

SEVENTH ANNUAL REPORT

OF THE

# Agricultural Experiment Station

OF THE

A. & M. COLLEGE,

AUBURN, ALABAMA,

*JANUARY 25TH, 1895.*

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MONTGOMERY, ALA.:

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# AGRICULTURAL EXPERIMENT STATION.

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## COMMITTEE OF TRUSTEES ON EXPERIMENT STATION.

I. F. CULVER.....	Union Springs.
J. G. GILCHRIST .....	Hope Hull.
H. CLAY ARMSTRONG .....	Auburn.

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## STATION COUNCIL.

WM. LEROY BROUN.....	President.
A. J. BONDURANT.....	Agriculturist.
B. B. ROSS.....	Chemist.
P. H. MELL.....	Botanist.
J. M. STEDMAN.....	Biologist.
C. A. CARY.....	Veterinarian.

## ASSISTANTS.

J. T. ANDERSON, PH. D.....	First Assistant Chemist.
R. E. NOBLE, M. Sc.....	Second Assistant Chemist.
C. L. HARE, M. Sc.....	Third Assistant Chemist.
T. U. CULVER.....	Superintendent of Farm.
W. B. FRAZER.....	Farm Clerk.

## TRUSTEES.

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*His Excellency*, WM. C. OATES, President..... Ex-Officio.

J. O. TURNER, Superintendent of Education..... Ex-Officio.

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C. C. HARRIS..... Decatur.

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J. A. BILBRO..... Gadsden.

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E. T. GLENN, Treasurer.

AGRICULTURAL AND MECHANICAL COLLEGE,

AUBURN, ALA., January 25, 1895.

To Governor WM. C. OATES,

*Executive Department,*

*Montgomery, Ala.*

SIR:—I have the honor herewith to transmit to you the Seventh Annual Report of the Agricultural Experiment Station of the Agricultural and Mechanical College of Alabama, for the year ending July 1st, 1894.

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

Very respectfully,

WM. LEROY BROUN,

President.



# TREASURER'S REPORT,

For the fiscal year ending July 1st, 1894.

THE AGRICULTURAL EXPERIMENT STATION OF THE  
 A. & M. COLLEGE OF ALABAMA,  
 In account with U. S. Treasurer.  
 Receipts and Disbursements of Hatch Fund to July 1, 1894.

RECEIPTS.		
To cash from U. S. Treasury.....		\$ 15,000 00
DISBURSEMENTS.		
To amount paid Salaries.....		\$ 9,404 11
“ “ “ Library.....		499 73
“ “ “ Printing.....		564 85
“ “ “ Stationery.....		14 47
“ “ “ Experiment Station labor.....	1,427 12	
“ “ “ Soil Test.....	223 49	
“ “ “ Chemical.....	432 65	
“ “ “ Trustees.....	96 33	
“ “ “ Building.....	750 00	
“ “ “ Incidental.....	87 25	
“ “ “ Museum.....	500 00	
“ “ “ Experiment Station—Current Expenses.....	1,000 00	\$ 15,000 00

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

THE STATE OF ALABAMA, }  
 Lee County. } Personally appeared before me, W. S. J. Lampkin, a Notary Public in and for said county and State, E. T. Glenn, known to me as Treasurer of the Agricultural and Mechanical College of Alabama, who, being duly sworn, deposes and saith that the above and foregoing account is true and correct.  
 Witness my hand, this 30th day of January, 1895.  
 W. S. J. LAMPKIN, Notary Public.

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,  
 A. & M. College.

This report is not made in accordance with recent directions from the Secretary of Agriculture, for the reason that the expenditures were made and entered prior to the reception of the order. They are now being kept as required, and will hereafter be so reported.  
 E. T. GLENN, Treasurer.



## REPORT OF THE BOTANIST.

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DR. WM. LEROY BROUN,

*President Alabama Experiment Station:*

SIR:—I have the honor to submit herewith my report of work performed in the department of Botany during the past year:

### EXPERIMENTS CONDUCTED.

The botanical garden was laid out and the following seeds and plants were carefully tested:

75 varieties and species of grasses.

