

THIRD ANNUAL REPORT

OF THE

Agricultural Experiment Station,

OF THE

A. & M. COLLEGE,

AUBURN, ALABAMA,

FEBRUARY 1, 1891.

MONTGOMERY, ALA. :

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AGRICULTURAL AND MECHANICAL COLLEGE,
AUBURN, ALA., Feb. 1, 1891.

To Governor THOS. G. JONES,

Executive Department,

Montgomery, Ala.:

SIR—I have the honor herewith to transmit to you the Annual Report of the Agricultural Experiment Station of the Agricultural and Mechanical College of Alabama, for the year 1890.

This report is made in accordance with the provisions of the act of Congress establishing the Experiment Stations in the different States, and contains the report of the Treasurer, the Director and Agriculturist, the Chemist, the Botanist, and the Biologist.

Very respectfully,

WM. LEROY BROUN,
President.

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OF THE

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N. T. LUPTON..... Vice-Director and Chemist.
P. H. MELL*..... Botanist.
G. F. ATKINSON..... Biologist.

ASSISTANTS:

ISAAC ROSS, First Asst. Agriculturist in Charge of Live Stock and Dairy.
JAS. CLAYTON..... Second Assistant Agriculturist.
J. T. ANDERSON, PH. D..... First Assistant Chemist.
L. W. WILKINSON, M. SC..... Second Assistant Chemist.
J. F. WILKINSON, B. SC..... Third Assistant Chemist.
R. E. NOBLE, B. SC..... Fourth Assistant Chemist.
A. M. LLOYD, B. SO..... Assistant Botanist.

* Prof. Mell has charge of Meteorological Observations.

TREASURER'S REPORT,

For the fiscal year ending July 1st, 1890.

THE AGRICULTURAL EXPERIMENT STATION OF THE

A. AND M. COLLEGE OF ALABAMA,

In account with U. S. Treasurer.

RECEIPTS.		
To amount balance on hand	\$	66
To amount from U. S. Treasurer.	14,999 34	\$ 15,000 00
DISBURSEMENTS.		
By Amount paid salaries.....	8,694 46	
Amount paid Uniontown Station.....	2,000 00	
Amount paid Equipment Dairy Department..	241 60	
Amount paid Botanical Department.....	139 08	
Amount paid Biology Department.....	498 15	
Amount paid Incidentals.....	113 15	
Amount paid Trustees	24 40	
Amount paid traveling expenses of officers...	72 10	
Amount paid Library.....	203 02	
Amount paid Printing.....	796 77	
Amount paid Arboretum.....	27 90	
Amount paid Stationery.....	89 35	
Amount paid Postage.....	81 37	
Amount paid Soil Test Experiments.....	268 59	
Amount paid Building	750 00	\$ 15,000 00

E. T. GLENN, *Treasurer,*
A. & M. College.

AUBURN, ALA., February 1st, 1891.

I hereby certify that the foregoing is a true copy from the books of account of the Agricultural Experiment Station of the Agricultural and Mechanical College of Alabama.

E. T. GLENN, *Treasurer.*

AUBURN, ALA., February 1st, 1891.

I hereby certify that E. T. Glenn is Treasurer of the Agricultural and Mechanical College of Alabama, and that the above is his signature.

WM. LEROY BRUN,
President Alabama Agricultural and Mechanical College.

REPORT OF DIRECTOR.

—♦♦—
J. S. NEWMAN.
—♦♦—

The printed matter issued by an experiment station conveys but a faint idea of the amount of work done, since the results of the work only are printed. The general reader, unacquainted with the patience and painstaking, and the watchful anxiety with which the faithful station-worker guards against every possible source of error in order that the results may be implicitly relied upon, can have but meagre conception of the amount of work not shown in the printed pages.

Many inquiries occupy a series of years before any results can be announced, and yet each season demands its quota of carefully recorded observations. This is especially true of much of the work in pomology, stock-breeding and experiments with fertilizers.

Inaccurate experiments, scientific investigations based upon false data and partial statistics, not only add nothing to the general fund of knowledge, but positively misrepresent facts and discount the credit of the results of good work.

The public should not, therefore, be impatient of the apparent delays in publishing results or announcing conclusions, and the prudent experimenter should possess sufficient courage to resist the temptation to gratify public clamor with abortive conclusions.

Since the last annual report was issued, eleven bulletins have been issued as follows.

PEACHES AND PLUMS.

[Bulletin No. 11, New Series. By the Director.]

