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ALABAMA

Agricultural Experiment Station

OF THE

Alabama Polytechnic Institute

AUBURN

27th

Annual Report of the Director of the Experiment Station on Work Done Under the Local Experiment Law in 1914

BY
J. F. DUGGAR
Director

Montgomery, Ala.
The Paragon Press.
1915

Auburn, Ala., Feb. 25, 1915.

HON. J. A. WADE,

Commissioner of Agriculture and Industries,
Montgomery, Ala.

Dear Sir:—In accordance with Section 5 of the Local Experiment Law, requiring me, as Director of the Experiment Station of the Alabama Polytechnic Institute, to make a full and complete annual report through the Commissioner of Agriculture to the Governor of Alabama, I herewith hand you my report of work done under the Local Experiment Law in the calendar year 1914, with the request that you transmit this report to his Excellency, Governor Charles Henderson.

Yours very truly,

J. F. DUGGAR,

Director Experiment Station of
the Alabama Polytechnic Institute.

STAFF OF SPECIALISTS ENGAGED IN WORK UNDER THE LOCAL EXPERIMENT LAW

J. F. Duggar, Director

Agriculture, Plant Breeding and Farm Machinery

* J. F. Duggar, in charge.

- * E. F. Cauthen Associate Agriculturist.
- * M. J. Funchess Associate Agriculturist.
- J. T. Williamson Field Agent in Agriculture.
- * D. J. Burleson Assistant Agriculturist.
- * O. H. Sellers Assistant in Agriculture.
- * H. B. Tisdale Assistant in Agriculture.

Livestock and Poultry Investigations

* Geo. S. Templeton, in charge.

- E. Gibbens Assistant in Animal Husbandry.
- J. A. McLeod Assistant in Animal Husbandry.

Entomology

* W. E. Hinds, in charge.

- * J. E. Buck Assistant Entomologist
- * G. W. Ells Field Assistant in Entomology.

Drainage

** Lewis A. Jones, in charge.

Horticultural Investigations

* Ernest Walker, in charge.

- * J. C. C. Price Associate Horticulturist.
- G. V. Stelzenmueller Field Assistant in Horticulture.

Junior and Home Economics Extension

** L. N. Duncan, in charge.

- ** Miss Madge J. Reese State Agent Girls' Canning Clubs.
- ** J. C. Ford In charge Pig Clubs.
- ** I. B. Kerlin Assistant in Boys' Corn Clubs.

Plant Diseases

* F. A. Wolf, in charge.

* Devoting only part time to Local Experiment Work.

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

PART I

REPORT OF WORK DONE DURING 1914 UNDER THE LOCAL EXPERIMENT LAW.

Director's Summarized Report of Work in All Departments.

By

J. F. DUGGAR, Director of Experiment Station.

This report is submitted in compliance with Section 5 of an Act of the Legislature of Alabama, approved February 9, 1911, under which provision is made for local experiments to be conducted throughout the State and for other agricultural services to be rendered to the farmers of Alabama. The work done under this law is of a more popular nature than would be permitted by the funds appropriated by Congress for the support of the scientific work of an experiment station in each state. In the execution of this law field experiments have been made in every county, so as to study local problems of soil and climate that could not be solved by experiments made on the Station farm at Auburn.

In all the various lines of investigation undertaken under this Act the aim has been to accumulate a body of knowledge that would lead to a more diversified and a more profitable agriculture, so as to place the farmers of Alabama in a better position to withstand the reduction in acreage in cotton which is likely to follow the advent of the boll weevil and to enable them to so modify their practices in fertilization and cultivation of cotton as to be able to continue to grow this crop in the presence of the cotton boll weevil.

The information already acquired through the local experiments conducted under this Act is of a kind to be of great assistance to farmers in the present emergency. For the necessity of practicing diversification in their farming has been made imperative by the decline in the price of cotton, and the results of these widely scattered experiments serve as guides to show what crops or what varieties should be advised for the different sections of the state, and the best methods of fertilizing the principal crops on the principal soils of Alabama.

For example, the following are among the crops or subjects on which these local experiments have already thrown enough light to be helpful to farmers in 1915.

- (1). Best crops on which to produce pork.
- (2). Best varieties of cotton for land infected by cotton wilt or black-root.

