GREETING

THE photographic story or resumé of the work of the Ohio Station, as tersely embodied in this pamphlet, is presented not alone as a quarter-centennial anniversary souvenir of this Institution; it is designed more particularly to serve as a medium through which every citizen of Ohio, who is in any measure identified with or interested in the tilling of the soil, may gain a comprehensive idea of the general character and scope of the scientific work in agriculture of the Station. It is hoped that the interest which, with pen and camera, may be awakened or intensified in the mind of the reader, may be suggestive of a closer relationship between the individual and the institution; that there may result a determination to enjoy, and profit by, a personal visit to the Experiment Station at Wooster. Only by such a visit may one become most intimately acquainted with the Station's scientific and practical workers, from whom a hearty welcome may confidently be expected at all times.

It is, indeed, exceedingly gratifying to note that in greater and greater numbers annually, do our people come to the Station: singly or in company with one or more friends; in separate families or family reunions; in farmers' clubs or Sunday School picnics; in Grange excursions or various other associations and conventions. Yet, notwithstanding this rapid increase, it is evident that there are many who, through circumstances beyond their control, are denied a personal visit. This thought has been a constant inspiration in the endeavor to faithfully portray a number of views and features of actual work, as they may be seen by the guest of the Station.
A BIT OF HISTORY.

The Ohio Agricultural Experiment Station was organized under an act of the General Assembly of Ohio, passed April 17, 1882, and supplemented by two acts of Congress, approved March 2, 1887, and March 16, 1906.

The plan of creating an institution for research and experiment in agriculture originated in a farmers' club in Germany. In 1851 this little group of studious, enthusiastic and enterprising tillers of the soil equipped and financed a small experiment farm at Moeckern, near Leipsic, until such time might come when government aid could be secured.

Ohio was the fifth state to establish an experiment station in our country, having been preceded by Connecticut, North Carolina, New Jersey and New York, in the order named.

The initial appropriation of money for the organization of the Ohio Station was insufficient to permit the purchase of land or an independent equipment. As had been anticipated when the creative law was passed, there was perfected an agreement between the Board of Trustees of the Ohio State University and the newly appointed Board of Control of the Experiment Station, under which thirty acres of the University farm were assigned to the use of the Station and small offices were fitted up for Station use in one of the University buildings. Actual work was at once begun.

The Station's property at this time, 1882, consisted only of various collections of illustrative materials, microscopes, seed-testers, weighing apparatus and the plainest, least expensive office furniture. There were no books except its own records and a few agricultural reports.

By paying a part of the salary of a competent agricultural chemist employed by the University, the Station was privileged to a part of his time. Chemical work was necessarily done with University apparatus.

The Station was allowed the use of a team of horses and such implements and tools, belonging to the University, as were needful in field work. For the use of these, all produce not used for seed and museum purposes was turned over to the University.

Notwithstanding the limitations with which the newly established Station was hedged about in its early years; the many needs which the state appropriations were inadequate to supply, and the ceaseless care and thought required to obtain results from the
resources available, the persistent endeavor of the officers and their small force of workmen accomplished much good and merited the rapidly increasing interest and appreciation of the farmers and home owners of the state. Many helpful bulletins were prepared, these being designed more especially for publication in the newspapers—the most available medium through which, at that time, the results of the Station’s work could be given wide and generous circulation.

In 1888 the Station was reorganized under the national experiment station law, known as the Hatch Act, passed in 1887. This rendered possible enlargement and extension of the work in the several departments.

Practically all of the tillable land of the University farm was now placed at the Station’s disposal without rent. There were, however, numerous obstacles in the way of continuing experimental work on this farm. Of the actual area of 165 acres eventually occupied by the Station about 100 acres were fertile, “first bottom” land, bordering the channel of the Olentangy river. This land was subject to overflows which were very disastrous to the Station’s work—many experiments being wholly destroyed, while others were rendered undependable. Attempts had been made to protect the land by dikes, but these were destroyed by high waters. The repair of these, it was estimated, would cost fully as much as a farm of 200 acres elsewhere. Nor was the rich, level, river-bottom land fairly representative of a considerable proportion of Ohio soils. The more elevated ground was but 15 to 30 feet higher than the bottom level. Moreover, the farm was situated entirely within the corporate limits of Columbus. Streets were being surveyed and opened and sewers constructed across and lengthwise of the tract, rendering much of the ground unsuited to experimental work.

Inasmuch as only in the continuity of experimental work on the same ground year after year exists the greatest value and dependence, it was decided by the Board of Control to request the Legislature to authorize the removal of the Station to a more suitable location. This authority was granted through an act empowering the various counties of the state to raise funds by special taxation, approved by a majority vote of the citizens, such a fund to be donated to the Station for the purchase of land in the county, and for the erection of suitable buildings. Wayne, Clark and Warren counties proposed donations of $85,000, $75,000 and $40,000, respectively. A careful consideration of the matter from all standpoints prompted the acceptance of Wayne county’s proposition, and a location one mile south of the city of Wooster was chosen.
The new site, 470 acres in extent, is admirably adapted to the needs of the Station. There are considerable areas of soil of quite uniform character, physically. Much of the ground has suffered from exhaustive cropping, affording opportunity to demonstrate the practicability of soil improvement by systematic fertilization and rotation of crops.

The transfer of the Station from Columbus to Wooster was effected during the spring and summer of 1892. Temporary office rooms were secured in Wooster until the necessary buildings could be erected on the Station farm. The greenhouses with their heating plant or boiler house were erected during this year.

In 1893 a complete drainage system was installed in the fields designed for plot work. Twenty-six miles of tile were laid in this system. In this year, also, were extensive orchard plantings made. A sufficient appropriation was secured to allow of the erection of the dairy barn in 1894. The main or administration building was begun in 1895 by the construction of a “wing” to be used as a chemical laboratory. The work was continued in 1896 by the beginning of the main structure, of which the previously completed “wing” became a part. The greater portion of the building material was supplied by a quarry of stone of excellent quality found on the farm. The administration building was finished in May, 1897, and dedicated with appropriate ceremonies on June 3, of the same year.

Thus do we find the Ohio Station, at the age of fifteen years, established on broad acres and in a beautiful, substantial home—all its own. But, as with the founding of a private home by a builder of limited resources, the completion of the building was but the beginning of home making. The location, beautiful as it was naturally, or as found when the farm was purchased—elevated, with its sweeping view of miles of undulating, fertile, well-kept farm lands upon every hand, its view of plain, dale and city—was in itself barren of trees. The sharp architectural lines and angles of the buildings lacked the softening and refining touch which only Nature’s green foliage in vine and plant can bestow. The intersections, curves and divergences of newly made walks and driveways were as yet unmarked and unflanked by ornamental shrubs or borders of flowering and foliage plants.

