already been shown by the work of the agricultural colleges and experiment stations. Various methods of uniting school training with farm and home training have been suggested. Teachers can co-operate with parents, for example, in arranging field and feeding experiments, in testing seeds, in studying varieties of plants. The operations of the garden and orchard; pruning, budding, grafting, and spraying trees and vines; testing the value of foods and fertilizers — these activities offer many opportunities for co-operation between teacher and farmer in the interest of the children.

We must not only take the work of the farm and home into the school, but the school must go into the life of the people. In the old days, the church was the centre of the life of the people. The whole life of the people, social, educational, and religious, centred around the old church. The protracted meetings were the great social events of the year, and practically all social developments, including the weddings, had their source in the church, the school, or the Sunday-school. Now all this is changed. In this sense, I fear the church is losing its hold upon the life of the country people. It has certainly ceased to be the one centre of their life, as it formerly was. The pastor, teacher, and physician should be the joint conservators of country life and they should all work together from one common centre.

There may be differences of opinion as to where the new centre of the life of our country people should be located. Some think it should be in the town or village; others, that there should be lyceums or agricultural clubs; and still others that it should be in the country school. It is probable that more than one

social centre will be developed in large, prosperous communities. No church can undertake all this co-operative work, because it is interested in only one phase of life, but the whole community is equally interested in the public school. It would seem, therefore, that the school is the natural, organic centre of country life. If, however, the school is to develop as such a centre, it must concern itself directly with all the interests of the people and organize all the social forces of the community.

Such are some of the chief opportunities and needs of the farmers. We have in this state, we see, all the resources and conditions for a prosperous and happy country life. With as good soils and climate as can be found anywhere, with better markets and other economic conditions than are found in most places, with a noble people for friends and neighbors, with good schools now and better ones coming, why should any man wish to leave Ohio?

How shall we classify these wanderers away from the old state into the West? How shall we analyze their motives? Some are restless and never satisfied anywhere long; others are essentially land speculators and buy cheap lands in the West to sell to their friends at home. Most of the farmers who are urging you to go West belong to that class. Some good men, having large families of boys and little money, go West to buy cheap lands for them. Some go simply because they have in their blood the pioneering spirit, inherited from their fathers, who settled this great country; but a large majority, including all those who put the things of mind and spirit above material things, will stay at home in Ohio, where all the conditions are favorable for making our children nobler, wiser, truer, and braver than we are; for this, after all, is the chief end of our living and striving.

OHIO; A BATTLEGROUND; HER POSSIBILITIES.

By George W. Brown,
Zanesville, Ohio.

That Ohio is today a battleground is quite evident to the close observer. Her history from Col. Zane and Tecumseh to this day is replete with characters that have left a deep impress upon her institutions. Her valleys have afforded a natural outlet to the lakes and the Mississippi. Her soil has not only produced an abundance of life-giving qualities but has likewise sent forth from her hill tops and valleys men and women of worth to all the vocations of life. Her churches and schools have been a mighty factor in her development. Today a mighty battle is being fought over the same territory that our forefathers fought over. Ours is a different battle. They fought for the possession of the soil and we are fighting for the retention of its soil and its rehabiliment. Our forefathers contended against a mighty foe who sought to destroy the home life of the whites. We are contending against foes as deadly to home life as were the early men of the forest. Let us see along what lines these battles are being waged.

Ohio, politically, is a battleground. Adams County vote sellers, grafters and bribers in high places, failure to enforce law until a mighty crisis arises that compels a stern hand; all these are indicative of a mighty contention that must soon bring us to a better day. But this phase does not so much concern in this article.

Religiously there is a mighty battle raging. This is especially true in the rural districts where the churches have seemingly outlived their usefulness. By that is meant the church that no longer serves the community in which it is

situated. The *large number* of churches in a given community is another mighty problem awaiting a proper solution. That a given community is over churched goes with the mentioning of the fact. One place known to the speaker has, in two hundred square miles, (20 miles long by 10 miles wide) forty-six churches and hardly any of them doing anything to forward the cause of the Master's kingdom. This problem must and will be fought out.

The rural schools are likewise undergoing transition. Depleted districts are compelling the solution. The little "red school house" has passed into history together with many other things dear to our hearts. The boys and girls of our rural districts are demanding as good an education today as the boys and girls in the city. That can best be accomplished by the centralization of our rural schools.

And the greatest battle might well be termed the battle of the *soil*. The correct solution of this problem will, in a large manner, solve all the rest. Many of her fields and farms are depleted in fertility and power to produce. The home life they once maintained has passed. The social life in many places a thing of "the long ago." And all this because of a depleted soil which has been robbed by an incompetent husbandman or a type of farmer that hitherto wrought havoc on many Ohio farms.

Having recounted some of the most important battles that are being fought let us turn our attention to possibilities that are awaiting the state of Ohio. That her possibilities lie in the correct solution of her battles is self-evident. And the correct solution is centralization.

Let me say to you, gentlemen, two things that I want you to forever remember. (1) No people will ever rise higher than their religion. Religion is the fountain-head from whence all might impulses flow, (2) Farming is to enable a man to live and not to make a living. That vast numbers of men have only farmed to make a living is evident from the large number of depleted and abandoned farms. Our great aim therefore should be to keep alive our religious interests as well as our farming interests. Let us endeavor to unify them. And in seeking to unify the interests of religion and farming we work for the idea of centralization.

Our church life has undergone a rapid transition the last decade. It once served well the community. The early pastor visited among the homes, had prayer, kissed the babies and served the church by serving the family group. The idea of serving the community group had not dawned. His service to the community was wholly through the family. But today the new idea has dawned. The pastor serves the entire community. He renders his best service as he serves the entire community. In other words it is not sufficient alone to have prayer, some squaw talk and kiss the babies, but his interests lie in working for those things that will bring the entire community to higher ideals. And that means to endeavor to establish a community heart or ideal. Without doubt, gentlemen, the establishment of a community ideal will work alike to the good of religion and better farming. Are they not one and the same in a way. And the setting up of a community ideal is what we mean by centralizing.

Let us see how this community ideal works out. As a specific illustration we will take the farmer and his apples. One farmer may take the blue and red ribbon both at the county fair but the price of apples in his community remain the same. However if it is a community ideal and business to raise good apples, the best, the price of apples will be raised accordingly for the entire output can be handled by a single buyer. (And right here is certainly a good application of the Master's famous saying "Ye shall love your neighbor as yourself.") Hood River apples from Oregon sell on the Ohio market for about three dollars a box (bushel per box) and outsell our apples with three bushels in a barrel. Why?

Hood River apples are sent out by a Packers' Association backed up by a community ideal. Apples that will not pass through a two and a half inch hole are sent out as A1 apples. Any man who dares to send out apples under that grading is expelled from the association. In some instances his "output" has been destroyed by the community rather than suffer their ideal to be lowered by one stingy cuss whose interests are personal rather than community. Now what about Ohio apples? *No community ideal.* Alas how many think it a sharp business deal to put large apples in the head end of the barrel and fill with cider culls. At a recent apple show in Baltimore, "New York apples were ruled out because of dishonesty in the packing, though on the authority of President Brown of the New York Central, three shipping points of New York State each ship more apples than Washington, and Oregon and Colorado combined." (See Technical World for August, 1911, page 635.) There, gentlemen, is a striking instance for the country pastor to strike for a community ideal and to serve the entire community by bringing it about. Are not the interests of the farmer and pastor one and the same? Again I say — no community can rise higher than her religion. And downright honesty is a basic principle that must be strictly adhered to by all mankind.

Another striking example is the egg business. Here we see the lack of community ideal or co-operation. Some people do candle their eggs. The price of eggs, however, are determined by the uncandled eggs. The difference in price between the producer and consumer is brought about largely at this very point. Alas, again, how many bring uncandled eggs to market. Rotten apples would be detected at once and the sale spoiled. Rotten eggs are only detected when candled or broken. The dealer must therefore candle and grade the eggs. To do this he must estimate a per cent of bad eggs. The price to the producer is accordingly reduced to cover all shortage. But suppose the entire community would candle their eggs. Don't you see that the price of eggs are bound to go up for the producer. Let it become known that Brownville people all candle their eggs, that a case of eggs from that community have the stamp and approval of the community as an A1 grade and the city merchant can afford to pay more for such eggs and will gladly do so. Here is another instance for the pastorial effort. And right here the speaker wants to say that in a case of eggs recently purchased from a community whose religious belief was one of the strictest at least one-fourth if not one-third were bad. (Confidentially their religion was about as rotten as their eggs.) I contend, gentlemen, that our work is not unlike. I insist that our religion ought to get us somewhere. And I am mighty tired of that sort of preaching that says to the down and out or the unfortunate "Hold on, brother, and in the glorious hereafter you will have a gracious reward." I say let's make heaven right here on earth. Have better homes, better schools, better farms, better social environments and higher community ideals. And right here I want to remind you of what I said a few moments ago, "Farming is to enable a man to live and not to make a living." I believe in the preaching that will enable a man to live better. In other words preach more about living grace than dying grace.

Now in this idea of co-operation, community interest, etc., lies one of Ohio's greatest possibilities. Around a given community build up a community ideal and commodity. That commodity and ideal becomes known to the world at large. It simplifies advertising and in a vast number of ways adds to the interests of the community. Holstein cattle so largely raised in one of the counties of Ohio is known in South America. So in the matter of raising good horses of whatever breed. It likewise follows concerning sheep, hogs or whatever can be advantageously raised in a given community.

Again since the church life in the country seems to be waning let us apply the community ideal or more strictly speaking the community center. Make the country church the center of all its activities. Around it revolve its religious life, its social life and everything that pertains to the interests of that community. Its religious life must seek to arouse and define and set up such ideals. In other words it is not sufficient to say "Lord, what must I do to be saved," but "Lord, what can I do to help." Constructive work and not defensive. The social life will likewise seek its community center and that around the church. It will take the place of the "spelling school," "apple peeling," "carpet rag sewing," "log rollin'," etc. The singing school can yet afford a starting point for such a social life. And certainly no one will deny the need of the rehabiliment of the strong type of social life in the country.

Around that center will be the centralized school which can best serve the full interest of the community. It will give the very best educational system to the country place. That will give the grades and grade teachers. And the central school will be dependent upon the good roads leading to and from it. The church will here again seek to arouse the community ideal. As I see this whole question every community should be made a place so inviting that people will want to move there to die rather than move to town. That brings us to the idea of the home which we want to speak of for a few moments.

A few moments ago I said "Farming is to enable a man to live rather than make a living." That is true and evident. "Farming to make a living" is the farmer who robs the soil of its virgin fertility and then leaves for parts beyond rather than like the other thief who leaves for parts unknown. The man who has thus robbed a farm has been a menace to the community. Yea, he has been a veritable thief. On the other hand the man who "farms to live" is the man who will build up the soil, seek the best interests of the community as to her schools and churches, roads, and what not. The home idea is the prevailing thought. And that home idea must not be personal. It must seek the best ideals for the entire community. For the community is not known to the world at large, by the best homes in it but rather by the lowest. It's the individual and home that is on the margin that represents that community to the world at large. The aim and effort, therefore, should be to raise the standard of the marginal man or home. Here again we see these interests converging. Let us take a specific instance.

Suppose a few farmers are interested in trying to raise the standard of their community by assisting a few marginal men. In addition they are church men seeking to carry out their Master's teaching "Ye shall love your neighbor as yourself." They will, we will say, set aside a few hundred dollars to assist their brothers not so fortunate. So they go to Tom Brown who has lost a team, to Bill Smith who has lost a cow, and Sam Perkins who needs some new machinery and say "Brothers we will help you." Each man is assisted to his want. He is saved the expense of a mortgage, etc. Now the men who loaned the money are interested in seeing Tom Brown, Bill Smith, and Sam Perkins get a good crop, good price and market (brother's keeper). And in turn Tom Brown, Bill Smith, and Sam Perkins are interested in the church that relieves the *present* needs as well as *those to come* and says: "By Gum! this is the very sort of a community and church that I want to 'tie up' to." As a result three good homes are soon established and that community strengthened just that much. Such a church and community ideals will eventually build up a home community of the strongest type. Men believe in a religion and community like that and will seek to contribute to its welfare themselves.

Gentlemen of The Ohio Agricultural Society, we must seek to establish the community idea throughout our state to bring about the largest results. Then in turn these community groups centralize into larger circles and these in turn

into the larger or state itself. Small communities blessed with good roads will be interested in working for good roads throughout the entire state, the centralization of schools, nine foot stage of the Ohio for the counties bordering on the Ohio, etc. But our greatest possibility will be in working out the greatest trust reposed in us by the Creator of the universe when he said "Thou madest him to have dominion over the works of Thy hands: Thou hast put all things under his feet." Farming will be, or should be, considered a holy calling. God created the universe. God is holy. Everything He created is holy. The earth is holy and therefore everything that comes out of it is holy. It is ours to feed the other two-thirds of the peoplne. But until we reach up to our highest ideals we can never do it. We are taught to pray and say "Give us this day our daily bread," but how can we see that prayer answered if we hang our hoe on the fence and leave the plow in the shed? Impossible. And yet in this state there are thirty-four counties producing less corn, wheat, and small grain than twenty-five years ago, while there are, possibly, a million more people to feed. Shall we offer the same prayer and expect to see the people fed? Never. We must follow the laws of almighty God. He says "Thou shalt not steal," so we must cease our robbing the soil of its fertility and put back again the elements that it originally contained. The highest type of dominion is brain not brawn. Our greatest aim is in Scientific Agriculture. To answer our own prayer will mean to raise two bushels where now only one grows. To make it bloom like the rose of Sharon.

In conclusion, gentlemen, let me use a few verses written for this occasion:

Boost Ohio, boost her high,
Boost Ohio and boost her dry.
Boost her valleys — up and down
Boost her country, village, town.

Boost her — North, East, South and West;
Boost her — outside but *inside* best.
Boost her roads, schools, farms and church,
Boost not alone by words but work.

Build her government broad and deep:
Make social conditions all races keep.
Centralize and work and plan
Her markets, railroads to best serve man.

But in our boosting don't forget
God's will and plans are working yet.
To boost Ohio and make her rare
Have boys and girls of character.

OHIO'S INFLUENCE AND PRESTIGE IN THE LIVE STOCK WORLD.

By Prof. C. S. Plumb,
Ohio State University.

Those sections which seem best suited to live stock, have what we term a temperate climate and a reasonably fertile soil. If that is so, in what respect is Ohio adapted to the raising of farm animals?

Without going into too much detail, the following facts may be credited to Ohio. Our climate is of the moderate sort, such as might be expected of territory lying approximately from 41° to 38° North. We have but very little severe heat or cold, and over the southern half of the state, in winter snow is the exception and not the rule. In central Ohio, winter is hardly expected before January, and in March the grass begins to take on new life. In southern Ohio, live stock may be grazed on the fields for twelve months in the year. In the northern section, snow is more abundant, closed stables in winter are common, and the conditions are more vigorous than farther south. However, over much of the State, farm animals require much less winter shelter than is customary in the east and north. In the southern half of the State, the winter conditions usually allow for much freedom of the stock in the open, to its advantage.

The soil of Ohio is variable, but there is hardly a section in which standard forage crops and cereals will not grow to perfection under proper management. There are two crops, universally recognized as playing a most important part in farm economy as applied to stock, namely blue grass and Indian corn. These two plants may be found in every section of the State. Better blue grass cannot be found in the famous region of Kentucky, than one finds here and there in the pastures of Ohio. Blue grass is universal to Ohio, and where this grass thrives, horses, cattle, sheep and hogs are most economically kept for the growing season of the year. Ohio is famous for its corn crop, and in yield per acre this State stands up among the leaders, in 1909 producing over 150,000,000 bushels, ranking seventh among the states in the quantity produced. In average yield per acre, Ohio ranked second among all the so-called corn growing states.

In the production of the other standard cereals, grasses and clovers, Ohio is one of the leaders. Red clover is a universal crop, while alfalfa is rapidly securing a strong clientage in the State, some 20,000 acres reported as grown in 1911. Any soil that will grow blue grass, corn, red clover, alfalfa and timothy hay abundantly, can compete with the world in the breeding and feeding of farm animals. This can generally be done on the farms in Ohio.

So far as markets and shipping facilities are concerned, no State is more advantageously situated. We have a population of over 5,000,000 people. We have five cities widely separated in the State, with populations ranging from over 100,000 to 500,000 with many good sized towns and smaller cities. In these is a market for the producer of meat. No State is better supplied with railways and shipping facilities. In less than 24 hours we may deliver meat stock by freight to the largest stock yards in America, while by express we can deliver into New York, Philadelphia or Boston within a similar period of time. Steam railways penetrate all but one of Ohio's eighty-eight counties, whereby the farmer at a minimum of expense can easily reach a shipping point.

Ohio assumed a most important place in American live stock affairs at a very early date. Very early in the last century, before the day of the railroads, cattle were driven overland from southern Ohio to Baltimore and New York. Ohio cattle were recognized as the best produced on the continent. In 1833 at Chillicothe, there was organized the Ohio Company for Importing and Breeding Shorthorn Cattle. This company sent men to England to purchase Shorthorns, and their 1834 importations is one of the notable events in American Shorthorn history. As a result of the success of this company, others were organized in other counties in Ohio, and in other states. From that day to this, Ohio has been regarded as one of the most important Shorthorn breeding grounds in America. Today we have in the State, three herds of Shorthorns second to none on the continent, viz., that of Thomas Johnson of Columbus, Carpenter and Ross of Mansfield, and D. R. Hanna of Ravenna. The herds of these men have won the highest honors in the most severe competitions in

the greatest of our shows. The most famous Shorthorn bull of this generation, Whitehall Sultan, was calved at Yellow Springs on the farm of Mr. E. S. Kelly, and a part of his long and notable service as a sire was in this State. Three of his greatest sons, Avondale, Glenbrook Sultan and Fair Sultan, have done much in these latter days to add to the laurels of our Ohio. breeders. Our Shorthorn breeders have purchased the choicest breeding stock abroad, regardless of expense, since the thirties, when Young Mary and Rose of Sharon, founders of distinguished families, found their way to the Buckeye State. About ten years ago, Mr. E. S. Kelly paid $6,000 in Scotland for Brave Archer, and within the past few years both Carpenter and Ross and D. R. Hanna have imported sires that in their herds are creating results that are of the very best sort. At our state fair the Shorthorn assumes a place of great popularity. Here in Ohio came the first development of the Polled Durham, and the names of Miller of Ottawa and Crane of Tippecanoe City, will always hold a most important place in the development of this breed. They were long recognized as the master breeders of this Shorthorn family.

One of the greatest recognized beef breeds of today is that black, hornless one from Northern Scotland — The Aberdeen-Angus. In the beef show competitions during the past ten years, the Angus has more than held its own, — it has led. While there are comparatively few herds in Ohio of this breed, we have long had a recognized place on the map. Mr. D. N. Hine of Erie County introduced the Angus to Ohio about 1880. Almost thirty years ago, Mr. Benton Garringer of Washington Court House, showed the Angus and was a noted winner at the fairs, his bull Buffalo Bill being one of the famous early sires and show bulls of the breed. O. E. Bradfute and Son of Cedarville and Dr. H. M. Brown of Hillsboro, have for years been active Angus breeders. The Bradfute Meadowbrook herd is one of the noted ones of the continent. One may be safe in saying that no herd in this country has done more for the breed than that of Meadowbrook. Zaire 5th and Lucy's Prince, long in service in this herd, may be regarded as two of the most valuable sires of the breed, while as a show bull, the latter had a remarkable career, such as rarely comes to one animal. Each year sees the Bradfute herd lined up in the most severe show ring competition and holding high place in the list of awards.

In beef production, since early days, Ohio has held high rank. Early in the 19th century herds were driven overland from Ohio to Baltimore, Philadelphia and New York, after being fattened on our rich pastures. Since those early days our feeders have been consistent shippers to Chicago, Cincinnati and Pittsburgh markets, and each year hundreds of cattle are fed in Ohio for export. It was our distinction as a beef and pork producing state that resulted in the establishment of the stock yards and packing houses at Cincinnati, long the leading institutions of their kind in America. While we do not produce fat cattle for feeding as much as formerly, large numbers or cattle are shipped into Ohio for feeding, later to be sent to the markets in finished condition. In southwestern and western Ohio, thousands of feeders have fattened on our grass and corn. Mr. D. W. Black of Lyndon, for years showed car load lots at Chicago at the International Exposition, where his exhibit secured the highest honors, that of grand championship, and attracted national attention. Mr. J. D. Rogers of Bloomingburg for many years fed extensively and has been a successful exhibitor at Chicago. Humphrey Jones of Washington Court House has fed large numbers of steers, in which silage has been an important feature of the rations, so that his feeding methods have attracted wide attention in the middle West.

The dairy breeds of cattle have long had a strong foothold in Ohio, and much more so today than ever. The great increase of population in our cities,

the enormous increased demand for milk, and the better compensation for its production, has stimulated the dairy industry. Today we have about 1,000,000 milch cows in the State.

The Jersey breed of cattle was first introduced to Ohio in Hamilton County, in 1865. The breed found favor, and for many years, this State has led in Jersey cattle production. In recent years, more transfers of cattle of this breed have taken place in Ohio than in any other State. In 1911, there were transferred 3,140 Jerseys in Ohio. There have been many men prominent in Jersey development in the State. The late Mr. Frank Hart of Clevveland, had a very noted herd, and King of St. Lambert's King, his leading sire, was recognized as one of the great bulls of the breed. Mr. Hart had many great producers and was for years one of the great promoters of the St. Lambert family. Later he turned to the Island for stock, and made important importations, and was the first man in Ohio to introduce in a serious way, cattle of Island blood lines and type. He brought from the Island, Eminent's Raleigh, noted as a sire of high class females. Judge Bradbury of Pomeroy has long been a prominent Jersey breeder, as have Messrs. D. H. Olds of Springfield, Henry Dubois of Vigo, L. P. Bailey of Tacoma and Hugh Stewart of Washington Court House. Jerseys are found on every side in Ohio, and are generally popular. The Ohio Jersey Cattle Club is the most wide-awake local State Club in this country. Among the three notable Jersey herds of America today are those of Sheffield Farm, Glendale, Ohio, Hartman Farm, Columbus, and Goodhold Farm, Mentor. Sheffield Farm paid $11,000 for imported Plymouth Lad, Hartman Farm purchased Lucy's Prince in the East, and Goodhold Farm secured Raleigh, each famous sires.

In recent years the Holstein-Friesian has gained rapidly in favor in Ohio, especially in the northern part contiguous to Cleveland. In 1866, O. F. Jones of Wooster, Ohio, is credited with bringing the first cattle of the breed to Ohio, a bull purchased from Chenery of Massachusetts. In 1882 it is said there were just 1,000 Holsteins in Ohio. In the nineties, W. B. Smith & Son of Columbus, had a famous herd and showed over much of the middle West with great success. In their herd were many prominent producers. They had in service Paul De Kol, Aaggie Beauty Seconds' Statesman and Clyde Paul De Kol, sires of many advanced registry cows. This herd now is in the ownership of Derrer & Son of Columbus, and is each year well represented on the show circuit. In northern Ohio, the Horr herd for many years was prominent, and today in Geauga County, herd of Dimmick & Brother is attracting national attention. Here may be found Daisy Grace De Kol, with a world's record for 7, 60 and 90 days, for producing more butter fat than any other cow of her age has done. From her milk was produced 32.5 pounds of 80% estimated butter. They have five cows that in their two year form produced 20 or more pounds each of estimated 80% butter, the greatest showing of any herd in America for this class. Their bull Pontiac Aaggie Korndyke, is rated as one of the notable present day Holstein sires. Dimmick Bros. have several cows that have produced 30 or more pounds of estimated 80% butter in seven days. At the present time no class of cattle bring such relatively high prices and are so much in demand as the Holsteins.

Among the dairy breeds, the Guernsey has very high place, and while the breed has not had a prominent place in Ohio in the past, it bids fair to become a popular favorite. Already Ohio has the largest Guernsey herd in the world, that of Mr. O. C. Barber of Barberton, and in it is Spottswood Daisy Pearl, 17696, the world's champion butter producing cow of the breed. In one year ending in November, 1911, she produced 936.4 pounds of butter fat, containing 1,125 pounds of estimated 85% butter. This cow is now seven years old,

and was bred in Ohio, by Mr. Jacob Beidler, of Willoughby, a member of our State Board of Agriculture and long a Guernsey breeder of prominence.