10 kinds of clovers.

28 improved varieties of cottons. (See page 21 of bulletin number 56.)

6 varieties of India rice. (Killed by late frost.)

3 kinds of sugar beets. (See Bulletin number 60.)

“Ragi” millet (*Eleusine coracana*); “Kodo” millet (*Paspalum scrobiculatum*), both from Japan. (See bulletin number 60.)

“Cajan-pea” (*Cajanus indicus*).

“Horse gram” (*Dolichos biflorus*). India pea.

“Green gram” (*Phaseolus mungo*). India pea.

20 varieties of foreign cottons from India and Egypt.

“Catraing bean,” from India.

Soja bean.

New Japanese buckwheat.

New Danish oats.

2 kinds of haricot beans.

2 kinds of sesame from India.

Hairy Vetch (*Vicia villosa*). Sand or winter vetch.

The grass experiments were of special interest in determining what species are adapted to poor lands in hot summers and cold winters. A supply of seeds of the wild

species were gathered during the year to sow next season ; and the effort will be made to extend this feature of the botanical garden until the whole range of the wild grasses of Alabama are tested.

The experiments on the improvement of the cotton were continued during the past season—making the fourth year in this line of work on the cotton—and the results were most gratifying. The twenty-eight varieties mentioned on page 21 of bulletin 56 were selected for the tests in 1894, and a bulletin is nearly ready for the printer on the results secured.

The twenty foreign cottons under examination were carefully cultivated in order to accomplish two things : 1st, to acclimate the seeds if possible ; 2nd, to secure strong hybrids by blending them with the best plants among the twenty-eight varieties noted on page 21 of bulletin 56. The results to be obtained in another year are looked forward to with much interest. Several hundred experiments were made in the attempt to hybridize and a large number were successful.

The experiments on the sugar-beets were so satisfactory plans for continuing the work another year have already been formed. For results in this line of tests see bulletin number 60.

#### BULLETINS PUBLISHED.

I. The results of the experiments on the cotton during the season of 1893 were published in bulletin number 56, issued May, 1893. The following are the chief points in this bulletin :

1. Introduction.
2. The plan of the cotton flower and the method adopted by nature for maturing the seed.
3. Methods adopted in the field for producing the crossing.
4. Some of the problems to be solved.
5. Four tables of results.
6. Four full page illustrations with several cuts.

II. Some of the results secured in testing the foreign seeds were published in bulletin number 60, January, 1895.

The contents of this bulletin are :

1. Ragi millet (*Eleusine coracana*.)
2. Kodo millet (*Paspalum scrobiculatum*.)
3. New Japanese buckwheat.
4. Flat pea (*Lathyrus sylvestris*).
5. Sugar beets.
6. Bengal gram or chick-pea (*Cicer arietinum*).
7. Green gram or small kidney bean (*Phaseolus mungo*).
8. Sesame or oily-grain (*Sesamum orientale*).
9. Soja bean (*Glycine hispida*).

There has been considerable demand on the part of the farmers of Alabama for the forage plants and buckwheat mentioned in this bulletin. The supply of seeds on hand available for this purpose was soon exhausted and a number of applicants were disappointed.

STATION LIBRARY.

The station library under my charge has steadily grown since my last report. Many valuable scientific journals and books have been purchased. More than one hundred volumes of periodicals were bound last year and are now in an available form for reference and preservation. The total number of volumes and pamphlets on the shelves amounts to more than 9,600.

Very respectfully,

P. H. MELL,  
*Botanist.*

## REPORT OF THE CHEMIST.

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DR. WM. LEROY BROUN, *President*

*Alabama Agricultural and Mechanical College :*

SIR:—I respectfully submit the following report as to the operations of the Chemical department during the past year.

