

Twenty-ninth Annual Report

OF THE

Agricultural Experiment
Station

OF THE

Alabama Polytechnic Institute

1915 - 1916

Auburn, Alabama

January, 1917

ALABAMA POLYTECHNIC INSTITUTE.

Auburn, Ala., Jan. 30, 1917.

Governor Charles Henderson,
Executive Department,
Montgomery, Ala.

Sir:

I have the honor herewith to transmit to you the Twenty-ninth Annual Report of the Agricultural Experiment Station of the Alabama Polytechnic Institute.

This report is made in accordance with the Act of Congress approved March 2, 1887, establishing agricultural experiment stations, and the Act of Congress approved March 16, 1906, known as the Adams Act.

Respectfully,

CHAS. C. THACH,

President.

Auburn, Ala., Jan. 29, 1917.

Dr. C. C. Thach, President,
Alabama Polytechnic Institute,
Auburn, Ala.

Sir:

I herewith submit the Twenty-ninth Annual Report of the Experiment Station of the Alabama Polytechnic Institute for the fiscal year ending June 30, 1916.

It contains the detailed report of the Director and Agriculturist, the Treasurer, the Chemists, the Veterinarian, the Botanist, the Horticulturist, the Entomologist, the Plant Pathologist, and the Animal Husbandman, for the year ending December 31, 1916.

Respectfully submitted,

J. F. DUGGAR,
Director, Experiment Station.

AGRICULTURAL EXPERIMENT STATION.

TRUSTEES.

His Excellency, Charles Henderson, President.....	Ex-Officio
W. F. Feagin, Superintendent of Education.....	Ex-Officio
A. W. Bell.....	Anniston, Ala.
Harry Herzfeld.....	Alexander City, Ala.
Oliver R. Hood.....	Gadsden, Ala.
C. S. McDowell, Jr.....	Eufaula, Ala.
W. K. Terry.....	Birmingham, Ala.
W. H. Oates.....	Mobile, Ala.
T. D. Samford.....	Opelika, Ala.
R. F. Kolb.....	Montgomery, Ala.
J. A. Rogers.....	Gainesville, Ala.
C. M. Sherrod.....	Courtland, Ala.

COMMITTEE OF TRUSTEES ON EXPERIMENT STATION.

R. F. KOLB.....	Montgomery
A. W. BELL.....	Anniston
J. A. ROGERS.....	Gainesville
C. S. MCDOWELL, JR.....	Eufaula

STATION STAFF.

C. C. THACH, President of the College.

J. F. DUGGAR, Director.

AGRICULTURE:

J. F. Duggar, Agriculturist.
E. F. Cauthen, Associate.
M. J. Funchess, Associatè.
J. T. Williamson, Field Agt.
O. H. Sellers, Assistant.
O. L. Howell, Assistant.
F. E. Boyd, Assistant. *

VETERINARY SCIENCE:

C. A. Cary, Veterinarian.

CHEMISTRY:

J. T. Anderson, Chemist.
Soils and Crops.
C. L. Hare, Physiological
Chemist.
_____, Assistant.

BOTANY:

W. J. Robbins, Botanist.
A. B. Massey, Assistant.

PLANT PATHOLOGY:

G. L. Peltier, Pathologist.

HORTICULTURE:

G. C. Starcher, Horticulturist
J. C. C. Price, Associate.
P. O. Davis, Field Agent.

ENTOMOLOGY:

W. E. Hinds, Entomologist.
F. L. Thomas, Assistant.
E. A. Vaughan, Field Asst.

ANIMAL HUSBANDRY:

G. S. Templeton, Animal
Husbandman.
H. C. Ferguson, Assistant.*
E. Gibbens, Assistant.
F. W. Wendt, Assistant.
A. E. Hayes, Assistant.

AGRICULTURAL ENGINEERING:

R. U. Blasingame, Agricul-
tural Engineer.

*In co-operation with United States Department of Agriculture.

REPORT OF HATCH AND ADAMS FUNDS FOR 1915-1916.

RECEIPTS.

	Hatch	Adams
To amount from U. S. Treasury -----	\$15,000.00	\$15,000.00

DISBURSEMENTS.