This bulletin reports results of comparison of seedling with budded trees, manner and objects sought in pruning and its effects; treatment to protect from the borer, date of flowering for two years, color and size of the flowers of each of thirty-

six varieties, description of fruit of each variety and their classification with reference to the use to which each is best suited. A similar classification of a dozen varieties of plums is also given.

CO-OPERATIVE SOIL TESTS.

[Bulletin No. 12. By the Director.]

This gives a report of results of soil tests of fertilizers conducted in 1889, by farmers upon typical soils of the State for the purpose of studying the chemical defects of the soils. It also embodies explicit instructions for conducting similar experiments in 1890. These experiments were conducted in thirty localities in the State during 1890 by farmers who voluntarily undertook the work, this station furnishing the chemicals already prepared for use and supplying printed instructions for its conduct, and blanks for reports. Of these *twenty-four* have sent in satisfactory reports, and with one exception desire to continue the work in 1891. Varieties of grapes and small fruits will be sent to these, free of cost this year, for the purpose of testing their adaptation to the typical soils of the State.

The number of such experimenters will be increased to forty during 1891.

In many localities these experiments have excited great interest on the part of farmers. Some of the experimenters write that farmers "came many miles to inspect the crop during the growing season." Several planters have written asking where the chemicals can be purchased, and expressing a determination to conduct the inquiry on their own lands at their own expense.

MICROSCOPIC STUDY OF CERTAIN VARIETIES OF COTTON.

[Bulletin No. 13. By the Botanist.]

This gives the results of a most tedious and painstaking examination of specimens of lint of twenty-five varieties of cotton, a discussion of species and varieties, the nature of cotton fibre, the twist, length and strength of the specimens examined and the conditions necessary for the improvement of the quality of the lint or fibre.

This bulletin is illustrated by longitudinal views of the fibre

showing the twist of the different specimens, and also with cross sections of the fibres magnified. These are from original drawings by the author of the bulletin.

PEA VINES AS A FERTILIZER.

[Bulletin No. 14. By the Chemist.]

After a brief discussion of the commercial sources of nitrogen and a statement of Wagner's conclusions as to *nitrogen collectors* and *nitrogen consumers*, the value of pea vines as a fertilizer, the special subject of the bulletin is considered, and the results of chemical investigation of the vines as compared with the roots, and of the green vines compared with those that have been weathered and dried, and conclusions are announced as drawn from the results. An appendix contains results of analyses of commercial fertilizers offered for sale in Alabama.

INSECTICIDES.

[Bulletin No. 15. By the Biologist.]

Gives instructions how to make and apply kerosene emulsion to plants as an insecticide.

SOME CONCLUSIONS FROM SIX YEARS OF EXPERIMENTATION.

[Bulletin No. 16. By the Director.]

This bulletin covers quite a wide range of subjects and conclusions from experiments conducted during the years 1884 to 1890, inclusive. The comparative agricultural value of the different forms of phosphoric acid is discussed as the result of repeated experiments.

The influence of a judicious rotation of crops in which the pea vine is used, is discussed in connection with the improvement of worn soils; the economical use of home manurial resources, the management of the compost heaps, the choice of plants for different sources of potash and nitrogen, the cheapest commercial and natural sources of the latter, how to use pea vines to the best advantage, and practical conclusions drawn from the experiments, practice, experience and observation of the author, occupy the body of the bulletin. In addition to these are the results of some recent experiments with corn, cotton, rye and chufas.

DRY APPLICATION OF PARIS GREEN AND LONDON PURPLE FOR
THE COTTON WORM.

[Bulletin No. 17. By the Biologist.]

This is a very practical presentation of essential facts in the life-history of the cotton worm and the use of the two poisons, Paris green and London purple, for its destruction.

A circular letter was addressed to quite a number of planters in the section of the State subject to the ravages of the cotton caterpillar. The very lucid and intelligent replies of the planters, telling how they used the poison make interesting reading. As an appendix to this bulletin is given the report of the Alabama Weather Service.

CLIMATOLOGY OF ALABAMA.

[Bulletin No. 18. By Prof. Mell, Botanist and Meteorologist.]

This is a very valuable work, which will be sought for reference for many years. It represents a vast deal of careful labor and research, resulting in a complete history of the climatology of Alabama.

ROADS AND ROAD-MAKING.

[Bulletin No. 19. By Gen. Jas. H. Lane, Prof. of Engineering in the College.]

Furnished in response to the request of the Board of Direction of the station. It contains concise directions for constructing farm and turnpike roads.

SMALL FRUITS, MELONS AND VEGETABLES.