The work of improvement and addition, both in building and planting, has been gradually and steadily progressing as the seasons have passed. There is yet much to be accomplished; but the object lesson thus afforded by development of the attractiveness and homeliness of our Station, should be strikingly suggestive of what may be done, on a smaller scale, perhaps, in connection with the country, city and village home.
In addition to the Wooster farm, the Station also owns 300 acres at Carpenter, Meigs county, and leases 185 acres at Strongsville in Cuyahoga county, and 53 acres at Germantown, Montgomery county. This enables the Station to carry its work into widely separated districts of the state. The cold, tenacious clay of the level land in Cuyahoga county is very different from the lighter, warmer and widely diversified soils among the steep hills of Meigs county in southern Ohio, while in both of these sections soil conditions are different from those prevailing on the gently rolling land in Wayne county.

It is, therefore, to this, our own Ohio Experiment Station, as it is passing its quarter-century milestone of scientific and practical service in Agriculture, that the reader's attention and thought are kindly directed in the pages which follow. It is sincerely hoped that the closer relationship which may thus be promoted between the Ohio citizen and the Institution which he should feel is peculiarly his own, may be the beginning of mutual and lasting helpfulness.
THE DEPARTMENT OF ADMINISTRATION.

The work of the Station is divided into ten separate sub-departments. These, as a group, are under one—the Department of Administration—at the head of which is the chief executive or director of the Station.

The various Departments of Station work, named in alphabetical order, are Agronomy, Animal Husbandry, Botany, Chemistry, Co-operative Experiments, Entomology, Forestry, Horticulture, Nutrition and Soils. Each of these departments is under the supervision of a chief who is a specialist in his particular division of Agriculture.

Each chief has one or more assistants, also of special training and competent to perform office duty and to superintend the field work of the Department under which they serve. Under the assistant or assistants is a foreman in each Department, who, in turn, has charge of the manual labor.

Members of the Station Staff, 1907.

The scientific staff of the Station numbers about 25 persons. The clerical force, foremen, helpers and field workmen bring the entire Station force up to 70 persons during the winter, and to 100 or more during the summer.

The Administration Building was designed to afford office rooms for the several Departments and did so for a number of years; but it has become inadequate to accommodate all. Five offices and a second chemical laboratory for special work are located in an adjacent and recently enlarged building. The offices are all
similar in general plan and furnishings, being equipped with bookcases for department libraries, cabinet letter files, desks and typewriters. These offices also have telephonic connection each with the other, and with the local exchange at Wooster and with the U. S. Long Distance system, bringing the Station within conversational touch of every section of Ohio, as well as with neighboring states.

All mail received at the Station is handled by one person whose duty it is to assort, classify and distribute it among the different Department baskets in the Station mail cabinet. This system at once places all letters of inquiry pertaining to definite subjects in the hands of specialists in the various departments, who promptly make reply by mail, directly to the correspondents. All executive correspondence and letters pertaining to Station business in general are answered from the offices of the Director or the Bursar.

The Station Library now contains about 3,300 volumes, while constant additions are fast rendering the present library apartment inadequate in capacity. About sixty different periodicals, including news and farm papers and magazines, are received at the Station. Many of these publications are filed for reference by the Librarian, who also receives all new books, which are at once stamped, numbered consecutively, recorded and classified according to subject.

The Station is equipped with its own printing outfit, and a dozen persons are constantly employed in printing and mailing its bulletins, which are sent without charge to any person interested in agriculture who expresses a desire to receive them. The printing, with paper storage, etc., occupies the larger part of the basement of the main building.
During the two years, 1905-1906, 20 bulletins, embodying 602 pages of printed matter, were turned out by the Station Printing Division. The total number of copies in the original editions of these was 674,000, requiring for completion 4,053,000 impressions. During the same years 448,500 copies of 26 separate circulars and 35,200 copies of 14 different press bulletins were issued. In addition to this great quantity of new matter turned from the press, there were reprinted 35,000 copies of 10 separate bulletins.

The mailing of an edition of over 30,000 copies of a bulletin is by no means a light task; but here, too, improved machinery has greatly lessened the time and labor required. The names composing the mailing list are cut, by a special machine, in small, metal-bound stencils of hard manila paper. These stencils are filed, in alphabetical order, in small, special racks or cages.

The bulletins are addressed by use of another special machine—a companion-piece to the stencil-cutting machine—through which the stencils are automatically fed as the names are stamped on the bulletins or wrappers. As the stencils pass the stamping device they drop, in regular, alphabetical order, into their special rack or case, thus being filed away as before, ready for the next edition.
On the second floor of the Administration Building there is a hall which, by means of its equipment of folding chairs, can be quickly converted into an assembly room or auditorium for the convenience of various agricultural meetings which may be held at the Station. In inclement weather this hall has served both as dining room and auditorium to visiting-picnicking farmers' conventions.

From the tower of the Administration Building the visitor may be made familiar with the extent, topography and general plan of the entire Station farm, and at the same time may look upon one of the most charming rural landscapes to be seen in Ohio. This part of Wayne county abounds in grand, sweeping and remarkably distant views of wondrous beauty, as seen even from natural elevations; but from the tower of the Main Building on "Madison Hill" the views, upon every hand, are beautiful and interesting in the extreme, so much so that they are worthy of brief description:

Standing upon the summit of the tower one may look down upon the Campus, spread as a map below; upon the curving drive-ways and walks; the beds of richly colored flowers and bedding-plants; the groups, borders and screens of evergreens and shubbery; the groves of young forest trees. To the eastward, at different distances, are three groups of Station barn buildings beyond which, half a mile away and the last of a series of interesting farm pictures, a range of plots stands out in bold relief against the dark background of Station woodland. Above and beyond all the vision is lost in the hazy distance of undulating field and shadowy forest.

Looking toward the south and south-east the visitor sees the principal plot field, in which is conducted a four-year rotation of farm crops on four sections of ten acres each—each section being divided into 90 tenth-acre plots. Still farther toward the south-east, nearly a mile distant and slightly overtopping an intervening block of forest, may be seen the roofs of the dwelling and farm buildings at the South Farm, where the orchards and garden are located. Directly south, beyond the limits of the Station farm, the eye again wanders over a country which becomes more and more broken and hilly as the southern horizon is approached. Down the valley of the Killbuck, extending toward the southwest, may be seen approaching and departing trains on the P. Ft. W. & C. R. R., over nearly the entire distance between Wooster and Shreve, 10 miles distant. Far toward the north-west extends the upper and marshy valley of the Killbuck, which, in seasons of high waters,
assumes the character of an extensive lake. Above and beyond the valley the eye traces the forest bordered horizon to points 8 to 10 miles distant. To the northward, across the intervening valley of Apple Creek, there is encountered an excellent birds-eye view of the city of Wooster, beyond which, on the brow of the high land, facing the Station and about two miles distant, are the imposing buildings of Wooster University.

