

FOURTEENTH ANNUAL REPORT

OF THE

Agricultural Experiment Station

OF THE

ALABAMA POLYTECHNIC INSTITUTE,

AUBURN, ALABAMA.

JANUARY 21, 1902.

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MONTGOMERY, ALA.

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1902.



PRESIDENT WILLIAM LEROY BROUN

DIED

ON THE 23RD DAY OF JANUARY,

1902.



ALABAMA POLYTECHNIC INSTITUTE.

AUBURN, ALA., Jan. 26th, 1902.

GOVERNOR W. D. JELKS,

*Executive Department,*

*Montgomery, Ala.*

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

The report of the Treasurer, herewith included, is for the fiscal year ending June 30th, 1901.

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 Director, Botanist, the Chemist, and the Veterinarian, the Agriculturist, and Biologist, and the Horticulturist, for the year ending December 31st, 1901.

Respectfully,

O. D. SMITH,

*Acting President.*

## AGRICULTURAL EXPERIMENT STATION.

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### COMMITTEE OF TRUSTEES ON EXPERIMENT STATION.

THOMAS WILLIAMS.....Wetumpka, Ala.  
JONATHAN HARALSON.....Selma, Ala.

### STATION COUNCIL.

WM. LEROY BROUN, LL.D.....President.  
P. H. MELL, Ph. D.....Director and Botanist.  
B. B. ROSS, M. S.....Chemist.  
C. A. CARY, D. V. M., B. S.....Veterinarian.  
J. F. DUGGAR, M. S.....Agriculturist.  
\*F. MEAD WILCOX, Ph. D.....Biologist and Horticulturist.  
J. T. ANDERSON, Ph. D.....Associate Chemist.

### ASSISTANTS.

C. L. HARE, M. S.....First Assistant Chemist.  
C. W. NIXON, B. S.....Second Assistant Chemist.  
THOMAS BRAGG, B. S.....Third Assistant Chemist.  
T. U. CULVER.....Superintendent of Farm.  
R. W. CLARK, B. S.....Assistant Agriculturist.  
C. F. AUSTIN, B. S.....Assistant Horticulturist.  
G. F. FREEMAN.....Assistant to Director.  
M. J. LIDE.....Assistant to Director.

\*Prof. F. S. Earle resigned to accept a position in Columbia University of New York.

## TRUSTEES.

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<i>His Excellency</i> , W. D. JELKS, President.....	<i>Ex-Officio</i>
JNO. W. ABERCROMBIE, Superintendent of Education..	<i>Ex-Officio</i>
R. F. LIGON, JR.....	Montgomery, Ala.
TANCRED BETTS.....	Huntsville, Ala.
W. C. WHITAKER.....	Tuscaloosa, Ala.
JONATHAN HARALSON.....	Selma, Ala.
THOMAS WILLIAMS.....	Wetumpka, Ala.
J. A. BILBRO.....	Gadsden, Ala.
J. M. CARMICHAEL.....	Ozark, Ala.
W. K. TERRY.....	Birmingham, Ala.
T. H. FRAZIER.....	Mobile, Ala.
J. F. PURSER.....	Opelika, Ala.

## REPORT OF TREASURER.

*Treasurer of Alabama Polytechnic Institute, in account with United States Appropriation Hatch Fund, for the year 1900-1901.*

### RECEIPTS.

To U. S. Treasury.....\$15,000 00

### DISBURSEMENTS.

By amount paid	salaries.....	\$ 9,072 35
“ “ “	labor .....	1,266 49
“ “ “	publications .....	1,138 39
“ “ “	freight and expenses....	346 61
“ “ “	heat, light and water....	216 44
“ “ “	chemical supplies .....	584 95
“ “ “	seeds, plants and supplies	870 41
“ “ “	fertilizers .....	315 80
“ “ “	feeding stuff .....	215 56
“ “ “	scientific apparatus .....	177 52
“ “ “	library .....	500 00
“ “ “	tools, implements and machinery .....	142 03
“ “ “	live stock .....	44 11
“ “ “	contingent .....	14 00
“ “ “	traveling expenses .....	95 29

Total .....\$15,000 00

E. T. GLENN,

*Treasurer A. P. Institute.*



STATE OF ALABAMA,

LEE COUNTY.

Personally appeared before me Welborn Jones, a Notary Public in and for said county; E. T. Glenn, known to me as Treasurer of the A. P. Institute of Alabama, who being duly sworn, deposes and says that the above and foregoing account is true and correct.

Witness my hand, this 15th day of Jan. 1902.

[SEAL.]

WELBORN JONES, N. 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 the same.