By Salaries -----	\$ 7,450.00	\$10,096.80
By Labor -----	2,401.08	1,771.52
By Publications -----	1,293.71	
By Postage and Stationery -----	276.25	162.98
By Freight and Express -----	510.28	259.04
By Heat, Light, Water and Power -----	410.46	343.14
By Chemicals and Laboratory Supplies -	139.92	489.60
By Seeds, Plants and Sundry Supplies --	586.84	230.39
By Fertilizers -----	361.89	104.14
By Feeding Stuffs -----	494.83	372.20
By Library -----	253.69	62.24
By Tools, Machinery and Appliances ---	215.06	55.09
By Furniture and Fixtures -----	49.55	84.15
By Scientific Apparatus and Specimens	7.22	219.19
By Live Stock -----	268.00	183.80
By Traveling Expenses -----	164.17	238.02
By Contingent Expenses -----	20.00	
By Buildings and Land -----	97.05	327.70
 Total -----	 \$15,000.00	 \$15,000.00

State of Alabama:

Lee County.

Personally appeared before me, B. L. Shi, a Notary Public in and for said county, M. A. Glenn, known to me as Treasurer of the Alabama Polytechnic Institute, who, being duly sworn, deposes and says the above foregoing account is true and correct. Witness my hand this 19th day of January, 1917.

B. L. SHI,

Notary Public, Lee County.

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

CHAS. C. THACH,

President Alabama Polytechnic Institute.

REPORT OF DIRECTOR AND AGRICULTURIST.

J. F. DUGGAR.

Dr. C. C. Thach, President,
Alabama Polytechnic Institute,
Auburn, Alabama.

Sir:

I respectfully submit the following report for the past year of the work under my charge as Director and Agriculturist of the Alabama Experiment Station:

PUBLICATIONS.

During the calendar year 1916 the publications of the Alabama Experiment Station consisted of the annual report, six bulletins, one circular, seven press bulletins, and two indexes, making a total of sixteen publications. These constituted a total of 224,000 copies and an aggregate of 2,534,500 pages in all editions. The titles and authors are given below:

Bulletion No. 187: Cabbage; by the Associate Horticulturist and the Field Agent in Horticulture.

Bulletin No. 188: Boll Weevil in Alabama; by the Entomologist. (From the Local Experiment Fund).

Bulletin No. 189: Wilt Resistant Varieties of Cotton; by the Associate Agriculturist. (From the Local Experiment Fund).

Bulletin No. 190: Citrus Canker; by the Pathologist.

Bulletin No. 191: The Effect of Certain Organic Compounds on Plant Growth; by the Associate Agriculturist.

Bulletin No. 192: Cottonseed Meal Compared With Velvet Beans for Fattening Steers; by the Animal Husbandman and Assistant. (From the Local Experiment Fund).

Circular No. 34: Annual Report of the Director of the Experiment Station on Work Done Under the Local Experiment Law in 1915. (From the Local Experiment Fund).

Press Bulletin No. 83: Controlling the Boll Weevil by Collecting Weevils and Infested Squares; by the Entomologist. (From Local Experiment Fund).

Press Bulletin No. 84: Wilt Resistant Varieties of Cotton; by the Associate Agriculturist and Recorder. (From the Local Experiment Fund).

Press Bulletin No. 85: Separation of Corn Cockle Seed from Commercial Narrow Leaf Vetch Seed; by the Assistant in Agriculture.

Press Bulletin No. 86: Tests of Varieties of Corn in 1916; by the Associate Agriculturist.

Press Bulletin No. 87: Varieties of Fruits for a Home Orchard in Alabama; by the Associate Horticulturist and Field Agent in Horticulture. (From the Local Experiment Fund).

Press Bulletin No. 88: Tests of Varieties of Cotton in 1916; by the Associate Agriculturist.

Press Bulletin No. 89: The Home Orchard; Setting and Care; by the Associate Horticulturist and Field Agent in Horticulture. (From the Local Experiment Fund).

Bulletin Index for Volume 22. (1914).

Bulletin Index for Volume 23. (1915).

STAFF.

Several changes have occurred among the heads of departments during the past year. Dr. W. J. Robbins, of Cornell University, was appointed Botanist of the Station in succession to Dr. J. S. Caldwell, who had resigned to accept a position in another state. Dr. Robbins began work in February, 1916.

A vacancy, created by the resignation of Dr. F. A. Wolf, to accept a position in another state, was filled in June, 1916, by the appointment of Dr. Geo. L. Peltier, then of the University and Experiment Station of Illinois.

Several changes have occurred among the assistants in the several departments, as may be noted from the list of the Station Staff published on another page.

REPORT OF DEPARTMENTS.

The attached reports of the Botanist, the Acting Horticulturist, the Entomologist, the Plant Pathologist, the Animal Husbandman, the Chemists, and the Veterinarian, present a brief statement of the experimental work in their respective departments.