With this brief survey, within and from the Station's central figure, the Administration Building, let us take up, more in detail, though as tersely as may be, the more important details of service in the various individual departments in field, laboratory, office and work-room.

THE DEPARTMENT OF AGRONOMY.

The Department of Agronomy is devoted to experiments with different species and varieties of cereals, forage plants and legumes; to comparisons of different rates and dates of seeding and methods of culture of the various farm crops, and to extensive work in plant breeding, with view to the production of new varieties of superior merit or to the development of improved strains of the more excellent varieties already existing.

In scope of service; in working force and equipment, and in area of ground occupied, the position of this Department of Station work is approached only by the work of the Department of Soils, with which it is quite closely indentified in various ways.

Many varieties of corn are tested annually—the list embracing a number of well known sorts of widely acknowledged merit. Recognizing the fundamental truth that there exist distinct variations in different individual plants of the same variety; that variations, as definite individual characteristics are inherent; and that, barring accidental variations, such characteristics may reasonably be expected to recur in consecutive generations, particular attention is given to discovering the superior strains of our standard varieties of corn and separating them from those of lesser
merit, by the ear-row breeding work. Well marked and valuable results have already been attained by this most interesting system of corn breeding. It has been shown that a particular ear of corn from among many ears of the same variety may possess an inherent power to transmit to its offspring—to the plants grown from its grains—a distinct character of prolificacy—a tendency to produce heavy grain in abundant quantity. Another ear of corn of the same variety and from the same lot, which may, from superficial appearance, seem to be equal or superior to the first, may prove to possess a character of weakness in point of prolificacy—a lack of power to produce heavily and abundantly. It has been demonstrated that a particular strain of a certain variety of corn produces strong, stiff plants or stalks well able to support their weight of grain and forage, while a different strain of the same variety produces stalks so deficient in strength and rigidity as to almost invariably break or fall under the weight of grain, or as a result of wind or excessive rainfall. Likewise it has been noted that one strain of a variety of corn will produce its ears of grain at a great height from the ground, while another type of the same variety possesses the desirable habit of bearing the ears uniformly at a much lower elevation.

It is therefore clearly apparent that the skillful corn breeder occupies a most fertile, promising and important field of experimental work. The discovery, perpetuation and multiplication of a strain or type of corn, even of a well known and widely grown variety, which proves unmistakably to possess, as an inherent quality, a single point of superiority above the ordinary type of the same variety, may mean millions of dollars in money to the corn growers of our own and other states.
It is the process of "trying out" these prizes which nature holds in reserve for the earnest and diligent corn breeder, and the subsequent mating of the "banner" ears in the isolated breeding plots, in which the Department of Agronomy is studiously engaged at the present time.

Prospective visitors inquiring at what particular season of the year the Station farm may be seen at its best, are almost invariably advised to come during late June or early July. While it is true that all departments present exhibits of particular interest and attractiveness at this time, it is the work of the Department of Agronomy supplemented by that of Soils, which affords the crowning feature of the season. It is during this period that the great sections of plots of many varieties of wheat are approaching the harvest. Each variety, according to its natural characteristics or season of maturity, presents its own peculiar shading of color, ranging from glaucous or light green through the various tints of yellow and gold and amber to brown, yet all blending these tints harmoniously in a rippling, waving field of marvellous beauty. The oats and corn, in similar plots, present great blocks and fields of brightest green, while plots and blocks of native and foreign forage and leguminous plants and green bordered, closely-mown driveways carpet and divide the farm from boundary to boundary, with patterns of ever changing form and color, as the visitor passes along.

Individuality in Alfalfa.
Strains descended from single plants showing:

A low proportion of leaves.

A high proportion of leaves.
The character of the experimental work with wheat and oats is the testing of such varieties as may be found in our own and other countries, as well as propagation, in the breeding plot, of individual plants possessing points of superiority. A study is also being made of the relation of mechanical grading of seed, rate of seeding, and time and method of seeding to yield. The plan of clipping back oats, as a preventive of lodging, is being tested.

Of experiments with legumes the work with alfalfa is quite extensive at the present time. Cultural tests are being conducted to learn the better methods of seeding, including the use of nurse-crops; the best crop to precede alfalfa and time and rate of seeding.

Alfalfa breeding work is also a prominent feature of experiment. Twenty-five different strains, gathered from various parts of the world, are being used as a basis. The plants of these strains are grown in nursery rows, 2 ft. by 2 ft. apart, affording about 7000 individual plants from which selections have been and are being made, for plant-row tests. The more excellent individuals are being used as mother plants, a row (with duplicate) being planted from the seed of each.

![The alfalfa nursery.](image)

Work with clover is very similar to that being conducted with alfalfa. With both the hope is that, by starting with individual plants which have proved their superiority, new strains may be developed which will be hardier, have a larger proportion of leaves and be more prolific in seed-bearing than anything we now have.
The work with soy beans includes the testing of existing varieties and those being from time to time developed by breeding work which is conducted as with alfalfa and clover. Rate of seeding and plant-row testing are subjects of experiment.

Tests are made each year with a large number of more or less commonly grown forage crops.

In all cereal and forage crop work the object is not only to develop valuable strains for use in Ohio, but to discover principles which may be of use in seed selection and to work out the most satisfactory methods for carrying on plant breeding work.
The Dairy Barn.

A frosty morning in December.

THE DEPARTMENT OF ANIMAL HUSBANDRY.

The Department of Animal Husbandry, formerly conducted as a division of the Department of Agriculture, was, in 1905, placed upon a separate basis. Succeeding years have marked substantial progress in the development of this broadly important branch of agriculture. Experiments with sheep and swine were added to the former lines of dairying and stock feeding, which are still being carried forward.

A great deal of interest, even among those who are engaged in different phases of farm work, usually centers in dairy work and the dairy herd. In this Division of Animal Husbandry plans for enlargement of scope and modernization of equipment are contemplated, as rapidly as the means at command will allow. Feeding experiments, designed to study the relative efficiency of different rations in milk production, have been features of the work. records
being carefully kept of the character and amount of food consumed and the weight of milk and percentage of butter fat produced by each individual of the herd. By the use of a separator the cream from the milk product of the Station herd is daily placed upon the market, while the skim milk becomes an important factor in pig feeding experiments.