WM. LEROY BROWN,

*President A. P. Institute.*

## REPORT OF DIRECTOR.

*Dr. Wm. LeRoy Broun, President:*

SIR—I have the honor as Director of the Station to submit the following report concerning the work under my charge during the year 1901.

The steady increasing popularity of the Station and its work among the farmers of Alabama is gratifying, and there are constant demands made on the office for bulletins relating to such subjects as are of special moment to the material advancement of Alabama agriculture. Letters have reached the Director's office during the year asking for information on topics relating to orchards, the lands and fertilizers suitable for the successful cultivation of corn, cotton, grass, and other forage plants, how to save hay, and the best plants adapted to making pastures; how to feed for beef and milk and butter, the best breeds of stock for this climate, and how to take care of the fine grades of stock. Parties living in other sections of the country north of us have written many letters asking for all kinds of information concerning the State. In what portions are the best lands located for fruit, raising hogs, market gardens and the opportunities for successfully cultivating and disposing of all kinds of vegetables, the climate of the State, and numerous other like questions which bear on the subjects of farming and the development of homes. The increasing demand for information on stock and the making of hay is exceedingly encouraging, and is a hopeful sign that the farmers are realizing at least the great advantage of diversified industry, and the hopelessness of depending on the one crop

system. Most of the earlier bulletins relating to forage plants and to stock have been exhausted, and the demand has not been satisfied. There are many letters on file in the Director's office speaking in high terms concerning the estimates the farmers place on the results of the work of the Station for their benefit. They appreciate the fact that certain results of the long conducted experiments at the Station have been the means of saving them many dollars, and the past year they have read the bulletins more generally than in any year since the establishment of the Station.

The mailing list has rapidly grown during the year, and in almost every mail letters come asking for bulletins, and to have names added to the list. The policy of the Station has been not to burden the mailing list with names simply to scatter the bulletins, but we have carefully avoided placing any name on the list unless specially requested to do so. The number of parties who are now regularly receiving the bulletins of the Station is 8,933. The mailing list being encumbered with many names of parties who were either deceased or removed, it was decided to make a revision of the same. Accordingly postal cards with return slips were sent out notifying those to whom they were addressed that the mailing list was being revised, and requesting that if they wished to continue to receive the bulletins to so indicate it by returning the attached card, with their names and addresses. Some years having elapsed since this matter was attended to, the revision caused quite a reduction in the number of names, due to the death of the parties in many instances, and to the changes in post offices of a number of others who formerly received the bulletins. There were something over 1,500 names dropped from the mailing list because of this revision. During the year there have been added

to the mailing list 750 names from Alabama and abroad.

Many of the earlier bulletins of the Station have been exhausted some time ago, and a number of the more recent ones have been greatly reduced, and at the present rate of demand they will also become exhausted very soon. I would advise, therefore, an increase in the numbers printed of each bulletin.

The following synopsis of the bulletins issued during 1901 indicates the character of the experiments conducted by the Station staff during the year:

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LIST OF BULLETINS WITH CONTENTS ISSUED BY THE STATION IN 1901, COMPRISING VOLUME IX.

113—CO-OPERATIVE EXPERIMENTS WITH COTTON  
IN 1899-1900.

Contents: Plan of experiment; weather in 1899-1900; coöperative fertilizer experiments at Collinsville, Snow Hill, Furman, Maple Grove, Gordo, Tuscaloosa, Hugent, Vick, Notasulga, Auburn, Kaylor, Cusseta, Opelika, Burnt Corn, Hurtsboro, Calhoun, Naheola, Jackson, Garland, Wilson, Dothan, Boligee, Berney's, Hamilton, Tuscumbia, Sterrett, Dillburg, Marvyn, Oak Bowery, Greensboro, Greenville, Union Springs, and Abbeville; fertilizer experiments at Auburn Station; determination of the relative effects of cotton seed meal, acid phosphates, and kainit; effect of kainit as a preventive of rust; ammonia equivalents of nitrogen.

114—FEEDING EXPERIMENTS WITH DAIRY COWS.

Purchased vs. farm-grown rations; cotton seed meal and sorghum hay, cotton seed meal and hulls; effect of different foods on the health and weight of cows; the amount and quality of manure collected from cows on

different rations; green rye as a substitute for cotton seed hulls and sorghum hay; effect of green food on richness of milk; digestible nutriments in rations fed; value of cowpeas in corn fields as pasturage.