AGRICULTURAL DEPARTMENT.

(Work Under Hatch and Adams Funds from Congress).

Plant breeding has continued to be one of the lines of work

that has occupied much of the time of the members of this department. The large amount of data accumulated on correlations between yield and various qualities of the corn plant and corn ear have been to a large extent summarized and put in shape for publication. There remains to be added the field results for 1916, and a study of the correlations between certain additional qualities, for which the data are on record.

The breeding of oats has been continued, and field tests indicate the practical value of this. It is hoped that at an early date there may be prepared for publication a part of the data accumulated by a number of year's breeding of cotton and oats. Field tests, both at Auburn and other parts of the State, continue to give increasing evidence of the value of the strains of cotton, corn, and oats, evolved as a result of the breeding work at Auburn.

It is believed also that the results when fully analyzed will throw important light on some of the details of plant breeding that are important from a scientific standpoint.

The following is a list of the principal field experiments conducted on the Station farm in 1916:

- Alfalfa, fertilizer, variety and culture experiments.
- Barley, variety tests.
- Cotton, effects of planting light and heavy seed.
- Cotton, variety tests.
- Cotton, breeding with Cook, Cleveland and hybrids.
- Cotton, tests of long staple varieties.
- Cotton, culture experiments, including thick and thin planting.
- Cotton, sub-soiling.
- Cotton, time of applying nitrate of soda.
- Corn, variety tests.
- Corn, Williamson versus other methods of culture.
- Corn, best rotation for.
- Cowpeas, variety and culture tests.
- Cowpeas, for soil improvement.
- Clovers, tests of species and varieties.
- Clovers, best plants for sowing with legumes.
- Grains, as forage crops.
- Forage crops, tests of many species and varieties.

Grasses, tests of species and varieties.
 Hog crops, chufas, peanuts, soybeans, etc.
 Hemp.
 Kudzu.
 Nitrogen, best sources of.
 Oats, variety tests, methods of seeding, and time of sowing.
 Oats, breeding experiments.
 Oats, fall sown versus spring strains.
 Phosphates, raw versus acid, versus basic.
 Peanuts, variety tests.
 Rotation experiments.
 Rye, variety tests.
 Silage, yield of different crops for.
 Soybean and cowpea mixtures for hay.
 Soybeans, varieties.
 Soybeans, tests of varieties.
 Sorghum, tests of varieties.
 Subsoiling.
 Sudan grass, culture tests.
 Sugar cane, Japanese, as a forage crop.
 Velvet beans, varieties for seed and for hay.
 Vetches, varieties.
 Vetches, best mixtures.
 Wheat, breeding experiments.
 Wheat, varieties.

In the Division of Soils a bulletin (No. 191) has been prepared and published by Professor M. J. Funchess giving the results of some of his experiments relative to soil toxins. The work of Professor Funchess along this line is now being supplemented by the Botanist of the Station, who is studying the decomposition of the toxins. Professor Funchess is also continuing his study of changes in the nitrates and other soluble constituents of the soil under various conditions.

LOCAL EXPERIMENT WORK WITH FIELD CROPS THROUGHOUT THE STATE.

Experimental work, (supported by a State appropriation) intended to throw light on the adaptability of special varieties to the different soils and climatic conditions in the different parts of the State has been conducted in every county. Fer-

tilizer experiments have been made with the principal field crops in a large number of counties.

The impossibility of securing an adequate supply of potash, and the high cost of this fertilizer constituent, has made it necessary to reduce somewhat the number of fertilizer experiments with cotton.

It should be borne in mind that the departments of the Experiment Station doing local experiment work in the various counties of the State are Agriculture, Horticulture, Animal Husbandry, Entomology, Plant Pathology and Agricultural Engineering. The work of all of these is discussed in a separate publication constituting an annual report of the local experimental work of this Station.

Respectfully submitted,

J. F. DUGGAR,

Director of Experiment Station.

REPORT OF BOTANIST.

W. J. ROBBINS.

Prof. J. F. Duggar, Director,
Alabama Experiment Station,
Auburn, Alabama.

Sir:

1. Under the Soils Toxin Project, which is carried on under the Adams Fund, I can report the following results: The cause of the disappearance of Vanillin, Cumarin, Pyridine and Quinoline in the soil has been found to be due to the action of bacteria. It is believed that the bacteria concerned in the disappearance of these compounds are more or less specific for each of them.

