TWELFTH ANNUAL REPORT

OF THE

Agricultural Experiment Station

OF THE

Alabama Polytechnic Institute,

AUBURN, ALABAMA.

FOR

1899.

MONTGOMERY, ALA.:
THE BROWN PRINTING CO., STATE PRINTERS AND BINDERS,
1900.

ALABAMA POLYTECHNIC INSTITUTE.

AUBURN, ALA., Jan. 15th, 1900.

Governor JOSEPH F. JOHNSTON,

Executive Department,

Montgomery, Ala.

SIR:—I have the honor herewith to transmit to you the Twelfth Annual Report of the Agricultural Experiment Station of this College.

The report of the Treasurer, herewith included, is for tthe fiscal year ending June 30th, 1899.

This report is made in accordance with the provisions of the act of Congress (approved March 2nd, 1887), establishing Agricultural Experiment Stations in the several States and Territories.

It contains the report of the Botanist, the Chemist, the Veterinarian, the Agriculturist, the Biologist and the Horticulturist, for the year ending December 31st, 1899.

Respectfully,

WM. LEROY BROUN,
President.

TRUSTEES.

His Excellency, JOSEPH F. JOHNSTON, President--------*Ex-Officio.*
JNO W. ABERCROMBIE, Superintendent of Education--*Ex-Officio.*

J. G. GILCHRIST, ----------Hope Hull, Ala.
TANCRED BETTS, ----------Huntsville, Ala.
W. C. WHITAKER, ----------Tuscaloosa, Ala.
JONATHAN HARALSON, ----------Selma, Ala.
THOMAS WILLIAMS ----------Wetumpka, Ala.
J. A. BILBRO, ----------Gadsden, Ala.
F. M. MOSELEY, ----------Union Springs, Ala.
W. K. TERRY, ----------Birmingham, Ala.
T. H. FRAZER, ----------Mobile, Ala.
N. P. RENFRO, ----------Opelika, Ala.

AGRICULTURAL EXPERIMENT STATION.

COMMITTEE OF TRUSTEES ON EXPERIMENT STATION.

F. M. Moseley ..... Union Springs, Ala.
J. G. Gilchrist ..... Hope Hull, Ala.
Jonathan Haralson ..... Selma, Ala.

STATION COUNCIL.

Wm. LeRoy Broun ..... President.
P. H. Mell ..... Director and Botanist.
B. B. Ross ..... Chemist.
C. A. Cary, D. V. M. ..... Veterinarian.
J. F. Duggar ..... Agriculturist.
F. S. Earle ..... Biologist and Horticulturist.
J. T. Anderson ..... Associate Chemist.

ASSISTANTS.

C. L. Hare ..... First Assistant Chemist.
J. Q. Burton ..... Second Assistant Chemist.
A. McB. Ransom ..... Third Assistant Chemist.
T. U. Culver ..... Superintendent of Farm.
R. W. Clark ..... Assistant Agriculturist.
Moses Craig ..... Assistant Horticulturist.

REPORT OF TREASURER.

TREASURER OF ALABAMA POLYTECHN C INSTITUTE,
In account with United States Appropriation
Hatch Fund for the year 1898-1899.

To cash received from U. S. Treasurer for the fiscal year ending June 30th, 1899 ..... $ 15,000 00

Cr.

By amount paid Salary Account	$ 8,742 00		
" " " Labor	1,127 92		
" " " Publications	1,099 18		
" " " Postage and Stationery	162 45		
" " " Freight and Express	320 84		
" " " Heat, Light and Water	168 96		
" " " Chemical Supplies	433 46		
" " " Seeds, Plants and Supplies	520 42		
" " " Fertilizers	237 38		
" " " Feeding Stuff	143 79		
" " " Library	572·12		
" " " Tools and Implements	46 93		
" " " Furniture and Fixtures	135 36		
" " " Scientific Apparatus	200 17		
" " " Live Stock	6 00		
" " " Traveling Expenses	297 52		
" " " Contingent Expenses	35 50		
" " " Building and Repairs	750 00	--$	15,000 00

E. T. GLENN,
Treasurer, A. P. Institute.

THE STATE OF ALABAMA,
Lee County.

Personally appeared before me, Chas. Gachet, a Notary Public in and for said county and State, E. T. Glenn, known to me as Treasurer of the Alabama Polytechnic Institute of Alabama, who, being duly sworn, deposes and saith that the above and foregoing account is true and correct.

Witness my hand this 12th day of January, 1900.