The raising of calves both for breeding herd and for veal, on a ration in which skim milk is a prominent element, is also being studied.

More and more attention is being directed to a practical as well as scientific consideration of inherited characteristics of greater or lesser degrees of excellence in animals. In no branch of animal husbandry do these recognized variations in the individual become a greater factor in profit or loss, than in the dairy animal. Individuality in dairy cows is a subject of present departmental study at the Station.

Long time feeding experiments with dairy cows, and experiments in breeding and management are contemplated for the future.

The feeding of beef cattle has also been a subject of study. The feeding stock is composed of animals reared at the Station farm, together with stock purchased on the Chicago market. The Angus breed is largely used in the feeding experiments. Rations for beef animals and the cost of beef production in animals of different ages are being studied. As with dairy animals, the subject of inheritance of special characteristic receives consideration; in this case the capacity for meat production being of major importance.
Experiments with sheep are being conducted at the Carpenter Test-farm in which section of Ohio conditions are very favorable for this branch of animal husbandry.

Tobacco as a means of combating internal parasites of sheep is being tested and an extensive study of the subject is contemplated in the near future. Production of early spring lambs will also be taken up, as well as experiments in growing forage crops for sheep in southern Ohio.

Ready for dinner.

The study of rations for fattening lambs has been carried on co-operatively by this Department, on the farm of Mr. S. J. Fryer, near Big Prairie, west of Wooster. Results achieved in the initial experiments have been published in Bulletins 179 and 187.

With swine, as with beef cattle, the comparison of rations for growth and fattening, and the cost of production of meat at various ages, are subjects of experiments. Inbreeding and inheritance of special capacity for meat production will be studied. Supplemental feeds and feeding of hogs in connection with cattle is of interest to cattle men as well as pork producers. Experiments along this line are being worked out at the Station.
Rations for work horses is a subject under investigation in co-operation with the Department of Agronomy, while the relations of animal husbandry to the maintenance of soil fertility is a matter of import by no means overlooked nor underestimated in this Department.

The Department of Botany and Plant Pathology embraces a class of work which is largely technical. Many duties of an advisory or special nature are demanded from various districts of Ohio, which, when problems call for personal investigation of an expert, are visited by a representative of the Department.

The Department's office and laboratory, including the herbarium, are on the second floor of the Administration building; its greenhouse (Pathologium) in the Biological building. The investigations conducted include the following lines:

I Plant Diseases, their special parasites and their prevention.
II Plant Breeding, including tobacco and a long series of wheat, oats and corn hybrids; also of filler tobacco hybrids and selections.
III Identification of weeds and a study of methods for their destruction.
IV The examination of clover, alfalfa, grass and other seeds for purity and germination, as well as for the diseases likely to be carried within and upon such seeds. This work is done, in part, in the laboratory and greenhouse of the Department, and, in part, in the field. The nature of the work of seed examination requires that it become a special feature during winter and early spring.

More in detail the work of the Department may be described as follows:

**Plant Diseases—their study and prevention**—Plant diseases infect all crops in increasing degree and demand special studies which extend over the whole of Ohio. In the laboratory, in addition to the microscopic examination of specimens, etc., culture tubes and flat dishes of glass are sterilized in a hot-air oven, filled with culture media of different kinds, and again sterilized each of three succeeding days in the autoclave. These sterile cultures are then inoculated with material from diseased seeds, fruits, leaves, roots or plants, and the cultures are grown in thermostats or in the large culture chamber designed especially to accommodate the large amount of such work now being carried forward with diseases of wheat, oats, clover and alfalfa. Some fungus cultures are seen to arise from within kernels of wheat and oats even after the external fungi have been killed by treatment with corrosive sublimate.

The cultures from the tubes and dishes (or plates) are inoculated into healthy plants by means of a sterile needle, or sprayed upon them by an atomizer, and the true relation of the particular fungus or bacterium to the suspected disease determined. Washings from seed oats or wheat may be examined in the centrifuge, where the spores are readily separated.
In the Botanical Laboratory

Culture chamber.

Thermostats.
Seeds of wheat and oats, as well as seeds of other crops, are treated for seed infesting diseases of which the number now appears to be very great. Plantings of specially treated wheat, oats, clover and alfalfa seeds have been made on the Station grounds, in co-operation with the Department of Agronomy. The particular diseases of wheat and oats under observance are, for wheat: loose and stinking smut; for oats: loose smut and leaf blight.

Clover, alfalfa and oat seed, treated, are sown in continuous oat and wheat plots as well as in rotation wheat field, to study the diseases which appear to pass from oats and wheat to the clovers.

A special culture cage of glass is used in the pathologium to facilitate the study of diseases, in wheat plants, that come from infested seed. The plants are grown in this cage free from outside infection.

Other special work in plant disease includes, each year, co-operative spraying experiments in orchards for fruit diseases; spraying potatoes and tomatoes for late blight and leaf spot, and work with greenhouse owners in treating their soils to kill soil infesting parasites where lettuce, tomatoes, cucumbers, etc. are grown under glass. The soil of tobacco plant-beds is also treated to destroy fungi which attack the young tobacco plants and destroy them.
The study of onion smudge and the rotting of onions in storage, especially in the Hardin county marshes, is also under way.

**Tobacco Hybrids**—The production of new varieties of tobacco by hand crossing, chiefly in the filler tobacco district and at the Southwestern test-farm at Germantown, Montgomery county, is conducted by this Department. The new varieties thus originating are recorded by numbers and are grown in comparison with the standard varieties of the district. The seed of each hybrid and variety is saved under bag and thus kept pure. These hybrids promise to be of better quality than Zimmer Spanish and are yielding more per acre. A very large number of these tobacco hybrids have been made and are being carefully tested out each year by making smoking tests in co-operation with the Bureau of Plant Industry, U. S. Department of Agriculture, of the leaves of the seed plants, before the seed is sown for the next year's crop. Those especially interested in tobacco work are invited to visit the Test-farm above named.

Wheat hybrids—Much work has also been done in crossing varieties of wheat, oats and corn, in order to produce varieties more resistant to disease. Such varieties, when sufficiently established, are planted in the general variety plots, where they are designated by the plot stakes.

Station collection of plants and seeds—The Herbarium of the Station, containing specimens of plants and plant diseases, as well as the seed collections of the Department, are found in the Botanist's office. The Herbarium is used to identify specimens of plants sent to the Station for that purpose; the seed collections to distinguish the various foreign weed seeds that occur in clover or alfalfa seed, or in timothy or other grass seeds.
Samples of forage plants commonly grown in Ohio, including alfalfa, are sent to the Station in great numbers and are examined. It is often necessary to identify seeds of plants that do not commonly grow with us, but which do flourish in the region of Europe or Asia where the seed was grown.