Ayrshire cattle are also becoming better known in Ohio, and Mr. John Sherwin of Willoughby has a large and choice herd, headed by Bargenoch Bonnie Scotland, for which he paid in 1910 the sum of $1,600, the top price in America for an Ayrshire bull at that time.

Red Polled are a general purpose breed, for both beef and milk. Ohio men have long promoted this breed. Mr. J. McLain Smith of Dayton and Captain V. T. Hills of Delaware were importers in the eighties, and did much to push the breed to the front in America. Mr. Smith was long the Secretary of the Red Polled Cattle Club, and Captain Hills did more than any other one man to intelligently promote and test the breed. He brought out the famous Mayflower tribe, and his cow, Mayflower 2nd, in 1901 at the Pan American Exposition held second place among fifty animals representing ten different breeds. His sales at Chicago received the highest prices paid for cattle of this breed.

Our cattle interests are of great magnitude among the states, Ohio occupying ninth place in value, our combined beef and dairy cattle by the last census being valued at $51,370,000.

Ohio horses from early days have been in great demand in the East. While farm horses had been taken East for many years, the first notable progressive horse movement in this State occurred in the middle of the nineteenth century, when some of our enterprising horsemen visited France and made importations of French horses. Along at this time, Horse Importing Companies organized in Ohio, and a movement set in to bring better horses to the State than we then had. The introduction of the two Percherons, Louis Napoleon, to Champaign County, and Pleasant Valley Bill to Pickaway County, about 1851, was really a notable historic affair, for these became great early day sires, and largely affected the character of the horse stock of this country. Since these days, great numbers of draft horses have been brought to Ohio from Europe, and more especially France. The Percheron is essentially the favorite draft breed in Ohio, and many of the best specimens imported to America have been brought here by Ohio importers. For many years the McLaughlin Brothers of Columbus, have been importing the best stallions purchasable in France, and among the horses they have brought to America have been some of the best show animals and sellers in the American market. This firm has probably distribute more high class stallions, and sold more horses at high prices than any other American firm of equal age in the business. Among the noted horses they have imported and sold are Orangiste, sold for $5,500, Fronton, sold for $6,500, Pour-Quoi-Pas, sold for $7,000, and Rosemberg, sold for $8,000. In their recent importations they have brought over three great show stallions, Etudiant, a famous French winner, Intime, first prize in a competition of 177 two year old stallions at the 1910 International Exposition, and Hantbois, first prize aged stallion at the 1911 International. Messrs. Bell Bros., of Wooster, Col. G. W. Crawford of Newark, Forney Bros. of Plainfield, and Mr. D. J. Grindell of Kenton, have for years been also engaged in importing draft horses. As a result of these various importations, and our home breeders, Ohio has many high class draft horses scattered over the State. Not only this, but Ohio draft geldings and mares have become famous in the large eastern cities, due to the shipments made by dealers in certain sections of the State. Large numbers of thin heavy horses are purchased in states to the West of us, and are brought into different sections of the State and fed by farmers making a specialty of this business, being later shipped East. Horse feeding is a special industry in Wayne, Holmes, Delaware and other counties of the State. It is said that about 3,000 horses were fed and

shipped out of Orrville in 1911. Farmers not only pay a high price for these horses, but sell them also for top figures, $400 not being uncommon.

Light harness and saddle horses came into the State with the early settlers. There was much nondescript blood in the early days. Thoroughbreds, Morgans and what later came to be known as standard-breds gradually secured a foothold. In 1832 a trotter named Bellfounder was brought to Ohio from New York, and stood at Cleveland and elsewhere and sired many fine colts. Along in the forties the Morgans received considerable attention. With the development of the light harness horses came increased interest in the trotter and pacer. Race tracks were established over the State and the race became a feature of the county and tsate fairs. At Columbus at the present day, we have one of the celebrated fast tracks of the country. Here Cresceus on Augus 2nd, 1901, reduced the world's trotting record to 2:02¼, while Sweet Marie in 1907 reduced it again to 2:02. In 1909 at Cleveland, the mare Hamburgh Bell reduced the world's trotting record in a race to 2:01¼, and in 1910, against time, The Harvester reduced the world's trotting record to 2:01 at Columbus. The great Uhlan, the most noted gelding of today, with a record of 1:58¾ is owned by Mr. Billings of Cleveland. Independence Boy, 2:01½, one of the best trotting geldings on the circuit is owned in Columbus by Messrs. Shepard and Valentine. Around Washington Court House, much interest is shown in the trotter, and here Bobby Burns, a noted sire, has long been in the stud here. These facts simply show that the people of Ohio take more than a passing interest in the speed producing horse.

The last census shows Ohio well up among the horse producing states, with total valuation of about $125,000,000.

Since Seth Adams found his way in 1807 from Dorchester, Mass., to Muskingum County, Ohio, with the first Merinos brought west of the Alleghanies, Ohio has ranked at the top, or nearly so among the sheep producing States. Adams came to Ohio and began to breed and distribute Merinos over this and adjoining states and beyond. The Merino interests rapidly developed, and W. R. Dickenson, became a noted promoter and pioneer in the eastern part of the State. The hills of Eastern Ohio became dotted with Merinos, and the flocks developed in a very superior manner. James McDowell, Bezaleel Wells, Thomas Rotch, and Adam Hildebrand contributed much to Merino development. Along in the sixties and seventies, many fine flocks were established, and Ohio became a powerful factor in the breeding of pure bred sheep. In 1870 there were nearly 5,000,000 sheep in the State. While the number has fallen off materially, the 13th census for 1910 giving the State 3,907,055 sheep and lambs. Ohio as a State for stud flocks is pre-eminently the most important one in the country. In numbers, only Montana and Wyoming surpass Ohio, while for the states east of the Mississippi River, no other state may be seriously regarded as in the same class with Ohio. The sheep show at the Ohio State Fair each year is the most important even of its kind on the American continent, for the largest and finest exhibit of breeding stock is brought forward here. Here gather the most prominent exhibitors and breeders, and many important sales are made at this show. Men attend the show to buy for the South African and South American trade, and Ohio bred sheep are purchased for wide distribution over the United States. The Merino is, generally speaking, the leading breed in the State, and the Ohio Merino is known as the best produced today in America. The flocks of S. M. Cleaver of Delaware, George Helser of Lafayette, A. T. Gamber of Ada, Blamer & Son of Johnstown, C. S. Chapman of Marysville, Uriah Cook & Sons of Peoria, J. J. Deeds & Son of Pataskala, R. D. Williams of Xenia, W. M. Staley of Marysville and many others, are well known. These men have bred sheep that have been exported, and buyers of their stock have come from over a wide territory. The prestige once held by Vermont as a Merino headquarter has been transferred

to Ohio, and now the breeder of that State comes to this one for a source of supply.

The Rambouillet, a cousin of the American Merino, has a great hold in sections of Ohio, and has been bred here for long over a half century. The late Mr. R. C. Moulton, of Woodstock, began with this breed in 1851, and maintained a herd for over fifty years continuously. Mr. Dwight Lincoln of Milford Center, the Secretary of the American Rambouillet Sheep Association, has not only imported Rambouillets from France and Germany, but has tried his hand at exporting to the Argentine Republic. Ohio has a number of Rambouillet colonies in the north and western part of the State, and from these colonies many carloads of rams have been shipped to western buyers for us on the range. At the present time, Ohio is the only State east of the Mississippi seriously producing Rambouillet sheep for outside trade. The flocks of Messrs. Dwight Lincoln of Milford Center, L. W. Shaw of Pottersburg, Max Chapman of Marysville, P. Clark & Son of Cable, and J. H. McMullen of Woodstock, have distributed Rambouillets over much of the country.

The mutton breeds were introduced in Ohio not long after the Merino, and Isaac Maynard of Coshocton did much to promote some of these sheep. He introduced the Southdown, Leicester, Cotswold and Lincoln in 1834, and thus made a unique record. The Shorpshire, the most common of the mutton breeds here today, was probably first introduced about 1885, and Mr. Chauncey Hills of Delaware was one of the earliest importers, and a very intelligent and successful breeder. The first Oxfords were brought to the State in 1861, to Granville, and since that day but comparatively few flocks have developed here. Mr. W. A. Shafor of Hamilton, has long been noted as a breeder, and years ago he was a well known importer and exhibitor. The Dorset has been largely handled in the past by the Wing Bros., of Mechanicsburg, but not many flocks are found in the State. Some most excellent flocks of Cheviots are owned in Ohio, notably those of F. L. Postle & Son of Camp Chase, Ed. S. Foust of Xenia, W. D. Calland & Son of DeGraff, and Boyd & King of Hillsboro. The Hampshire has been known some time in the State, and C. O. Judd of Kent, P. W. Artz of Osborn, and W. J. Cherry of Xenia are all prominent and most successful breeders. Mr. Judd has been a very prominent importer for some years, and his sheep on the show circuit have been among the most successful American winners. Chas. Leet & Son of Mantua are prominent breeders and importers of Hampshires and Southdowns, and are well known as very successful exhibitors at the shows. There are some very excellent Shropshire flocks in the State, although these in the main represent Ohio bred stock. Messrs. F. W. Palmer & Son of Pataskala, H. M. Brown of Hillsboro, Ed. Post and George F. Stallsmith of Urbana, Ralph Postle, Camp Chase and J. D. Keiter of Xenia, breed and maintain superior flocks. The beautiful Southdown has its following, and the Southdown show at the Ohio State Fair is one of the fine exhibits of the mutton breeds. Among the breeders of Southdowns are R. B. Watt of Cedarville, C. J. Stuckey of Mechanicsburg, Compton & Son of Kile, and C. L. Mitchell of Lucas.

The Longwool breeds years ago had a considerable hold in Ohio, but at the present day but few are being produced. Dr. H. M. Brown of Hillsboro, and W. A. Lisle & Son of West Liberty, keep flocks of Lincolns. There are probably no Leicesters in the State, and but few Cotswolds.

In addition to its fame as a sheep breeding State, Ohio has long enjoyed a high rank as a sheep feeding ground. Large numbers of Western sheep and lambs are shipped into the State each year and fed during the winter season. Very considerable success has attended this work in the past, and Ohio fed sheep command a comparatively high price in the market. The Wing Brothers of Mechanicsburg have long fed Western lambs. On two different years, Dan W.

Black of Lyndon won the grand championship in the carlot contests at the International Live Stock Exposition, the highest honors obtainable. Mr. Black bred these lambs, using Oxford rams on Western ewes. They were a very high class lot of lambs. The feeding of lambs in western and northwestern Ohio has had its ups and downs, but generally the balance has been on the right side of the ledger. During the past few years, a large number of sheep have been in and about Fayette County, where good grass and corn are easily produced.

The so-called hot house or winter lamb, is one of the delicacies of the rich and finds its best sale in the large eastern markets. There are but comparatively few winter lamb producers. For some years, Mr. Geo. M. Wilber of Marysville has been the largest producer in the United States, shipping close to 2,000 some years. He has a very large flock of ewes, and begins to get his lambs about Thanksgiving, and ships daily during the season to New York. Mr. J. B. Peelle of Sabina is another successful specialist in this field.

The swine industry of Ohio is one of its most important live stock products. Hogs are generally grown all over the state, but more especially in the richer corn producing sections. Beginning early in the last century, the farmer of southwestern Ohio devoted much attention to swine, having in mind converting their corn crops into pork. These men largely stimulated Cincinnati as a pork packing center. Here among these men, the famous Poland China breed of hogs was developed and came into its greatest prestige. Among the Shakers hogs were regarded as of great importance as corn converters, and they promoted the Poland China vigorously. Many men in Ohio attained note by the character of Poland Chinas they bred, and the names of Harkrader, Klever, Magie, Duffield, Young, Irwin and Bonham, were among the most important breeders. Since these early days has come a long list of prominent breeders in Ohio, among which Ed. and J. M. Klever of Bloomingburg, Charles E. Keller of Newark, Watkins & Broadway, Centerville, A. C. Grieve, Xenia, J. H. Staley, Pataskala, J. M. Linson, South Solon, Osburn Bros., Newark, J. B. Fernon, Leesburg, L. C. McLaughlin and many others are notable. No better Poland Chinas are to be found than those produced in Ohio, and for many years they have had a wide distribution over the United States. The annual show of Poland Chinas at the Ohio State Fair has nosuperior in the country, when quality and character is considered. Among the more notable sires of the breed produced in Ohio, have been Tom Corwin 2nd, Tecumseh, Ideal Sunshine, High Roller, Thickset, Chief Delight, Chief Tecumseh, etc.

The introduction of the Duroc-Jersey came with the plainer red hogs of which the Jersey Red was a pioneer. For many years, a few men in Ohio bred the Duroc-Jersey, of which Mr. Sam Morton of Camden, was a notable pioneer. These men adhered to their favorites, and for a long time bred and promoted a red hog that was of hardy constitution, prolific, and fairly easily fattened, but was coarse and lacked quality. In the later years the breed found a wider clientage, and many new men took up this breed as a favorite. With their efforts came a very intelligent improvement of the Duroc-Jersey, so that today this breed stands before the public as a different sort from in early days. The efforts of Messrs. Sam Morton of Camden, Ira Jackson of Dayton, E. S. Kelly of Yellow Springs, Thos. Johnson of Columbus, W. H. Robbins of Springfield, R. C. Watt of Cedarville, E. S. Foust, Xenia, and many others gave a new impetus to the breed. Today the Ohio Duroc-Jersey Swine Association numbers about 200 men, and a more aggressive organization of the kind does noe exist. The sales of this breed have brought wonderfully good results, and in Ohio, many animals have brought $500, or more, Mr. Thomas Johnson of Columbus, paying $3,500 for Orion Chief, $2,000 for King's Pal, and $1,500 for Instructor, all noted sires and show boars. The influence of the Ohio Duroc-Jersey breeders is not surpassed

if equalled by the breeders of any other state, for more really superior hogs of the breed are produced in Ohio than in any other State. Many herds of the Poland China have had to give way to the popularity of this favorite.

The Berkshire was first introduced into Ohio in 1835, and its blood played an important part in the improvement of the Poland China. Many herds of Berkshires came into existence, and the breed received much popularity in the State. However, it passed through some decline in public favor, although in recent years, many Berkshires have been established, and the breed is more extensively developed here than in most of the states. There are at present some of the notable herds of the country in Ohio, especially those of Sheffield Farm at Glendale, Tannenbaum Farm at Willoughby, H. D. Helmuth of Millersburg, Alber Fisher of Orient, Everson & Son at Wellington, J. L. Axline at Pataskala, W. H. Palmer at Thurston and Lippincott at Lima. Among the noted boars of the breed, Longfellow Premier C., Handsome Lee, University Lee, and Matchless Baron Duke have been owned in recent years in Ohio.

The Chester-White is famous in Ohio, through the great improvements made by S. H. Todd of Ada, and L. B. Silver of Cleveland, both of which men have long been very intelligent improvers of this pig, and have brought much special distinction to the State through their breeding work. The Chester-White is well distributed in Ohio, and does well here. From here, fine specimens of the breed have been sent over much of the United States.

The College of Agriculture of the Ohio State University has many fine specimens of live stock, which are primarily for use with the students, as object lessons on animal form and production. The University owns pure bred specimens of Percheron, Clydesdale, Hackney and Morgan horses; of Shorthorn, Aberdeen-Angus, Jersey, Holstein-Friesian, Guernsey, Ayrshire, Kerry and Devon cattle; of Merino, Shropshire, Southdown, Cheviot, Oxford and Cotswold sheep; of Berkshire, Poland China, Duroc-Jersey, and Large Yorkshire hogs. Each year the University exhibits stock at the International Live Stock Exposition, and has met with fair success in competition. On two occasions, we have won grand championship on pen of barrows, over all breeds, grades and crosses, with Berkshires of our own breeding, and twice we have won the Berkshire breed championship on barrow, the last being in 1911. We also have won the breed championship on Shorthorn, Galloway and Red Polled steers in past years.

No one at all familiar with Ohio, but what must recognize her eminent fitness for live stock production. If one knows of the doings in the live stock world, then he will also recognize the illustrious part Ohio has played in this work in the past, and is today.

Our stockmen need but to push forward to still newer and greater accomplishments. An army of young men is passing through the College of Agriculture, and many of these should come out stimulated to identify themselves with the great agricultural uplift of the future, and to especially devote themselves to Ohio's live stock interests. Our breeders of today should encourage them and support the college literally in its work. There is no better field today than right here in Ohio, for engaging in the live stock business as breeder or feeder. Here we have the right conditions from the various points of view, and the man who believes in himself and in Ohio, with intelligent effort will secure success as a stockman.

FINANCING THE FARM.

By Hon. Myron T. Herrick,
Cleveland, Ohio.

The division of industry that occupies the most important position in relation to the welfare of all the people, is the cultivation of the soil. Agriculture is the basic vocation. The stability of national life largely depends on the existence of a sound agricultural development. The history of the older countries of the world shows that there have been recurring movements of the people to and from the soil. History also teaches that the periods of greatest prosperity in those countries have been co-existent with the movements back to the soil,—away from the centers of population. The rise and fall of many nations and civilizations can be traced in the growth and decline of agricultural interests. As these nations grew rich and powerful, the pick of the people, lured by the glamor of urban life, deserted the country, and the cultivation of the soil was left to the incompetent and the slothful. Within the cities, luxury at one extreme and want at the other, gradually undermined the moral, intellectual and physical fibre of the people. The result was that these nations, lacking transforming energy and the stamina for successful resistance, gave way before barbarians or other nations with a civilization less advanced, but more virile. The pressure of population in the cities of this country is making the struggle for existence, by a large proportion of the people, severe and uncertain, and destructive of industrial efficiency and of a proper civic consciousness. Want and misery are inimical to the success of a democracy. The overcrowding in our cities is producing a large class of people, whose low moral and intellectual standards make them unfit for citizenship. It is the existence of this class in increasing numbers that makes it more and more difficult for us to assimilate the foreigners that immigrate to this country.

That our cities are devastating the farms is emphasized in the last census reports. Unless the cities re-people and regenerate the farms, the cities will suffer for the want of food and for the want of strong men. The brain of the city, like its food, is produced in the country. There is a growing appreciation of the fact that the future material and political progress of the United States largely depends upon turning the trend of population from the cities to the country. It also is realized that to be permanent and of the greatest utility, this movement must be accompanied by a very great improvement in the methods of cultivating the soil, and a very decided increase in the number of farms that are cultivated by owners.

Since the Civil War we have bent our energies, with unparalleled success, to the building up of our "infant industries." It is now time to turn some of the milk that has stimulated the "infant industries" to the nourishment of senile agriculture. We have neglected the farm; we have emulated England in our race for commercial supremacy. We have not taken heed of the example of France, Germany and other European countries that have recognized the importance of the equal development of manufacturing and agriculture. The contest with the old world for the market for manufactured products, on account of the vast prizes to be gained, has drawn away from the land a preponderance of the best intellect of America, until we now find that the production of foodstuffs in the United States is not increasing as rapidly as the population. From 1900 to 1910 the population of the United States increased 21% but the number of farms did not grow as rapidly. In 1900, the number of farms was 5,737,372, and in 1910, 6,340,357,—an increase of 10½%. For the whole United States this is the lowest

rate of increase for any decade since 1850. If the number of farms is taken as a measure, agriculture shows a diminished rate of increase, and in large areas of the country is practically stationary. The small increase in the number of farms has not been offset by a growth in the size of farms, as the average number of acres in farms decreased from 146 in 1900 to 138 in 1910. The increase in the total acreage devoted to agriculture was only 4.2% in ten years. However, improved land acreage makes a somewhat better showing, — the increase from 1900 to 1910 amounting to 15.2%. Yet this percentage of increase was only about two-thirds of the growth in population; which shows that the number of acres under cultivation has not kept pace with the increase in the number of people. The inadequate increase in the number of farms and in the amount of improved land has not been compensated for by a per acre increase in the production of staples. From 1899 to 1909, the average production of oats decreased from 31.9 to 28.6 bushels; the per acre production of wheat increased slightly,— 12.5 bushels in 1899 to 15.4 in 1909; and the per acre production of corn fell from 28.1 to 25.9 in the same period. Should such a ratio continue, it will be but a few years before we are dependent on the bounty of other countries for much of our food supply. We are aghast when we contemplate the possibility of this country, with its vast domain, losing eight or ten years hence, not only its ability to supply foreign countries with food, but its enviable position as a self-supporting country. However, it is not likely that we shall ever be compelled to beg food from other nations. The quick comprehension and the ready adaptability of the American people will prevent such an unfortunate situation, but the responsibility of correcting conditions lies upon us of this generation. The national government, through the Department of Agriculture, and the states through their agricultural colleges, are accomplishing much, but we are not moving fast enough. Some of the older countries, particularly France and Germany, have been through the same experience. Years ago they recognized the imperative need of using scientific methods in farming, and both France and Germany are now far in advance of the United States in the successful application of modern scientific methods of cultivating the soil. In the United States the average yield of wheat per acre is about 15 bushels; in Germany it is about 28 bushels; in France, 20 bushels. The farms of the United States produce, on the average about 30 bushels of oats per acre; those of Germany, 46 bushels.

1. The statistics as to the per acre production of potatoes are peculiarly striking. In 1909 France produced 190 bushels of potatoes per acre, Germany 226 bushels, Russia 135 bushels, Belgium 286 bushels, — in 1911 the United States produced but 80 bushels of potatoes per acre.

There is absolutely no reason why we should lag behind any of the countries of Europe in the per acre production of foodstuffs. By the use of proper methods the volume of the farm products of this country easily can be doubled.

2. In Germany and France, co-operative societies, formed among the agricultural classes, have done much to promote scientific farming and the general interest of farmers by enabling them to advantageously buy and sell products and merchandise. In Germany the local societies have united into branch societies, circuit and district societies and these form the basis of the two general German Agricultural Organizations — the Imperial Union of Agricultural Societies and the General Union of Agricultural Societies. In 1905 these two organizations were united for all administration purposes, and is known as the Imperial Agricultural Organization. This organization, in 1909 embraced 67 circuit unions, 18,333 local societies, and a membership of 1,575,000.

The local societies are divided into 12,584 savings and loan societies, 2,128 co-operative purchasing societies, 1,960 dairy societies and approximately 1,591 societies devoted to various other objects. In 1907 the total assets of the savings

and loan societies amounted to about $400,000,000, the assets of the co-operative purchasing societies to $13,000,000, and the value of the merchandise purchased to $22,500,000. The dairy societies have for their object the selling of dairy products for the members of the societies. Some idea as to the importance of these societies can be gained from the fact that the total value of dairy products amounts to $46,385,649. The dairy societies are typical of those societies belonging to the Imperial Agricultural Organization that have for their purpose the selling of the products of the land. The development of Agricultural societies in France has been very similar to that in Germany. It is impossible to overestimate the advantage of such societies to the agricultural interest of Germany and France. They constitute the connecting link between the farmer and what he produces and the large public, that buys and consumes. Similar societies in this country undoubtedly would add to the independence, contentment and prosperity of those who cultivate the soil.

The permanent improvement of farming methods, whereby the yield per acre may be substantially increased, demands two things. Farmers must be made to appreciate the possibilities of scientific methods, and taught how to use such methods, and they must be supplied with funds to make the needed changes and improvements. We can not hope for an increase in the production of foodstuffs in this country equal to the increase in consumption, unless the deserving tiller of the soil can be supplied with the funds he needs, at low rates and for long periods. It is as necessary for the farmer to have cheap money as it is for the railroad builder or the manufacturer. The availability of cheap money for loans on farm land will make it possible for may farm tenants to buy farms for themselves. It will encourage many others to purchase land and take up farming as a means of livelihood. At the present time 37% of all the farms of the country are cultivated by tenants, — an increase of 16% since 1900. The cultivation of the soil by owners is essential to the highest agricultural development. Tenants will not use the same care and skill that owners do. The young man of today who scans the field of human endeavor will see, in the cultivation of the soil with the aid of modern science, what was not there thirty or forty years ago. Profit, plenty and peace will be his portion of he makes agriculture his profession, and is equipped as well as he must be to make a success in other vocations. Farm life today is immeasurably more attractive than it was twenty, or even ten, years ago. Improved roads, the telephone, rural free delivery and other conveniences, to a large extent have done away with the depressing isolation of country life, and it is now possible for the farmer and his family to take part in the social life of the community. Of those engaged in industrial pursuits, less than 5% can ever hope to "own their own jobs and employ themselves," but of those that look to the land for their living, provided they are well trained and work with energy and intelligence, 95% can reasonably hope to be their own masters.