We have also found that guanidine carbonate, which is toxic at very weak concentrations to higher plants in water culture, is readily used as a source of nitrogen by many of the soil fungi. The compound appears to be absorbed and used as such but with the autolysis of the fungi the nitrogen in it appears as ammonia.

2. Some progress has also been made under the Hatch Fund in a preliminary study of the factors affecting cellulose digestion in fungi. This work is undertaken with the ultimate view of studying the causes of resistance of many plants to disease.

3. The list of Station projects are:

- (1) Soils Toxin project, Adams Fund.
- (2) Miscellaneous Botanical Investigations, Hatch Fund.

Respectfully submitted,

WILLIAM J. ROBBINS,
Botanist.

REPORT OF PLANT PATHOLOGIST.

G. L. PELTIER.

Prof. J. F. Duggar, Director,
Agricultural Experiment Station,
Auburn, Alabama.

Sir:

I am herewith submitting a brief statement relative to the Adams Fund project in the Department of Plant Pathology since my appointment September 1.

The one project we are working on under this Fund is a study of Citrus Canker. The work of the past few months has been devoted mainly to one phase of the life history of the organism. We are attempting to find whether the organism winters over in the soil on diseased fallen leaves or on diseased leaves on the trees. Not enough time has been devoted to this subject to give any definite information.

The work this coming season will be devoted to the many unknown points which occur in the life of the Citrus Canker organism. A start will be made in an attempt to find a resistant stock that will supercede Citrus Trifoliata, which is rather susceptible to Citrus Canker, now used entirely as stock for the Satsuma Grower.

Respectfully submitted,

GEO. L. PELTIER,
Plant Pathologist.

REPORT OF ASSOCIATE HORTICULTURIST.

J. C. C. PRICE.

Professor J. F. Duggar, Director,
Experiment Station,
Auburn, Alabama.

Sir:

I hereby submit report of the work under way in the Department of Horticulture for the year 1916. Professor Ernest Walker was head of the Department until September first, at which time he resigned, and I have had charge of the work only from that date until the present time.

The experimental work being conducted by this department is as follows:

Apples: Bloom notes and notes on yields of apples were continued, but since there are but few trees in the orchard, and only six of any one variety, the yield notes do not possess much of value.

Peaches: We continued our bloom notes, yield notes and notes on disease resistance for about twenty varieties for home and commercial use. Some excellent data have been secured. We have under way some pruning experiments to determine the relative effect of winter and summer pruning.

Pecans: Twelve varieties are now growing on the Station grounds that promise good results. We are comparing different methods of grafting and budding of the pecan, with indications that valuable results will be secured.

Pears: An experiment which has been running for a number of years to note the result of the use of potash as a preventive of "fire blight" is still being carried on, but owing to the scarcity of potash it seems that we may have to abandon this for the incoming year. We have planted a variety pear orchard consisting of eighteen of the leading varieties. A part of these trees should yield their first crop in 1917.

Grapes: Our variety vineyard was planted to test variety adaptability and disease resistance of this fruit. It gives promise of excellent results. The early freeze of the present

winter has damaged the vines considerably, but what the final damage will prove to be is problematical.

Vegetables: We are still continuing our variety and fertilization tests on tomatoes. We have also similar experiments under way with sweet potatoes as well as experiments in tuber selection, methods of bedding, vines vs. slips for late planting, and storage with a view of obtaining data on the keeping qualities of all varieties used in these tests. Variety tests were continued with sweet corn, peppers, okra, egg plant and cucumber. We are also continuing our work on the winter forcing of lettuce in cold frames with varieties and fertilizer tests of the same. We are also continuing our forcing of tomatoes in the greenhouse as well as work in the greenhouse with carnations and chrysanthemums.

The above is in addition to the Local Experiment work, conducted in a number of counties and separately reported.

Respectfully submitted,

J. C. C. PRICE,

Associate Horticulturist.

REPORT OF ENTOMOLOGIST.

W. E. HINDS.

Prof. J. F. Duggar,
Auburn, Alabama.

Sir:

Regarding Entomological projects in 1916, I would report as follows:

ADAMS FUND PROJECTS.

1. Rice Weevil Investigations: This project has received principal attention during the past year and substantial progress has been made. It is planned to embody the principal results in a bulletin which may be issued within the next few months. After the final study of the notes is made for this publication, we can tell better whether the project will call for further attention during the season of 1917.

2. Arsenate of Lead Investigations: The work on this project during the past season has added much data both in the field and in the laboratory. Co-operation on the chemical analytical work has been arranged with Dr. J. T. Anderson of this Station. The project is not yet completed.