- (3). Suitability of wheat to certain areas in which it had not been grown in recent decades.
- (4). Best fertilizers for cotton on a number of different soils.
- (5). Best fertilizers for sweet potatoes on various soils.
- (6). Best fertilizers for corn on a number of different soils.
- (7). Prevention of oat smut at insignificant cost.
- (8). Best forage plants for hay and pasture on different soils.
- (9). The superiority for certain parts of the state of two new and early varieties of velvet beans.
- (10). Best methods of sowing fall oats to escape winter-killing.
- (11). Best varieties of cowpeas.
- (12). Adaptability of soybeans to various soils.
- (13). Dissemination and local testing of pedigreed strains of oats, corn, and cotton bred up on the Experiment Station farm at Auburn.
- (14). Tile drainage; distances between drains, depths required, and increase in yield of crops.
- (15). Peanuts, best varieties and yields.
- (16). Best varieties of certain vegetables.
- (17). Effects of spraying in overcoming diseases and insect pests of fruit and truck crops.
- (18). Methods of combatting the grass or army worm.
- (19). Relative advantages of certain insecticides in combatting the cotton caterpillar.

The amount received for this work in 1914 was \$27,000.00 in addition to a small balance brought over from the preceding year, as shown by the report of the Treasurer, which constitutes a part of this report.

Publications Under the Local Experiment Law

From the funds provided under the Local Experiment Law there were published in 1914 six bulletins, four circulars, three press bulletins, and four reprints of earlier publications, making a total of 17 publications. The number of pages in these was 294, and the total number of pages in all of the copies printed amounted to 3,126,000 pages. This State appropriation has enabled the Alabama Experiment Station to print several times as many publications as would have been possible from Federal funds alone. Moreover, this State appropriation enabled the Station to publish bulletins of a more popular and immediately practical character than would be permitted under Federal funds.

The following is the list of publications of the Alabama

Experiment Station issued in the calendar year 1914 from the funds provided by the Local Experiment Law:

- Bulletin No. 175.*—Local Fertilizer Experiments with Cotton in North Alabama in 1913; by the Director and Assistants.
- Bulletin No. 176.*—Reducing Insect Injury to Stored Corn; by the Entomologist.
- Bulletin No. 177.*—Raising and Fattening Beef Calves in Alabama; by D. T. Gray and W. F. Ward.
- Bulletin No. 178.*—Boll Weevil Effect Upon Cotton Production; by the Entomologist.
- Bulletin No. 181.*—Local Fertilizer Experiments with Corn in South Alabama in 1911, 1912, 1913, and 1914; by the Director and Field Agent.
- Bulletin No. 182.*—Local Fertilizer Experiments with Corn in North Alabama in 1911, 1912, 1913, and 1914; by the Director and Field Agent.
- Circular No. 25.*—Annual Report of the Director of the Experiment Station on Work Done Under the Local Experiment Law in 1913.
- Circular No. 26.*—Silos and Silage; by the Dairyman.
- Circular No. 27.*—Citrus Canker; by the Pathologist and Assistant Botanist.
- Circular No. 30.*—Program of County Organization Day for Boys' Corn Club; by the Superintendent of Junior and Home Economics Extension and Assistant.
- Press Bulletin No. 71.*—County Organization in the Campaign Against the Boll Weevil; by the Entomologist.
- Press Bulletin No. 72.*—Cotton Work Control; by the Entomologist.
- Press Bulletin No. 74.*—Cotton Boll Weevil Infested Area and Quarantine Line in Alabama 1914 to 1915; by the Entomologist.

In addition to the above publications the following reprints were published:

- Bulletin No. 174.*—Local Fertilizer Experiments with Cotton in South Alabama in 1913.
- Press Bulletin No. 64.*—Boll Weevil Control in Early Summer.
- Press Bulletin No. 68.*—Tests of Varieties of Corn in 1913.
- Press Bulletin No. 69.*—Cotton Boll Weevil Infested Area in United States and Quarantine Line in Alabama 1913 to 1914.

Fertilizer Experiments and Other Experiments With Field and Forage Crops

Thirty-four distinct lines of experimentation were conducted under this head in 1914.

The following is a list of the local experiments (that is those made elsewhere in the State than at Auburn) undertaken in the Agricultural Department of the Alabama Experiment Station during the calendar year 1914:

Cotton, complete fertilizer experiments.
 Cotton, time of applying nitrate of soda.
 Cotton, extensive variety tests.
 Cotton, tests of wilt resistant varieties.
 Cotton variety tests, short.
 Cotton breeding.
 Special fertilizer test with corn after legumes.
 Corn, complete fertilizer experiments.
 Corn, time of applying nitrate of soda.
 Corn, variety tests, extensive.
 Cotton variety tests, short.
 Corn breeding.
 Cowpea, variety tests.
 Peanuts, complete fertilizer experiments.
 Peanuts, variety tests.
 Sugar cane, complete fertilizer experiments.
 Sweet potatoes, complete fertilizer experiments.
 Soybean tests.
 Wheat experiments.
 Velvet bean, variety tests.
 Extensive forage crop tests.
 Bur clover, fertilizer experiment.
 Bur clover, variety tests.
 Crimson clover experiments, methods of inoculation.
 Vetch, variety tests.
 Oats, variety tests,
 Oats, breeding experiments.
 Oats, treatment for smut.
 Alfalfa experiments.
 Rice experiments.
 Lespedeza, fertilizer experiments.
 Lime tests with rape.
 Kudzu experiments.
 Sudan grass experiments.