Experience in France and Germany conclusively proves that the development of successful scientific farming in large measure depends upon the existence of facilities whereby land owners can obtain funds on favorable terms to finance improvements. In France and Germany there are numbers of organizations, uniformly successful, that loan money to farmers — particularly to those owning and cultivating small tracts of land, on long and easy terms. These organizations have been so successful that they can loan funds to land owners on terms as favorable as those secured by large railroad and industrial corporations in this country. In this country loans on farm land as security, with few exceptions, have retained their primitive immobile form. The farmer when he needs funds for improvements, additional stock or new implements only can borrow, if at all, in his own immediate neighborhood and for short periods. The consequence is

that, not infrequently, he is unable to get funds when needed, and usually he is obliged to pay a rate of interest higher than that to which the nature of the security he has to offer entitles him. There are in this country no organizations by which loans on land — the safest of all security, can be mobilized, and access obtained to the wide stable investment market.

To show what has been accomplished in other countries in this direction, descriptions follow of the Landschaften Associations in Germany and the Credit Foncier in France.

The Landschaften Associations are societies of farmers. The members have the right to issue mortgage bonds based upon the mortgages held by the Association. These bonds are guaranteed by all the members of the Association. By virtue of such a guarantee the bonds are readily salable upon favorable terms, throughout the empire, to banks and all classes of investors. By means of these bonds, and the conditions under which they are issued, the farmers belonging to the associations can command the money market as readily as great business corporations or municipalities. Those who join the associations must have their estates appraised, and they are permitted to make mortgage loans up to one-half or one-third of the appraised value of their land. The association assumes the responsibility for the payment of the loan. The association pays the interest and also the principal, when due, for which it is reimbursed by the borrower. In order to show the actual working of one of these organizations, I will describe one that has its headquarters at Kiel. This institution has the right to acquire real property, and to issue mortgage bonds payable to the holders. Only those that own agricultural or wooded lands of a certain earning power or determined value can become members. As all those that join the association need capital, the initiation fee is calculated at the rate of 1-10 of 1% of the amount to be borrowed. Mortgage bonds are issued in denominations of 5,000, 2,000, 1,000, 500 and 200 marks, in four classes, bearing 3%, 3½%, 4% or 4½% interest. The bonds are quoted and sold on the financial exchanges and find a ready market. The Association guarantees the payments of the bonds when due. If the capital of the Association is not sufficient for the purpose, then the individual members become jointly liable to an amount not to exceed 5% of the money loaned and not repaid. The total amount of the bonds of the Association in circulation must not be in excess of the total amount of the mortgage claims against its members which the Association holds. The bonds are redeemed at intervals, the numbers being drawn by lot. The mortgagor can negotiate a loan through the Association at 3%, 3½%, 4% or 4½%. He selects a rate according to the circumstances of the money market. The mortgagor pays into the Association, in addition to the interest, and until the termination of the loan, ½ of 1% for amortization, and 1-10 of 1% as a contribution to the cost of administration. If the mortgagor fails to meet his obligations to the Association, it may demand full payment of the loan upon six months' notice, and if the payment is not then made, the property is sold. If property on which a loan has been made decreases in value partial repayment of the loan is demanded. The surplus receipts of of the Association go into a reserve fund from which losses are made good. The administration of the affairs of the Association is under the supervision of the Prussian Minister of Agriculture, and under the special control of a Royal Commissioner, who is authorized, at any time, to inspect the books and fund, to attend meetings, and to call meetings. On January 1, 1908, the bonds of the Landschaftliche Credit verband, were as follows:

	Marks.	
4 per cents	7,044,800	$1,676,662.40
3½ per cents	33,481,800	7,968,668.40
3 per cents	1,813,200	431,541.60

In 1908 the largest loan amounted to 62,600 marks ($14,898.80) and the smallest 600 marks ($142.80). The average was 13,000 marks ($3,284.40).

The Credit Foncier de France established to satisfy an imperative need is a limited liability company with a capital of 200,000,000 francs, operating under the supervision of the state. In the beginning (1852) the government granted the Credit Foncier a subsidy of ten million francs in order to help it make loans at a rate advantageous for that time. The subsidy was not renewed, and the state does not now intervene except occassionally to exercise its control. The purposes of the Credit Foncier are:

1. Lending money to land owners, counties, communes and public services.

2. To create and negotiate real estate bonds, or mortgage bonds to a value which cannot exceed the amount of the sums due from its borrowers.

The company is permitted to receive deposits, but the aggregate of the deposits must not exceed one hundred million francs. The funds received on deposit are employed in discounting commercial bills on condition that they have two signatures and do not run over three months. The shares of the Credit Foncier, which are dealt in on the Bourse, are issued at five hundred francs, and anyone can own them. The stock now receives 6% dividends and sells for about 750 francs a share. The government appoints the governor and two sub-governors. There must also be three treasurers general among the 23 members of the council of administration. These treasurers, as well as other administrators, are appointed by the general assembly of the company. The general assembly represents all the stockholders, and is composed of the 200 who own the largest amount of stock.

The two principal kinds of operations of the Credit Foncier are mortgage loans and communal loans. The total of these two kinds of operations now amount to more than four billion francs. So far as the possible adoption of some of the methods of the Credit Foncier in the United States is concerned, that part of its operations covering the making of loans to land owners is of the greatest interest. Our municipalities now have a broad and steady market for their securities.

The Credit Foncier makes loans to land owners on the following terms:

1. Short time loans, without amortization, for a period of from one to nine years.

2. Long time loans, with annual amortization, for a period of from ten to seventy-five years.

The rate of interest on the loans is 4.30% per annum, and the rate is the same for all kinds of property. Loans are made only on first mortgage security, and the amount of the loan cannot exceed one-half of the value of the property, except that loans on wines and timber must not exceed one-third of their vavlue. When the loan is made for a short period, the borrower pays each year only the amount of interest due and the principal amount must be paid in full at the end of the term of the loan — one to nine years. Long time loans are gradually paid by means of an annuity, which includes the interest and a small fraction of the principal. As a rule the borrower himself fixes the length of the time that the loan is to run. The amortization extends over the whole period of the loan, so that the total of the interest and capital is repaid from a constant yearly annuity. Consequently, the most of amortization depends on the length of the loan and on the rate of interest. On a loan running for 75 years at 4.30% interest the annuity — including interest and amortization, is at the rate of 4.48% per annum. The borrower has the right to pay the principal of the loan at any time, and to profit by the amortization already made. He can also make partial payments and thereby reduce the amount of the anuity. The land owner, who wishes to build, can obtain from the Sous Comptoir des Entrepreneus — a society connected with the

Credit Foncier, a mortgage credit based on the value of the land and of the building to be erected. When the building is finished the credit can be converted into a Credit Foncier loan.

The real estate bonds issued by the Credit Foncier have no fixed maturity, but are called for payment by lot. Each payment of bonds must be of such an amount that the bonds remaining in circulation will not exceed the balance of the principal owed upon the hypotheticated loans. If the government approves, there can be added to the bonds called for payment certain prizes and premiums. The funds received from the usual amortization, or anticipated payments must be used to amortize or redeem bonds, or to make new loans. In general the bonds bear 3% on the nominal capital, and the cost of the loans to the company, including interest and amortization, is about 3.60% which places them on a par with municipal bonds. At the present time the company is redeeming bonds to the amount of about 30,000,000 francs per year, but the amount of redemptions can be increased, if it becomes necessary in order to keep the balance between the bonds and the loans. The bonds are sold by public subscription. About every three years the company issues bonds sufficient to yield from 300,000,000 to 350,000,000 francs. The bonds are subscribed for by people of small means, and usually remain in their hands; consequently the quotations of the bonds show little fluctuation. The company always keeps a few bonds on hand for sale, but the bulk of them are disposed of by public subscription.

It is not necessary for us here to inaugurate a new and untried scheme of finance to enable farmers of the United States to borrow at low rates and for long periods. We can profit by the long and successful experience of other countries. We can take the French and German models and revamp them to harmonize with conditions in this country. The principles that underlie the mortgage loan organizations in France and Germany are familiar to us here, and we know that they are economically sound. If those countries could successfully initiate, can we not adopt?

There are several conditions that must be observed if organizations for the loaning of funds to land owners in this country are to be successful. The corporations or associations must have a large capital. They must be established for the single purpose of loaning money to land owners at low rates and for as long periods as possible. There should be no profit to promoters in the organization of such corporations, and the return to the stockholders must be kept within very reasonable limits. In other words, the borrowers, and not the stockholders, should be the chief beneficiaries of the success of the undertaking. The active assistance and co-operation of the state or nation must be obtained. The mortgages held by the company should be exempt from taxation. Special laws would be needed and the provision made for thorough examination by state or national authorities, or both. It might be wise to have some of the executive officers receive their appointment from the state or nation.

There are many patriotic men of great ability heretofore engaged in the accumulation of wealth who, realizing, as many of them do, the supreme importance to the lasting welfare of the nation of stimulating and assisting the movement of population back to the farm, would be willing to give freely of their time and money to an undertaking of this sort. The old school of public spirited business men regarded material prosperity as the end of everything, but of late business men have assumed a somewhat different attitude and it is due to them that most of the reforms in business and political life have been successful. Prosperity must be guarded as sacredly as in the times of McKinley, but it is now more fully recognized that there are other essentials that must go hand in hand with prosperity. Because of their recognition of these things American business men undoubtedly can be relied upon to assist the development of agri-

culture in this country, not only because it will advance our material prosperity, but also because it will broaden, strengthen and purify the basis of American political and economic life.

At the convention of the American Bankers' Association, held in New Orleans last month, a committee of seven on agricultural improvement and farm financing was appointed. This committee will consider thoroughly the subject of farm financing in relation to conditions in this country, and in its report to the next convention will make same definite recommendations, which might well embrace a plan which could be used as the basis of state or national legislation.

The demand for cheap money for the purposes of agriculture is nation wide, and the effort to supply it should interest all who appreciate the fundamental importance of national prosperity and progress.

BOOST OHIO

By Fixing the Roads and Lifting the People Out of the Mud.

By Jesse Taylor,

Secretary The Ohio Good Roads Federation and Editor of Better Roads.

Better roads are being discussed everywhere — in the office, bank, school, church, woman's clubs, boards of trade, grange meetings, bankers' conventions, railway meetings, on the streets and along the roads.

Good roads are civilizers.

Good roads are educators.

Good roads pay for themselves.

Good roads are as essential as harbors.

Good roads are promoters of good health.

Good roads convert swamps into homesteads.

Good roads are mile-stones of civilization.

Good roads bind people together in industry, intelligence and patriotism.

Good roads will bring the country to the town with its produce and will send the town to the country for pure air and good health.

Good roads will convert barren lands into fertile fields.

Good roads will enhance the value of everything they touch.

Good roads will bring good returns to everything that travel them.

Good roads will facilitate and cheapen transportation.

Good roads will bring untold wealth to the producers.

Good roads will save millions to the consumers.

Good roads will be the solution of the rural problem.

Good roads will make country life more attractive than city life.

Good roads will make the consumer's dollar go further and will put into the farmer's pocket a greater portion of that dollar.

Good roads are indispensable to our growth and progress.

Good roads will make possible the three great links of civilization — the model home and the model country school.

Good roads mean a higher life for the people of the states upon whom rest the responsibility of our government and our Christian civilization.

Every dollar expended in encouraging road building, every dollar employed to carry expert advice on road construction into every section of our state is a distinct contribution to the welfare, comfort and happiness of the people of the state.

Hell on earth is on a back road with a neighbor landowner who will not

sign a petition for the construction of a good road.

The value of a man's services to society is in proportion to his ability to work with other men. Try it once on the roads and make better roads and better men.

Throw away your clubs, stop your knocking and get into the good roads campaign in Ohio.

Bad roads are the signs of backwardness, indolence and careless citizenship.

Every day a road is bad the users of it and the purchasers of supplies hauled over it loose money.

Bad roads are responsible to a great degree for driving the young people from the farm into the cities.

Bad roads empty the benches in the school houses and are largely responsible for four hundred abandoned church buildings in Ohio.

Bad roads play an important part in what we eat and wear.

Bad roads are an extravagance that no civilized people can afford.

Bad roads keep the farmers at home to read the catalogues of mail order houses.

Bad roads prevent the farmer from delivering the corn from which he is expected to realize money with which to pay an account with his local merchant and the note due in bank.

Bad roads have been tried by the farmer, doctor, lawyer, merchant, preacher, trader, teacher, the old and the young, the rich and the poor, the high and the low, the millionaire and the tramp, the drunk and the sober and the saint and the sinner, who, although familiar with the history of bad roads of the past and the waste of untold millions due to bad roads, have just commenced to realize that the time is at hand for the people of Ohio to demand a change in road conditions and to pull themselves out of the mud.

Right now is the time to fix the roads and spend less time in cussing the middle-man for with good roads we can dodge him and reach the consumer.

Elbert Hubbard says "Instead of hitching your wagon to a star, suppose you get in touch with the good roads movement."

I am interested in the question of better roads, am not committed to any pet scheme, am not interested in the manufacture of road materials or road machinery and care not who gets the glory so long as the people of Ohio get the results — better roads.

I am in the better roads campaign with the people to win a victory for better roads everywhere to be constructde and maintained less and less at the expense of the abutting land owner and more and more by county, state and national assistance.

I am opposed to all laws, either existing or proposed, which place all the burden of the construction and maintenance of public roads upon the farmer and the abutting land owner.

The highways of the state are for the use and benefit of the people of the state and are free to inter-state travel which has all been made possible, with but few exceptions, by direct tax upon the abutting and near-by land owner who have blazed the way and laid the foundation for a great system of public highways throughout the states and nation-wide extent.

The state of Ohio has spent millions of dollars in the construction and maintenance of its canals and but a meager sum for the improvement of the wagon roads of the state upon the theory that money spent for canals would lessen transportation by water and without any consideration whatever of the much greater demand for cheaper transportation by land.

Now is the time for Ohio to follow the splendid examples set by California, New York and Pennsylvania and issue the bonds of the state for state

aid in the construction of a complete system of inter-county roads and let future generations and all property of the state help pay the cost.

The Constitutional Convention now in sesion should submit an amendment to the present Constitution to permit the issuing of state bonds, for state aid in road construction, in an amount not to exceed one per cent on the grand tax duplicate of the state, which, when spread out over all the property of the state can be paid off, both principle and interest, at the end of twenty-five years at an average per capita cost of fifty-five cents.

In addition to state aid I believe the Congress of the United States has as much right to appropriate money for either money aid to the states in road construction and maintenance or in the building of great national roads as it has to appropriate money for the building of public roads in Alaska, the Canal Zone and the islands of the sea.

THE SCHOOLS OF OHIO.

By Hon. Frank Miller,
State School Commissioner.

Mr. Sandles has asked me to say a few words in behalf of the schools of Ohio. I take it for granted that it is his desire and your desire that I confine my remarks to the rural schools. Some of you may wonder what I may know about the country. Well, I will tell the story that you have often heard from others, "I was reared on the farm." Not only was I reared on the farm but my interest in farm work and farm life have never ceased. In fact my neighbors call me the farmer. I can hold the handles of the plow as well as the rest of you, and I still occasionally take the pitchfork in harvest time and jump onto a hay doodle and toss it on the wagon so that the fellow on the other side must hustle to keep up.

Ohio has not only given birth to many great men who have acquired national fame but has also given birth to the township centralized school as that term is now understood. This form of rural school is considered by educators as the most efficient school for the rural districts and I am proud to be able to say that it is an Ohio product. We have in this State many townships that are under the supervision of able township superintendents. Here too we find good school work and the teachers are guided and encouraged to render still more efficient service. There are many faithful teachers in the townships that are not organized and are without a superintendent but by earnest endeavors on their part they too are rendering excellent service.

You may have observed that some poor schools have been reported as existing in Ohio. Ohio is not by any means the only State in the Union that has some poor schools, but Ohio has awaked to the importance of having an efficient school system, not for a part, but for all of her children.

That the very worst conditions have been brought to light is a wholesome sign of a better future. The citizenship of Ohio will insist upon giving every boy and girl within the domain of this State an opportunity for an education. It is my earnest hope that within the next few years these neglected schools will be regenerated into newer and better schools. We boast of this country being a land of equal opportunities, then by all means let us get together and make it so. The revelation of school conditions is a boost because it leads to betterment. We must keep in mind also the fact that Ohio has some of the best common schools, and country school buildings to be found anywhere. Ohio has more high schools than New York and Massachusetts combined, and this is saying a whole lot for the schools of Ohio. The country boy hears the city boy tell about his

high school studies. He becomes interested and wants to go to high school himself. If he has no high school near home his tendency is to go to the city high school. There should be a high school near enough so that every country boy and girl can attend, and Ohio is trying to meet this demand.

At the present time the State each year pays two dollars for every enumerated youth in each school district. If this were raised to four dollars per enumerated youth instead of two, much would be done toward the solution of this difficult problem. Such a law would be a just law. For instance there are communities in this State where mining is almost the sole industry. There is very little property of high value for taxation and consequently their schools must suffer. They pour out a stream of wealth of coal and iron ore which spreads over the entire State to furnish the power which turns the factory wheels and make possible wealth whose benefits they do not reap. It gives railroads business and permeates all the trades and industries. If the next legislature will allow four dollars for each enumerated youth it will bestow untold blessings upon the schools of the poorer districts and those districts which are in distress will be relieved.

One of the most important measures of a constructive legislation passed last winter is the Cahill Law which provides for the teaching of agriculture in the common schools of the rural and village districts of Ohio. In the past the rural schools were not in touch with the life of their communities. In large part they were imitations of city schools teaching not country life but city life. The children had held up before them ideals taken not from the country but from the city. They had held up before them for their ideals great lawyers and doctors, generals and the great masters of finance without ever pointing out some farmer who possesses the sterling qualities of true manhood.

Not many weeks ago I opened a text book which had been in use in our schools and saw on the first page the picture of a lady leading a little boy by the hand. She was pointing to a temple which was standing on a hill. Across the end of the temple was printed the word knowledge. On that temple was a dome which had on it the word Fame. I take this picture to mean that the lady was the goddess of learning and that she was telling that little boy that he must acquire knowledge in order that he may become famous. Then that boy had held up before him the fame of an Alexander, a Caesar, a Napoleon and men of that type, heroes of the battlefield, without even referring to the heroes of everyday life and of peace. Then those same tachers would plead for universal peace and be answered by what? Another battleship from every one of the great nations of the earth. The implements of destruction. The implements which bring nothing but misery and distress instead of happiness to the people of this world. Under the influence of such teaching in the past what could be more natural than that our boys and girls in the country be restless, and as they grow up to be men and women they will turn toward the city where they hope to realize those ideals they have been so faithfully taught during their childhood days.

I have a son in the public school, but I do not want him to be taught that he must learn his lessons in order that he may become famous. I want the aim of his teaching to be such that he will become an honest, upright, and useful citizen. When this is done, I as his father will be satisfied. When such teaching is found in every school room the public schools will be fulfilling the mission for which they are intended. House with children in it.

The teaching of agriculture is bringing a new atmosphere into the country school. The country school is coming in touch with the life and interests of its community. Boys and girls are beginning to see that in the country there are great possibilities and that it is the best place in which to live. Mr. Ivins, one of the supervisors of agricultural education told me that when he was called to

supervise the schools of Turtlecreek township in Warren County and introduce agriculture into the schools, he asked the pupils in each school who intended to remain on the farm to raise their hands. Fifteen percent raised hands indicating that they intended to remain on the farm. After the subject was taught for four years, he again asked the same question. Eighty-five percent indicated that they intended to remain on the farm. This is an example of what the teaching of agriculture in the schools of Ohio is accomplishing.

The boys and girls are beginning to see that Ohio has great agricultural possibilities. School work is being more closely related to life-work than ever before. The new agricultural work is improving country life conditions everywhere. There is fine co-operation where it never before existed. A better understanding between teachers and patrons has come about and conditions in Ohio schools are travelling toward the ideal.

Last winter I placed a few books on elementary agriculture within reach of my little daughter of eleven years to see what she would do. She had been reading fairy tales but on opening one of the books on agriculture she became so absorbed that her mind was literally buried in that book for over an hour. Finally she looked up and with a beaming countenance said, "Papa are we going to study agriculture in our school?" I said no, my dear, you are not. And she said with a changed countenance and pleading voice why not it is so interesting. I am trying to rear my children under country influence as much as I can, because I believe it is the best influence under which children can grow.

Nature is the most beautiful thing on God's green earth whether it is the sunset sky with its glowing colors, the fleecy clouds floating in the air or the flowers and animals of the fields. Have you ever stopped to think that what one can see in an object depends upon his previous training or occupation. The lumberman who goes through a forest sees the great trunks of great trees and the saw logs they will make. He sees the commercial side of the forest. The hunter goes through the forest. He sees no saw logs but soon discovers the hole in the tree trunk which is the den of the raccoon or the other denizens of the forest. He sees the pleasure side. The botanist who goes through that forest sees the leaves of the trees, their buds and flowers, and the humble flowers and vines which grow at his feet. He sees the scientific phase of that forest. Finally there comes the poet who sees things none of the others have seen. He sees the finer elements in nature. He sees those things which appeal to our finer sensibilities, bring inspiration, and awaken the emotions in the heart of man that he may sing the glory of the forest in song and verse. He who has never lived in country — appreciate literature.

Agriculture is taught today in something like 10,000 elementary schools and 800 high schools in Ohio. This teaching is bringing the boys and girls in harmony with their environment. It is leading them to see and appreciate the beauties of their surroundings. The child who grows up surrounded by that which is beautiful is going to develop a beautiful character. There is nothing but what is good in most plants and animals and the child who grows up in the midst of these is bound to imbibe some of this quality.

If people from the city would spend their vacation in the country, it would be far better and enjoyable for their children than to go to the seashore resorts where everything is artificial and high except the low moan of the sea.

The old forms of brutal punishment which were used when I was a boy no longer find a place in our school rooms. Such subjects as agriculture create an interest in our boys and girls, and it is interest which induces good school work. There is a feeling of friendship between teacher and pupils, and boys and girls behave without the rod because they wish to do what is right. As far as the schools are concerned we are in the glowing dawn of a bright era.

Bring up the few schools that need bringing up and we will all be ready to shout "Hurrah for the schools of Ohio."

It don't pay to growl and grumble and have a grouch all over. The grouch only makes himself and those about him miserable. Be up and do things. We have a little realm all in itself. We may not have any mines that produce gold bricks, gold bricks in more senses than one but we have deposits of iron ore and coal the backbone of civilization. We have a soil which is rich in its possibilities, and above all we have a sturdy citizenship which is bound to make Ohio the finest place on earth in which to live.

AN AGRICULTURAL SURVEY OF OHIO.

By L. H. Goddard,
Department of Cooperation, Ohio Experiment Station.

A Wheat Experiment and Its Lesson.

Mr. Chairman, Ladies and Gentlemen:

If permissible I would like first to relate a little personal experience which happened to me down on the farm in Fayette County a few years before I took up my present work. A friend of mine, wishing to improve his wheat crop, finally decided at my suggestion to purchase a few bushels of wheat as seed from the Experiment Station. The selection of the variety being left to me, I chose that which had been rated by the Station at the end of a long series of experiments as unqualifiedly the best, and did so with perfect assurance as to the ultimate results of the use of this variety on my friend's farm. To my mind nothing but a splendid outcome could follow the use of such seed by my friend or anyone else in Ohio, for that matter. How could seed with such a stamp of approval fail in any way?

You will therefore judge of my pique when I tell you that the first year this wheat produced only moderately well; in fact, not so well as some of the other varieties in that neighborhood and indeed no better than the other variety in use on the farm on which it was seeded. In defense of the variety and of the Experiment Station, however, I tried to explain and succeeded in producing conviction that the comparative failure was due probably to deficiency in preparation of the seed-bed and perhaps to a certain extent to lack of climatic adjustment, and that another year with more care used in seeding would tell a different story.

I was correct in assuming that another year would tell a different story. No man who saw the wheat at threshing time the second fall would question that. The seed produced the previous year had been used on a selected field carefully prepared and owing to the different and rather beautiful appearance of the crop as it grew and the fact that it was situated close to the road where it was observed by many in passing, the threshing results were awaited with great expectancy. My friends, the story which the threshing machine told the watching crowd on threshing day was, **that the field which had been given such care and seeded with this new special variety of wheat, had produced about two-thirds of a crop and that crop quite largely screenings or chicken feed.**

Such an experience as this is bound to make a very lasting impression on one's mind. We can read with a certain amount of calmness of unfortunate experiences which are sustained by others, but when such come home to us personally and in the public manner in which this did to me, the effect is apt to be very

different. We are apt to keep the matter pretty clearly in mind and if we are disposed to philosophize, to do a lot of thinking as to the reason why such a thing could possibly happen.