CHAS. GACHET,
N. P. & Ex-officio J. P.

This is to certify that I have compared the above account with the Ledger account of the Treasurer, and this is a correct transcript of same.

WM. LEROY BROUN,
President, Alabama Polytechic Institute.

REPORT OF THE BOTANIST AND DIRECTOR.

DR. WM. LEROY BROUN, *President*,

SIR:—I have the honor to submit the following report concerning the work under my charge in the Agricultural Experiment Station during the year 1899.

REPORT OF THE DIRECTOR.

The correspondence of the office is rapidly growing in importance and in volume, and much of the time of the Director is consumed in answering questions relating to the general work of the Station. A number of letters has been received during the year from parties residing in other States seeking for information on the soils, the climate and the suitable localities in Alabama for the cultivation of certain kinds of fruits, vegetables and farm crops. These letters have been generally from parties who were contemplating moving to Alabama to establish homes as farmers and fruit growers. A portion of the time of the Director has, therefore, been consumed in the line of general information on the lands and agricultural products of the State. Many letters have been received from persons who wished to be instructed in the methods of making composts, the best commercial fertilizers for cereals, for cotton and for floriculture. Information has been sought through the office for the names of the best books treating of planting, cultivating and gathering the crops. In addition to this there has been an unusual demand for the back numbers of the bulletins, indicating that many of the farmers are keeping up with the work of the Station, and are using every effort to enlighten themselves on subjects relating to farming.

During the year the office has answered 1,255 letters.

BULLETINS ISSUED BY THE STATION.

The number of bulletins issued during the year is 7, from number 101 to 107. These bulletins comprise volume 7 of the Station publications. The following is an analysis of these bulletins:—

No. 101. Experiments with Cotton, 1898.

Contents: The rainfall during the growing season of 1893; varieties; sub-soiling; experiments with fertilizers; methods of applying fertilizers; cotton seed vs. cotton seed meal or nitrate of soda; special potash experiments; where to get seed. 19 pages.

No. 102. Co-operative Fertilizer Experiments with Cotton in 1898.

Contents: Objects and methods of the experiments; list of experimenters; fertilizers used; detailed account of each experimenter's report and an analysis of the results; general suggestions about suiting the fertilizer to the soil; means of determining the needs of the soil; fertilizers for the red lime soils of the Tennessee Valley region; fertilizers for the calcareous valley soils of Northeast Alabama; fertilizers for oak and hickory uplands with short leaf pine; fertilizers for gravelly hills region with long leaf pine; fertilizers for gray isinglass and red clay lands of east Alabama; fertilizers for southern long leaf pine region; fertilizers for the central prairie region; fertilizers for other regions; conclusive experiments; inconclusive experiments with cotton. 75 pages.

No. 103. Experiments in Syrup Making.

Contents: The importance and method of securing pure syrups with attractive color and good keeping qualities; clarifying agents. 11 pages.

No. 104. Velvet Beans.

Contents: Introduction; uses of the velvet bean; velvet beans for soil improvement; abvantages and disadvantages of velvet beans; the velvet bean for forage; amount of seed required; uses of the beans (fruits); co-operative tests of velvet beans in Alabama. 20 pages.

No. 105. Winter Pasturage, Hay and Fertility Afforded by Hairy Vetch.

Contents: What is Hairy Vetch? special value of leguminous plants; the function of root nodules or tubercles; winter growing plants; increasing the fertility of rarely-grown soil- improving plants by means of inoculation; natural inoculation; making a start with hairy vetch; does inoculation of hairy vetch pay; uses of hairy vetch; is hairy vetch or cotton seed meal the cheapest nitrogenous fertilizer; driections for sowing hairy vetch; fertilizers for hairy vetch and other legumes; the weed question; enemies of vetch; suggestions about the re-seeding of hairy vetch; adapting vetch to ordinary rotations. 35 pages.

No. 106. Orchard Notes.

Contents: Apples; insects and diseases; cherries; figs; grapes; kaki, or Japanese persimmons; peaches, pears; plums; San José scale. 16 pages

No. 107. Cotton: Results of Experiments Conducted by the Station During the Past Sixteen Years.

Contents: This bulletin was issued for the Paris Exposition to accompany the exhibit made by the Station on Cotton. The subjects of the field experiments in agriculture, the botany of the cotton, the chemistry of cotton and the insects and diseases of cotton are treated.

The mailing list now comprises 8,010 names and almost every day new names are added to the number.