How to have weeds named—Visitors who desire to bring specimens of weeds to be named, will do well to collect a good specimen showing flower, seed and leaves with root if possible. Upon arrival at the Station these may be left at the point of reception, with a card attached, or may be brought directly to the office of the Botanist where attention will be given to their naming. Specimens may also be sent by mail at any time.

Bulletin No. 175, “A Second Ohio Weed Manual” is always available upon application for it.

THE DEPARTMENT OF CHEMISTRY.

THE DEPARTMENT OF CHEMISTRY is closely identified in its work with the operations of almost every other department of the Station. The greater part of this work, however, is in connection with the Departments of Agronomy, Co-operative Experiments and Soils.

The Department is called upon to perform large numbers of necessary analyses of grains, forage crops and manures for these other departments. Soil investigations, which are being carried on in connection with soil fertility work, include analyses of soils from the plots upon which experiments are being conducted on the farm of the Station and the grounds of the various Sub-stations, as well as from various sections of the state.

The purpose of the soil work is to determine the effect of various added mineral fertilizers, lime and farm manures, on the soil constituents, and the changes consequent to the growing of crops, both by continuous cropping and various rotations.

Investigations on the composition of barnyard manure, as affected by different treatments and methods of handling will be continued.
A study of the composition of the various crops grown on soils treated with different amounts and carriers of plant food, will be pursued still further.

There will also be determination, extending over a period of years, of the amounts of nitrogen in the form of ammonia and nitrates, carried down by the rainfall.

The laboratory force of workers has been doubled in late years, but the work of this Department has so greatly increased that its capacity is at times demanded to the limit.
The Department of Cooperative Experiments was organized in 1904. The purpose of the Department is to widely disseminate among the farmers of Ohio the practical benefits of scientific experiments in agriculture, as conducted at the Station, and to encourage the testing, on the farmer's own soils, of almost any crop or method being tested at the Station. This presentation of advanced ideas in farm practice, at widely distributed points in the state, is effected by the most convincing means possible to employ—actual demonstration in the field, the orchard, the dairy or the garden. New methods, appliances and varieties are carried to the very farm threshold—even in the more remote corners of Ohio—where wide-awake agriculturists are enthusiastically availing themselves of the opportunities thus extended to them, and proving to themselves and to their neighbors, with what increased profit and interest and pleasure the cream of results of modern experimental work may be utilized on the private farm.

In the office of the Experimentalist.
Materials for tests on the private farm are, as a rule, furnished to the experimenter at no other cost than an agreement to faithfully follow the clearly laid down planting and cultural instructions, and to return to the Department carefully and seasonably made notes and figures as to growth, maturity, yields and quality of products grown. The crops, including standard, and many times, new and valuable varieties, belong to the experimenter who may not only profit in an educational way by the experience in producing these under the direction of the Department, but by introducing new blood, new life and new interests which abide with him on his farm, and which cannot but create desire for like improvement through-out his neighborhood.

Some twenty lines of work have been taken up by the Co-operative Departments, and others are being added from time to time as additional subjects promise sufficient general interest to justify. Principal among the experiments now being promoted are: Corn, wheat, alfalfa, timothy, potatoes, forestry, fertilizers, lime, potato spraying, plant breeding and farm management.

The list of correspondents of the Department has already grown to more than 4,500, while the number of active Co-operators is above 1,700. In the year 1907 alone, 795 Co-operators were distributed over 87 of the 88 counties of the state; two-thirds of these conducted the large plot tests.

A propitious beginning has been made in co-operation with different County Farms of the state, the Department having established forestry work at Medina county and farm crops at Coshocton, Hardin, Hancock, Paulding and Clinton counties.

Farm management is a division of co-operative work which has sprung into popularity within the past two years. Already over twenty farmer co-operators report, in detail, every half hour of time devoted to their work. Every cent of money expended on their farms or received as income therefrom, is faithfully reported in order that the Department may know the cost of every operation on every crop or project in each field on the farm, as well as the net profit accruing from each and from the farm as a whole. There are also more than a half-hundred dairymen similarly reporting to the Department the quantity of milk and amount of butter produced by 600 cows, together with statements of the approximate amount of feed consumed by each animal. It is desired to enlarge this work very much in the future, because of its great importance fundamentally in the study of rural economics.
In past years, materials for only small cultural, varietal and other tests were sent out from the Co-operative Department; however, the increasing ability of co-operators to do accurate experimental work; the introduction and establishment of County Farm work and the official approval and acceptance by the Experiment Station of the policy that the testing and the distribution of varieties should be made at and from various centers located upon different soils of the state, it has become necessary to increase the large plot work, and to plan for a still greater increase in the future. The small plot tests will be continued; but, for the most part, these will serve as preliminary work with new crops, as a means of testing new varieties of standard crops, or as an introduction to co-operative service by untrained experimenters.

The Department will eventually assume the care of all demonstrational work of the Station, this including such features as state and county fair exhibits, field meetings in various parts of Ohio and the entertainment of visitors at the Station and Sub-stations. Indeed the plans for entertainment were under the supervision of this Department during the season of 1907, and were conducted with satisfaction to all concerned.

A word to those contemplating visiting the Station in classes, Granges, clubs or other parties of considerable consequence, numerically, will not be out of place at this juncture: The secretary of such organizations, or the organizer of the prospective visiting party,
should write to the Department of Co-operative Experiments stating the desire to visit the Station and tentatively stating a date at or near which it is desired to make the visit. A reply from the Department will instruct the inquirer as to whether the date mentioned is open at the Station. Should there be a conflicting engagement, other dates as near as possible to that designated by the correspondent will be named. In this way a suitable date may be promptly and satisfactorily decided upon. The Department will thus be enabled to arrange for transportation for the visitors from the railroad station to the Station farm, and for the various courtesies and features of entertainment which it is desired by the Station to extend to the public.

The months of June and early July are, of all in the year, most satisfactory to visit the Station. It is at this season that the growing and maturing crops; the developing and ripening fruits; the ornamental trees and shrubs and plants; the flowers, lawn and all Nature—both on the Station grounds and throughout the surrounding beautiful country—are at their best. It is distinctly the season in which most can be seen in all departments. It is the particular season in which special preparation must necessarily be made to handle, with system and attention and the greatest degree of comfort to all concerned, the crowds which are sure to come, week after week.

Reception of visitors at the Station.