Experience Begets Caution.

Some of you who have noted the character of the work of the Extension Department of the Experiment Station, with which I have been connected since

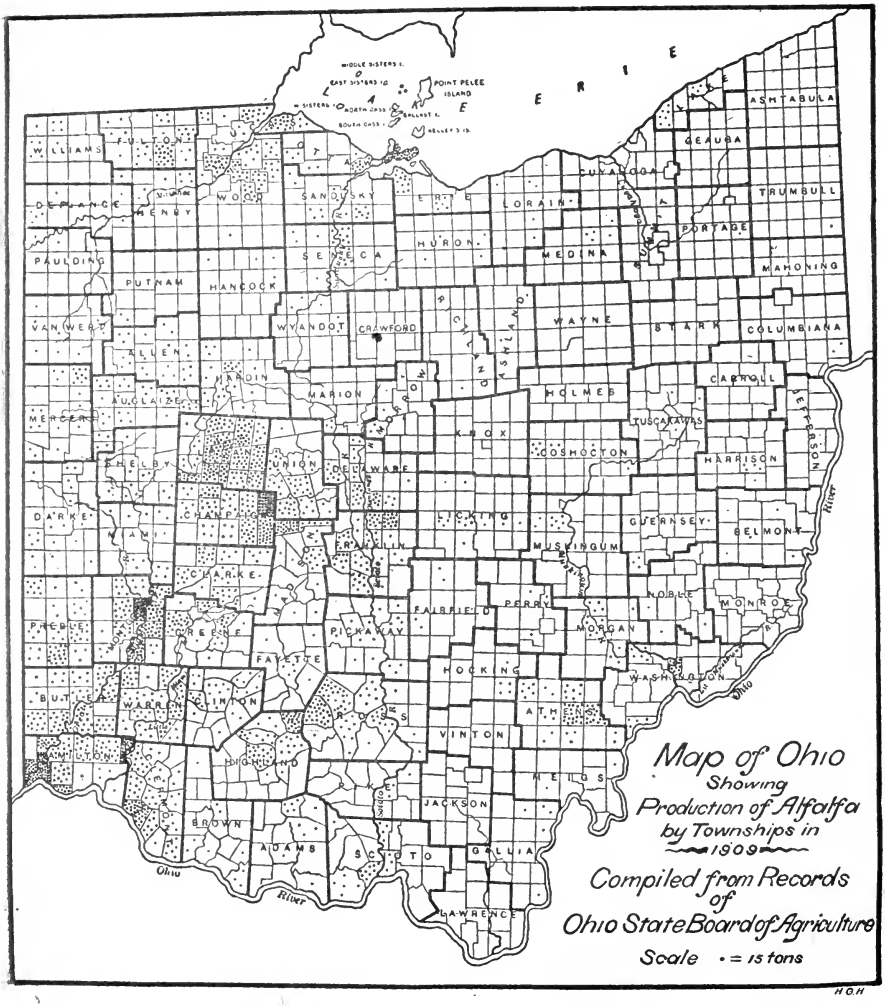

Fig. 1.

commencing work there in 1904, will now understand why every feature which has been taken up by that Department has been encompassed by a great big question mark; why we have always introduced everything by means of cooperative experiments; why we have always insisted that negative results in connection with these experiments were just as valuable to us as positive results, and why on almost every occasion we have been so extremely non-committal.

I took up the Experiment Station work in 1904 with the feeling that perhaps my experience had been unique, and with the hope that with the opportunity to observe through cooperative experiments and field investigations I would somehow be able to clear up the matter, for at no time then or since has there ever been the slightest question in my mind as to the accuracy of the work of the Experiment Station.

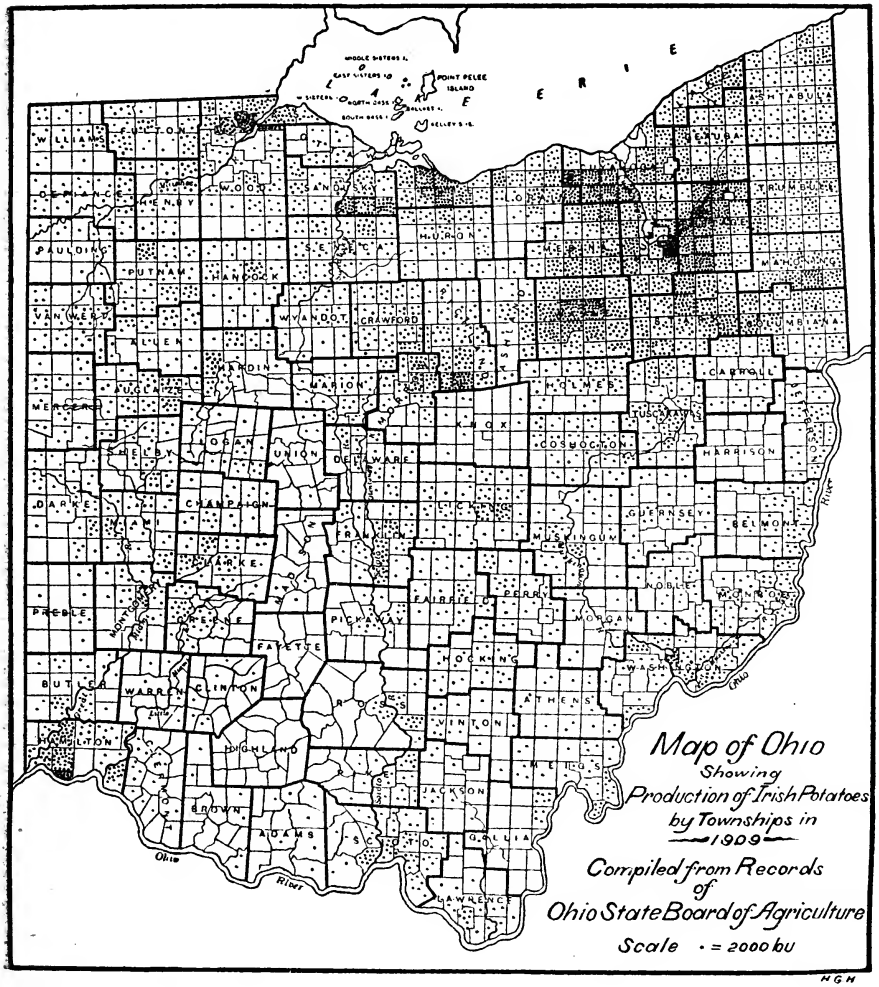

FIG. 2.

EXPERIMENTS IN COOPERATION WITH FARMERS.

While as just stated, we always announced that negative results in connection with cooperative experiments were just as valuable to us as positive results, as indeed they were, I must say, however, that the large number of negative results secured was indeed much of a surprise and soon became a little wearing on the nerves. In nearly every case we received a few reports of remarkably positive results from our experiments, showing that they had

been of much value to the farmers conducting them, but from perhaps the majority of them came nothing but tales of woe. How could such a condition exist?

At first we were disposed to blame the trouble on the method of conducting the experiment and accordingly tried a number of methods, as some of you may know. We had small hand experiments worked out with the greatest of care. We had small experiments in connection with which machines were used. We

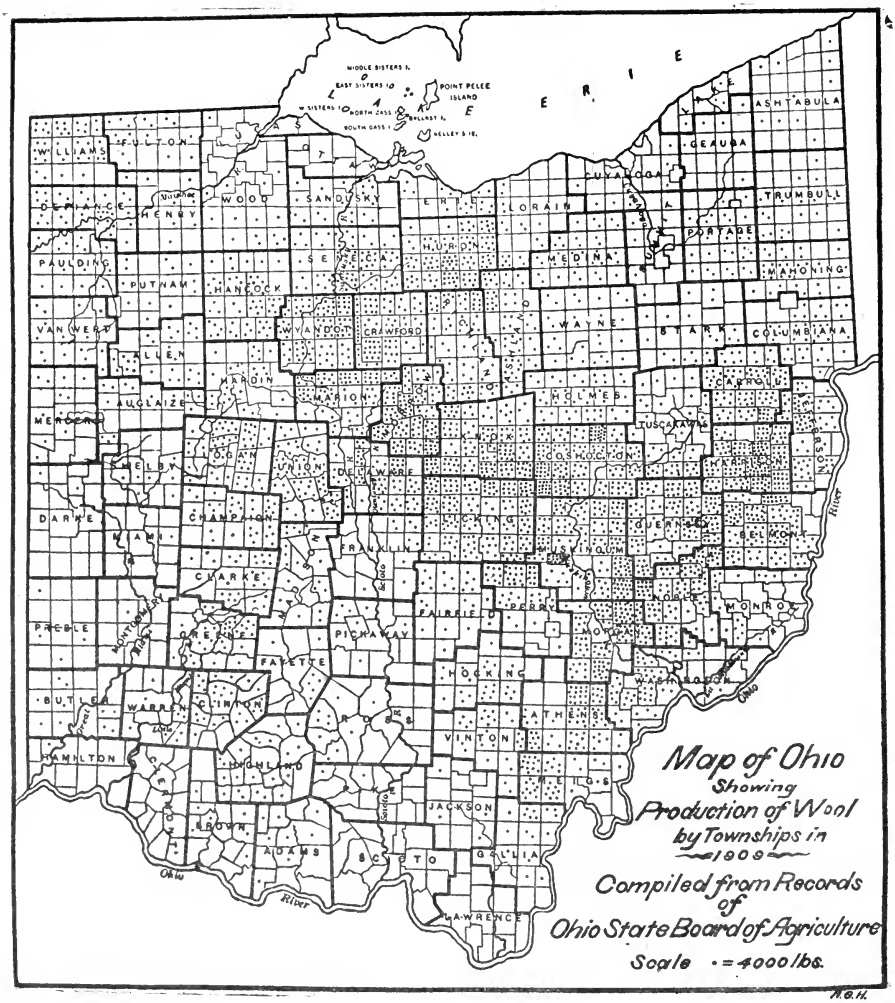

FIG. 3.

had large experiments made under field conditions. In fact, we tried almost every plan we could devise, not only one year but for several years and yet the results were unsatisfactory. Varieties or methods of the excellence of which we had not a doubt would fail comparatively in a large number of cases no matter how we would conduct the test. We could not blame the result on the carelessness of co-operators, because we knew from visits at some of their farms that such was not the case or rather was not the case in enough instances to explain all our trouble.

Experiments on a Sub-Station.

In the meantime, referring again to our personal experience with the variety of wheat, we had occasion to visit one of the Station test farms in southwestern Ohio where the soil and climatic conditions were much the same as those on the farm on which the variety had been tried at my suggestion and there we found identically the same results with that particular

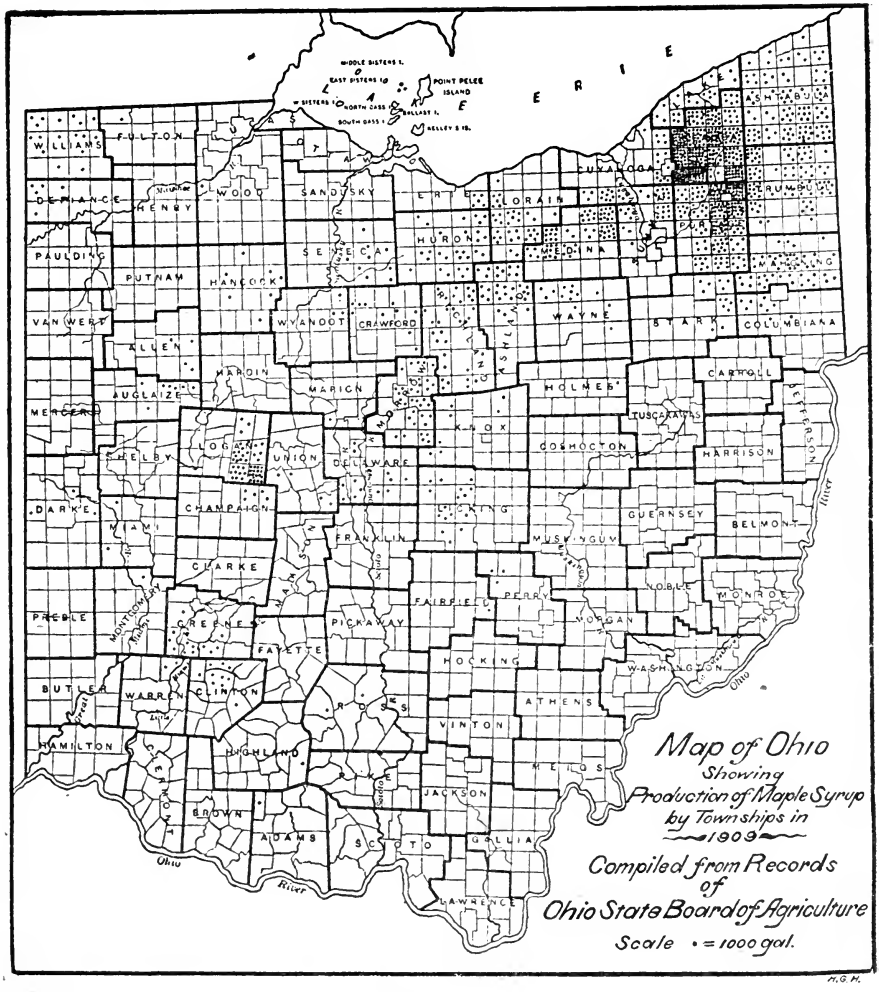

Fig. 4.

variety as in our own experience, thus indicating that our own farm experience was normal rather than unique and that perhaps the type of soil and climate or something else were after all very important factors in the growth of a crop.

A State-wide Field Study Becomes Necessary.

Finally, with the hope of solving this irritating riddle, we were fairly driven in 1910 to make an elaborate state-wide field study of the farm practice in con-

nection with one of Ohio's most sensitive crops, — alfalfa. In this study our Mr. W. M. Cook, who was making it, visited specially in connection with this investigation 293 farms which were located in 49 counties of the state and which represented fairly well all parts of it. He also visited a number of other farms incidentally in connection with other investigations.

The lessons learned from this field study which was reported in Circular

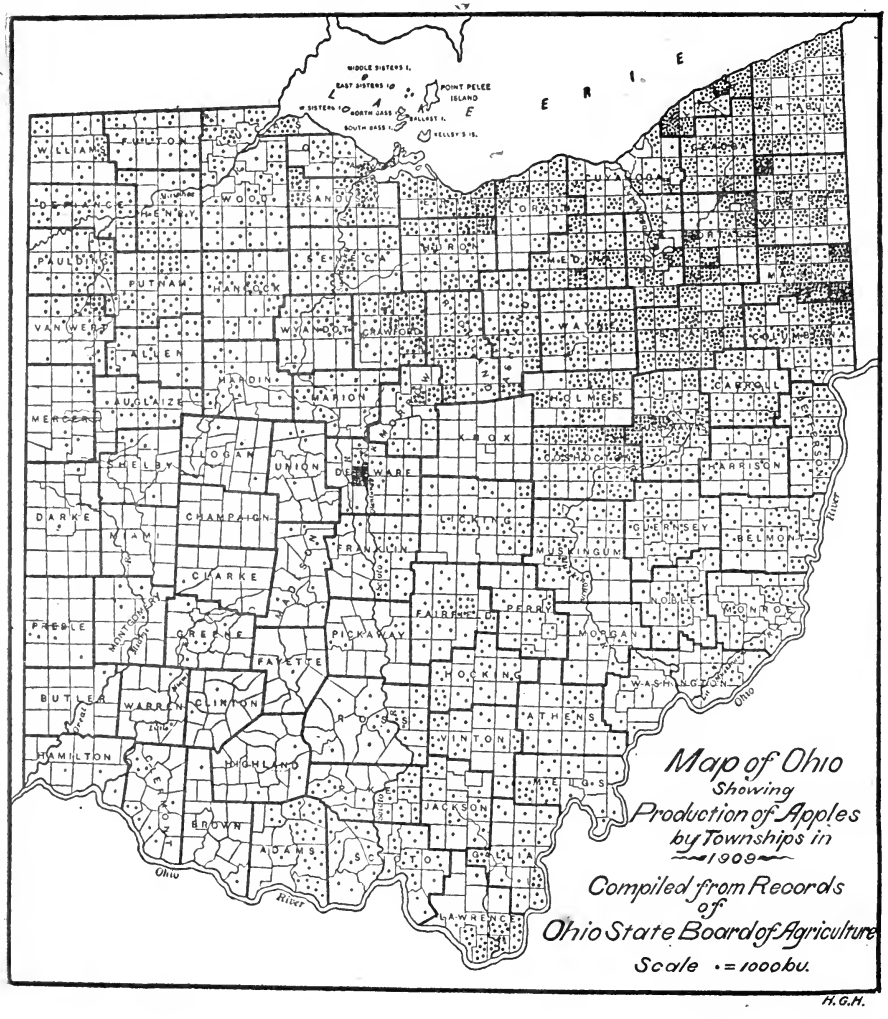

FIG. 5.

113 of the Ohio Experiment Station certainly confirmed the wisdom of the long-standing policy of the Station to extend its field plot work to areas widely distributed over the state; indeed, pronounces the need of each county having its own experiment farm, for which a number have already made arrangements and so many more are now making plans. They also pronounced another very important fact; that something must be done to enable every farmer in the State to know to which of these experiment farms he should

turn for information. In other words, we became convinced that, on the basis of experiments made on any given farm we positively can not predict with certainty as to what will happen on another farm regarding many things, especially those related to plant growth, unless we know that the soil, climate and other conditions limiting or promoting plant growth, are similar on the two farms.

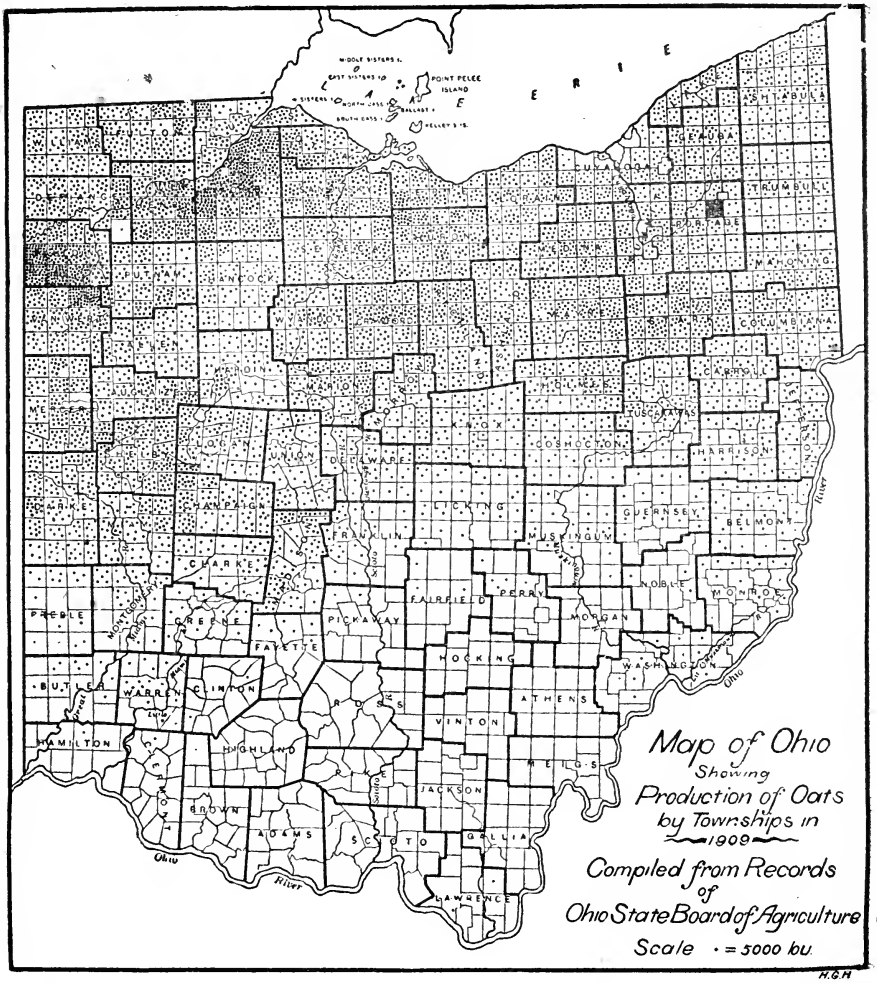

FIG. 6.

AN AGRICULTURAL SURVEY.

Doubtless with this conviction in mind Director Thorne decided that a beginning should be made at once toward the execution of his long-cherished plan—the making of an agricultural survey of the state of Ohio, and, since the Department of Cooperation had men who were trained in field work and who were interested in this very problem, that that Department should be placed in charge of the work. This decision was made in the spring of

1911, but the past season has been one of reorganization. It has been necessary to work out plans for immediate action that were suited to funds and forces available and that would fit in, if possible, with enlarged plans which might be developed to use more funds in the future.

It was also necessary to avoid casting aside for destruction the unfinished work which we had been conducting up to that time. Accordingly, it became

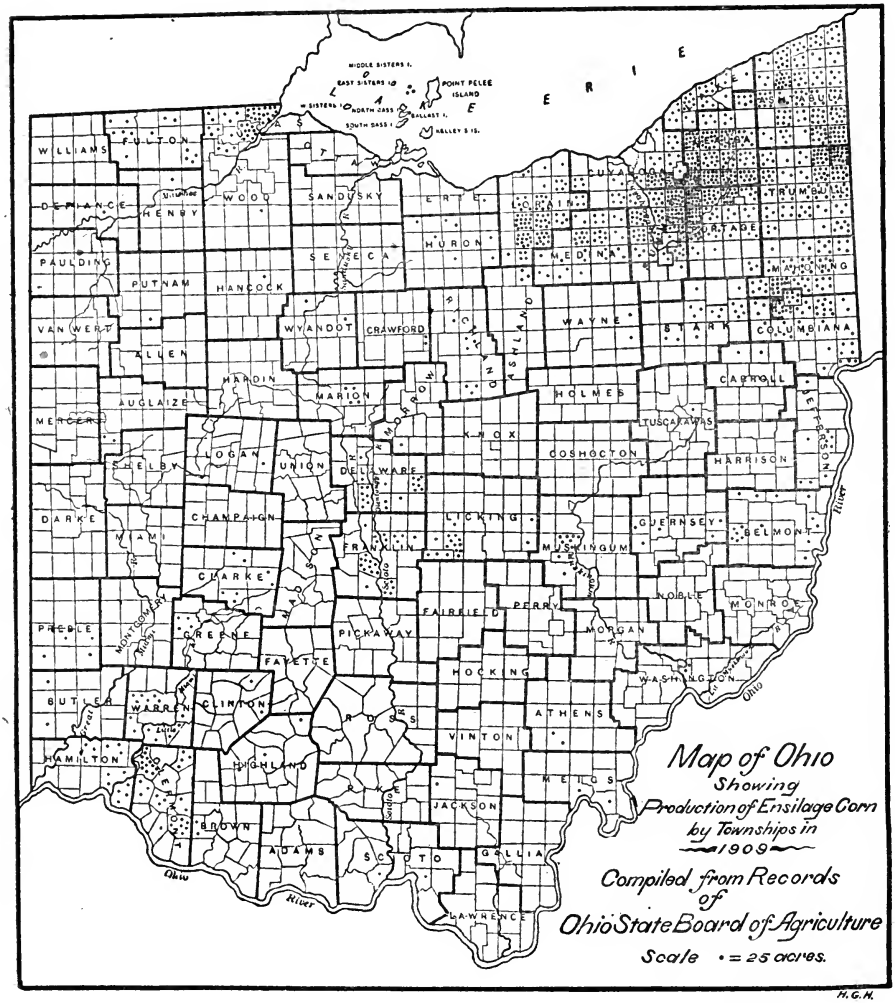

FIG. 7.

necessary to turn over for continuance by other Departments of the Experiment Station a number of lines of work in which our Department was very much interested; such for instance as the county fair exhibit work and Corn Improvement Association work, both of which are now in charge of Mr. D. W. Galehouse of the Department of Administration. We feel sure, however, that the farmers of Ohio will be better served under the new arrangement than they have been in the past.