The following bulletins are the only ones which are now available for general distribution. The increased demand for these publications has greatly reduced the earlier issues.

No. 1. Report of Agricultural Experiment Station.
No. 2. Report of Agricultural Experiment Station.
No. 5. Cotton experiments, pig feeding, etc.
No. 9. Nematode root ga'ls.
No. 12. Co-operative soil experiments.
No. 13. Microscopic study of certain varieties of cotton.
No. 14. Pea vines as a fertilizer.
No. 15. Insecticides.
No. 17. Dry application of Paris green and London purple for cotton worm.
No. 18. Climatology of Alabama.
No. 22. Experiments with cotton.
No 23. Co-operative soil tests of fertilizers.
No. 27. Black rust of cotton.
No. 28. Watermelons and cantaloupes.
No. 32. Corn, wheat and oats.
No. 34. Co-operative soil test experiments for 1891.
No. 36. Some leaf blights of cotton.
No. 64. Tobacco.
No. 70. The Flora of Alabama.
No. 71. Experiments with foreign cottons.
No. 78. Co-operative fertilizer experiments with cotton in 1896.
No. 79. Some horticultural suggestions.
No. 86. San Jose Scale and use of insecticides.
No. 87. Soil inoculation for leguminous plants.
No. 88. Experiments with corn.
No. 89. Experiments with cotton.
No. 90. Peach tree borer and fruit bark beetle.
No. 91. Co-operative fertilizer experiments with cotton in 1897.
No. 92. Experiments with lime on acid soils.
No. 93. Peanuts, cowpeas and sweet potatoes as food for pigs.
No. 98. Orchard notes.
No. 99. Cotton rust.
No. 100. Lawns, pastures and hay.
No. 101. Experiments with cotton in 1898.
No. 102. Co-operative fertilizer experiments with cotton in 1898.
No 103. Experiments in Syrup making.
No. 104. Velvet Beans.
No. 105. Winter pasturage, hay and fertility afforded by hairy ve tch.
No. 106. Orchard notes.

STATION LIBRARY.

The Library of the Station, which heretofore has been a separate institution, was, by the action of the Board of Trustees, at its last meeting, made part of the General Library of the College under the management of one Librarian. The funds devoted to the purchase of books and papers appropriated from the Hatch income, are spent under the direction of a special committee. The money has been carefully used for only those books and periodicals which relate to agriculture and the allied sciences, so that the Station division of the General Library is still kept in tact for the special use of the Station workers.

The following papers and magazines are sent to the Library in exchange for the bulletins:

American Cultivator.
American Swine Herd.
Boletin de la Socieded Nacional de Agricultura.
Boletine do Instituto Agrionomico do Estado de Sao Paulo —Brazil.
Breeders' Gazette.
Bulletin Botanical Department, Jamaica.
Commercial and Financial Chronicle.
Cotton Planters' Journal.
Cotton Ginners' Journal.
Drainage Journal.
Dairy World.
Elgin Dairy Report.
Farm and Home.
Farmers' Guide.
Farm and Fireside.
Farmers' Voice.
Farming.
Farmers' Magazine.
Farmers' Home.
Agricultural Gazette of New South Wales.
Hoard's Dairyman.
Homestead.
Indiana Farmer.

Kansas Farmer.
National Rural Family Magazine.
Our Grange Home.
Practical Farmer.
Rural New Yorker.
Southern Cultivator.
Southern Farm Gazette.
Southern Farm Magazine.
Sheep Breeder and Wool Grower.
Tri-State Farmer.
Wallace's Farmer.
West Virginia Farm Review.
Western Fruit Grower.
Public Ledger of Philadelphia.
Baltimore Sun.

BOTANICAL EXPERIMENTS.

A study of the arborescent flora of Alabama is still being pushed as fast as the limited time I am able to give the work will permit without detriment to the other duties pertaining to my position as Director and Botanist of the Station. A number of varieties of trees and shrubs were planted in the Botanical Garden during the year, for the purpose of determining their values. The Department has received from the Division of Botany, United States Department of Agriculture, the following seeds of species of trees which will be added to the list of native plants now growing in the Garden:

Sterculia platanifolia (Chinese Parasol.)
Idesia polycarpa.
Cratægus pyracantha (Thorn.)
Vaccinium parviflorum (Red huckleberry.)
Eucalyptus calophylla.
Caragana frutescens (Pea tree.)
Cratægus chlorosarca (Thorn.)
Olex aquifolium (Holly.)
Diospyros ebenum (Ebony.)
Leycestria formosa.
Thuja orientalis (Arbovitæ.)