Interested in the Station's alfalfa work.
The annually increasing number of Ohio citizens who are availing themselves of the hospitality of the Station for the purpose of making a personal study of agriculture along special or general lines, indicates that the practical farmer and scientific worker may labor together harmoniously and be of very great service, encouragement and inspiration, each to the other. This is, indeed, a form of co-operative work and association which should develop to the greatest possible degree; which should broaden and deepen and become more and more firmly established as time goes on, and as new problems confront these co-workers whose interests are so closely allied.

A cooperative orchard meeting, arranged by Department of Cooperative Experiments to study work of the Department of Entomology.

THE DEPARTMENT OF ENTOMOLOGY.

The Department of Entomology deals with the control of insect pests which are destructive to our field, orchard and garden crops. The work of this Department is especially attractive to Station visitors, not only because of the general recognition of its importance to all who are identified with the growing of cereals, fruits or vegetables, but because of the collection of insects in the Entomologist’s office. Here may be seen and studied, by the aid of powerful magnifying glasses and cheerfully given explanation in detail, such formidable and dreaded orchard enemies as the San Jose scale, the various other scales with which it is often confused, and the codling moth which, it is estimated, causes the loss of more than $10,000,000 per year to the orchardists of the United States. Hundreds of curious and beautiful moths and beetles and insects of every description are preserved in life-like form in the specimen cases.
An important feature of entomological work at the Station is the identification of injurious insects and their work, specimens of which are daily received by mail, and the giving of advice and instruction, by return mail, as to the better methods and appliances for combating these pernicious forms of insect life.

The office equipment is quite elaborate, rendering the apartment a fascinating scientific workshop at times. The rarer specimens of insects are mounted from time to time, as received, for preservation, while these and such others as are designed to be portrayed in bulletin work are photographed either life size or in magnified dimensions to readily permit of a comprehensive study of the same by the reader.

An exhibit of spraying appliances is kept in a separate building, which serves to illustrate to those unacquainted with the plan of spraying for insects and fungous diseases, the equipment necessary for such work and to suggest the form of outfit best suited to individual requirements.

The more extensive experiments in orchard and vineyard spraying, by the Department of Entomology, are conducted co-operatively in other parts of the state. Such orchards are chosen for the work as present considerable areas or blocks of the same variety in the different classes of fruits. Uniformity of conditions, to begin with, is especially desirable in spraying tests. The Station orchards are not suited for this character of work on a large scale, as they necessarily contain many varieties and but a limited number of trees of each. The best possible results are, of course, desired in these variety tests, and only such remedies as are most highly recommended by the entomologist are used.

The co-operative plan in various localities also affords demonstrational work in insect control at various points in the state and awakens interest in spraying and the betterment of orchard conditions in many sections where there has heretofore been little done, or attempted, in the way of producing fine fruits.
Making lime-sulphur mixture.
Various forms of spraying outfits.
The Department will continue testing different methods of spraying for the codling worm in apples; the relative efficiency of several light sprayings or a smaller number of heavy ones will be a special subject of investigation. Whether it is possible to spray apples heavily when they are young, without russetting the fruit, is to be determined. The exact effect of adding soap as a “sticker” to the spray, for orchard treatment, needs further investigation.

The work on various methods of protection from peach tree borers will be continued. Also experiments in combating the radish maggot which affects radishes, cabbage and cauliflower.

Much work has already been done in spraying for the control of the grape berry worm, in vineyards in northern Ohio; but further experiments are to be conducted.
Grapes sprayed once with poison
Yield from section of row 120 feet long.

Grapes unsprayed with poison.
Yield from section of row 120 feet long.

The raspberry flower beetle will be made the subject of special investigation, also the shot-hole borer and wooly aphid of the apple and the strawberry root louse.

A few of the proprietary remedies for scale insects are tested in a small way.

Many observations on grain and garden insects are made each year, and numerous experiments are performed as opportunity offers.
HERE are several plantings of catalpa on the farm, the first just east of the picnic grounds, being made in 1900. Unfortunately these trees are not pure speciosa but are allowed to remain for the sake of comparison.

The largest plantation, just north of the orchards, is used for pruning experiments. Osage orange, locust, ash, mulberry and black walnut have also been planted.

A woodlot of about twenty acres, on the east side of the farm where the trees stand very thin on the ground, is being converted into a forest by interplanting. A small plot just south of the picnic grounds had all of the large trees removed from it in 1892. A fairly good stand of self sown white ash seedlings were in the ground and have been allowed to remain, a little thinning and interplanting having been done. Some other untillable portions of the farm are to be planted with forest trees at an early date.

A forest nursery is maintained on the south east corner of the farm. This is to supply trees for use on the farm and for co-operative work.

The co-operative forestry work is carried on by farmers in different parts of the state, nearly five hundred persons having been supplied with trees in this manner. The plots range in size from half an acre to ten acres in extent. The purposes of this work is to determine the trees best suited to different soils; the proper distances for planting; the trees most suitable for various purposes; the rate of growth, and to learn such other facts as may be necessary in order to develop a rational system of forestry for the state.
Thus far the work has been confined mostly to the planting of catalpa speciosa, yellow locust, mulberry and osage orange in plots for the production of posts, but hereafter the farm woodlot is to receive relatively more attention.

The best timber trees, such as ash, tulip poplar, oaks, chestnut, walnut, maple, basswood, white pine, Norway spruce and larch are now growing in the nursery for that purpose.

THE DEPARTMENT OF HORTICULTURE.

Here are few lines of work which are of such general interest to our people as horticulture. It matters not what business, profession or occupation the home owner or tenant may follow, he delights to look upon a plant, vine, bush or tree laden with blossoms or growing or ripening fruits. He recognizes the value, from an economic standpoint, of a generous supply of fruits and vegetables, fresh from the orchard or garden, for his table and cellar.

The Department of Horticulture embraces three distinct divisions—orchards and gardens, greenhouses, and campus or ornamental work in planting.

The orchards and gardens, which include the different classes of tree-fruits, small-fruits, potatoes and other vegetables, occupy 25 or 30 acres of the "south farm" of the Station. This part of the farm lies one mile south-east of the Administration Building, and is
Identifying varieties of apples.

The most elevated portion of the entire 470 acres. The work of this division is devoted principally to variety and culture tests and plant selection and breeding work. Over 1,000 varieties of the different kinds of fruit are planted.

From 50 to 100 varieties of potatoes are grown each season, including the newer introductions, the more promising of the partially tested varieties and a number of those which, by their constant excellence, have won a place among the recognized standards of their kind.

The fertilizer work on potatoes, as it comes in the farm rotation of potatoes, wheat and clover, is annually taken up and conducted, under the supervision of the Department of Soils, by the Horticultural Department. In this experiment, different quantities and combinations of various commercial elements of fertility are compared with each other and with barnyard manure, on 34 tenth-acre plots of ground, every third one of which is left unfertilized as a "check" plot.
Orchard renewal—Before cutting.