#### 115—COMMERCIAL FERTILIZERS.

Fertilizers—selection and use, calculation of commercial values; analysis of fertilizers reported by the State Chemist from July, 1900, to July 1, 1901, giving phosphoric acid, potash and nitrogen content with commercial value of the fertilizer per ton; guaranteed analysis of commercial fertilizers filed in the office of the Commissioner of Agriculture by dealers and manufacturers; fertilizer licenses issued during the past season; laws regulating sale of fertilizers; criminal laws; manner of taking samples; regulations for manufactures and dealers.

#### 116.—TEXAS OR ACCLIMATION FEVER.

What is Texas fever; changes that occur in the blood; quarantine against; southern cattle tick; can cattle ticks be exterminated; how to recognize Texas fever; examination after death; immunity to and methods of producing immunity to Texas fever; defibrinated blood method; temperatures of northern bred cattle inoculated with defibrinated blood; records of animals inoculated with defibrinated blood; remarks on inoculation; points to be remembered concerning Texas fever.

#### 117—ORCHARD NOTES.

Condition of orchard in 1901; notes on apple rust, effect of Bordeaux mixture on apple rust; comparative immunity of different varieties; notes on green aphid, varieties affected; notes on varieties of apples; Bordeaux mixture as a preventative of summer rot; cherries, varieties; Japan walnuts; peaches, geo-

graphical limit of different races, varieties; notes on the blooming of peaches and plums; list of varieties of peaches for general planting; plums, varieties, general condition of orchard.

The following changes have taken place in the personnel of the Station since the last report:

Prof. F. S. Earle, the Biologist and Horticulturist, resigned the first of August to accept a position in Columbia University of New York, and his place has been filled by the election, October 1st, of Dr. E. Mead Wilcox, who occupied the chair of Botany in the Agricultural and Mechanical College of Oklahoma.

J. Q. Burton and H. S. Houghton, Assistant Chemists, have resigned to accept positions elsewhere, and Thomas Bragg has been appointed to the post of Third Assistant Chemist.

G. F. Freeman and M. J. Lide were appointed Assistants to the Director September 15, 1901.

P. H. MELL,  
*Director.*

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### BOTANICAL EXPERIMENTS.

*Dr. Wm. LeRoy Brown, President:*

The experiments concerning grasses, cultivated, native and foreign, have been continued, and a large number of species have been added to the collection, growing in the Botanic Garden. A large number of shrubs, evergreens and other trees, native and foreign, were planted in the Arboretum during the year. And many varieties of forest seeds have been planted for future experiments in forestry.

The experiments on the improvement of the cotton, which have been under way for a number of years, were continued during the past season.

P. H. MELL,  
*Botanist.*

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### REPORT OF CHEMIST.

*Dr. Wm. LeRoy Broun, President:*

SIR—The report of Dr. J. T. Anderson, Acting Chemist of the Station, up to September 1, 1901, covered the work of the year up to that date, at which time I resumed my duties as Chemist of the Station.

During the past few months, the time and attention of the laboratory staff has been devoted chiefly to miscellaneous analytical work, including the examination of soils, marls, natural phosphates, waters, ores, miscellaneous minerals, etc.

A considerable amount of valuable analytical work has been performed by Mr. Hare, First Assistant Chemist, in connection with his duties as Referee on Potash for the Association of Official Agricultural Chemists, and some important results have been secured which will no doubt lead to improvement in the existing method of analysis.

Work upon the analysis of samples of forage crops grown at the Station is in progress at this time, and this department has also recently made a considerable number of tests of varieties of lard produced at the Station with a view of noting the influence of certain foods upon the character of the lard produced.

Mr. Phelps, one of the laboratory assistants, has in progress a series of experiments to determine to what extent nitrogen compounds are leached from the soil

by the winter rains. This question is quite an important one for investigation, as the soils in this section by reason of being denuded of vegetation during the winter months are liable to suffer greatly from continuous exposure to the leaching effects of the rains prevalent at this season. It is, therefore, hoped that some results will be secured which will throw some light upon the character and extent of the losses sustained by the soils through leaching processes.

During the present year, it is designed to pursue the study of several important questions—among others, a further investigation of the normal constituents of the sugar cane, this being a continuation of a line of work commenced several years ago.

During the absence of the undersigned in Europe, several Experiment Stations and Station Laboratories were visited and inspected with a view to securing information with regard to their methods of investigation, methods of analysis, their equipments, apparatus, etc., and some interesting notes and data were obtained for use in Station work.

My thanks are due Dr. J. T. Anderson for his careful and efficient conduct of the work of the Department during my absence in Europe.

Very respectfully,

B. B. Ross,

*Chemist.*



## REPORT OF ASSOCIATE CHEMIST.

*Dr. Wm. LeRoy Broun, President:*

SIR—I have the honor to submit herewith my report for the year 1901.