Albizzia lophantha.
Eucalyptus saligna (Gray gum.)
Acacia longidolia (Golden wattle)
Stenocarpus salignus (Silky oak.)
Acacia dealbata (Silver wattle.)
Cryptomeria japonica (Japanese cedar.)
Gleditsia caspica (Caspian honey locust.)
Pinus laricio (Larch pine.)
Tyrax officinale (Storax.)
Pinus maritima (Pine.)
Ginkgo biloba (Ginkgo.)

The Secretary of Agriculture has designated this Station as one of the few selected in the South to determine the practicability of tea culture, and 800 plants are now growing on the horticultural grounds under the supervision of Prof. F. S. Earle, the Horticulturist. The Station has also received from the Secretary the following letter, which fully explains itself:

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
WASHINGTON, D. C., December 28th, 1899.

PROF. P. H. MELL,
Director, Alabama Experiment Station,
Auburn, Alabama.

SIR:—You are probably aware that the Department has been making experiments in the production of a hardy orange by hybridization. As a result of this work there is on hand at the present time, budded trees of some sixty hybrids which we desire to have tested in various localities and latitudes. If it is convenient for your Station to cooperate with us by testing these hybrids in your locality, we should be pleased to send you about two six month's budded trees of each sort, to be grown and fruited under any soil or fertilizer conditions you may think best. . . . . At the conclusion of the experiments we would be pleased to have your Station make a brief report to the Department, giving the final results of the tests. This report will be incorporated in a general report on the results of the tests in various localities.

If you are crowded for room, the trees can be grown close together, possibly about ten feet apart, as it will only be necessary to fruit

them about two years. Again, the test is to secure hardiness, and it is possible that some of the hybrids will prove tender and be frozen down the first winter.

We think the work promises to be of great value to your State and hope that you may be able to test the hybrids as proposed. Kindly inform us regarding the matter at an early date, as we desirs to send the trees out in January if possible. Further correspondence relating to the matter may be addressed to the Chief of the Division of Vegetable Physiology and Pathology.

Respectfully,

JAMES WILSON,

Secretary.

The work of testing these orange trees will also be under the direction of the Horticulturist of the Station.

EXHIBIT AT THE PARIS EXPOSITION.

This Station has been requested to prepare a report on cotton for the Paris Exposition, and to make an exhibit of the staple in its raw condition. This request came from Director H. P. Armsby of the Pennsylvania Station, who is chairman of a committee appointed by the Association of Agricultural Colleges and Experiment Stations, which committee has been authorized to take charge of and develop a plan for a general exhibit of station work in the United States. The Alabama Station having conducted experiments in cotton to a greater extent than probably any other station it was deem best to assign that work to us. We have forwarded to Washington an extensive exhibit of the cotton fiber and a numher of photographs showing the plant growing, its bolls, fiber and photo-micrographs. The following represent some of the material furnished by this Station for this Exposition:

25 Pressed and mounted specimens of cotton plants.

40 Sacks of cotton fiber showing results of hybridization.

69 Packages of fiber showing the number of varieties of cotton grown in the south.

20 Packages containing open bolls to show the size of the cotton bolls.

20 Microscropic mounts to exhibit the miscropic character of the fiber.

A photograph of a cotton field during the picking season, in ordinary upland cotton.

A photograph of a cotton field during the picking season, in the hybrid cotton plants.

20 Photo-micrographs of the fiber from experiments in hybridization. Magnified 115 diameters.

5 Photographs showing limbs from the following varieties of cotton: Okra Leaf; W. A. Cook; Allen's long staple; Cherry's cluster; Jones' long staple.

11 Photographs showing limbs from the following varieties of cotton: Sea Island; Sea Island crossed on upland cotton; Ghoghari; Herbucco; Mit Afifi; Bamieh; Manoah; Roji; Miduopur; Jakko; Nimari bari.

Photograph of a Sea Island cotton plant as it grows.

Photograph of a Namari bari plant as it grows.

Photograph of a Deshi cotton plant as it grows.

Photographs of open cotton bolls of the following varieties of foreign cotton: Miduopur; Herbucco; Indrepur; Broach; Ghoghari; Jakko; Nimari bari; Deshi; Mit Afiffi; Manoah and Bamieh. Also of the American upland and Sea Island.

5 Photographs showing by comparison certain hybrid experiments.

5 Photographs showing closed bolls from certain American varieties of cotton.

Photographs showing closed bolls from eight varieties of foreign cottons used in the production of the hybrids.