What is an Agricultural Survey?

We have already indicated some features that should be considered in such a movement, yet there are many other things that should be studied; in fact, everything should eventually be taken up for analysis that has any bearing on agricultural production or on rural life. Dean Liberty H. Bailey of Cornell University, has probably given us the best definition of such a survey. On page 81

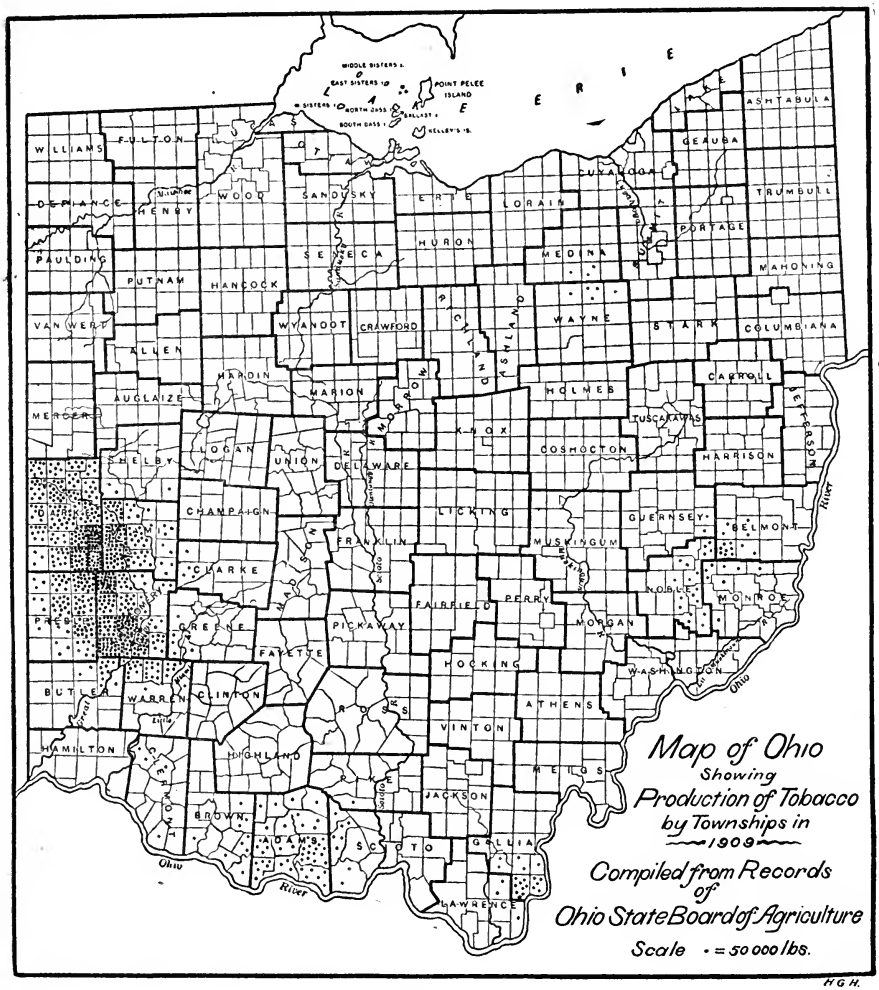

Fig. 8.

of "The State and the Farmer," he writes "A thorough-going study of the exact agricultural status of every state should now be made. * * * * * We must have the geographical facts. We are now lacking them. We talk largely at random. **We must discover the factors that determine the production of crops and animals in the localities, and the conditions that underlie and control the farm life. Consideration of these conditions involves study of local climate; knowledge of the kinds, classification and distribution of the**

soils and the relation of place and altitude to production of crops and live-stock; determination of the best drainage practices on various soil types; consideration of the cultural experience and manurial needs as adapted to the types; inquiry into the practice with all leading crops and products of the localities; study of the possibilities for farm water-power; collation of community experience. Such a study of a State should be broad and general

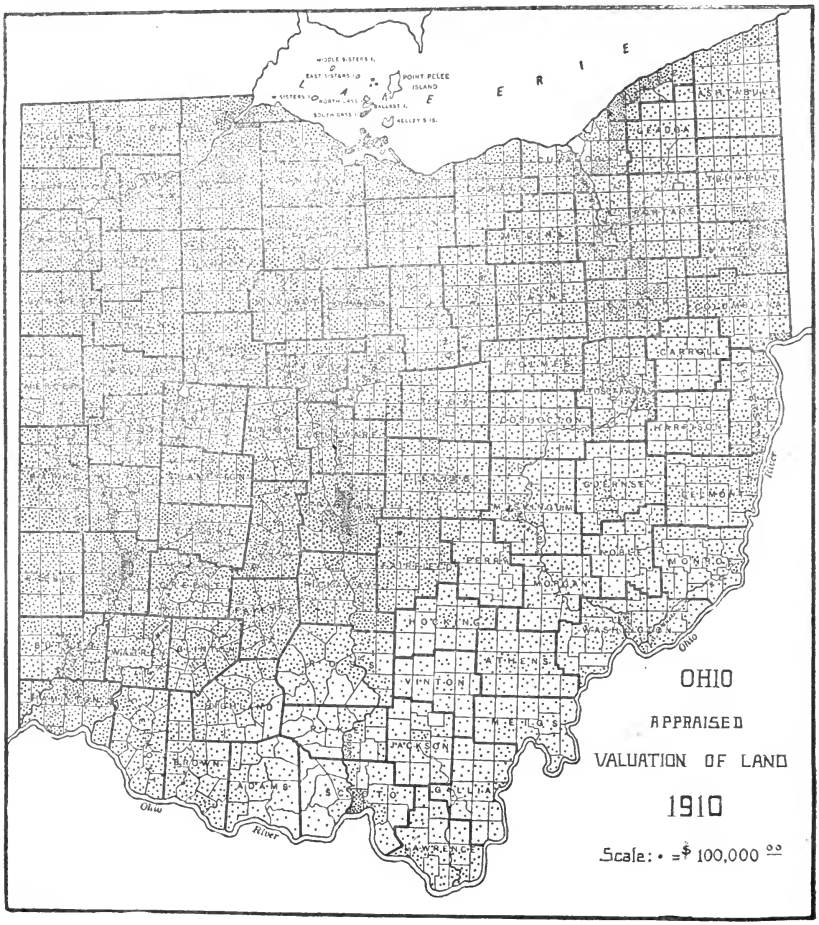

FIG. 9.

Map showing appraised valuation of rural property in Ohio. Each dot represents one hundred thousand dollars valuation in the township in which it is placed.

enough to consider the status of all the agricultural industries in the State, and it should also take full cognizance of educational and social conditions.

"This constitutes the greatest need of practical farming at the present day. The agricultural institutions are working out the principles, but they may not be able to apply these principles to individual farms because they do not know the exact local conditions. The farmer himself may not know the

principles, nor even the local facts. The result is a lack of articulation between the teaching and the practice. Farming is founded on the facts of the locality; no business can hope for the best success until it has exact knowledge of its underlying conditions."

FIG. 10. PRECIPITATION.

The distribution of precipitation during the spring months, March, April and May, is shown on this chart. Lines are drawn for each inch of rain, from 8 inches to 11 inches, and the different areas shaded to correspond with the scale at the bottom of the chart. The least fall is near the Lake and the greatest in the central counties and near the Ohio river.

This you say is surely an elaborate program. To this we must heartily agree, but would add that if the work is not conceived in the beginning in its full breadth and scope the little which we can do while making the start will be largely wasted on misdirected effort and be lost to the future. And again, that

if we did not expect to have the assistance of all the institutions in the state or out of it whose work bears directly on our agriculture or is related to it, we would hope to accomplish but little. We believe, however, that to a work as important as this there is no institution that will not stand ready to contribute

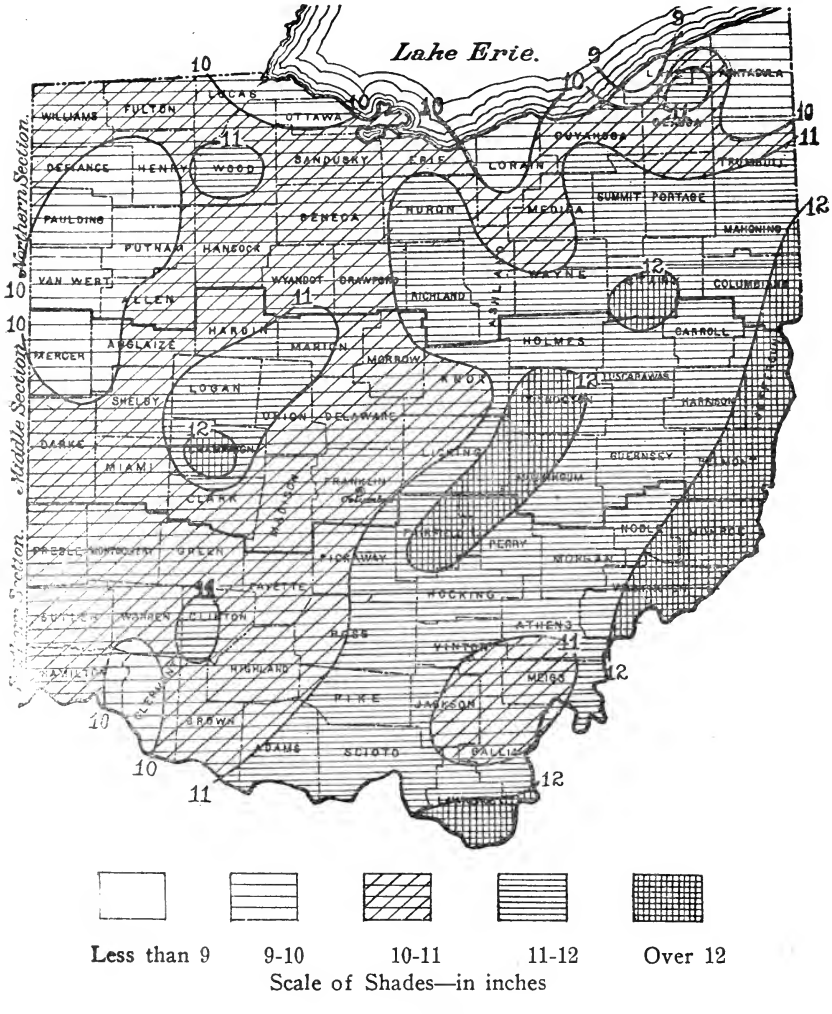

FIG. 11. RAINFALL.

This chart illustrates the rainfall for the state during the summer months, June, July and August. The amounts range from slightly below 9 inches to over 12 inches. In general, the southeastern half of the state receives considerably more rain than the northwestern.

its full part. Certainly, up to the present time we have found none that were not ready and we anticipate that none such will be found.

THE STATE-WIDE SURVEY SHOULD PRECEDE THE DETAILED SURVEY.

Before outlining to you the part of the work which we have already organized, I would pause to state that as a general principle we have deter-

mined that the reconnaissance, preliminary or state-wide survey should precede the detailed survey. The reason for this is, first, to enable us to select areas for the detailed surveys in such a manner that they will be typical of larger areas; and, second, to enable us to know within what boundaries the

FIG. 12. PRECIPITATION.

The distribution of the precipitation during the months of September, October and November in Ohio is quite different from that for the summer, as is indicated in this figure. The total precipitation is less for this autumn quarter than for any other, and the least rainfall is in south-central and southeast counties. The amount of fall varies from somewhat below 6 inches to over 11 inches.

conclusions of these detailed surveys may be applied. We very much fear that these state-wide surveys will demonstrate to us that the value of many of our previous field studies have been seriously affected by unfortunate se-

lection of the areas in which they were made, but even if this does prove to be true we shall have the satisfaction of knowing, after the state-wide surveys have been made, where the lessons which we have learned from these detailed studies will apply.

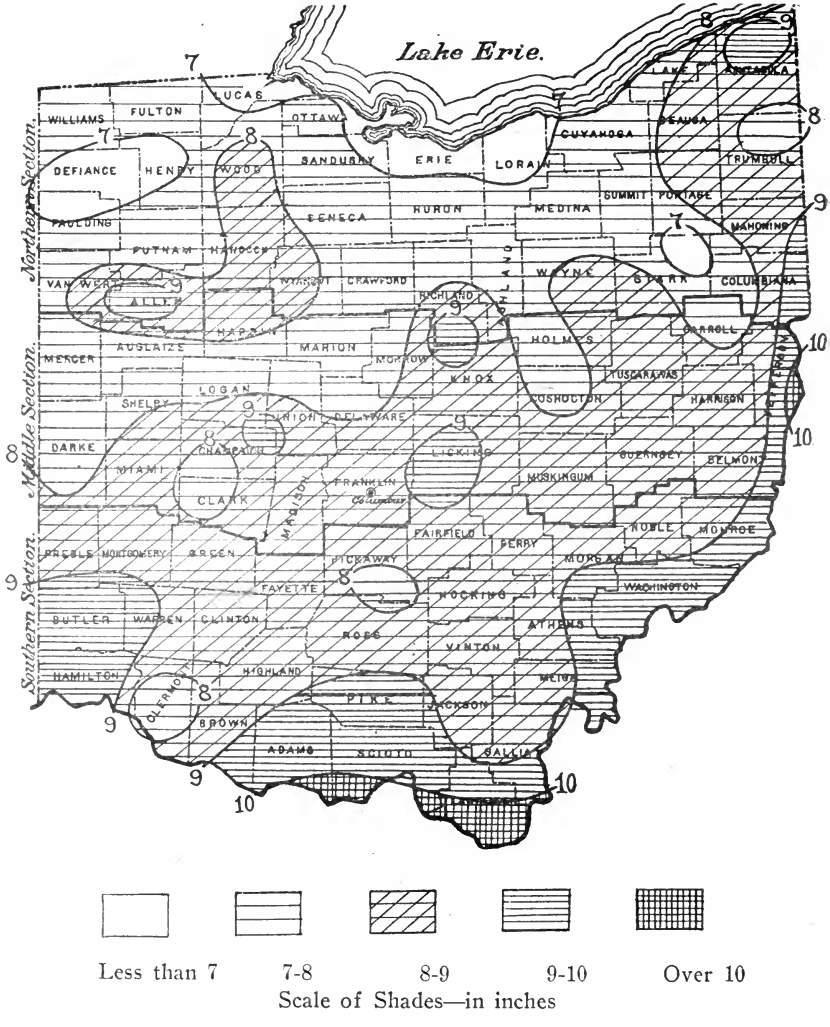

FIG. 13. RAIN AND MELTED SNOW.

The total rain and melted snow during the months of December, January and February is given in Chart 13. The amounts vary from below 7 to over 10 inches. The heaviest amounts are along the Ohio river and the least near the western end of the Lake.

Another very important reason for conducting the state-wide survey first, is, that if properly conducted such a survey may be of very great immediate value to the state and yet cost but a moderate fraction as much as would a detailed survey covering the entire state. For instance, we are convinced that for from

twenty to forty thousand dollars and in from two to four years' time we shall be able to complete a general soil survey of this state that will answer the present needs of our farmers almost as well as would a detailed survey of the state that would cost a much larger sum and take a correspondingly longer time; and,

FIG. 14. SNOW FALL.

In this chart we have shown the distribution of the amount of unmelted snow that averages to fall each year. Lines are drawn for each difference of 10 inches and then the areas shaded as in the preceding charts. This shows that the average snowfall is less than 20 inches in the extreme southern counties, and over 60 inches over a small area in the northeast. This district of greatest snowfall corresponds with or is just to the north of the highest land between the southern and northern watersheds.

that if it were decided later to make an accurate detailed survey of the state, it could be completed for much less money and would be much more valuable in the light of what had preceded than had it been undertaken first. In other

words, we believe that it probably would cost no more to make both the general and detailed surveys of the entire state than to make the latter if that had been undertaken first, and that by making the general survey first the farmers would receive great benefit at a very much earlier date.

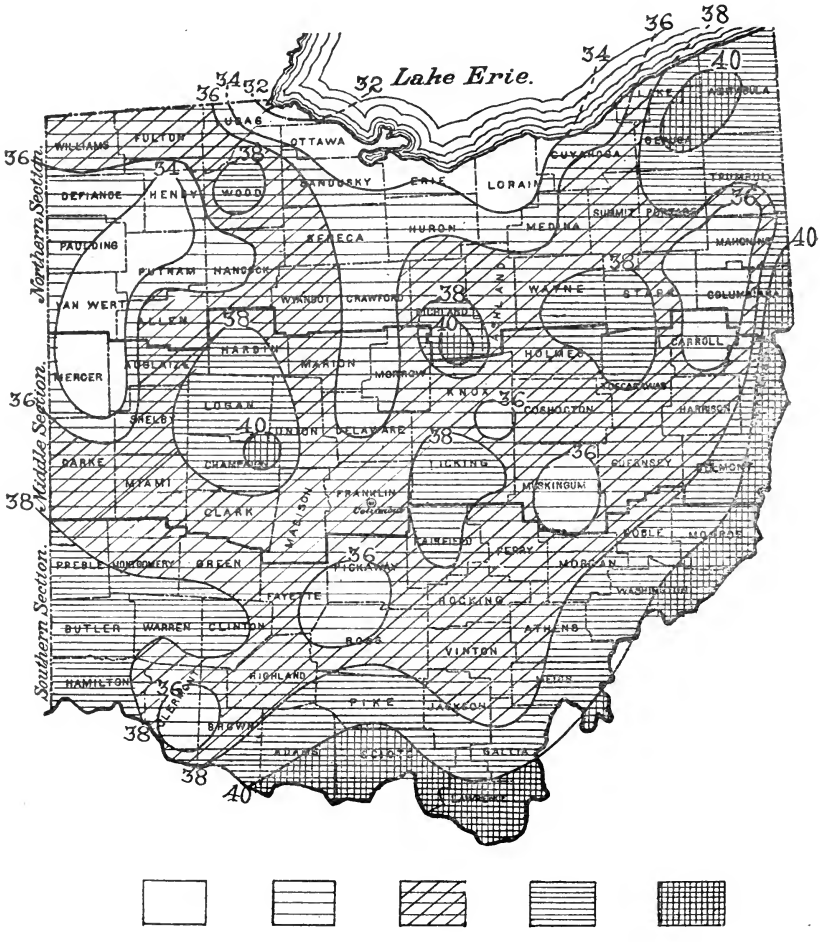

FIG. 15. ANNUAL PRECIPITATION.

The average annual precipitation for the different sections of Ohio is shown graphically on this chart by means of shaded areas. Lines are drawn for each difference of 2 inches from 34 inches to 40 inches and areas having the same precipitation are given the same shading. The greatest precipitation is along the Ohio river, and the least near the western end of Lake Erie. There is quite a large district in the western portion of the state with a rainfall of less than 34 inches.

So far as possible we propose to follow this principle in all the work which we undertake, although in making the transition from our old work we have already found it necessary in some cases to get the cart before the horse.

You will realize that it is necessary to suit immediate plans to the immediate means available and to mold them according to circumstances; but, having the goal clearly in mind, the work will all orient itself into proper shape in due season.

Statistics Made Interesting.

In the very forefront of this work we feel it to be necessary to study the available statistics regarding this state which have a bearing upon our agriculture. We realize that to some, statistics and their consideration suggests

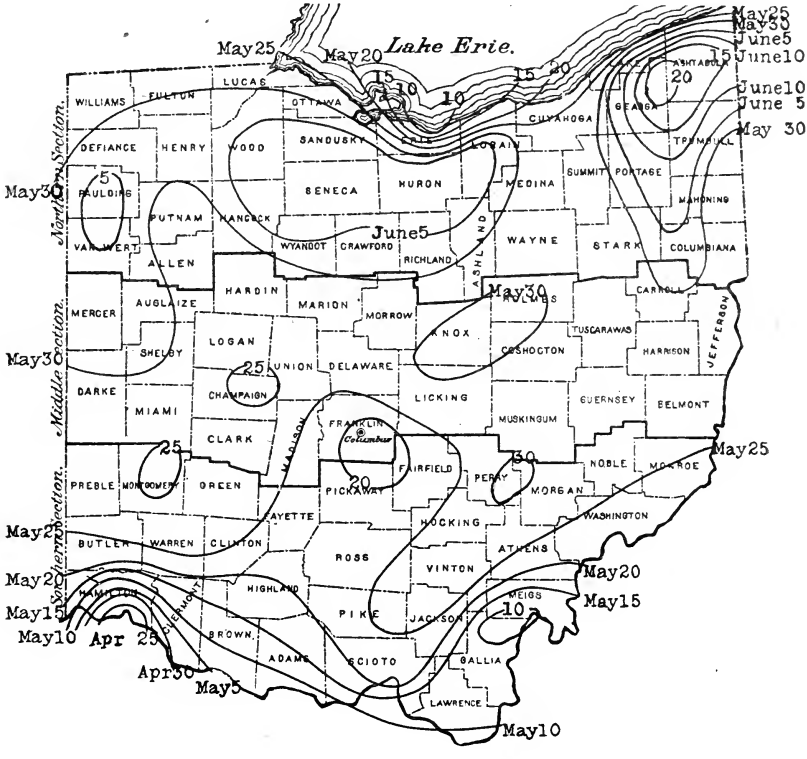

Fig. 16. Last Killing Spring Frost.

The average dates of the last killing frosts of spring are indicated on this chart by lines that are drawn for each 5 days. The latest killing frosts in the spring occur in the northeastern counties at some distance away from the Lake, and there they average slightly later than May 15. They average earlier than April 20 along the Lake and in some southern districts.

at once a dry and well-nigh fruitless task—a work which they are ready to give over to the cranks and the propagandists. We find, however, that by analyzing these figures township by township and presenting them graphically they immediately become interesting and valuable.

Centers of Agricultural Production.

Our first work of this kind, which was begun in 1909 and published the following spring as Circular 100, was a study of the centers of agricultural

production of the state, based on the statistical returns of the township assessors which are turned over by the County Auditors to the State Board of Agriculture. The time has been when I had a feeling that figures secured in this way were of very limited value. I believe, however, that if you will look at the maps showing the production of alfalfa, potatoes, wool, maple syrup, apples, oats, ensilage corn and tobacco (Figs. 1 to 8 inclusive), you will not hesitate to agree

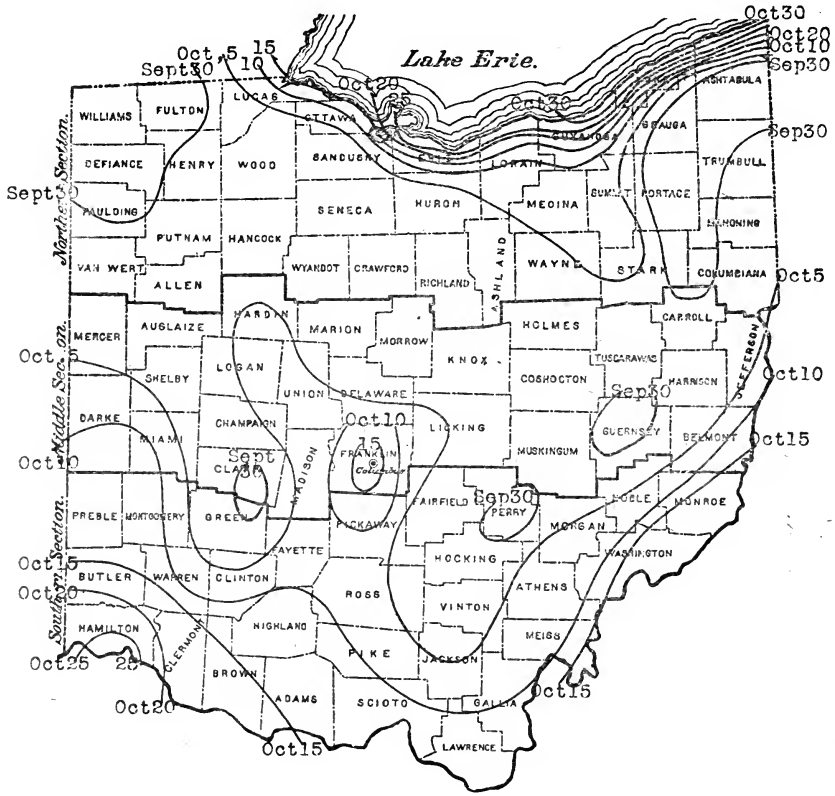

FIG. 17. FIRST KILLING AUTUMN FROST.