After cutting.

Results in growth and fruit.
A most interesting feature of potato work, within recent years, is the study of variation in types of the same variety, and the testing out of the more excellent strains through the hill-row system of selection. Very interesting and valuable results have already been attained, both in selecting for disease resistance of plants and for high yielding qualities in the hill. In illustration, the disease resistant strain of Whiton's White Mammoth, four years from the time of the original selection of the unusually resistant parent hills, yielded, in 1907, at the rate of 206.9 bushels per acre, while the common strain yielded 153.5 bushels per acre. Carman No. 3, four years from the time of the original selection of unusually prolific parent hills, yielded 181.9 bushels while common stock of the same variety yielded 116.15 bushels per acre.

Other experiments with potatoes are comparisons of different quantities of seed per acre and experiments in spraying for blight.

Over 100 varieties of strawberries are usually to be found in the annual test plots, these, as with potatoes, including the newer, the partially tested and a few of the standard sorts for comparison.

The production of true pedigreed varieties of strawberries is being demonstrated through the only means by which a pedigreed variety can be produced, viz., by the absolute isolation of the parent plants, hand pollination of blossoms and the growing of new varieties from the seeds of fruits grown under these conditions.

Other small fruits are being grown and tested, as well as a few classes of vegetables—celery, tomatoes, etc.,
Experiments with and comparisons of different methods of orchard culture now being conducted at the Station, and the work of renewal or rejuvenation of old orchards is a feature in which there has been much interest manifested by visitors at the Station, where a practical illustration of the plan may be observed.

While no extensive spraying experiments are feasible in mixed or variety orchards such as those of the Station, the Department nevertheless sprays regularly and persistently for insects and fungi, using such sprays as are pronounced by the Entomological and Pathological Departments, through their tests of the various preparations, to be most effective.

The persistent inquiry of hundreds of correspondents of the Station, for bulletins and treatises dealing with the elementary principles of horticulture, has suggested taking up a line of work which will meet this demand. Arrangements have been completed which will provide for the taking up of this special work at a central location in the state.
GROUND AND ORNAMENTAL PLANTING.

The land surrounding the Administration Building, an area some seventeen acres in extent, has been set apart for park purposes. The ground slopes gradually from the building to the west, north and east, where the slope terminates in a natural valley which intersects the region and aids materially in the production of landscape effects. Aside from the interest aroused in the institution and its increased attractiveness, the chief purpose of the ornamental planting has been to assemble a somewhat complete collection of choice deciduous and evergreen trees, shrubs and hardy plants for the instruction of home improvers and to illustrate at least a few of the effects which may be secured by grouping and massing. The natural style has been followed in the main.

A wintry morning on the campus.

A distinctive feature of the planting has been the liberal use of evergreens which have been planted in large masses along the eastern, western and southern boundaries. The mass north of the central barn consists principally of Norway spruce, with the admixture of a few Colorado blue spruce and silver or concolor fir. Along the
edge of this group occasional specimens of the white birch have been used with good effect. The evergreens along the western border are chiefly white and Scotch pine, varied by the presence of an occasional specimen of the Austrian species. At the southern extremity of this belt the pines give way to Norway spruce.

The planting along the western boundary has become a most effective and valuable windbreak and here, during a spell of severe cold and violent wind, such as often occurs in mid-winter, one can almost experience the sensation of being transported at once from January to April by stationing himself on its leeward side. The evergreen belt along the southern side is composed for the most part of White, Austrian, Norway and Ponderosa pine, Douglas fir, Norway and Colorado blue spruce and arborvitae in variety.

Occasional trees of such uncommon kinds as Lawson’s cypress, Swiss stone pine, Alcock’s spruce, Remont’s spruce, weeping blue spruce, blue-tinted red cedar and a number of others will also be found. The glowing bark of the red-twigged dogwood may be seen at intervals along the margins of this belt of trees.

The attention of the visitor entering the Station grounds by the main drive from the north will at once be arrested by fine specimens of concolor fir, one of the very choicest ornamental evergreens, and Douglas fir, the famous timber tree of Oregon and Washington and one of equal value for ornamental purposes. Passing these, on both sides of the drive will be seen scattered groups of evergreens in which the beautiful Colorado blue spruce predominates. Continuing toward the building, to the right will be noted large masses of shrubbery, the first one consisting of spireas Thunbergii, prunifolia and Van Houttei, followed by a mixed bed of weigelas, a few magnolias intervening between this group and the one of spireas. As the visitor nears the main entrance to the Administration Building, whose walls are almost concealed by a luxuriant growth of Boston ivy, he will drive between large masses of viburnum, the bed to the west consisting of mixed varieties while the one to the eastward is composed entirely of viburnum tomentosum bordered with Thunberg’s barberry, a thorny but useful low-growing shrub, attractive in foliage as well as in fruit.

Here the drive divides, branches, passing on either side of the building and range of vegetable forcing greenhouses situated in the rear, back of which they converge again. East of these greenhouses is found an extensive rose bed, in which are grown rugosa, multiflora and prairie roses, with the everblooming baby rambler used as a border.
Striking bits of campus scenery.
Should the visitor enter the Experiment Station's domain by way of the west entrance he will find the drive lined with the Gingko or maiden hair tree, a handsome and deciduous cone-bearing species from Japan. The rugged, stony bank to the south of this drive has been covered with a heavy growth of Hall's Japan honey-suckle, one of the best vines to be had for such purposes.

Immediately west of the small building used as insectary and pathologium is a circular bed of hydrangeas, beyond which lies a group of the Japan cypress, one of the finest small evergreens and one especially adapted to lawns of limited size.

Any detailed enumeration or description of the species and varieties to be found on the Station grounds must necessarily be incomplete and unsatisfactory from the fact that new kinds are constantly being added to the collection, and from the further fact that the size and form of beds and masses are continually being altered, while trees and shrubs are often discarded or shifted from place to place. Among the finest deciduous trees are to be found groups of American white elm, tulip tree, birch, horse-chestnut, oak and sugar maple. As specimen trees occur such excellent and desirable sorts as weeping beech, cut-leaved silver maple, willow oak, Japan weeping rose-flowered cherry, liquidambar and many others.

There are now growing on the grounds about one hundred species and varieties of deciduous, ornamental and forest trees; forty of evergreens; seventy-five of shrubs and roses; one hundred of vines and perennial plants.