20 Photographs of closed cotton bolls showing the results of hybridization.

From this material and from the published results of cotton experiments made by the Station during the past sixteen years, a bulletin has been prepared which may be correctly termed a standard on cotton and its cultivation. The analysis of this bulletin is given on another page of this report and is numbered 107 in our series of publications. It was prepared especially for the Paris Exposition and a number of the copies will be forwarded to Paris with the exhibit made by the Station. The compilation and the preparation of this bulletin has been under the immediate supervision of the Director, the Agriculturist, the Chemist, the Associate Chemist, and the Biologist.

An unusual demand on the part of the farmers of Alabama for bulletin No. 100, Lawns, Pastures and Hay, besides other bulletins on the subject of grass and other forage plants, would indicate an awakening interest in the matter of hay making and cattle raising. A number of letters has been received by the Director asking for detailed information concerning the growing of grass for hay. This is a healthy sign that Alabama farmers are beginning to depart from the old method of cultivating only cotton and are endeavoring to make the farm produce meat and bread as well as raiment.

In closing this report permit me to thank you for the kindness you have extended to me during the year and for the interest you have manifested in my work.

Respectfully,

P. H. MELL,

Director and Botanist.

REPORT OF CHEMIST.

DR. WM. LEROY BROUN,

President Ala. Polytechnic Institute.

SIR:—I beg leave to submit the following report with regard to the extent and character of the work of this department for the year just closed:

In conjunction with the other members of the Station staff, the undersigned has been engaged upon the work of preparation of a bulletin designed to supply, in a comprehensive and yet in a condensed form, the results of the investigations of the several departments with regard to the cotton plant.

The attention of this department has been devoted exclusively to the chemical features of the subject, and a large amount of analytical work has been, and is being done in connection with the study of the composition of the cotton plant at various stages of growth.

Samples of the plant were carefully selected at five different periods during the season of growth, and each particular portion of the plant was subjected to an analytical examination with a view to noting the variation in composition of the different parts of the plant during the different stages of plant development. It is believed that the results of this work will supply important information with regard to the food requirements of the plant at various periods of growth, and at the same time will throw some light upon the subject of the transfer of certain constituents from one part of the plant to another during the progress of its growth.

The analytical data secured as a result of this work will be incorporated along with the results of some previous investigation relating to the composition of the cotton plant, and will appear in the bulletin above referred to as a contribution from this department.

Experiments in the manufacture of syrup from sugar cane have been continued with marked success during the past season, and farmers in this vicinity, as well as in other portions of the State, have manifested considerable interest in the results secured by the employment of improved processes of manufacture.

A steam evaporator of much larger capacity than those originally employed for experimental purposes was constructed for use during the past fall, and was tested with excellent results both upon the college grounds, and upon a farm several miles distant.

The use of a steam evaporator presents a number of important advantages over that of the ordinary open fire pans, and there is no reason why steam evaporation should not come into general use, as the boilers at the numerous steam gins and mills throughout the country could be called into requisition for the manufacture of syrup from cane supplied by farmers within a radius of a mile or two of a gin or mill.

The subject of the examination of foods and food materials has continued to receive the attention of this department, and additional data of importance was secured during the past year.

In co-operation with the Agricultural Department, of the Station, an investigation has been made of the composition of some of the chief leguminous corps employed as soil renovators, and additional evidence of their importance as nitrogen collectors has been secured as the result of these experiments. A number of analysis of forage plants and other materials have also been made for the agricultural department, the results being embodied in bulletins issued by that department.

Quite a number of samples of sugar beets grown in the western portion of the State have been analyzed in this laboratory since the date of the last annual report, and the results secured confirmed those of previous years as regards the sugar content, which was quite low in all the samples examined.

This department has been lately engaged in the examination of a number of samples of natural phosphate from the northern portion of the State, the specimens examined being either forwarded by parties in the vicinity, or secured personally by the writer, while on a visit to the locality. Most of these specimens contained a rather low, or at best only a fair, percentage of phosphoric acid, while a few specimens were characterized by quite a high phosphoric acid content. A further and more extended investigation of these deposits is contemplated, and if any results of importance are secured, a bulletin will be issued on the subject.

The results of the analyses of fertilizers for the past year have been published, as usual, in a bulletin issued by the State Department of Agriculture and distributed by the commissioner.