OTHER ENTOMOLOGICAL PROJECTS.

1. Mexican Cotton Boll Weevil: The advance of this important cotton pest has been followed for the season 1916, and it now occurs in every county in Alabama. A small area in the extreme northeastern corner of the State remains uninfested as yet. Some study has been made of life history, parasites, methods of stalk destruction, etc. Boll weevil work has been done under Local Experiment Fund.

2. Green Plant Bug (*Nezara viridula*): This pest has been steadily increasing in abundance during the past three years, and in the southeastern counties of Alabama has become a pest of extreme importance. It occurs in small numbers to the northern edge of the State. It attacks a very large variety of garden and field crops, and in some sections appears to be a much more serious pest than is the boll weevil. Considerable study has been given to this pest during the fall months of 1916 under Local Experiment Fund.

As this pest has not been studied extensively by any station or by the U. S. Bureau of Entomology, and promises to be of prime importance particularly in the territory where cotton production is most severely affected by the boll weevil, it is quite possible that we shall desire to make this an Adams Fund project in 1917, taking the place of the Rice Weevil project, which may then be considered completed.

3. Argentine Ant: This important pest has become established at several points in Alabama, and has received considerable attention during 1916, particularly at Montgomery and Letohatchee. It is certain to command increasing attention in the future. This work has been done under Local Experiment Fund.

The publication work of the Department during 1916 has been as follows:

Bulletin No. 188: Boll Weevil In Alabama.

Press Bulletin No. 83: Controlling the Boll Weevil by Collecting Weevils and Infested Squares.

The Department has contributed to Plate Service, and has also published numerous articles in daily and weekly newspapers and in special Agricultural Journals.

The extension correspondence work of the year has required approximately 1100 dictated letters, and a large number of circular letters together with about 450 bulletins.

Respectfully submitted,

W. E. HINDS,

Entomologist.

REPORT OF ANIMAL HUSBANDMAN.

G. S. TEMPLETON.

Prof. J. F. Duggar, Director,
Alabama Experiment Station,
Auburn, Alabama.

Sir:

I respectfully submit the following report of experimental work in the Animal Husbandry Department for the year 1916:

The experimental work conducted at Auburn, Alabama, is supported by the Hatch and Adams funds, appropriated by Congress. The experimental work in Marengo, Mobile and Dale counties is supported by the State appropriation provided by the Local Experiment Law. The experiments with the various classes of live stock are as follows:

BEEF CATTLE.

The co-operative steer feeding experiments started at Allenville, Marengo County, Alabama, two years ago were continued during the year. Forty-five steers are now on feed at Allenville, divided into three lots and fed as follows:

Lot 1—Velvet beans and corn silage.

Lot 2—Cottonseed meal and corn silage.

Lot 3—Cottonseed meal and sorghum silage.

An experiment was conducted during the past summer with the view of determining the relative carrying capacity of some of the pasture grasses adapted to the lime lands of West Alabama. The three grasses compared in this experiment were Bermuda, Paspalum and Johnson grass. This experiment will be repeated the coming summer.

The breeding herd of 450 head of pure bred and grade Herefords is now used in experiment. The herd is divided into several lots with the view of testing the different methods of wintering cattle of various ages, and determining the cost of producing feeder steers.

DAIRY CATTLE.

The dairy cattle projects at Auburn, Alabama, under way during the year were as follows:

First, a study of the relative feeding value of ground velvet beans in the pod and cottonseed meal as part of the ration for milk and butter fat production.

Second, a study of the influence of the above feeds on the quality of butter.

Third, a comparison of skim milk, Blatchford's Calf Meal and oat meal as a feed for rearing dairy calves up to sixteen weeks of age.

SWINE.

The experimental work at Auburn, Alabama, in co-operation with the Department of Chemistry to determine the influence of some southern feeds upon the properties (melting point, iodine value, keeping quality and color) of lards, is still in progress.

The experimental work at Ozark, Dale County, Alabama, was continued throughout the year. The experiments under way on this farm were planned with the view of determining the cost of producing pork under average farm conditions, and studying the relative feeding value of crops typical of that section for producing pork.

POULTRY.

The experimental work at Citronelle, Mobile County, Alabama, was continued throughout the year. Several feeds are being studied as to their relative efficiency and economy in egg production.

Two new features were added to this work during the year:

First, to determine the influence of selection on the egg production of the flock.

Second, to determine the best age to market poultry.