During the first eight months of the time embraced in this report, viz., from January 1, to August 31, inclusive, the Associate Chemist was Acting Chemist of the Station, the Chief Chemist, Prof. B. B. Ross, being absent on leave. During this time the chemical staff was occupied chiefly with the fertilizer work. Eight hundred and fifty-one samples of commercial fertilizers were received from various sources and analyzed, and in August the results of these analyses were issued as Bulletin No. 15 by the State Department of Agriculture, and a limited number of these were bound in the covers of the Station Bulletins and issued by the Experiment Station as Bulletin No. 115.

In addition to the fertilizer work, a considerable number of miscellaneous analyses were made for the other departments of the Station, chiefly the Agricultural Department, and the results were published in the bulletins issued by these departments. These include analyses of samples of peavines and roots, stable manures, soils, butters and lards.

Since October 1 the Associate Chemist has been occupied exclusively with some experimental work which he has undertaken jointly with Prof. Duggar, viz.: A Study of the Sources from which Leguminous Plants Derive Their Nitrogen. This work has been in progress for two seasons, 1900 and 1901, and was done in the vegetation house. Some fifty odd metal pots containing different kinds of soils with several kinds of fertil-

izers were required for the experiments. The chemical data to be furnished by the writer are: the nitrogen content of each pot of soil as it was prepared for the plants in the outset; the amount of nitrogen added in the seed in planting; the amount of nitrogen added with the water used for watering from time to time throughout the season; the amount of nitrogen in the harvested crop, both vines and roots, from each pot; and, finally, the nitrogen content of the soil in each pot after harvesting. With these data it is easy to determine how much nitrogen the plants have gotten from the soil and how much from the atmosphere.

Owing to preoccupation with other duties, the greater part of this analytical work for the season of 1900 had to be deferred, and has been done since October 1 last, and hence is embraced in this report. All the data for 1901, also, will shortly be ready, when it is intended to offer the results of the two season's work together for publication in bulletin form.

Respectfully submitted,

JAS. T. ANDERSON,  
*Associate Chemist.*

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#### REPORT OF VETERINARIAN.

*Dr. Wm. LeRoy Broun, President:*

SIR—The following constitutes a brief summary of the work of the Veterinary Department for the year ending December 31, 1901:

Farmers Institutes were held in the following towns and counties:

Columbiana, Shelby county.

Jacksonville, Calhoun county.

Greenville, Butler county.  
 Fruithurst, Cleburne county.  
 Vinemont, Cullman county.  
 Thorsby, Chilton county.  
 Seale, Russell county.  
 Union Springs, Bullock county.  
 Clayton, Barbour county.  
 Ozark, Dale county.  
 Geneva, Geneva county.  
 Andalusia, Covington county.  
 Athens, Limestone county.  
 Hartselle, Morgan county.  
 Cullman, Cullman county.  
 Ashville, St. Clair county.  
 Collinsville, Dekalb county.  
 Center, Cherokee county.  
 Arlington, Wilcox county.  
 Grove Hill, Clarke county.

The total attendance at these meetings was 1,028.

The average attendance at each meeting was 51.

As far as possible the institute forces were divided in order that more places might be visited. At the three fruit growing centers, Prof. Earle held meetings by himself. Prof. Duggar, with three helpers, held six institutes in the southeastern part of the State. With two assistants, I conducted the other eleven institutes that were held during the year. Profs. Duggar, Earle, Hare, Austin and Clarke of Auburn have all done efficient and faithful work in many of these institutes. The attendance is not as large as it should be; yet the great majority of those who do attend are interested farmers. In every instance where institutes have been held a second time the attendance and interest have improved. The territory covered this year embraces

nineteen different counties of Alabama; five more than in any previous year without an increase of funds.

Bulletin No. 116 was issued by this department in September, 1901. It embraces the causes, symptoms, diagnosis and methods of producing immunity to Texas fever. The results of the defibrinated blood method of immunizing northern bred cattle to Texas fever, at this Station and others, are given in this bulletin. The newer and later methods of immunizing cattle to Texas fever have proven very successful. In fact they can be employed with safety and profit. In all cases where requests have come to the department I have inoculated susceptible cattle, charging only my actual expenses for the work.

This department has furnished tuberculin of its own production to all cities and veterinarians in the State, who have applied for it and agreed to report the results of the tuberculin tests to the department.

Search is being continued for the cause of osteoporosis (big-head) in horses and mules. Also investigations are being continued to determine why cotton seed and cotton seed meal are poisonous to pigs. Records of the occurrence and search for the cause and treatment of infectious cerebritis have been continued during the past year.