During the past summer and fall, a new laboratory building for Station work has been constructed, immediately adjacent to, and to the north of the present laboratory building. The structure is very neat and commodious, with a front of re-pressed brick with stone trimmings, while the interior is finished in natural wood.

The building is twenty-six feet by sixty feet, and will furnish ample space for the analytical work of the Station. As soon as the working desks are completed, the laboratory staff of the Station will be transferred to the new building, and all analytical work can then be more expeditiously conducted, and with greater freedom from interruption than heretofore.

Respectfully submitted.

B. B. Ross,

January 16th, 1900. Chemist.

REPORT OF ASSOCIATE CHEMIST.

To Dr. W. L. Broun, *President.*

In addition to the usual fertilizer work and some miscellaneous work, including some analyses of food stuff reported by the chief chemist and some partial analyses of soils for the Agriculturist, the Associate Chemist reports the following original work done by him during the year 1899 and to be continued during the year 1900:

I. *A Study of the Availability of Plant Food in Soils.*

This work was begun in 1896 and has been described in detail in former reports. It involves the exhaustion as far as possible from definite amounts of soil confined in metal cylinders imbedded in the ground, of the three fertilizer constituents singly by the continuous growth of cotton plants in them. It is believed that one of the constituents (nitrogen) has practically been exhausted from the cylinders devoted to the investigation of that constituent. The results are being worked up and report will shortly be made. It will be necessary to grow another crop of cotton in the other cylinders to exhaust them of their potash and phosphoric acid respectively.

II. *A Study of the Sources from which Leguminous Plants Derive their Nitrogen.*

This work is being done in metal pots in the vegetation house with the co-operation of Prof. Duggar, to whom is committed the care of the pots with their plant growths, while all the analytical work connected with these experiments is done by the writer. For a fuller description of the plan of investigation reference is made to the report of the Agriculturist. Two independent but similar series of experiments are in progress, one with alfalfa and

the other with cowpeas. These plants are grown under a variety of conditions of soil fertility, these conditions being artificially produced by the application of different forms of nitrogenous fertilizers. The chemical data determined by analysis are: the nitrogen content of each pot of soil as it was prepared for the plants in the outset; the amount of nitrogen added with the water used for watering the plants; the amount of nitrogen in the harvested crop from each pot, and, finally; the nitrogen content of the soil remaining in each pot after harvesting. With these data it is easy to determine how much nitrogen has been taken from the soil and how much from the atmosphere.

III. *The Determination of the availability of the phosphoric acid in the several forms in which that constituent is commonly applied in the fertilization of soils.*

This work is proposed for the purpose of testing the relative value of these phosphatic materials as sources of phosporic acid. Clay cylinders are imbedded in the ground and known weights of a well mixed and thoroughly homogeneous soil are added to each. To exhaust the available phosphoric acid in the soil in each cylinder preparatory to testing the above mentioned phosphatic materials, crops are grown in succession in them until a point is reached where plants will no longer grow on account of the lack of available phosphoric acid. To be assured that the growing plants have an abundant supply of all other constituents, these constituents are supplied in needed quantities from time to time. When the soils in the several cylinders have thus been deprived of all the available phosphoric acid which they contained originally, they are ready for the application of known weights of the materials to be tested, and then the process of exhaustion of the available phosphoric acid will be repeated by growing cotton plants in

successive crops. The determination of the phosphoric acid in the harvests obtained from each cylinder will show the amount of available phosphoric acid contained in the material used in that cylinder.

Several seasons of growth will be required for this work.

Respectfully submitted,

JAS. T. ANDERSON,
Associate Chemist.

REPORT OF THE VETERINARIAN.

To Dr. Wm. LeRoy Broun, *President.*

Dear Sir—The following is a report of the work of the Veterinary Department for the year 1899:—

As director of the Farmer's Institutes for the Station and College I have conducted institutes at—

Thorsby, in Chilton County,
Prattville, in Autauga "
Centreville, in Bibb "
Luverne, in Crenshaw "
Dothan, in Henry "
Jasper, in Walker "
Double Sp'gs, in Winston "
Russellville, in Franklin "
Tuscumbia, in Colbert "
Moulton, in Lawrence "
Courtland, in Lawrence "
Meridianville, in Madison "
Scottsboro, in Jackson "
Hayneville, in Lowndes "
Elba, in Coffee "

The total attendance at these meetings was 1,258.

The average attendance at each meeting was 84.

Professors Duggar and Earle attended and worked in all the institutes; Prof. Mell, in two of them. Morning and evening sessions were held in each place for one day. In all instances each member of the station staff gave a talk or lecture in the morning and evening. The 15 institutes were held in 14 counties and they represent the various regions of Alabama.