[Bulletin No. 20. By the Agriculturist and Assistant, Jas. Clayton.]

This contains results of experiments with the crops mentioned in the title and report of Alabama Weather Service for October, 1890.

SOME NEW ROOT DISEASES OF THE COTTON PLANT.

[Bulletin No. 21. By the Biologist.]

This gives the results of the study of the diseases of the cotton plant during the last season, presented in clear and popular style. It is accompanied by plates illustrating the appearance of the plant when attacked by the diseases. These plates are made from original drawings illustrative of the appearance of the diseases under the microscope.

WORK IN PROGRESS.

There is a large quantity of material awaiting preparation for publication, including results of experiments with cotton, corn, wheat, oats and other field crops, apples, pears, grapes and small fruits, grasses and forage crops, results of co-operative soil tests, chemical investigation of the influence of certain feed-stuffs upon the chemical and physical properties of butter, diseases of plants, and especially of the cotton plant, and composition of feed stuffs; analysis of fertilizers and fertilizing materials and feed stuffs.

Experiments with fungicides and insecticides.

Experiments with fertilizing materials.

Experiments in culture of field and garden crops.

Experiments with seed saved under different conditions.

Experiments with cross-fertilization and hybridizing to produce specific results.

Experiments with different hardy and native stocks for the apple, peach and plum.

Experiments with treatment of surface to discover its influence upon soil temperature.

And many other subjects will receive attention during the present year.

DEPARTMENT OF CHEMISTRY.

—•—
N. T. LUPTON.
—•—

The work in the Chemical Department during the past year has consisted largely of the analysis of fertilizers, natural and artificial, samples of which were furnished the Commissioner of Agriculture, and the results reported for publication in bulletins issued from time to time. This work has greatly increased with the increased use of fertilizers and the more general understanding on the part of farmers that they can have samples of their fertilizers analyzed free of cost when sent through the Commissioner.

The whole time of Dr. J. T. Anderson, first Assistant, has been occupied in work connected with the Experiment Station. Sixty-three samples of sorghum have been analyzed for the Director, together with a variety of samples of feed stuffs, fertilizers, and other products.

An investigation is now in progress in reference to the composition of milk and butter, with special reference to the effect of cotton seed and cotton seed meal on the specific gravity and melting point of the butter produced, and the volatile acids contained therein. These results, when completed, will be published in the usual form.

During the past year a special bulletin on "pea vines as a fertilizer," was prepared and widely circulated. The farmers of the State are evidently becoming more and more interested in the work of this, as of other departments of experiment station work. The numerous letters received show a high appreciation of our published results and an earnest desire to derive all the benefit possible therefrom.

AUBURN, ALA., Jan. 31, 1891.

AUBURN, ALA., February 1st, 1891.

Dr. Wm. LeRoy Brown, President :

SIR—I have the honor to submit to you the following report of the work accomplished in the departments of the experiment station under my charge during the past year. The subjects are :

- I. Botanical investigations.
- II. Meteorological observations.

I.

BOTANICAL INVESTIGATIONS FOR STATE EXPERIMENT STATION.

The work of the year has been of two kinds :

1st. That order of compilation of known facts in botany best adapted for the use of the farmers of the State.

2nd. Original investigations, looking to the discovery of new facts in science, for the benefit of agriculture.

Under the first head bulletins were not prepared during the year, because my time was fully occupied with other work mentioned under division 2nd, and, moreover, there seemed to be no immediate necessity for such publications.

Under division 2nd the following bulletin was prepared and issued to the farmers of the State :

No. 13. Microscopic Study of Certain Varieties of Cotton.

We have been engaged during the past year in extended work upon the following investigations, and a large amount of material has been collected to be used in the preparation of bulletins within the next year :

1. A microscopic study of the woods of the State, looking to the determination of the following points: (a) At what stage of the tree's growth will the best lumber be produced? (b) What is the difference in the character of lumber produced by trees that have been tapped for turpentine, and the lumber furnished by trees that have been permitted to grow without molestation? (c) What is the difference between lumber, kiln dried by steam or hot air, and air dried by exposure to free circulation of atmosphere? (d) Comparison between oaks, pine, poplar, etc., lumber? (e) Microscopic examination of fine grain woods, suitable for veneering and fine cabinet

work, and the extent of this character of growth in the State.

2. Economic study of weeds of the State.

3. Progress made on the classification of the wild plants of Alabama.

Mr. A. M. Lloyd, the assistant in Botany, has aided largely in the progress of the work above outlined.

II

METEOROLOGICAL WORK AT THE STATION AND THE ALABAMA WEATHER SERVICE.