Respectfully submitted,

GEO. S. TEMPLETON,
Animal Husbandman.

REPORT OF VETERINARIAN.

C. A. CARY.

Prof. J. F. Duggar, Director,
Alabama Experiment Station,
Auburn, Alabama.

Sir:

During 1916 the following lines of work were conducted:

Tests were made to determine the internal toxic effects of *Robinia pseudacacia*, *Lolium temulentum* and *Rhus toxicodendron*.

We also repeated tests on the toxic effects of china berries on pigs.

Some observations were made on the effects of peanuts upon the ovaries of sows. This work will be investigated more extensively in 1917.

Some tests were made on the internal effects of nitrate of soda on dogs and cats.

An attempt has been made to find the eggs of *Sclerostoma pinguicola* in the urine or bladder of pigs infested with that parasite.

Records of the kinds and frequency of the various animal parasites in chickens, pigs and cattle have been continued.

A press bulletin was issued on hog cholera. It gave a brief outline of the cause, symptoms, post mortem lesions, methods of spreading and preventing the disease.

On account of the extremely wet weather in July and early August the Summer Series of Farmers Institutes were cut short. In fact all the Institutes were held prior to the rainy season.

Number of Institutes Held	12
Average Attendance	53
Total Attendance	637

The Summer School for Farmers was held at Auburn July 29th to August 5th, in the middle of the rainy season.

Notwithstanding the unfavorable weather conditions, there were 734 in attendance, and a large number of the Counties of the State were represented. While the attendance was

somewhat less than the previous year, the lectures and demonstrations were very valuable to the farmers of the State.

Respectfully submitted,

C. A. CARY,

Veterinarian.

REPORT OF CHEMIST OF SOILS AND CROP
INVESTIGATIONS.

J. T. ANDERSON.

Prof. J. F. Duggar, Director,
Alabama Agricultural Experiment Station.
Auburn, Alabama.

Sir:

The following condensed statement of the work of this department for the year 1916, is respectfully submitted:

1. Adams Project: Soil Requirements by Plant Analysis. Hitherto the work on this project has been limited to Potash in the Cotton Plant. As this narrowed down, the analytical work has been completed, and the manuscript will soon be ready for the printer.

It was decided to extend the scope of the work so as to include both phosphoric acid and potash and use the turnip as the plant for investigation. Three different types of soil were selected for the study, and inbedded cylinders were used as containers. The same system of fertilization was used as with the cotton plant, using the three fertilizer constituents alone and in their several combinations.

2. Adams Project: Arsenate of Lead as an Insecticide. This work was done in co-operation with the Department of Entomology, only the chemical analysis being done by this department.

3. Miscellaneous. Under this head is included all the chemical work for the other departments of the Station, as well as for individual citizens of the State, and embraces the chemical analysis of corn, hays and other crops used in experimentation, soils, etc.

Respectfully submitted,

JAMES T. ANDERSON,
Chemist, Soils and Crops Investigations.

REPORT OF PHYSIOLOGICAL CHEMIST.

C. L. HARE.

Prof. J. F. Duggar, Director,
Alabama Experiment Station,
Auburn, Alabama.

Sir:

Herewith I submit a report of the investigations of the Physiological Chemist:

During the year 1916 the work of this department in general outline has been along the same lines that have been pursued for several years.

Experiments in breeding cotton with seed with continuous high oil content from year to year, shows promising positive results.

One or two strains of cotton have maintained a high average percentage of oil in seed throughout the breeding experiments, even during years when the amount of oil in cotton seed generally was below the yearly averages.

The results secured in breeding for cotton seed of high protein content seem to promise some measure of success.

Experiments designed to show the effect of different kinds of fertilizers upon the percentages of oil, protein and mineral constituents, in cotton seed, indicate that the quantities of these constituents are not materially effected by the difference in fertilizers used, although the numbers of analyses made to date are not sufficient to prove the indications.

Determinations of the more important mineral constituents in cotton seed have so far failed to show any definite relationship between the percentages of these constituents and the oil and protein content of the seed.

The analyses of lard from hogs from nine feeding experiments were made during the year, showing some interesting points, of the effects of some common fat producing feeds upon the lard.

The following experiments are now in process:

A study of the lard produced by feeding the following:

1. Corn alone.

2. Velvet bean meal alone.
3. Corn one half and velvet bean meal one half.
4. Velvet bean and pod meal.
5. Peanut meal one half and corn one half.
6. Peanuts one half and corn one half.

Respectfully submitted,

C. L. HARE,
Physiological Chemist.