**THE GREENHOUSES.**

The greenhouses, four in number which are devoted chiefly to the forcing of vegetables, are connected at the north by a glass-covered arcade or corridor in which may be found a small collection of palms, ferns, and other decorative plants, although the conditions under which they are grown are rather trying for this class of plants. A part of one of the greenhouses, which is designated as "Number 3" is used for growing a stock of geraniums, salvias and many other kinds of tender bedding stock for use on the grounds. Cinerarias, primroses, pelargoniums and other spring-flowering plants are also grown quite successfully in this house.
Chrysanthemums in holiday attire.

It has been found possible to grow chrysanthemums in this house during the interval between harvesting of tomatoes or cucumbers in mid-summer and the planting of the first crop of lettuce in early winter. The plants, which are grown in pots on the side benches, are transplanted to the central bed in August. A few of the standard newer varieties are grown in considerable numbers.

The vegetable work of the Station is carried on mostly indoors, three houses being devoted to this purpose. Lettuce is started early in autumn and three successive crops grown. Tomatoes and cucumbers usually follow lettuce, but the last named crops are often grown in the fall as well. The beds are mostly subwatered but portions are watered in the ordinary manner for comparison. During the summer the soil in the beds is prepared for future crops by mulching the surface with coarse manure, instead of removing and renewing with fresh compost as commonly practiced.
At present about half the space is devoted to plant breeding of forcing crops, both by crossing and selection.

The leading object in the greenhouse work is to stimulate and develop vegetable forcing.
THE DEPARTMENT OF NUTRITION.

The Department of Nutrition was established in the autumn of 1907, therefore is yet comparatively new. While the service of this Department will, for the most part, be directed along special lines, its scope is a broad one and legitimately covers the subjects of both animal and human nutrition.

The creation of this new Department necessitated the fitting up of a special chemical laboratory which is already completed and equipped for active service and the work well under headway.

Briefly outlined, the Department of Nutrition is for the scientific investigation of feeding problems. The work now in hand contemplates a study of the specific or characteristic effects of food-stuffs on animals, with reference to the development of bone, muscle, fat, nervous tissue, visceral organs, etc., giving especial attention to the inorganic or ash constituents of feeds, particularly to compounds of phosphorus, because of the fact that the amount and condition of the phosphorus present is often a limiting factor in the production of growth.

The experiments will have to do principally with swine and poultry, because of the rapidity of their growth, and because the character of their rations is satisfactory for such work; but the results will be applicable with practically equal force to the nutrition of all animals.

Special chemical laboratory for nutrition investigations.
It is anticipated that the work of this new Department will be of deep interest and much value to those who give thought to the very important subjects of the character of the home food supply and to foodstuffs and feeding from the standpoint of the animal husbandman.

Not alone through correspondence is it the desire of the Department of Nutrition to come into touch with farmers and citizens of our state generally, but all those visiting the Stations will be made welcome in office or laboratory, and gladly shown the outside equipment and active work connected therewith.

Steam baths and digestion rack.

Nitrogen distilling apparatus.
THE DEPARTMENT OF SOILS.

The study of the maintenance of fertility was one of the initial subjects taken up by the Ohio Station, subsequent to its organization; but not until after its removal to Wooster were conditions really favorable for attaining results which would be of greatest value to those sections of Ohio which most needed help along the lines of soil management and improvement. A tour of the grounds devoted to the experiments conducted by this Department is usually of interest even to the visitor who has never before given serious thought to the problems which confront the student of soils, and which so directly concern the farmer who would so improve his land as to render it profitably responsive to cultivation.

Section C, 5-year rotation, just before harvest.

The experiment which, as a rule, most forcibly appeals to the farmer-visitor to the Station, is that extensive one embracing the 5-year rotation of corn, wheat, oats, clover and timothy. This principal experiment in the maintenance of fertility of the soil is conducted on parts of the farm which were, at the beginning, in a low state of fertility. The ground was laid out in tenth-acre plots, tile drains being laid under alternate dividing spaces. The plots are 16 feet wide by 16½ rods long and are separated by paths 2 feet wide, so that the drains are 36 feet apart.

The land was divided into 5 sections of 30 plots, or 3 acres, each, each section being divided into 3 blocks of 10 plots each, the blocks and sections being separated by narrow roadways, so that the crops might be harvested and hauled in without unnecessary driving over the plots.

An interesting feature for observation, in connection with the study of the 5-year rotation, is the effect of lime on which ever section may be in clover at the time of the visit. Lime was first
applied in 1900—being used on the west ends of the plots, both fertilized and unfertilized—at the rate of one ton per acre. Each of the other four sections used in the 5-year rotation, were, in 1901, 1902, 1903 and 1904, in turn, given a similar application of lime on their western halves. In 1905 the east half of the section first limed was similarly treated, the west half being left with only the application of 5 years previous. The lime was, in all cases applied to land being prepared for corn, being spread after plowing and harrowed in.

Of almost equal interest is the 3-year rotation of potatoes, wheat and clover, begun in 1895 at the south farm of the Station at Worcester. During the first twelve years of this experiment the potatoes on the unfertilized land gave an average yield of over 160 bushels per acre, and the wheat of nearly 26 bushels, while several of the fertilized plots have averaged nearly 200 bushels of potatoes and more than 37 bushels of wheat, for the same period.

Before viewing the special manure experiment the visitor should pass through the barn which is intimately connected with this work. The manure used in this test during recent years, has been produced in this barn. A part of the manure has been thrown out of the stables into the barnyard, and a part has gone directly to the field. The floor of the barn is constructed of cement. Previous to 1908 only part of this floor was cemented; but it was found, by chemical analysis of the manure, that in six months time enough of its value was lost to pay half the cost of cementing.
The field work in this test was begun in 1897. There are 60 plots containing one-sixteenth acre each. This experiment is conducted on a 3-year rotation of corn, wheat and clover. Manure taken directly from the barnyard where it has lain during the winter, is compared with manure taken directly from the stable to the field, without exposure. Both kinds of manure are used either without any treatment, or with various reinforcing materials, as shown by the stakes at the ends of the plots.

Three blocks of ten plots each are devoted to the production of the same crops continuously, the first crops being harvested in 1894. Wheat, oats and corn are included in this experiment in the maintenance of fertility.

The work of the Department of Agronomy, in seeking the methods, culturally, of establishing and growing alfalfa, is supplemented and aided by the Department of Soils, which is endeavoring to determine soil conditions and manures best suited to this highly important and desirable plant. In these experiments both fertilizers and manure are used. Likewise, on a two-year rotation of corn and soy beans, fertilizers and manure are being employed and the results compared.

Fertilizing experiments with tobacco, as with tobacco breeding, are conducted at the Germantown Test farm in Montgomery county.

A field freshly limed.