The instruction was given in the form of plain talks illustrated by specimens, prepared drawings, and black-board outlines. At each meeting about one-half of the farmers in

attendance would make application to have their names placed on the permanent mailing list for Station bulletins.

In addition to conducting the institutes for the College and Station, I have worked with the Commissioner of Agriculture in Farmer's Institutes held at Wetumpka, Albertville and Evergreen.

During July and August, I went to Illinois and Missouri, where I purchased two registered short-horn calves, two registered Polled or Aberdeen Angus calves, two registered Red Poll calves, three grade Aberdeen Angus calves and one grade short-horn calf. These calves were shipped to Auburn about the first of November. By special favor, the Louisville and Nashville Railroad, and Western Railway of Alabama granted the Station free freight from East St. Louis to Auburn; these companies favor the growth and development of the stock industry in Alabama.

The ten calves are now undergoing inoculations with defebrinated blood, from an immune Alabama-bred heifer, for the purpose of producing immunity or acclimation; a full report will be made when the test is completed. Obviously such work will materially aid Alabama breeders in securing valuable breeding animals from non-infected States of the north and of Europe.

I have given my assistance to the city of Montgomery in helping to improve its meat, milk and dairy inspection. I have also given to Montgomery sufficient tuberculin (made in this department laboratory) for testing its dairy cattle for tuberculosis.

It is gratifying to know that Birmingham has adopted practically the same system of meat, milk and dairy inspection as the one in operation at Montgomery. It will go into effect March 1st, 1900. This department will furnish tuberculin to the inspectors of Birmingham upon condition that complete temperature records be sent this department immediately following the tuberculin tests.

The Veterinary Department is continuing to collect pathological specimens, animal parasites and facts relating to animal diseases in Alabama.

The toxic effects of cotton seed and cotton seed meal when fed to pigs is still being investigated.

Our Saturday free clinic furnishes the students a large number and variety of diseases of farm animals. In fact, cases and material for clinical study are abundant.

I have answered numerous inquiries concerning registered cattle and diseases of farm animals; and have, also, visited localities to investigate outbreaks of contagious diseases, when called upon for such work by the proper authorities.

C. A. Cary,
Station Veterinarian.

REPORT OF THE AGRICULTURIST,

DR. W. L. BROUN, *President,*

SIR:—I respectfully submit the following report of the Agricultural Department of the Alabama Agricultural Experiment Station for the past year.

The bulletins recently published by this department explain the most important lines of investigation which have advanced to a stage ready for publication During the twelve months covered by this report the Agriculturist has published 4 bulletins, containing altogether 147 printed pages.

The titles of these bulletins are as follow:

No. 101. Experiments with cotton, 1898.
" 102. Co-operative fertilizer experiments with cotton, 1898.
" 104. Velvet beans.
" 105. Winter pasturage, hay and fertilizer afforded by hairy vetch.

The data obtained in cotton experiments in 1899 is being prepared for publication, and this, together with a summary of all investigations heretofore conducted by the Agricultural Department will constitute the contribution of this department to the book on cotton now being prepared by certain members of the Station Staff.

The investigations of 1899 were largely a continuation of lines of work begun several years before. As in past years, so in 1899, special attention was given to the growth of plants suitable for forage and for soil improvement, to cotton culture, and to pork production.

Of forage plants those receiving the largest share of attention were cowpeas, hairy vetch, velvet beans, sorghum, and rye.

In pork production the special end in view was to ascertain the relative values of peanuts, chufas, rape, sorghum, and hairy vetch as food for swine. Experiments in feeding rice, bran, corn meal, corn hearts and cowpeas were also conducted. The effect of these foods on quality of pork and lard, as well as on the rate of growth of the animals, was investigated.

In cotton culture a carefvl study was made of a large collection of varieties with a view to reducing the number of so-called varieties and of forming some practicable schedule for the classification of varieties of cotton. The problems connected with the fertilization of cotton were investigated, both on the Station Farm and in the numerous co-operative soil tests conducted far us by farmers in different parts of the State.

There are many minor lines of work under way, some of which will be given greater prominence as opportunity permits. One of the first of these which it is hoped to develop is corn culture, which will occupy this department to an increasing extent during the coming year.