On this chart lines are drawn to show the average dates of the first killing frosts in the autumn. The earliest dates are in the northeastern and northwestern counties, while the latest are along the Lake and in the extreme southwest. Both of these charts show the influence of the waters of the Lake in preventing damage from frost along the immediate lake shore. They indicate, however, that this influence extends but a very short distance inland.

with me that these maps based on the statistics just named show at a glance where are the centers of production of these crops, and would thus guide one of our field men or anyone else who was interested, very accurately to the localities in which these crops are being produced in large quantities. You will of course understand that each dot on these maps represents a given number of pounds, bushels, tons, as the case may be, that have been produced of the crops in question in the township on the map of which the dot has been placed.

The more dots there are in any township the greater has been the production in that township.

Please note from these maps that crop boundaries do not follow county boundaries; that within the same county it is possible to find townships that produce a very large amount of a given crop and other townships which produce virtually none of that crop, and therefore, that by taking the township as

FIG. 18. NUMBER OF CROP GROWING DAYS.

By taking the number of days between the dates on Charts 16 and 17, the data are obtained for this Figure 18, or the average number of days in the crop growing season. The greatest number of days between the average date of the last killing frost in the spring and the earliest in autumn is 195 at Sandusky, 194 at Cincinnati, and 193 at Cleveland. The least number of days is 134 in Portage county. The lines are drawn for each 10 days.

a unit, as we have done, we can outline the crop boundaries much more accurately than if we had used the county as a unit.

Before passing from these assessors' statistics, allow me to state that within a few years we hope to have these returns much more valuable even than they are at present. We believe that when the people see that these figures are being used thus in detail they will unite with the assessors to make them as valuable as possible.

Land Values Studied.

Most if not all of my hearers are doubtless familiar with the fact that a strenuous effort has been made within the past year to see that the farm land of Ohio is appraised at its full value. While we presume that in spite of the efforts of the County Taxation Boards and of the State Tax Commission, some mistakes have been made, we yet believe that the final figures represent more

Fig. 19. Annual Temperature.

The average annual temperature lines are drawn on this chart for each degree. The coolest sections of the state are in the northeastern and northwestern districts, while the warmest are in the extreme southern and southwestern counties. These isothermal lines are very regular in the southern portion of the state, bending to the north when they cross the valleys and to the south over the uplands. There is a large area in the west-central and northwestern counties, however, where the average temperature varies less than 1 degree for a distance of over 100 miles, from Champaign to Ottawa counties. The lowest annual mean temperature is 47.2° in Portage county, and the highest, 55.5° in Scioto county.

closely than anything else available the real average valuation of the land in each township of the state. That such figures as these would be of value to us in this survey work certainly none of you will question. The State Tax Commission has kindly favored us with advance information regarding these appraised valuations for use in our work. (See Fig. 9).

THE CLIMATE AN IMPORTANT FACTOR IN AGRICULTURAL INVESTIGATIONS.

Dean Bailey also says "A study of the local climate ought to be a part of these preliminary surveys. We are neglecting the climate factor. Climate is distinctly local. With the soil it determines the farming conditions. The best agriculture is a careful adjustment to the climate of the district." We in Ohio are fast coming to believe that many of the abnormal results which have been secured from our cooperative experiments have been due to abnormal weather conditions. **"No one knows better than the farmer the**

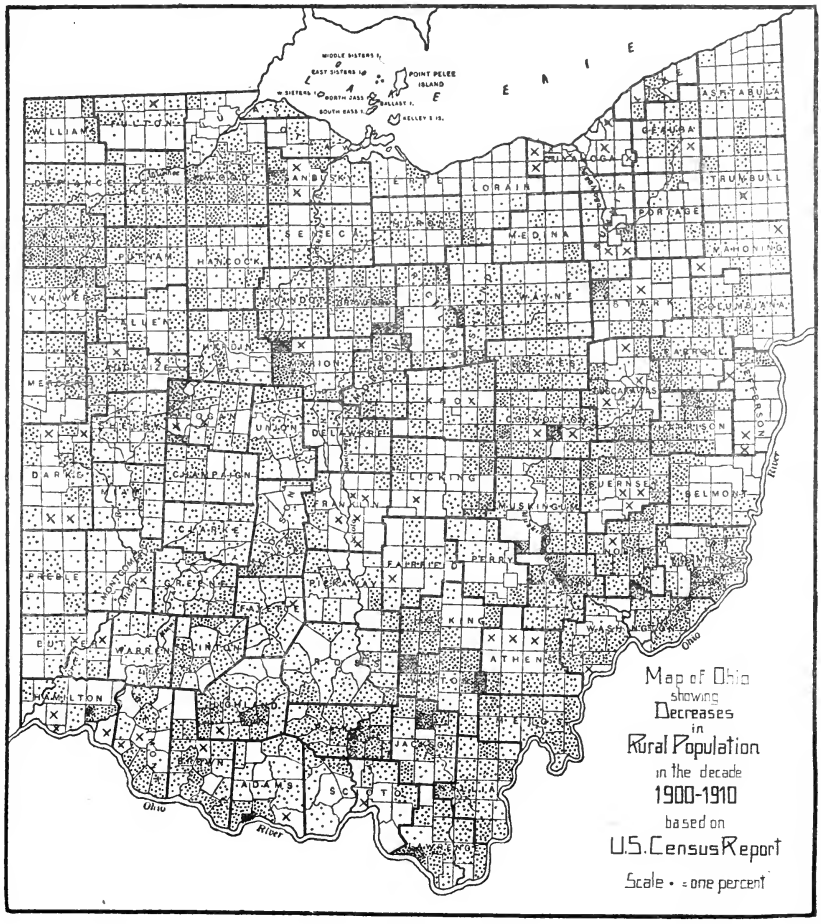

FIG. 20.

striking effect of abnormal weather—a wet year, a dry year or some other unusual kind of a year. It begins to look to us as though entirely too little attention has been paid to weather conditions in the past in arriving at conclusion based on the results of field experiments or of field observations. Certainly, in the making of detailed field studies we should attempt to confine ourselves if possible to areas in which the weather has been normal; or if this is not possible, to consider very carefully the extent of abnormality of the weather and its influence on the final results.

You may realize, then, how much it pleased us at the Experiment Station when we learned that the Ohio Section Director of the U. S. Weather Bureau, Prof. J. Warren Smith, was willing, with the approval of his chief, Prof. Willis M. Moore, of Washington, D. C., to become Honorary Climatologist of the Ohio Experiment Station in order to work the more closely in connection with our Agricultural Survey.

Prof. Smith has already prepared for publication by our institution as Bulletin 235 a graphically illustrated manuscript regarding the climate of the

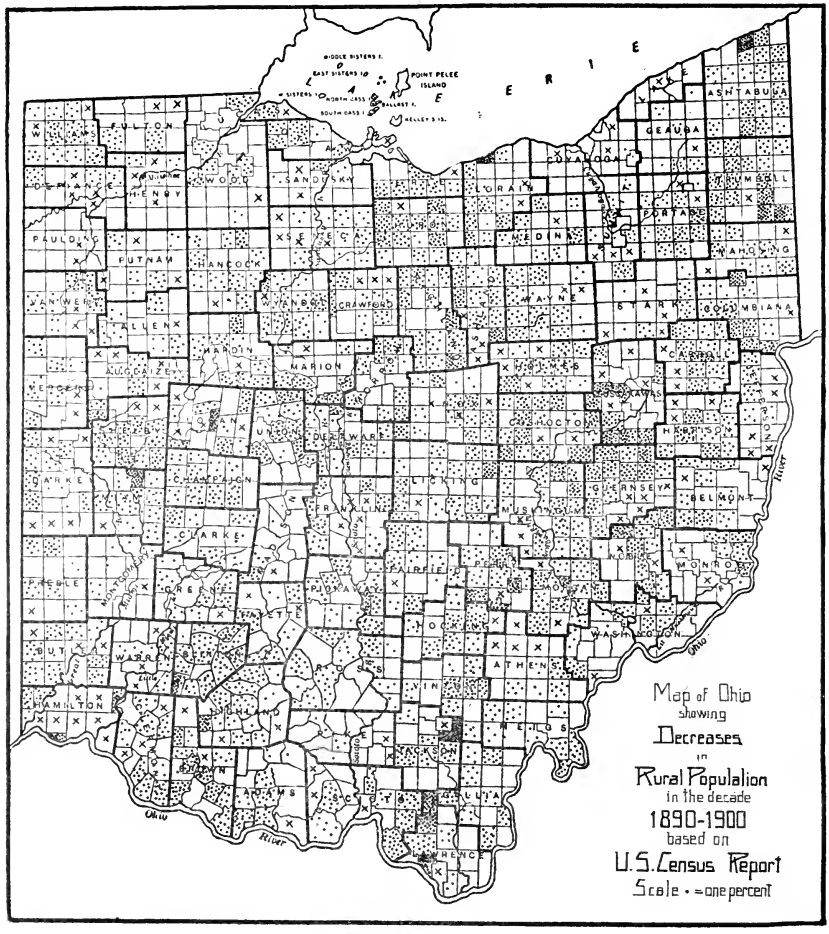

FIG. 21.

State and will provide for us from month to month a similar report of the weather for comparison with the climate in order that we may be able to select the points in the State where the weather has been reasonably normal. You will of course understand climate is simply the average of the weather for a long period of years. Prof. Smith is also making a number of studies of the relation of certain weather conditions to large or small yields of crops. Every field study which we make hereafter, so far as the weather can have any effect upon it, will be made in close co-operation with Prof. Smith and his office.

As quoted from Dean Bailey earlier in this paper, we have been guilty in the past of talking largely at random. Hereafter we must try to confine our statements and deductions, so far as possible, to facts. It seems very fortunate, therefore, that the machinery of this great organization, the Weather Bureau, is ready to join us in this Survey work. The accompanying maps Figs. 10 to 19) inclusive, will indicate some of the more pronounced climatic features of the State. A number of others will be found in the Bulletin mentioned.

The Shifting of Rural Population.

You certainly will agree with us that in connection with an Agricultural Survey it is necessary to know whether our rural population is increasing or decreasing and where these changes are taking place. Fortunately, we have

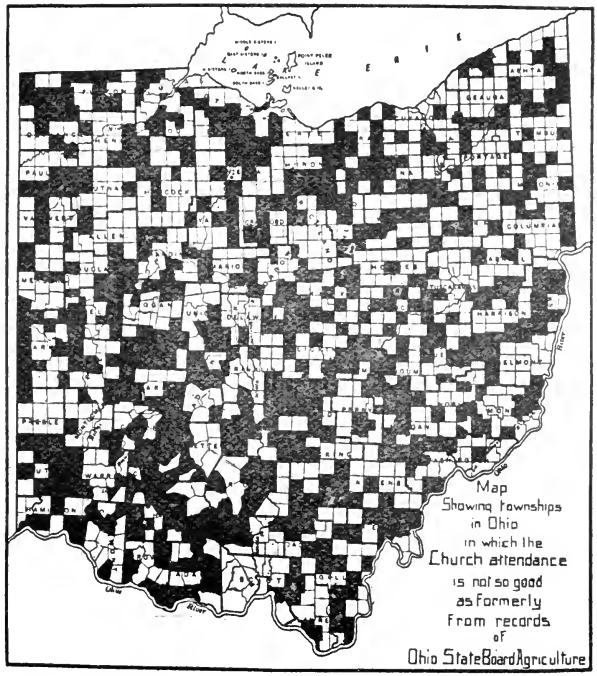

Fig. 22.

exact figures from the U. S. Census for the years 1890, 1900 and 1910. These are illustrated in Circular 116, two of the maps of which are reproduced herewith, Figs. 20 and 21. Each dot on these maps represent one percent of decrease within the ten-year period preceding the date of the map. A cross in the map of a township indicates that the figures for that township have for some reason been indeterminate and therefore have been thrown out.

We would call your attention to the fact that in 70 per cent of the townships of the state there were actually fewer rural people in 1910 than in 1900; that in spite of increases by birth to the rural population there was a net loss in the total number of rural people of the state within that decade of 112,707; that, averaging this total loss among the 1352 rural townships, there was an **average loss per township in rural population in spite of births,**

of 8.3 persons per year. Of course, as stated above, this loss was confined to about 70 percent of the townships, which makes it all the greater in the townships in which it did occur. It may be that this decrease in rural population is wise; we are not prepared at this time to say; it is merely our mission in conducting this work, which we are now undertaking, to gather the facts and state them so that others as well as ourselves may try to draw conclusions. Certainly, however, we should keep this fact constantly in mind in connection with all our field investigations.

These four statistical studies: centers of agricultural production, taxation valuation, climatic conditions and population, are sufficient to indicate how we shall endeavor to use all available statistics and to prove, I hope, that even dry

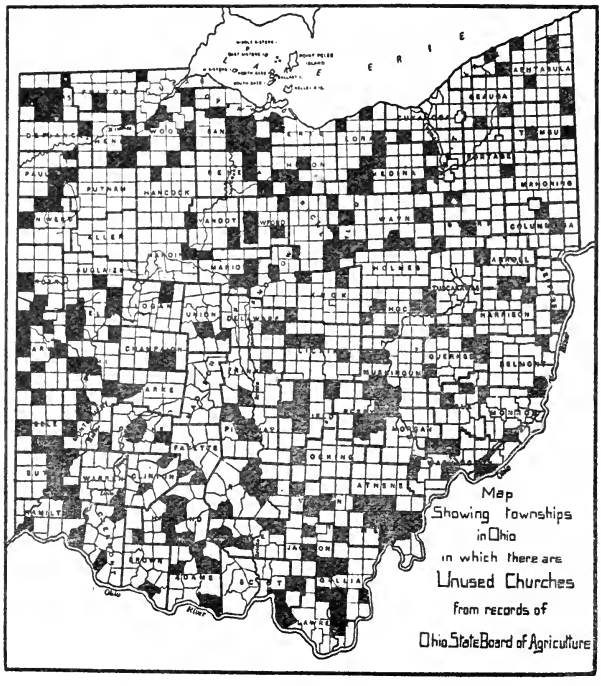

FIG. 23.

statistics may become very valuable and even interesting if one translates them into graphical illustrations.

A STUDY OF AGRICULTURAL HISTORY.

In traveling over the state in years past our field men have noticed many local agricultural conditions which we feel we shall not be able to trace entirely either to the climate or to the soil. For instance, why do we find the large farm area in Fayette, Madison and other nearby counties? Can it be because that area was settled by Virginians whose ancestors were the landless younger sons of old England and who came to Virginia with a pronounced appetite for land? Why do we find tobacco growing in but limited areas of the State? May not the likes and dislikes and previous training of the settlers of those areas have something to do with determining their location, rather than or as well

as the soil and the climate? Had the Yankees of the Western Reserve—Ashtabula, Geauga, Portage and other counties settled in Fayette and Madison counties, would or would not that have been a large farm area? Had they settled in Montgomery and Darke counties would parts of those counties be a pronounced center of tobacco production?

With the hope of unraveling these and dozens, yes hundreds, of other riddles and of helping us to understand better the agricultural conditions of the state, Mr. W. A. Lloyd of our office is now conducting a general historical survey of the state which considers the different classes of people, crops, livestock and types of farming; the date of introduction of each, the rate of increase of each; the date of climax of each if reached; the rate and cause of decline of each if such exists; and the relation of each to the other. To be sure, in the year or so that he can devote to this project he cannot hope to work it out in all its detail, but he can secure information that will be of vital importance and that will point the way accurately to later detailed surveys.

A General Soil Survey.

The need of a soil survey of the State has already been referred to in this paper. Certainly, no one who has traveled over the state to any great extent can question the importance of this need. If there are any who question it I am sure that a few months association with a department of extension of an agricultural experiment station will convince him of his error. In 1905, a year after the organization of our Department, the author of this paper wrote regarding Extension Work in Circular 47 of the Experiment Station as follows: "The varying climate and soil conditions prevent our formulating any general conclusions that will apply to the State at large, and therefore prevent the publishing of many reports. The best we can do in most cases is to attempt to answer each individual request with information regarding the section from which the request has come. This part of our work will be very much lightened and its value increased many fold as soon as the state is provided with a complete soil classification and preliminary soil survey. Accurate conclusions may then be drawn for a given soil which will be understood by all well informed farmers in that soil area." This was written more than six years ago and has been reiterated hundreds of times by the various members of our field staff who have, in connection with their field work, come face to face with the absolute necessity of assistance along these lines.

Perhaps it is well, however, that we have waited. I seriously question if six years ago the man was in existence who could have handled this work as we now feel it should be handled. At any rate, the man we have in charge of it in our Department, Dr. George N. Coffey, has been receiving constant training throughout the entire period, so that now our sister institutions in other states and the National Bureau of Soils, from which he came to us, say unqualifiedly that he is the best soil survey man in the country. He assisted in 1900 in making the first detailed county survey that was ever made by the National Bureau of Soils in the State of Ohio, and since that time has worked in every state in the Union east of the Rocky Mountains except two.

Beginning last July, he has been conducting a soil reconnaissance, in which he visited every county in the state but five, and by means of which and his former studies he hopes to determine quite largely what types of soil are to be found in the state. Beginning next spring with the two assistants which we shall be able to provide he will undertake a general soil survey of the state.* In this he will study the types and sub-types more carefully and undertake to locate them in a general way. While he will hope to

be able to make an accurate estimate of the percentage of each type or subtype which may be found in any given township, he will not undertake to determine in detail regarding the soil of individual farms. He will, however, undertake to define these soil types in such a way that every man of agricultural intelligence will be able to recognize and name any type on his or any other farm in the state. Dr. Coffey, who is to address you tomorrow, will tell you more in regard to this soil survey work.

*Since the above statement was made a cooperation with the U. S. D. A. Bureau of Soils has been arranged whereby the survey will be completed within the year 1912.

The State Topographical Survey.

This completes the preparatory or foundation surveys which we have already launched in the Department of Co-operation. We shall, however, be greatly assisted by the work of other institutions. Probably the most important of these is the State Topographic Survey. I wonder if many of our people know that the State of Ohio, in co-operation with the national government, is carrying forward at a greater pace than any other state in the Union, a most remarkable survey of the state, on the basis of which they prepare maps which may be purchased at 5 cents per area, about the size of a county, on which are shown accurately among other things the location of the streams, roads, lanes, farm buildings, churches, schoolhouses and, by contour lines, the approximate elevation of every point in the area. If you will all procure a map of the area in which you live or of those in which you are interested, we are sure that you will join us in urging that the state continue its appropriation of $25,000 per year, or increase it for that matter, so that the surveys may be entirely completed not later than 1916. We certainly wish that they were all done now. We need them badly in our work. Mr. C. E. Sherman, who is Professor of the college of Civil Engineering of the Ohio State University, is, by appointment of the governor, the State Inspector in charge of this work. The water power survey of the state which we understand Mr. Sherman is arranging to make, will be of much value to farmers if they awake to the situation in time to see that this power is conserved to their use. The road survey which has been made by the State Highway Commission we have also found of special value in our field

A Country Life Survey Needed.

Another class of surveys which we hope to see taken up very shortly are those which bear on the life which is lived by country people. It has been said, and we believe wisely, that the most valuable farm product is boys and girls who will grow into thoughtful, steadfast citizens. We may make the farms of Ohio profitable, a good place to live from a financial standpoint, but if we do not make the farm homes good homes and the rural communities good communities in which to raise boys and girls to manhood and womanhood, our work may well be called a failure. The Rural Life Survey should go hand in hand with the Farm Practice, Farm Management and Rural Economic Survey. Some of the work which we have already taken up will have a bearing on these rural life surveys, but we certainly hope that other institutions will throw the vast resources of their organizations into the leadership of work of this character in order that what little we do of it may, under their guidance, be well directed.

The Rural Church Problem.

Recognizing as we do the very great possibilities, perhaps largely undeveloped, of the country church as an instrument to solve this rural problem, especially in evolving rural communities and developing rural leadership, we feel

quite fortunate in having been able last September, to make tentative arrangements with a man of national reputation to conduct a church and rural life survey of the state this coming summer. If it is agreeable to all the church and other interested organizations, and a conference to determine this has been called for next Saturday, Dr. Warren H. Wilson, whom many of you heard at the Rural Life meetings at the National Corn Show last winter will undertake, with the support of his organization and any others that may be available, to put in the field next summer a large force of men to determine with exactness the conditions which exist in rural Ohio.

The records of the State Board of Agriculture show that in more than a fifth of the townships of the state there are unused churches and that in a much larger number of townships the church attendance is not so good as it was 10 or 15 years ago. (See Figs. 22 and 23.) This being true, it seems very desirable that we secure the assistance of a religious organization led by a finely trained minister of administrative ability such as Dr. Wilson, and supported by all the church and agricultural organizations of the state, to try to learn why it is true and then to determine the means of turning the tide in the proper direction. Let us hope that nothing will happen to prevent this church and rural life survey being started the coming summer and that it will be but the beginning of extensive surveys of this character to be made within our boundaries.

Profitable Farming Fundamental.

But to turn again for a moment to the financial problem of the farm, for we must all agree that much as a fine rural community is desired, there is no possibility of developing such unless we have a stable financial condition on which to found it. Is it going to be necessary to await the completion of all these surveys before we can begin to be of financial assistance to the farmers? Is there not something we can do in the meantime? We have no sympathy whatever with the pleas of those who would ask that the country boy and girl shall stay on the farm exclusively for the sake of the farm, the rural community, the state and the nation. While we would like to see every bright, honest boy who has been reared on the farm have developed within him such a love for the farm that he would remain there, surely you will all agree with me that such boys cannot be expected to stay there unless they are convinced that life there will be fuller for them, that it will have greater possibilities for them, than elsewhere; and surely you will all agree further that unless they can see possibilities of at least a reasonable financial competence there, they will never as a rule develop that feeling of love for the farm and the rural community which is necessary to keep them there; that indeed they should not even be expected to do so. What then, I say, can we do before the completion of these surveys to help solve the financial difficulties of the farm?

The Present Status of the Work.

In the first place, these surveys are further advanced than may be realized. The statistical surveys, as you will remember, are many of them ready for use right now. Indeed, some of them were used as long ago as 1910 in connection with the state-wide study of alfalfa. Before spring Dr. Coffey will have available a report of his soil reconnaissance on the basis of which, and with the advantage of special field instruction by him, field investigators may expect to work quite accurately on problems in connection with which the soil is to be considered.

For example, there is no reason whatever why a man should not start at once on the basis of farmers' experience throughout the state, to determine the

relation of tile drainage to the different soil types and crop production thereon. On some soil types drainage may not pay at all, while on others it does pay remarkably; some may require the tile much closer together, or, on the other hand, permit them much farther apart than on the average. Having secured this information an investigator could tell with a reasonable certainty whether or not and how, it would be profitable to tile-drain any given farm.

Again, on the basis of this soil information and that derived from the climatic and weather survey which is now available it would be entirely possible for a field investigator to determine to a reasonable certainty regarding the sections in which potatoes may be grown to the best advantage and to give very accurate advice regarding this and the different methods of handling the crop under the different soil and climatic conditions that obtain in the state. These and dozens of other farm practice and farm management studies for which we already have plans, some of which will be mentioned to you by Dr. Coffey in his address regarding soils tomorrow, will be taken up just as fast as funds and men are available.

In this connection I would say it is our hope that the other Departments of the Experiment Station will furnish men to take up agricultural survey work in connection with problems related to their regular departmental work. Indeed, **we are thoroughly convinced that many of them, as also similar Departments of all Experiment Stations, will eventually see the absolute necessity of doing just such work as this before daring to try to interpret the results of their experiments to the mass of the people of the state.** But, in the event they fail to do so, we shall not hesitate to go ahead just as fast as possible. Within the past week Director Thorne has asked us to conduct such an investigation regarding the use of manure, commercial fertilizers and lime, and we shall undertake to do so. We have already started a corn investigation of this character. We feel that there is no reason why the mass of co-operative and private experiments which have been made all over the state, under a hundred different conditions, may not now be studied in the light of the information which will be available this coming year regarding Ohio's soil, climate and the history of her agriculture, and conclusions be deduced therefrom which will be of the greatest value to the general farming public.

A GENERAL SOIL SURVEY OF OHIO.

By George N. Coffey,
Department of Co-operation, Ohio Experiment Station.

Mr. President, Gentlemen of the Board of Agriculture, and Gentlemen:

It is indeed a pleasure to have the honor of addressing the members of the State Board of Agriculture,—an organization which, under the leadership of its pushing, hard-working and efficient Secretary, is doing so much to advance the cause of agriculture in this good State of ours.