As far as possible records of all diseases that occur among farm animals are collected in order that the department may be in touch with the diseases that are peculiar to certain districts of the State and to certain seasons of the year.

Respectfully submitted,

C. A. CARY,  
*Veterinarian.*

## REPORT OF THE AGRICULTURIST.

*Dr. Wm. LeRoy Brown, President:*

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

Three bulletins have been issued and the preparation of three others has been begun.

The titles of the bulletins published are as follows:

No. 111.—Corn culture.

No. 113.—Co-operative experiments with cotton in 1899-1900.

No. 114.—Feeding experiments with dairy cows.

The work of the department with field crops has been chiefly along the lines previously reported. However, the work in animal husbandry has been extended as far as our means permitted. The experiments with animals conducted during 1901 consisted of—

(1.) Comparison of a farm-grown *versus* the oil-mills ration for dairy cows;

(2.) The substitution of vetch hay for wheat bran in order to cheapen the ration of dairy cows;

(3.) Experiments with calves of the beef breeds to determine the cost of producing beef and to compare corn meal with rice meal;

(4.) Records of the growth made and of the food eaten by the different individuals of our herd of beef cattle to secure data on the cost of growing beef cattle;

(5.) Records of the amount of milk and butter and of the food consumed by each cow in our dairy herd, so as to determine the cost of producing butter;

(6.) The substitution of cotton seed oil for butter fat in the food of young calves;

(7.) A continuation of the experiments in pork production, including (a) grazing experiments with peanuts and sorghum, (b) methods of hardening the flesh and lard of pigs which have grazed on peanuts, (c) effects of feeding cowpeas, cowpea hay, and cotton seed meal to pigs.

In the dairy Mr. R. W. Clark has made an important discovery of a means of getting rid of the bitter-weed flavor in cream and butter. He has also done some work to determine the degree of acidity at which cream from cows fed on cotton seed can be most advantageously churned, the proper richness or thickness of cream for most thorough churning, and has made careful observations on the effects of our common foods on the quality of butter.

In field work a number of experiments have been conducted with cotton, corn, oats, and wheat. Most attention has been given to corn.

A number of forage plants have been under test, cowpeas and sorghum having the most prominent place in our experiments.

In our co-operative soil tests, intended to learn the fertilizer requirements of the principal soil tests of the State, cotton has been, as heretofore, the principal test crop; however, this fertilizer test has, in a number of localities, been made with corn also, and, in a few instances, wheat and Johnson grass have been the crops employed in determining the seeds of the soil.

During the past year the writer has conducted the usual large correspondence and has participated in as many of the Farmers' Institutes as possible.

Respectfully submitted,

J. F. DUGGAR,

*Agriculturist.*

## REPORT OF THE BIOLOGIST AND HORTICULTURIST.

*Dr. Wm. LeRoy Broun, President:*

SIR—I have the honor to submit herewith the following report on the operations of the department under my direction. The prophetic character of this report finds its cause in the fact that my connection with this institution dates from 1 October, 1901, only.

In the Horticultural Department my assistant, Mr. C. F. Austin, has prepared for publication as Bulletin 117 a paper entitled "Orchard Notes." It is evident that these notes, detailing the results of the comparative tests of many varieties in this region, will prove of great value to persons engaged in, or about to engage in, fruit culture in our State. It is the desire of this department to foster and encourage in every manner possible the rapid development of the horticultural interests of our State. A valuable preliminary step in this direction will have been taken when, as a result of variety tests of a very extensive character, we are able to give specific information regarding the possibility of growing orchard and garden crops in the various parts of the State.

As Vegetable Physiologist and Pathologist, I have undertaken a very extensive study of the general physiology and pathology of the many leguminous forage plants grown in Alabama and other States. Several points regarding the biology of the organisms producing the tubercles on the roots of these plants are receiving attention. It is my intention to make a thorough study also of the diseases of these plants. For the elucidation

tion of all these points, extensive growing collections of these plants will be maintained this season.

Several important additions to our Herbarium were made during the past year. In the future my attention will be concentrated upon the State flora for the purpose of building up here a State Herbarium that shall be fully representative of the interesting plant covering of the State. For this purpose much time is now being devoted to the preparation of a card index of all our collections in the State Herbarium. Each one of these cards bears a county map of Alabama, so that, for each species, the geographical distribution over the State, so far as substantiated by our own collection, may be plainly indicated. This index will serve to indicate the profitable lines along which floristic and ecological work should be conducted over our State.

Respectfully submitted,

E. MEAD WILCOX,

*Biologist and Horticulturist.*