The work in this branch of my department has been steadily pushed ahead, and bulletins have been published at regular intervals, presenting the facts collected by observers in many counties of Alabama. Observations of soil thermometers, air thermometers, barometer, rain gauge, etc., and the general conditions of the atmosphere have been made each day at Auburn by the two young men, Messrs. J. M. Quarles and A. M. Lloyd, who have been aiding me in the work under my charge. The soil thermometers are in the care of Mr. Lloyd, who has this work of observing, besides the assistance he renders in botanical investigations. Mr. Quarles is an appointee of the United States Signal Service, and has charge of the compilation of meteorological data sent the office by observers over the State.

Bulletin No. 18 (*Climatology of Alabama*) is a valuable paper; and because of the long period of years covered by the observations and the character of the observers, this paper will, no doubt, be used as a standard work of reference on the subject of the climate of Alabama.

Beginning with the first of 1891 the three sets of soil thermometers will be used to determine the following questions, among others:

1. One of the sets heretofore located on the hill at the farm has been transferred to the campus on a grass plot underlain by a compact clay subsoil. These instruments will remain here for a number of years to determine the *frost line*, and such other facts that can only be secured after many years of careful observations. The thermometers range in length from 1 to 96 inches.

2. The other set on the hill at the farm, consisting of nine thermometers and ranging from 1 to 60 inches, will remain where formerly buried and the grass and other vegetation will be allowed to grow, and the soil will be permitted to harden and under no condition be disturbed. . At irregular interval, the amount of moisture will be carefully determined in the soil and subsoil. This determination will be made especially after a series of rains and during a drought.

3. The third set in the bottom land on the farm will also remain where first buried, and the soil will be cultivated regularly up as close to the thermometers as possible. Here, as with the set on the hill, the amount of moisture will be carefully determined in the soil and subsoil at irregular intervals. The results from the two sets will be compared and published from time to time.

The above are some of the points that will be considered in this new adjustment of the soil thermometers.

Very respectfully,

P. H. MELL,
Botanist and Meteorologist.

REPORT OF THE BIOLOGIST.

Since the last annual report three bulletins have been prepared from this department, as follows :

Bulletin No. 15, April, 1890.—Insecticides, kerosene emulsion ; how to make and apply it.

Bulletin No. 17, July, 1890.—Dry application of Paris green and London purple for the cotton worm. Preliminary to this bulletin a circular letter was issued (May 14, 1890,) to one hundred farmers of the State requesting their experience in the application of the dry poison, by dusting it through osnaburg bags suspended from a pole. The replies to this circular were used as a basis for the publication of the bulletin.

Bulletin No. 21, December, 1890.—A new root rot disease of cotton.

During the spring experiments were made to test the efficacy of certain fungicides for black rot on grapes, with perfect success in case of one of the fungicides.

August 1, 1890, circular letter No. 2 was addressed to the farmers soliciting specimens of diseased cotton, especially such diseases as are termed "black rust," "red rust," "Frenching," and "root rot." Between twenty-five and thirty replies have been received, and with what I have collected, a very large series of specimens exhibiting the black and red "rust," as it is termed in Alabama, has been gotten together. Much time has been spent in observing and studying this disease during the summer and autumn, together with artificial cultures in the biological laboratory. As a result, material is now nearly ready for bulletins relating to diseases of cotton, as follows :

Black "rust" of cotton.

Anthracnose of cotton.

Besides, a large number of fungi on grasses, fruit trees, forest trees, etc., have been collected and placed in the cabinet for the use of the department in offering instruction, and as the basis for other bulletins of economic interest.

NEEDS OF THE DEPARTMENT.

In view of the great amount of labor required in the collection, preservation, and cataloguing of specimens for the cabinet; of the necessity of facilities for studying more closely diseases of plants, etc., I would recommend—

1st, That an assistant be provided, who will be competent to aid in the work of the department.

2nd, That an appropriation be made for the purpose of erecting a propagating house, where plants of economic importance may be grown and experimented upon under easy control of temperature, humidity, and in certain cases the exclusion of organisms other than those used in the experiments to study the nature of the disease under investigation.

3rd, That provision be made for fitting up a biological cabinet, for the purchase of models, of reference specimens and books upon the special subjects which are within the scope of the department. These are especially necessary to supply the means for thorough work, that accurate work may be reached in the investigations, which alone can be of any permanent importance and usefulness.

Respectfully submitted,

GEO. F. ATKINSON,

FEBRUARY 1, 1891.

Biologist.