"A Boost for Ohio."

On the front of the program our Secretary suggested that this meeting be made "a boost for Ohio." We believe in boosting Ohio. All of us ought to do more of it. But at the same time we should not forget to **work,** else our **boosting** may simply become **boasting.** We wish to present to you a new line of work which we are undertaking, one which is essential to the proper conduct

of many lines of agricultural investigation. And we believe that such work can be legitimately classed as "a boost for Ohio." We hope that we may at least be considered as among the men behind the guns when the shots are fired.

In coming here to work with you for the upbuilding of agriculture I do not come as an entire stranger, for almost the first soil work which I ever did, aside from that on the farm, was to assist in the making of a soil survey of Montgomery County, Ohio. Later, when as a member of the Bureau of Soils of the United States Department of Agriculture, I was given charge of its classification and correlation work in the entire country, I had occasion to make several visits to this state. Since taking up my work with the Experiment Station last July I have been able to see something of every county in the State except five, and it is our purpose to continue the work until we have taken a complete inventory of our soil resources. What we have already seen is sufficient to convince any one of the immense resources and agricultural possibilities of this state.

Great Resources Alone do not Make a State Great.

But did you ever consider, gentlemen, that the possession of great natural resources in itself has never yet made a state rich and powerful? Were not all of these advantages, which we now enjoy, here for thousands of years before Columbus braved the winds and waves of the Atlantic to get a sight of a new and better land? Prosperity and power come only when a people make use of the advantages and resources which a beneficent Providence has placed before them or underneath them. Their proper development, however, requires a great deal of perseverance, of energy and of downright hard work. Yet, it requires all of these and more. The energy must be expended along the proper channels or no good may be accomplished.

I was standing at the depot the other day waiting for a train and was very much interested in watching a freight engine which was on the other track. It was standing still, but from it was rushing with a great deal of noise a large volume of steam. A little later I saw the engineer take hold of the throttle, give it two or three light pulls, the wheels began to revolve, the engine moved down the track, carrying with it a long line of heavily laden cars. Apparently no more energy was being expended than before. Why the difference? Because the trained hand of the engineer had directed the energy into the channels where it would produce work instead of going to waste.

Object of Agricultural Organizations.

Only a few years ago the commercial world was startled by the announcement that one of our great corporations was to pay its manager a salary of a million dollars a year. In agriculture, as well as other lines of business, the value of trained direction is being appreciated more and more every year. The recognition of this principle led to the organization of a national Department of Agriculture, of State Departments of Agriculture, of State Agricultural Colleges and Experiment Stations and various other institutions, the object of which is to find out and advise the farmer as to the lines along which his energy can be most profitably expended; to help him determine, among other things, how best to use and not abuse our most valuable resource,—the soil.

A Knowledge of the Soil Necessary.

Since all soils are not alike, are not adapted to the same kind or variety of crop, do not require the same kind of fertilization or cultural treatment, as will be brought out more clearly later, these organizations have been

greatly hampered in their work by a **lack of definite knowledge as to the character of the soil in the different sections** with which they have to do. **Without such knowledge definite advice is often impossible or, if given, may not apply.** In order, therefore, to furnish this information there has been organized what is known as the soil survey, **the primary object of which is to secure a knowledge of the character and properties of the soil in any given area.** Such a survey is now being conducted by the Ohio Experiment Station as a part of the great Agricultural Survey which it is making of this State.

A Soil Reconnaissance.

During the summer we have made a soil reconnaissance of a large part of the State and have secured much information in regard to the character of the soil in different sections. This work, however, is preliminary to the making of a general soil survey, including a map which will show all the larger areas of the most important soil types of the State. In making this survey we shall not endeavor to show the location of all the numerous small areas of the different types, because experience has shown that this is expensive both in regard to time and money. We hope, however, to be able to describe the types found in each township in the State in such a way that the farmer himself can recognize them.

Two Questions Asked.

In the conduct of soil survey work there are two questions which we are asked over and over again; first, "What are you doing?" and second, "What are you doing it for?" I might add that there is a third question which often precedes either of the others and that is, "How much do you get for doing it?" Since you gentlemen are connected with agricultural work in the state, I am sure that you realize that we do not get enough to make us millionaires and shall therefore consider it not necessary to discuss further this last question. We are willing to admit, however, that our salary is a little more than that of the members of the State Board of Agriculture. The other two questions, I do want to discuss, and to explain to you in some detail the nature of the work which we are carrying on, to state some of the benefits which will accrue therefrom. Let us therefore consider first the question of "What are you doing?" I want you gentlemen to know so that if you see a man with an auger boring a hole in your field you will understand what he is doing and not think that he is boring either for gold, oil, or gas, although he may get gold for boring and may make a lot of gas over what he has done.

The Soil Survey Defined.

A soil survey consists in examining the soils in the field, in order to determine the different kinds of types, in studying their origin, processes of formation and various obvious properties and characteristics, in the writing of a report describing these different types, and in showing on a map, by means of color or otherwise, the location of the different soils so far as this is practicable. In brief, it is taking an inventory of our soil resources. The soil survey will give us information in regard to the different kinds or types of soil, just as the Geological Survey has furnished us with a knowledge of the different geological formations. By means of the soil auger it is possible to secure a sample of both soil and subsoil down to any desired depth, for the purpose of studying its various characteristics. In usual practice it is only necessary to examine the soil to a depth of three feet in order to determine the type to which it belongs, although it is always well to secure all obtainable information in regard to the character of the material at greater depths. **It is**

often possible to get a very good idea of the character of the underlying material by means of road cuts and ditches. If such are not available it may be necessary to make deeper borings by means of extensions to the regular soil auger.

What is the Soil?

In undertaking such a survey it is well to remember that the **soil is not simply broken-down rock.** This degenerated rock must have been acted upon by life in some form or other; must contain some organic matter before it can be considered as a true soil. It is not mere dead, inert matter. It is full of life and various changes are constantly taking place. It is an independent natural body, a bio-geological formation, differing essentially from the rocks which underlie it, although closely related to them. It is the one great formation in which the organic and inorganic kingdoms meet and derives its distinctive character from this union.

The Factors upon which Classification is Based.

Since the soil survey is necessarily conducted in the field, the classification, which is made, must be based upon those factors, or obvious differences, which are there detectable, although the field examination should be followed up with laboratory studies to determine other factors or properties which cannot be decided upon in the field. We will, therefore, review rather briefly some of the factors or characteristics which we must consider in making a field classification or separation of the soil; or in other words, in determining whether the soil on your farm is like that on your neighbor's farm. In fact, the soil surveyor uses many of the same evidences of differences in soils that the farmers do. His more careful training, however, enables him to detect differences more quickly and interpret their meaning more accurately.

One of the most important of these factors is that of origin. In this term are included not only the **kind of rock** from which the soil is derived, together wth the agencies or processes which were concerned in the formation of this rock, but also the **various processes of weathering** that change the underlying formation from mere rock into actual, cultivatable soil. All of you, especially those who are from the western half of the State, know that the black soils are found in low places where swampy conditions formerly existed. The underlying material is exactly the same on the higher areas where the lighter-colored soils occur, the black color being due to an accumulation of organic mater under poor drainage conditions. Such difference are often of greater importance than those due to variations in the character of the underlying rock, and this is one of the principal reasons why a soil map and a geological map are not the same. Let me see if I can bring out a little more clearly just exactly what I mean.

When I was a boy I took part in the debates which were held in connection with our country school. I recall that one of the most heated discussions we ever had was upon the subject whether man is more the product of heredity or environment, and some of us at least thought that we had the question settled for all time; but it bobs up again every little while, so we must have been mistaken. To apply this to soil, I would say, that the differences due to the influence of the rock represent heredity, while those brought about by the processes of weathering correspond to environment. We can no more determine the character of a soil from a study of the rocks alone than we can that of a man from a study of his ancestors.

Kind of Underlying Rock an Important Consideration.

We must not fail, however, to consider the kind of rock from which the soil has been formed, for this has an important influence in determining its nature. In this state it is especially important to know whether the soil is derived from limestone or whether it is derived from sandstone and shale. This is due to the influence which the rock has in determining the amount of lime which will be found in the soil. Other things being equal a soil formed from a limestone will always have more lime than one derived from sandstone and shale. A great many people, however, make the mistake of assuming that a **soil formed from limestone necessarily has a large amount of lime in it, which is not always the case, especially in the surface soil.** This is due to the fact that lime is very soluble in carbonated rain water and may be practically all leached out; in fact, so nearly all of it may be removed through leaching that we may have an acid soil formed from a limestone.

In our studies last summer in the western half of the state, where the glacial drift is composed very largely of ground-up limestone, we found that the subsoil, within three feet of the surface, would often effervesce, when treated with hydrochloric acid, showing the presence of a large amount of lime. Very seldom, however, would such effervescence take place within 18 inches of the surface while the surface soil usually gave an acid reaction. In the eastern half of the State where the soils are derived very largely from sandstone and shale there was very seldom any effervescence even in the subsoil, indicating a rather low lime content. Some limestone layers, however, occur throughout the southeastern part of the State and it is necessary to be on the lookout for these as their influence is shown by an increased productiveness in the soil. In fact, one must know the character of the underlying rocks in order to understand the various peculiarities of the soils. In this part of our work the geological maps will be of much assistance to us.

How the Soil was Made.

It is also important to understand the processes of formation and the differences which may have resulted from a variation in these processes. Mention has already been made of the formation of black soils under swampy conditions. Those of you who are familiar with the conditions in Brown, Clermont, Hamilton, southwestern Clinton, western Highland or southern Warren counties know of the "white soils" which are found on the level areas there, as well as in some other sections of the State. You have doubtless noted that these "white soils" do not occur where the surface is rolling. Their formation is due to certain process which have gone on under intermittent wet and dry or stagnant water conditions. If the surface is not sufficiently level for the water to stand several days after a rain these processes are not brought about and the "white soil" is not formed.

The Size of the Soil Particles.

Another very important property of the soil, which must be considered in making our classification, is that of texture. By this we mean the relative proportion of the particles of various sizes which determine whether the soil shall be called a sand, a loam, a clay or some intermediate class. The texture is the most important physical property of the soil because of the important influence which it has upon the water-holding capacity and cultural properties. Through constant practice one may become very expert in judging of textural differences. In order, however, to secure the greatest uniformity in this classification, samples are collected and mechanical analyses made in the laboratory in order to furnish

a check on a man's field judgment. We find this necessary because of the differences in different men as to what constitutes a loam or clay. You gentlemen may not realize it but this difference is very marked among farmers themselves. In sections where there are large areas of sand a sandy loam with a clay subsoil will be called a clay, but where the surrounding soils are largely heavy clays the same sandy loam will be termed a sandy soil. This makes some standard necessary in order that we may know whether we are using these terms with the same meaning. It is of course necessary to determine the texture of both soil and subsoil as well as the character of the underlying material. You can readily understand that it will make a great deal of difference whether the substratum consists of gravel or clay. In the first case the drainage will be excessive, particularly where the gravel came near the surface, while in the latter it will be very poor and especially so where the clay is of an impervious nature.

Color an Important Consideration.

One of the most obvious physical properties of the soil, one which has been used by practical farmers as an index of its character from time immemorial, is that of color. "Black soils," "red soils," "gray soils," "brown soils," "white soils," etc., are terms in very common use. In itself color may be of very little importance but as an indicator of physical and chemical conditions it is of the greatest moment. The practical argriculturist will no more class together soils markedly dissimilar in color than the ethnologist will consider a white man and a black man as belonging to the same race.

Observations have shown that certain properties of the soil are associated with certain color characteristics. A black color has come to be almost synonymous to productiveness. If the soil in the level, rather poorly drained but not swampy places in your fields have **turned white it is one of the best evidences that I know of the need of lime. So far as my rather wide observations have extended I have never seen these "white soils" formed in the presence of a large amount of lime.** Their occurrence is therefore very strong evidence of the need of lime not only in the "white soils" but in the other soils formed from the same character of material. For reasons like this the color is of the very greatest value to the soil surveyor. By its use it is often possible to detect chemical differences which the most refined methods of chemical analysis are as yet unable to explain.

Arrangement of the Soil Particles.

One must also consider the structure of the soil, or the arrangement of the particles of which it is composed. We want to know whether a soil is open and porous or whether it is compact and impervious, whether it is loose and granular and easy to cultivate or whether it runs together and is difficult to work. Such information is necessary in order to know whether a soil here is similar to that in another place

The Relation of Soil to Native Vegetation.

Since the object of the soil survey work is to secure knowledge which will help us to understand better the relation of the soil to plant growth, one must not forget to make a study of the native vegetation and various crops, as this will often give an indication of differences which it would not be possible to detect otherwise. It is sometimes easy to trace the line of separation between two soils by the difference in the vegetation. The presence of certain trees like the chestnut and sourwood are indicative of an acid condition of the soil; while a luxuriant

growth of leguminous plants usually indicates that the soil is not in need of lime.

While the origin, texture, structure, color, amount and condition of organic matter, native vegetation and crop yields are the most important factors to be considered in making a survey of the soils, any other differences which have any apparent influence upon the growth of plants must not be overlooked.

How the Soil Survey Work is Performed.

Having in mind these various factors the soil surveyor goes over an area, examines the soil, determines the different types or kinds and indicates as far as practicable on his map the location of areas of similar soils. He studies the peculiarities of each and every type, makes full notes of his observations, so that when his work is completed we will have a careful description of the various soils found in the area which he has covered. We hope in the course of a few years to have such a survey of the entire state of Ohio.

A Knowledge of Soils Fundamental to Intelligent Agricultural Investigation.

This leads us to a consideration of our second question, "What are you doing it for?" What will be the value of this work?

It has already been stated that the primary object of a soil survey is to furnish information in regard to the character of the soil. Is not a knowledge of the soil as fundamentally important to the agriculturist, as a knowledge of drugs is to a physician or a knowledge of rocks to a geologist? **One great need in agricultural work today is a more general recognition of the individuality of soils, a fuller realization of the true meaning of soil differences. Much valuable time and money have been wasted trying to draw conclusions from experiments conducted upon entirely dissimilar soils. Many of the contradictory and seemingly inexplicable results obtained by different investigators, or even by the same investigator, are undoubtedly due to fundamental soil differences which would have been evident from a comparative field examination.** It is really amusing sometimes to read the heated discussions in which scientific men allow themselves to indulge because they do not secure the same results from similar experiments. If they would only stop and determine the nature of the soils upon which their experiments were made they might understand the cause of the difference and be less surprised at the results. Hilgard, than whom this country has never produced a greater soil investigator, has said, **"The history of plat experiments shows so common and unpardonable neglect on the part of experimenters to ascertain definitely the fundamental, physical and chemical conditions that their general unsatisfactoriness is easily accounted for on that score alone."*** The failure to recognize that the results secured upon one type of soil do not necessarily hold true for another, is responsible, in some measure at least, for the distrust which farmers have often shown toward the work of scientific investigators. You are told that a certain method of cultivation, certain varieties of crops, certain kinds of fertilizers, etc., will give the best results. You go home and try these but the yields are not what you expected. Why? Because the soil, or other conditions, on your farm are entirely different from that upon which your adviser's experiments were conducted.

Each Soil Type Should be Studied Separately.

It is often possible to learn something of a man's opinion about a question by consulting his friends, but it is not safe to depend upon them entire-

* Agricultural Science, Vol. 6, p. 327.

ly for information, else we may be misled. The man himself and he alone can give definite and positive knowledge in regard to what he thinks. So with soils. **Each type must be questioned separately and individually. The answer given may then be safely recommended for a similar soil but may not apply upon one of an entirely different character.** This fact has been clearly recognized by Director Thorne and others and has led to the establishment of sub-Stations in different parts of the state and also to the enactment of a law permitting each county to have an individual **County Test Farm.** And may I add here, gentlemen, that if any of you have anything to do with selecting one of these farms, you endeavor to secure one representing the most extensive and important type of soil in the county. If there are two or more types of about equal extent and an adjoining county has a test farm upon one of these, put yours on another type, so that the two will be of mutual benefit. If two or more counties will work together in this matter it will be possible to have these farms on all the important soil types in the state. Above all don't accept a farm upon which **the soil is so mixed that it is impossible to secure an area large and uniform enough for experimental purposes.**

But there are some people who do not appreciate the truth of some of the statements which have just been made. They do not realize that the difference in the soil has very much to do with the variety of a crop, for example, which will do the best on your farm. It is well, therefore, that we look into this question and see what evidence there is to support these statements.

Plants Adapt themselves to their Environment.

Everyone admits the great influence of environment upon both animals and plants. In fact, this influence is so important that one of the great philosophers has defined life as a correspondence with environment. We all recognize that we cannot do our best work when out of harmony with our surroundings. This is as true of plants as of men.

In the Year Book of the Department of Agriculture for 1908 Professor Woods, who is now Director of the Minnesota Agricultural Experiment Station, says, that "As far as they are able plants vary and adjust themselves to their environment. Under natural conditions only those survive which can modify their habits of growth so as to make a successful resistance to destructive influences and propagate their kind. The rest die. The longer a species or variety grows under a given set of conditions the better each generation bcomes adapted to grow and reproduce under these conditions. * * * Selected seed of crops grown under severe limiting conditions will as a rule give good results the first year when grown under conditions less severe. The second generation, however, begins to vary and break up, and unless careful attention is practiced the crop soon becomes very unsatisfactory. * * * The great importance of selecting and growing seed under the conditions under which the future crop must be grown is now apparent. Careful experiments and the experience of careful growers have abundantly demonstrated the truth of these facts presented. Seed breeders and growers especially must give attention to these points."

Plants Should be Assoilated as well as Acclimated.

While the influence of environment upon the growth of plants is now generally admitted, many fail to realize that this environment consists of two parts: **an above-ground or climatic environment and an underground or soil environment.** Although the influence of climate upon the growth and distribution of plants has long been recognized, the effect of a change from

one kind of soil to another has been given much less consideration. We all know that we cannot grow oranges, pineapples, bananas or cotton in Ohio and that buckwheat, rye, oats and some other crops will not do well in tropical regions, but how many of us realize the important change in the soil environment to which we are asking a plant to adapt itself when we take it from a deep sand, for example, and place it on a heavy clay?

After a discussion of this subject with a gentleman who is recognized as one of the pioneers and leaders in plant breeding, he said "I have known for a long time that you **must keep a plant within the same environment, else the good results secured from breeding would be lost, but I never had it connected up so closely with soils before.**" Now I would not seek to minimize the importance of climatic environment, but I do wish to emphasize the influence of the soil environment because it seems to me that the part it plays is not fully appreciated. We all recognize that it is necessary for a plant to become **acclimated**, but how many of us realize that it is necessary for it to become **assoilated** also, if I may coin this expression.

Different Soils are Adapted to Different Crops.

That some soils are better adapted to certain crops than other soils is being more and more appreciated every year. The selection of the peat and muck soils for the production of celery and onions gives one of the best examples, which we have in this State of the special adaption of a particular kind of soil to certain crops. Attempts to grow sugar beets on the Wooster soil have been a failure, but on the dark, heavy soil of the county test farm at Paulding are proving very successful. Other examples, which I need not mention here, will doubtless occur to all of you.

Our knowledge of the adaption of soils to particular crops or varieties is as yet incomplete and is doubtless resulting in the loss of thousands of dollars to the farmers of the State. Such knowledge, however, cannot be obtained until we know what kind of soil we have in different parts of the State and have made a study of the crops best suited to them.

Crop Varieties in their Relation to Soil Types.

Not only are different soils adapted to different crops but they are also suited to different varieties of the same crop.

There is no place where the influence of the soil can be studied so satisfactorily as in the greenhouse, for here temperature, moisture and fertilization are under control and can be manipulated to suit the will of the experimenter, but fundamental soil differences cannot be entirely eliminated by any amount of fertilization or manipulation. Other factors being under control, the influence of the soil can be definitely determined. Some florists have found it utterly impossible to compete with other growers in the production of certain varieties of violets, for example, although they may be more successful with other varieties. No satisfactory explanation has been offered to account for this except that it is due to some inherent quality in the soil which makes it impossible to duplicate the results upon any other than the one used.

A Lesson from a Study of Corn Varieties.

For several years the Experiment Station has been carrying on corn variety tests in cooperation with members of the Ohio Corn Improvement Association and other farmers. In these tests the check plats were always home grown seed. All the leading varieties grown in the State were included

in the tests, although the same varieties were not always grown on the same field. By taking the average of all the varieties, where the seed was grown elsewhere than on the farm, and comparing this with the average of the checks, which were planted with home-grown seed, it is possible to get some idea of the influence of or adaptation to local conditions. An average of 165 different tests located in all parts of the State, gave a **yield of 1.7 bushels in favor of the checks or home-grown seed.** When we consider that there were, according to the Year Book of the United States Department of Agriculture, 3,960,000 acres of corn in Ohio in 1910, we can easily see that a difference in yield of only 1.7 bushels means several million dollars to the farmers of this State. No clalim of absolute accuracy is made for these figures, but they enable us to appreciate the importance of the adaptation of varieties to local conditions, among which the soil is probably the most important.

An Illinois Wheat Experiment.

Bulletin 121 of the Illinois Experiment Station reports the results of variety tests of wheat. These were conducted in three sections of the state, —northern, central and southern. The first two were located on a black prairie silt loam of marked fertility; the last upon a white, very acid silt loam of much lower agricultural value. As a result of three years' trial it is stated that the Turkey Red variety stood first or among the very best upon the black prairie soil, not only in Illinois but also in Iowa. However, upon the light-colored soil this variety yielded 5.2 bushels per acre less than the Fulcaster, a variety which had been grown on this soil for a number of years. If these wheat variety tests had been conducted upon the "black soils" alone and the Turkey Red, which proved to be the best yielding variety on these soils, had been distributed to the farmers, situated upon the "white soils" in southern Illinois, **it would have resulted in the loss to them of approximately one-third of their wheat crop;** as the Turkey Red gave a yield of 11.4 bushels compared with an average of 16.6 for the Fulcaster. This experiment brings out very forcibly the necessity for **testing out the variety upon the soil upon which it is to be sown.**

It is very interesting to note in this connection that the Turkey Red wheat, which gave the largest yield at the Illinois Experiment Station, is one of the very poorest yielders on the Ohio Experiment Farm at Wooster. This variety has also been tried in North Carolina and Pennsylvania and has proved one of the lowest yielders in both states. The only soils in this State upon which this variety has given anything like a satisfactory yield are the black soils, which are not very different from those in Illinois.

The Close Relation between the Tobacco Crop and the Soil.

None of our great crops has been so highly specialized as tobacco. The demands of the trade have forced this upon the farmers. Tobacco does not go upon the market simply as tobacco, but as smoking, chewing, filler and wrapper tobacco. In other words, the quality of the leaf determines the use to which it will be put and this in turn depends very largely upon the character of the soil. Bright yellow tobacco, which is used for smoking and cigarettes, cannot be produced upon a heavy-textured soil and a single trial will be sufficient to convince the most unconvincible farmer. It is soon discovered that the leaf has become too thick and dark for this purpose. No such trade conditions, however, exist in regard to wheat, cotton, corn, and oats. The principal thing with these crops is quantity rather than quality and the farmers generally

(and I think I might safely say many of those who call themselves scientists instead of farmers) have not appreciated the importance of securing the variety adapted to their particular soils.

A Misguided Benefactor.

A few years ago a prominent banker in this State saw an account of a variety of wheat which the Kansas Experiment Station had found to produce very much larger yields than other varieties. Being desirous of helping the farmers in his section he secured 25 bushels of this wheat at $2.00 per bushel and distributed it among his farmer friends, but reaped a harvest of disappointment as the wheat proved much inferior to home varieties. The black soils, which are more like those in Kansas than any others in this State, where the only ones upon which the yield was at all satisfactory. By the soil survey we want to help eliminate such mistakes as this; we want to show public spirited citizens like this banker the lines along which their enthusiasm can be expended to advantage.

Similar illustrations could be supplied almost indefinitely, but these call attention to the necessity of considering the soil factor in all variety or crop adaptation studied. **For if a variety, which is developed in a certain environment, will not do best when placed in different surroundings and if the soil constitutes an essential part of this environment, then the change of a plant from one soil to another may negative the good effects of years of patient breeding.** A knowledge of the character of the soil in different parts of the State, therefore, becomes an essential and necessary corollary to a study of variety adaptations. Such knowledge will be especially valuable in the planting of apples and other crops where years must elapse before returns are secured and where a mistake means great loss of both time and money.