Special mention should also be made of the fact that investigations in cattle feeding and in dairying have been begun. This has been made possible by the appointment of an assistant especially for the work along these and related lines. Mr. R. W. Clark, the Assistant in Animal Husbandry, began work in September, 1898, and through this addition to the working force of the Agricultural Department it is hoped that we may be able to render valuable services towards building up and perfecting the live stock industry of Alabama. Since the date of the last report a herd of beef cattle has been added to our equipment, this herd consisting of a pair of Red Polls, a pair of Polled Angus, a pair of Shorthorns, and four grade heifers of the Angus and Shorthorn breeds.

During the past year the writer has done the usual amount of correspondence and has participated in the Farmer's Institutes conducted by the College and Station.

Respectfully submitted,

J. F. DUGGAR,
Agriculturist.

REPORT OF BIOLOGIST AND HORTICULTURIST.

DR. WM. LEROY BROUN, *President.*

SIR:—In the Horticultural Department, work during the year in the orchard has largely been of a routine character since the freeze in February last killed the crop of most fruits. No new orchard planting has been done during 1899. In the vegetable garden work has been carried on with Irish potatoes, tomatoes, cabbage, beans, watermelons and canteloupes. Also continued work in trying to find a remedy for the nematode root knot. Bulletin No. 106, entitled "Orchard Notes," has been published from this department during the year. A bulletin on tomato culture is in preparation but is not yet ready for the printer. Many valuable notes have been taken that will be used in future publications. The correspondence of this department is heavy and is rapidly increasing. This is a good index of the increased popular interest in commercial horticulture in various parts of the State.

In the Biological Department, work has been continued with cotton diseases and a paper has been prepared on this subject for the comprehensive bulletin on cotton now in preparation by the officers of the station. This paper gives a brief account of each of the diseases of cotton that has been detected in this State, the object being to present a compact statement of our present knowledge of the subject. It includes the results of my own unpublished observations and the results obtained by other investigators. A list of the fungi that have been reported as growing on cotton or the cotton plant in any part of the world is given, also a bibliography giving the titles, place and date of publication, and a brief statement of the contents of all the published writings on cotton diseases that are known to me.

Continued attention has been given to the diseases of the tomato. Observations and experiments during 1898 and

1899 seem to prove that the Bleach Rot or Blossom End Rot of the tomato is caused by the growth within the tissue of a specific *bacillus*, and not by the filamentous fungi that are often associated with it, and which have heretofore been considered as the cause. An account of these experiments was read before the Botanical Club of the American Association at the Columbus, Ohio, meeting. This account will be published in full in the forthcoming bulletin on the tomato mentioned under Horticultural work.

The diseases of beans and cowpeas received particular attention. One new one causing the wilting and death of the vines has been detected, making three distinct fungous diseases causing a "wilt" of these plants on our grounds. A bulletin is in preparation on the subject.

The fungus flora of the State has continued to receive attention. At the request of Dr. Chas. Mohr, a new list of the species occuring in the State was prepared during the spring of 1899. It includes those formerly published in Bulletin 80 of this Station and by Dr. Atkinson in Cornell University Bulletin, Vol. 3, No. 1. Also such additions as had been detected since the publication of Bulletin 80. It will form a part of Dr. Mohr's "Plant Life of Alabama," that is being published by the Division of Botany of the U. S. Department of Agriculture.

The following table shows the present condition of the Herbarium of this department:

	Fungi.	Lichens.	Mosses, etc.	Algae.	Total.
Previously reported,	14172	591	244	759	15,766.
Added during 1899,	1408	143	226	125	1,902.
Total,	15,580	734	470	884	17,668.

The collection is rapidly outgrowing its present quarters and new cases will soon be a pressing necessity.

Work in connection with the Biological survey of the State is being continued as fast as pressure of other duties permits.

A special study is being attempted of the plants and plant conditions of the granitic area of Central East Alabama. This is a well marked natural division of the State, differing in soils and topographical features from the other portions. A thorough study of it promises to yield interesting and instructive results.

The Herbarium of the Biological survey continues to make a satisfactory growth. At the time of my last annual report it numbered 11,237 specimens from all sources. There have been added during the year, 6,277 specimens making the total at this date 17,514 specimens. These with 17,668 in the cryptogamic herbarium make a total of 35,182 specimens for the two collections. The following plants are still largely unmounted, although they have been distributed in regular order so that they are accessible. It is very desirable that means be found at an early day for the proper mounting of this valuable collection, since, in its present condition it cannot be handled for study without serions danger to the specimens.

Respectfully submitted,

F. S. EARLE,

Biologist and Horticulturisc.