Since the date of the last annual report, nearly 400 samples of fertilizers have been analyzed in this laboratory, almost all of these samples having been forwarded through the State Department of Agriculture in accordance with the provisions of the fertilizer law.

In July of the past year, a bulletin was prepared by this department and issued by the Commissioner of Agriculture, in which the analyses of about 350 samples of fertilizers were published, and in addition, there was included a description of the crude fertilizing materials employed in the preparation of mixed fertilizers and of the characteristics and uses of the more common forms of commercial manures.

In May, 1894, Bulletin No. 57 by Dr. J. T. Anderson, first assistant chemist, was issued, and contained a report of an investigation of the "soil requirements of cotton as determined by the analysis of the plant," the experiments being made upon soils of different character and the plant analyses being made at several different stages of growth.

Additional experiments in connection with this same line of investigation have been in progress during the past season.

Bulletin No. 58, published in August, 1894, gave the results of the examination of a number of samples of Paris Green collected from various portions of the State, with a view to determining to what extent the adulteration of this insecticide was carried. In one instance it was found that Paris Green was entirely absent from a preparation sold

under this name, and these results were published with a view to cautioning farmers against the purchase of the spurious article.

In addition to the analysis of commercial fertilizers above referred to, there have been analyzed in this laboratory during the past year, a number of samples of marls, cave earths, bat manures, mucks, soils, mineral waters, ores, feed stuffs, sugar cane, syrups, and various miscellaneous substances.

A number of samples of sugar beets, cultivated under the supervision of Dr. P. H. Mell, were analyzed during the past summer and fall, and some of the results showed an unexpectedly high sugar content.

A number of imported forage plants, grown on the botanical plots, have also been analyzed to determine their nutritive or feeding values.

During the fall, some experiments in syrup making were undertaken by this department with a view to an improvement of the methods of the manufacture, clarification and preservation of syrups, and it is believed that the introduction of some of these improved methods will materially improve the character and at the same time increase the yield of this product.

Arrangements have been made to conduct some experiments in the cultivation of sugar cane during the present year and it is intended that the experiments in syrup making shall be carried out on larger scale during the next season.

A bulletin upon the subject of fertilizers and soils is now in process of preparation, it being designed to furnish therein information with reference to the composition, characteristics and best modes of utilizing materials as commercial manures, with a view to encouraging a more general and intelligent development of the manurial resources of the farm.

Respectfully,

B. B. Ross,  
Chemist.

# REPORT OF THE AGRICULTURIST.

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DR. WM. LEROY BROUN, *President,*

*Alabama Agricultural and Mechanical College:*

SIR:—I have the honor to submit the following report of the work in the Department of Agriculture during the past year.

Since I submitted my last report, January, 1894, the following bulletins have been issued from this department.

## BULLETIN NO. 54.

This bulletin contains results of experiments with tobacco made on the experiment station, 1893. It contains reports of the different methods of raising tobacco plants, preparation for transplanting the plants, method of cultivation, curing tobacco, classification and valuation, with statistics of the U. S. Department of Agriculture in regard to the yield and value of the tobacco crop.

## BULLETIN NO. 59.

This bulletin contains reports of twenty-three soil-test experimenters to whom fertilizers were sent in different parts of the State, including the report of this station. Bulletins showing the results of experiments made the past year with cotton and corn are now ready to be printed. A bulletin giving a report of the tobacco experiments has been commenced and will be gotten ready for publication as soon as possible.

## EXPERIMENTS.

Below will be found a plan of the experiments conducted on the station the past year, under supervision of the farm superintendent.

1 Comparison of the agricultural value of compost put out in the Spring with the materials of the compost put in the list in January.

2. Value of peas in renovating old and worn out land.

3. Comparison of rye with ensilage as to cost in producing milk.

4. Best crop of corn on one acre with fertilizers.

5. Best crop of cotton on one acre with fertilizers.

6. Experiments on varieties of tobacco.

7. Experiments in horticulture.

8. Catch crops in the fall for green manuring.

9. Experiments in pig feeding.

10. Experiments with cow peas to determine their value as a means of improving poor or worn out lands and as nitrogen collectors.