Soil Types and the Livestock Industry.

In Bulletin 222* of the Ohio Experiment Station is published the "results of a study of the mineral nutrients in blue grass, from which it appears that some blue-grass pastures in Ohio contains twice as high percentages of the mineral nutrients as others, these differences being due to differences in the soils upon which the grasses were grown. It is also shown that the content of blue-grass in mineral nutrients may be very greatly increased by the use of fertilizers. There is every reason to believe that the grass on a soil which is rich in lime and phosphorus is a better food and will produce more bone especially, and also more muscle and more milk, than grass grown on unfertile soils." In a recent bulletin of the West Virginia Experiment Station* it is stated that "The success or failure of any poultry enterprise depends to a large extent upon the character of the soil upon which the poultry plant is located, for if the soil is too heavy and tenacious there is a tendency for disease germs to accumulate to such an extent that after a time the fowls become unthrifty and unprofitable." It would seem, therefore, that a knowledge of the soil will be of much value to the raiser of stock or other animals as well as of plants.

Different Soils Require Different Systems of Soil Management.

We have seen that the kind or variety of crop which a farmer can most profitably grow depends to a certain extent at least upon the character of the soil. It is just as necessary to consider these differences in connection with the methods of soil management which should be adopted. Whether to plow deep or

*Summary of Bulletin 222 as given by Director Thorne in the Thirteenth Annual Report Ohio Ex. Sta. p. xxiii.

* Bulletin 135, West Virginia Experiment Station.

shallow, in the fall or in the spring, whether to turn under the clover crop or cut it for hay, whether to apply the manure in the fall or in the spring, and various other problems, depend to a very large extent upon the character of the soil.

At the meeting of the American Society of Agronomy at Columbus last fall Dr. Lipman, Director of the New Jersey Experiment Station, said that it was a common practice among the farmers in certain sections of New Jersey to apply the manure in the spring instead of hauling it out on the fields as fast as made, the method pronounced best by practically all the experiment stations. An examination of the soils in the localities where this practice is common showed them to be of a very sandy nature and leachy character and if the manure had been hauled out in the fall a very large percentage of the fertility would have leached out before it was needed by the crop the next season. On heavy soils such leaching would not take place. This illustrates the necessity of adapting the methods of soil management to the particular soil.

Profitable and Unprofitable Fertilization.

As our soils are becoming more and more depleted by exhaustive methods of farming, the question of fertilization is becoming one of greater and greater importance. All soils, however, do not respond equally to the same kind of fertilizers. Some need lime, some do not; some need phosphorus (most of our Ohio soils probably do), some may not; many may not need potash, some undoubtedly do; some need nitrogen, others have an abundance of this element.

At Wooster it is only necessary for one to observe the plots in order to see the beneficial effect of lime upon this soil. At Germantown, however, Director Thorne states * "that if lime has produced any effect thus far it has been to reduce the yield, but the work has not yet been continued long enough to afford conclusive evidence on this point. At Carpenter the effect of lime is less evident than on the Wooster and Strongsville soils." Most farmers know that the application of lime to a heavy clay makes it more porous and easily worked, while, under the same treatment, a sand becomes more compact and retentive of moisture.

As an average of two five-year rotations, consisting of corn, oats, wheat, clover and timothy, at Wooster and Strongsville, an application of 20 pounds of phosphorus, 108 pounds of potassium and 114 pounds of nitrogen gave a **net profit of $7.36 per acre at Wooster** and a **loss of $2.01 at Strongsville.** An application of the same amount of phosphorus and potassium on another plot, but 76 instead of 114 pounds of nitrogen, gave a net profit of $12.04 per acre at Wooster and of $1.64 at Strongsville. In a three-year rotation of corn, wheat and clover an application of 16 1-2 pounds of potash and of 25 1-3 pounds of nitrogen per acre, gave a **net loss of 8 cents per acre at Germantown but a gain of $1.07 per acre at Carpenter.** An application of 6 2-3 pounds of nitrogen, 30 pounds of phosphorus, 33 pounds of potassium and 1000 pounds of lime gave a **net loss of 54 cents per acre at Germantown and a gain of $3.06 per acre at Carpenter.** These results show that the application of a certain kind of fertilizer may prove profitable on one soil and unprofitable on another. A knowledge of the character of the soil is therefore necessary before anyone can advise most intelligently in regard to the use of fertilizers.

Why Doctors Disagree.

New York and Massachusetts have been carrying on experiments with fertilzers on apple orchards for a number of years. As a result of the New York experiments it is stated *"That the fertilizers have had no sensible effect upon the

* Bulletin 182, p. 180, Ohio Agricultural Experiment Station.

yield of fruit in this experiment." In Bulletin 100 of the Pennsylvania State College and Agricultural Experiment Station is given the data in regard to the Massachusetts experiment furnished by the Director of the Massachusetts Experiment Station. It is here stated that "in every respect the treated plots have proven superior to the untreated." A forthcoming report of the Ohio Experiment Station will show that "the increase in fruit production of the mulched and fertilized plots, as compared with those receiving no fertilization, has ranged from 200 to 1000 per cent. within eighteen months from the time of the first application." One of our agricultural papers recently called attention to the different conclusions reached by the first two experiments stations and raised the question as to what the farmer is to do when authorities disagree. The soil upon which the experiments were conducted are not the same and it seems to me that this furnished the reason why such entirely different results were secured. The farmer, therefore, must know which of the soils is like, or most like, that upon his own farm before he can tell which experiments to follow. A soil survey will furnish this information.

Why Chemical Analysis is Unsatisfactory.

The failure to recognize the importance of the differences in soil is one of the probable reasons why no more satisfactory results have been secured from chemical analyses. Chemists have tried to establish a standard that would apply to all soils. Is this not too much like trying to produce a medicine that would cure all diseases? We know that moisture in the soil is just as essential for the growth of plants as the presence of phosphorus or potassium or nitrogen, but it is not possible to establish a standard or optimum amount which will apply to all soils. An amount which would give the largest growth to a plant on a sand would not be sufficient to prevent its death on a heavy clay. Since this is true in regard to moisture, may not be true in regard to other compounds also, although in a less marked degree? The interpretation of the chemical analyses of soils in the past has been undertaken with practically no regard to the differences which are very obvious in the field. The analysis of a sand has been compared with that of a clay, although the two are about as unlike as two soils can be. It is very much to me as if a man were to secure samples of a great many different kinds of grain, analyze them and then endeavor to interpret their composition without first ascertaining whether he was analyzing corn, wheat, oats, rye or barley.

The Cart before the Horse.

A little more than three years ago I was invited to give a talk upon some phase of soil work before the students of one of our largest and most progressive universities. In the course of the address I tried to emphasize the importance of the study of soils in the field. When I had finished the professor who had charge of the soil work in that state said to me "You have taken exactly the opposite view in regard to the study of soils from that along which we have been working. We have thought it best to collect samples from different sections of the state, analyze them and study them in the laboratory, using the information there obtained as an aid in reaching the proper basis on which to separate and classify the soils. You would classify them upon obvious field differences and use the laboratory as a means of explaining those differences which cannot be explained from the field study alone, and the more I think about the matter the more I am inclined to believe that you are right." I might add that the legislature of that state is now appropriating $10,000 a year for the conduct of a soil survey.

* Bulletin No. 339, page 154, New York Agricultural Experiment Station.

The causes of the differences in the crop producing power of our soils is certainly one of the most important, if not the most important, problems with which our soil investigators have to deal. After many years of patient investigation there are many things relating to this great problem about which we know practically nothing. The classifying and mapping of the various types, together with a study of the conditions and processes under which they have been formed, will furnish essential and invaluable data for the conduct of laboratory investigation. The field is Nature's great laboratory and a study of her methods cannot fail to offer many valuable suggestions and in some cases the only means of solving her problems. **The field observation or experiment can be used as check upon and as an aid in the interpretation of laboratory investigations** and as stated by Dr. Wheeler, Director of the Rhode Island Station, **"is a safe and necessary anchor with which to keep the laboratory experimenter from being dashed against the rock of pure speculation."* It is only through a combination of field and laboratory studies that an understanding of many of these fundamental and puzzling problems can be reached.**

THE SOIL SURVEY A FUNDAMENTAL PART OF THE AGRICULTURAL SURVEY.

The Experiment Station is now conducting an Agricultural Survey of this State. It is not necessary for me at this time to explain in detail the character of this work, as this has already been done by Professor Goddard, who knows a great deal more about the subjest than I do. I will state briefly, however, that it will embrace a historical study of the different classes of people, crops, livestock and types of farming; the date of introduction, the rate of increase and cause of the decline of each, if such exists. A circular has been issued showing the centers of rural population, and the townships in which increases and decreases have occurred. Another circular gives the centers of agricultural production, the average yield per acre and shows the townships which produce the most wheat, the most corn, the most oats, the most tobacco, the most alfalfa and other data. A study of the reason for these differences will be made and a knowledge of the soil is an essential factor in all such investigations.

Studies of the farm practice problems relating to selected individual crops or enterprises will be taken up. Such a study of alfalfa has already been made, and it was found that the character of the soil is one of the principal factors in determining whether this crop can be grown successfully.

Farm Management Surveys for the purpose of securing all possible information regarding investment, expenses, incomes, enterprises, rotations, types of farming, etc., connected with each farm within an area, which has been selected as typical of larger areas, are being made; more definite information as to the exact cost of the production of farm crops is being secured; studies and reports dealing with the methods of farm practice used on successful farms in the state are being undertaken. All of these studies are of great importance and will be of much value to the farmers of the State, **but you farmers must know whether the soil on the farms upon which such studies are conducted is similar to your own before you can be sure that it will be best for you to adopt the methods found to be most profitable on some other farm.** By a determination and careful description of the soil types of the State we expect to make it possible for every intelligent farmer to know what type or types of soil he has on his place and thus be in a position to use to best advantage the large amount of valuable data which is being secured relating to various kinds of agriculture.

* Proceedings of the American Society of Agronomy, Vol. I, p. 44.

What the Soil Survey Hopes to Accomplish.

There is nothing more vital to the well-being of a nation than agriculture and nothing more vital to agriculture than the soil. Since this is true can there be anything of greater importance than a thorough knowledge of the properties and peculiarities of the numerous types of soils, together with an understanding of the kinds and varieties of crops, the methods of soil management, the system of rotation and farm management, the kind and amount of fertilization, best suited to each individual type.

Don't understand me to claim, gentlemen, that the soil survey will in itself answer all of these questions. We do believe that it is fundamental work in that it will furnish the basis for the various lines of investigation which are necessary to secure this information, and is therefore absolutely essential to a proper solution of these problems. **All these studies must be made from the standpoint of the individual soil type if the best results are to be secured.**

It is not possible for the Experiment Station to conduct experiments on every farm in the State. Such a course is entirely impracticable and unnecessary. We do believe, however, that **studies should be made on all the important soil types so that we may know just what is best for each of these.**

With a central experiment station, sub-stations, county test farms, cooperative experiments with the farmers, and studies of the practices on individual farms a great deal of data, pertaining to the requirements of each particular soil, can be rapidly secured. In fact, a large amount of material has already been acquired.

With the knowledge and careful description of the soils, which will be secured through the soil survey, we will be able, to determine pretty accurately what type of soil occurs on any farm and thus be in a position to give much more definite and positive advice than is now possible. We hope some day to be able to write a prescription to fit your particular conditions, but we must know what those conditions are before this can be done. One of the most important of these local conditions is the soil and a knowledge of this is, therefore, an essential step in the different lines of investigation which may make this possible. This knowledge we expect to secure through the soil survey which we are just beginning. When this survey, and the various lines of investigation with which it is proposed to follow it up and of which it forms the basis are completed, we believe there will have been accomplished something which will be of inestimable value to the farmers of this State, a work which will help Ohio to keep in the very forefront of agricultural production.

POSSIBLE CROP YIELDS IN OHIO.

By C. E. Thorne.

Director Experiment Station, Wooster, O.

Ohio is growing annually about 35 bushels of corn and about 14½ bushels of wheat per acre. This yield of wheat is less than half of that produced in England and but little more than half the yield of France and Germany. Those countries started 200 years ago with a yield smaller than the present yield of Ohio. Even fifty years ago the yield in those countries was not so very much greater than the present Ohio yield, but it has been brought up within the last half century to the present figures largely through the application of scientific methods to the culti-

vation of the soil. That there is no good reason for the present low yield in Ohio has been abundantly proven by the work which is in progress at the Experriment Station.

In selecting land for this Station one farm was chosen which had been in cultivation for three-fourths of a century, the last twenty-five years of that time under tenant husbandry. The farm buildings consisted of a large stone house and an excellent barn, such buildings as made Wayne county famous 25 years ago, and which bore evidence to the fact that the land when first brought under cultivation had responded liberally to treatment; but the land itself, as shown when the Station made its purchase, had been brought down to a very low state of productiveness. Part of this land was an old timothy meadow, which had been cropped and mown until little was left but weeds, and part a wheat stubble which apparently had a similar history. On this land we located an experiment in the cultivation of corn, oats, wheat, clover and timothy in a 5-year rotation, five tracts of land being laid out in tenth-acre plots, each crop being grown every season. In the first table accompanying is shown the arrangement of some of these plots and their average yield per acre for the last 8 years, the experiment having been in progress for 18 years.

TABLE I — Eight-year Average Yields of Crops Grown in 5-year Rotation Yields and Values Per Acre.

	Plot 10 Untreated	Plot 11 Fertilized	Plot 12 Fertilized	Plot 13 Untreated
Corn — bushels	25.9	49.8	49.5	27.1
Oats — bushels	32.3	50.7	48.5	31.9
Wheat — bushels	13.0	31.1	31.2	12.9
Clover — pounds hay	2090.	3986.	4061.	2241.
Timothy — pounds hay	3074.	4543.	4492.	3058.
Average annual value	$11.22	$20.78	$20.63	$11.33
Average annual cost of fertilizer	.....	4.70	6.10	.....
Average annual net value	.....	16.08	14.53	.....
Average annual net gain	.....	4.88	3.20	.....

	Plot 16 Untreated	Plot 17 Fertilized	Plot 18 Manured	Plot 19 Untreated
Corn — bushels	25.2	50.4	58.9	28.4
Oats — bushels	31.0	54.0	46.8	31.9
Wheat — bushels	12.0	28.4	30.2	13.7
Clover — pounds hay	2046.	4000.	5077.	2207.
Timothy — pounds hay	2921.	4274.	5164.	3117.
Average annual value	$10.72	$20.38	$22.65	$11.62
Average annual cost of fertilizer	.....	3.50	1.60	.....
Average annual net value	.....	16.88	21.05	.....
Average annual net gain	.....	6.16	9.43	.....
Net gain per ton of manure	.....	.....	3.44	.....

The plots in these experiments are 16 feet wide by 272 feet long and are separated by paths two feet wide. Every third plot has been left continuously unfertilized and unmanured from the beginning of the experiment; otherwise all have had the same treatment as to drainage and cultivation. The upper part

of the table shows the yields of Plots 10, 11, 12 and 13, Nos. 10 and 13 being unfertilized while Nos. 11 and 12 receive annually a large application of a complete commercial fertilizer, made up of nitrate of soda, acid phosphate and muriate of potash, the fertilizers being distributed over the three cereal crops, while the clover and timothy follow without any treatment. The total cost of the treatment on Plot 11 is $23.50 for each five-year rotation, and that on Plot 12 is $30.50, the increased cost on Plot 12 being due to the use of a larger quantity of nitrate of soda. These applications would be equivalent to an annual expenditure of $4.70 for each of the five years on Plot 11, and $6.10 annually on Plot 12. If we estimate corn at one-half dollar per bushel, oats at one-third of a dollar, wheat at 90 cents and hay at $8.00 per ton, and throw in the extra produce of stover and straw to balance the extra labor of applying the fertilizer and harvesting the additional crops produced, the total annual value of the five crops of the rotation produced on Plot 10 would amount to $11.22 per acre, and that on Plot 13 to $11.33, while the values on Plots 11 and 12 would amount to $20.78 and $20.63 respectively. Deducting from these the cost of the fertilizer, we have a net value of $16.08 on Plot 11, and $14.53 on Plot 12. Subtracting from these the value of the produce grown on the unfertilized plots alongside, we have a net annual gain of $4.88 on Plot 11, and $3.20 on Plot 12.

The experiment indicates that we have used nitrogen excessively on Plot 12, and in order to study this point further we have four more plots, 16, 17, 18 and 19. Plots 16 and 19, like 10 and 13, have been left continuously unfertilized, while 17 receives a fertilizer carrying half the quantity of nitrogen given to Plot 11 and about 50% more phosphorus, and 18 receives for every 5-year period 16 tons of open yard manure — 8 tons each on corn and wheat. The outcome is that for the 8 years under consideration the value of the crops grown on Plot 16 has amounted to $10.72, and on Plot 13, to $11.62, while those grown on Plot 17 have amounted to $20.38, or only 40 cents less than on Plot 11, and the manured plot has yielded an average value of $22.65. The fertilizers applied to Plot 17 have cost $3.50 annually, leaving a net value of $16.88, or a net gain over the unfertilized plot of $6.16; that is, this combination of fertilizing materials applied to Plot 17, at a cost of $17.50 for every 5-year period, or $3.50 annually, has been paid for in the increase of crop with an average profit over and above its cost of more than $6.00. Taking the manured plot and deducting $1.60 to balance the extra labor of hauling and distributing the manure over and above the cost of applying the fertilizer, we have a net gain per acre each year of $9.43, or a total net gain of $46.00 for the 5-year period, to pay for 16 tons of manure, which amounts to nearly $3.50 for each ton of manure.

The yields on the unfertilized plots in this experiment, for the period under review, have been for corn less by about ten bushels per acre, and for wheat less by about five bushels than the yields over Wayne county, thus showing that the land under experiment is not above the average of Wayne county in natural fertility; while the fertilized and manured yields in this test have been about 15 bushels per acre for corn and nearly as many bushels for wheat above the average yields of the county. It will be seen therefore that on this very thin land we have been able to bring up the yields of wheat to figures equal to the European yields I have mentioned, and to do this by methods which have left a net gain over and above the cost of treatment sufficient to pay a good rental on the land.

As I have stated, the manure used in this experiment has been open-yard manure, which has been exposed to the weather for from 4 to 6 months before applying to the land. We have believed from the start that such manure had lost much of its value, but we wished to see what could be done with the ordinary barnyard manure of the average Ohio farm. Another experiment, however, is in progress at the Station, in which we are endeavoring to learn something as

to the loss which manure suffers when exposed in the open barnyard. This experiment is on the same farm as the one just described, and is conducted on the same general plan. In this experiment only three crops are grown in rotation — corn, wheat and clover — and the manure is all applied to the clover sod during the winter and spring, and plowed under for corn, the manure being used uniformly at the rate of 8 tons per acre. Plots 14 and 17 in this test have been continuously unmanured, while Plot 15 has received manure which has lain in the barnyard during winter, exposed to the weather, and has been hauled out and spread on the land in April, and Plot 16 has received manure which has been taken directly from the barn to the field, and during later years spread early in the winter and allowed to lie until spring when all is plowed under together.

TABLE 2—Fourteen-year Average Yields of Crops Grown *in* 3-year Rotation. Yields and Values Per Acre.

	Plot 14 Untreated.	Plot 15 Manured.	Plot 16 Manured.	Plot 17 Untreated.
Corn, bushels	30.5	50.6	57.7	35.9
Wheat, bushels	10.7	20.1	21.6	11.2
Clover, pounds hay	2165.	3060.	3769.	2437.
Average annual value	$11.19	$18.54	$21.13	$12.58
Average annual gain per acre	.....	7.35	9.55	.....
Average annual gain per ton manure	.....	2.75	3.20	.....

	Plot 4 Untreated.	Plot 5 Manured.	Plot 6 Manured.	Plot 7 Untreated.
Corn, bushels	45.3	66.0	67.5	52.3
Wheat, bushels	10.3	20.4	20.6	10.1
Clover, pounds hay	2295.	3236.	3557.	2292.
Average annual value	$11.33	$23.17	$25.00	$10.85
Average annual gain per acre	.....	11.04	13.35	.....
Average annual gain per ton manure	.....	4.13	5.00	.....

Table 2 gives some of the results of this test, and shows that in this test the untreated yields have been practically the same as in the one previously described. The total annual value on Plot 14 has amounted to $11.19, while that on Plot 17, also unmanured, has amounted to $12.58, thus showing a slightly greater irregularity between the untreated plots than in the other experiment. Compared with these values the crops grown on Plot 15 under yard manure have given an average value of $18.54, and those on Plot 16 under fresh manure, of $21.13, leaving an annual gain per acre for the yard manure of $7.35, and for the fresh manure of $9.55, or $2.75 for each ton of yard manure, and $3.20 for each ton of fresh manure. On Plots 5 and 6 in this test the same quantities of the same kinds of manure have been used, with the difference that this manure has been dusted with acid phosphate before application to the land, using the phosphate at the rate of 40 pounds to the ton of manure, the phosphate being thoroughly mixed with the manure before the latter has been applied to the land.

Plots 4 and 7, it will be observed, have yielded a value of $11.33, and $10.85, or practically $11 per acre; while Plot 5 has given a total value of $23.17 and

Plot 6 of $25. After deducting the cost of the phosphate the net gain per acre in this case has been $4.13 for each ton of yard manure, and $5.00 for each ton of fresh manure, using the valuations previously employed.

These experiments have been made on small plots of land and the question has been raised whether it would be possible to obtain such yields on large fields. In order to test this matter an experiment was begun eight years ago on four ten-acre fields which have been growing corn, oats, wheat and clover in a 4-year rotation over the same period as the fertilizer experiment first described. The soil lies on the same formation, and probably originally with almost identical natural fertility, but the farm on which this experiment is located had been better handled than the other, and it came to us in a somewhat higher condition.

In the treatment of these fields we have aimed to combine the lessons learned from the small plots, and our system has been to apply to the clover sod during fall and winter a dressing of about 8 to 10 tons of manure per acre, the manure being reenforced by phosphate during accumulation, the phosphate being used either in the form of acid phosphate, or raw phosphate rock, at the rate of about 40 pounds per ton of manure, or one pound per 1,000-pound animal per day. The manure has been plowed under in the spring and the land dressed with lime, our experiments having shown that the use of lime on this land is absolutely necessary to the growth of clover as well as to the best yields of other crops. The lime has been used at the rate of one ton of quicklime or two tons of ground limestone per acre, the ground limestone being used during recent years. The oats has received no treatment, but the wheat has received 400 pounds per acre of a fertilizer similar in composition to the one used on Plot 17 in the experiment first described. The outcome has been an 8-year average yield of corn of 77 bushels per acre, followed by 60 bushels of oats, 36 bushels of wheat and nearly three tons and a half of clover hay, yields probably greater than would have been attained had the land been treated like that on the first farm, by about 47 bushels of corn, 28 of oats, 23 of wheat and two and one-third tons of hay. The annual value of this increase has amounted to $18 per acre, the cost of liming and fertilizing has amounted to $3.50 annually, or $14 for every four-year rotation. The net gain per acre has therefore been over $14, after paying for the lime and fertilizer, a gain equivalent to more than $5.00 for each ton of manure. This outcome shows that we have been able to secure very materially better results on these 10-acre fields than we have reached on the small plots in our special tests, and the reason is simply this — that in our plot work each plot is set to answer one question only, whereas in this field work we have combined the answers from a multitude of plots and put them into practice in general field culture.

I wish to call special attention to the fact that in this field work our 8-year average of wheat is far ahead of that of the general average of any of the European countries named. This average has been attained on land that is not above the average of the county in which the farm is located, in natural fertility, and I believe there is no sound reason why an average closely approaching this may not be attained over a large portion of Ohio. Of course this yield is obtained on land that has been thoroughly drained and subjected to systematic rotation of crops, as well as to a treatment planned and executed in the light of modern science; but the methods by which it has been obtained are applicable to every farm in Ohio, and capable of being employed by every farmer, and there are farmers over the state who are beginning to put these methods into practice.

As I have already said, each of the acres which is giving us 30 bushels of corn and 10 to 13 bushels of wheat is receiving just as much labor in the way of drainage and cultivation, and just as much seed, as the acre which is giving us 77 bushels of corn and 36 bushels of wheat. The only difference between the two is in the manuring and fertilizing; or in other words, the only difference is in the amount of intelligent thought given to the work.