*Experiments Conducted on the Botanical Garden.*

11. Grass experiments to determine the native wild grasses.

12. The adaptation of foreign grasses and other foreign plants to this climate.

13. Experiments on the cultivation of bread producing plants imported from foreign countries for this purpose.

14. Experiments on fibre producing plants from foreign countries. Among the number will be foreign cotton.

15. Continuation of the experiments of crossing our varieties of native cotton.

16. Experiments with foreign ornamental plants.

17. Experiments with foreign fruit trees and other plants.

*Experiments Conducted by Professor of Agriculture.*

20 special nitrogen experiments on tobacco.

13 Phosphoric Acid experiments on tobacco.

12 potash experiments on tobacco.

6 tobacco experiments with mixed fertilizing substances.

16 variety tests with tobacco.

6 tobacco experiments with stable manure.

20 soil test experiments on corn and cotton.

2 experiments each of cotton and corn as comparison with acid phosphate, cotton seed meal, and kainit against cotton seed, stable manure acid phosphate and kainit.

10 intercultural experiments on cotton.

Rotation experiments.

Experiments were also made with rye, wheat and oats.

For conducting all the above experiments full directions were given to the farm superintendent to whom details of management were intrusted.

#### CO-OPERATIVE SOIL TEST.

Twenty-seven experimenters living in different parts of the State were supplied with fertilizers compounded at the station to conduct corn experiments. The result of this work is reported in bulletin No. 54, which has been published and distributed to the farmers of the State.

#### CO-OPERATIVE SEED TEST.

About the first of last January, I was requested by the Agricultural Department at Washington to furnish names of farmers in different parts of the State, who were willing to co-operate with the department in experimenting with foreign cotton, field and garden seeds.

In compliance with this request, I furnished the names of fifty-two intelligent farmers to conduct this experimental work. Seed were sent direct from the Agricultural Department to these parties—printed blanks were sent from this department, which were prepared in Washington upon which these reports were to be made.

The reports from the different experimenters are now being received by the agriculturist, and any facts they may contain of value will be published in bulletin, together with the investigations made by this department the past year with foreign cotton and other seeds.

This new line of station work will be continued the present year. I have already furnished to the Agricultural Department at Washington double the number of names sent last year, and have been informed that the necessary seed will be sent to them. Also such seeds as may be needed for the experiments by this department with new seeds will be sent.

Respectfully,

ALEX. J. BONDURANT,  
Agriculturist.

## REPORT OF THE BIOLOGIST.

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DR. WM. LEROY BROWN, *President*

*Alabama Agricultural and Mechanical College :*

SIR :—I have the honor to submit the following report of the work in the Department of Biology during the past year :

Two bulletins have been published as follows :

Bulletin No. 55, April, 1894, entitled, "A New Disease of Cotton. Cotton Boll Rot," discusses a new bacterial disease of cotton affecting the seed, lint and bolls. This is a very destructive disease in certain localities in the Southern part of the State, where it has caused a loss of 30 per cent. to the cotton in the affected districts. Pure cultures of the bacteria causing the disease were separated and cultivated in agar-agar tubes, and inoculations made from these tubes into healthy cotton bolls caused the disease in question, thus proving that these bacteria are the cause of the disease. The bulletin discusses the nature and cause of the disease, and gives the biological, morphological and pathogenic characters of the bacteria in question, together with the methods of its isolation, cultivation and inoculation. Two insects found associated with, but not the cause of the disease, are also discussed. The remedies and precautions to be followed in regard to this bacterial disease is then discussed. A plate accompanying the bulletin shows the bacteria as seen in a tube culture natural size, two figures of the bacteria greatly magnified, and figures of the two insects found associated with the disease, also a figure of a diseased cotton boll cut open to show the way in which the disease attacks the bolls.

Bulletin No. 61, January, 1895, entitled, "Insects Injurious to Stored Grain," contains some general remarks in

regard to the life histories and habits of insects in general, their classification for economic purposes, and the various stages at which they can best be combatted. The different kinds of insecticides for both biting and sucking insects, with formulæ for making and methods of application are then given, together with the nature of the insect to be destroyed by each. A few of the best machines for applying various kinds of insecticides and fungicides are then figured, and a short description with the manufacturer's address is given. The following insects are then discussed, and their habits and life histories briefly given, together with figures of the adult, and also of its various stages and work in most cases :

The Pea Weevil (*Bruchus pisi*, Linn.)

The Bean Weevil (*Bruchus obtectus*, Say.)

The Four-Spotted Bean Weevil (*Bruchus 4-maculata*.)

The Grain or Corn Weevil (*Calandra granaria*, Linn.)

The Black or Rice Weevil (*Calandra oryzae*, Linn.)

The Angoumois Grain Moth (*Gelechia cerealella*, Oliv.)

The Grain Beetle (*Silvanus surinamensis*, Linn.)

The Red Grain Beetle (*Silvanus cassiae*, Reiche.)

The Brown Grain Beetle (*Tribolium ferrugineum*, Fab.)

The Corn Sap Beetle (*Carpophilus fallipennis*, Say.)

Remedies for Grain Insects.

The Plant Laboratory has been of great service in rendering possible the study of and experiment with different fungoid diseases of plants during the winter months. It also serves as an insectary, where the breeding of injurious insects and a study of their life histories can be conducted and experiments performed.

Special attention has been directed towards a study of the conditions that govern, control and modify the attack and growth of diseases in cotton; and experiments to determine the remedies, both preventive and curative, have received more attention than the nature and cause of the disease itself. In other words, less attention and time has been given to the discovery of new diseases, and more devoted to the control of old ones.

Experiments with different fertilizers and fungicides have been conducted with varying success.

The combining of different kinds of insecticides for biting and sucking insects, and also the combining of insecticides and fungicides, has been experimented upon with good results, and much time and trouble can thus be saved.

Work is progressing in the study of economic bacteriology, mycology and entomology, and the collections of economic fungi and of insects has been greatly added to.

One lecture was delivered to the State Agricultural Society in Montgomery on Fruit Tree Blight.

Respectfully submitted,

J. M. STEDMAN,

Biologist.

## REPORT OF THE VETERINARIAN,

TO PRESIDENT WM. LEROY BROUN,

*Of Alabama Agricultural and Mechanical College:*

SIR:—I herewith submit the following as the annual report of the Veterinary Department of the Experiment Station.

Lectures upon the diseases of domestic animals have been delivered in various parts of the State. This work has been continued because there were requests from the various localities, for instruction on the more common diseases of farm animals. One lecture on Texas fever was delivered in Montgomery at the Farmers Institute held during the State Fair.

Numerous letters relating to the various diseases of stock that have appeared in the State during the past year, have been received and answered.

In the later part of June, I personally investigated an outbreak of Texas fever, near Matthews Station, Montgomery county.

In January, 1894, this department issued Bulletin 53, "A New Milk or Water Sterilizer." The aim of this bulletin was to give a simple and effective method of destroying the disease producing germs that may appear in milk or water; and at the same time preserve the taste, healthfulness and digestibility of these staple food articles.

This department planned pig-feeding experiments; the aim of which were to test the values of raw cotton seed and cotton seed meal as pig foods, when mixed with other foods, such as green rye, green oats, green sorghum and sweet potatoes. So far the results show that green cotton seed can

be so fed with profit and without danger to the health of the pigs. This, however, needs further test before we can issue a bulletin or draw definite conclusions.

During last year nearly 400 cases were examined and treated at the Saturday free clinic.

The department is now equipping a bacteriological and pathological laboratory, which will soon be ready for use in the study of pathogenic germs and pathological specimens.

Respectfully submitted,

C. A. CARY,  
Veterinarian.