Of these the most extensive single line of experimentation was the determination of the best combination of fertilizers both for cotton and for corn growing on the numerous soils found within this State. In a study of this question 147 separate experiments, each containing twelve plots, were conducted in nearly as many localities in 1914. Every county in the State was represented.

That this is very productive work is evident when we consider that the amount spent for fertilizer in Alabama each year

is several millions of dollars and that a large part of the possible benefit of fertilizer is lost through a want of knowledge as to what combinations of fertilizer is needed on a given soil. Scores of examples could be cited to show how these experiments have pointed out means for large savings in the fertilizer bill or for much more effective use of fertilizer.

A campaign was conducted during each of the past two fall seasons for the prevention of oat smut, which usually destroys from two to eight bushels of oats per acre. One feature of this campaign was the conducting of 169 experiments in as many localities to show the gain resulting from the treatment of seed oats with formalin, at a cost of a few cents per acre, for the prevention of oat smut. These experiments have resulted in the adoption of this practice by a large number of farmers. The saving thus effected in one year is estimated as being far greater than the total cost of the local experiment work since its beginning.

Likewise, the local experiments conducted with wheat in a number of counties where the growing of wheat had become a lost art placed this Station in the position in which it could make definite recommendations regarding the parts of the State in which, under present war conditions, the culture of wheat is advisable.

In plant breeding the efforts of the Station have met with much commendation by farmers who have made experiments under our direction to compare with the usual varieties grown in their neighborhoods the strains of cotton, corn, and oats bred up at the Experiment Station farm, and distributed for these experiments under the Local Experiment Law. For example, one strain of Cook cotton has been developed as a wilt resistant variety. It has the advantage of being earlier and of producing a far higher per-centage of lint than most of the wilt resistant varieties heretofore in use.

The 47 experiments conducted in as many localities in 1914 with varieties of velvet beans have not only proved that a new kind, the Early Speckled Velvet Bean, is much earlier than the variety generally used, but they have demonstrated that this most valuable plant can be utilized in central and northern parts of the State, instead of merely in the southern counties as heretofore. All reports indicate that the farmers who made experiments with this early variety, under our direction, have almost universally saved all the seed and will plant a considerable acreage of this improved kind in 1915.

In experiments made in more than 100 localities pedigreed

Red Rust Proof oats, bred up at the main Station, have been tested. In most cases these have proved so superior in the opinion of the experimenters to the standard varieties that most of the pedigreed seed have been saved for planting and these improved strains now cover a considerable acreage.

In some cases farmers having such seed, both of oats and cotton, have reported that they were unwilling to part with even a small amount of it, desiring to plant a maximum acreage with it on their own farms or to permit their neighbors, who have been attracted by it, to use it for planting.

Work in Drainage and Farm Machinery

In order to secure the services of an expert drainage engineer co-operative arrangements were made four years ago between the Alabama Experiment Station and the U. S. Department of Agriculture. Under the terms of this agreement Mr. Lewis A. Jones, U. S. Drainage Engineer, has been in charge of the experimental drainage work. His report shows that during the past year surveys were made for tile drainage systems on 18 farms, and that on 6 of these tiles were laid under the supervision of the drainage engineer or his assistant, and that on 5 more the owners plan to put in the tile at an early date.

The drainage engineer and his assistant made during the past year preliminary examinations of land adjacent to six different creeks and rivers to determine whether it was feasible to reclaim these low lands by drainage. The total acreage covered by these examinations is estimated at 77,500 acres. Mr. Jones has also lent his assistance in the preparation of a drainage law for submission to the Legislature, modeled after the laws which have proved most useful in other states.

A systematic experimental study has been begun of the water levels under different conditions on tiled prairie land on the farm of W. E. Elsberry near Montgomery. Other experiments on the same farm lead to the inference, which is to be further tested, that it is feasible to save a considerable part of the expenditure heretofore considered necessary in draining prairie soils. This may be done by placing the tile further apart,—at least 80 feet,—than has heretofore been recommended for such soils.

The work with farm machinery has consisted largely in the collection of data on ditching machines, plowing with tractors, on the work of machines for harvesting cowpeas, in the giving of information in regard to machinery adapted to different purposes and in miscellaneous lines.

Injurious Insects

Fortunately the year 1914 was relatively free from severe insect injuries of a nature to attract general attention. However, the ever present injuries from the weevil attacking corn, were in progress in almost every crib in Alabama, and to this insect the entomologist and his assistants have devoted much attention. A bulletin on this subject has been published and a number of brief publications issued by this department.

The department has been active in matters connected with the cotton boll weevil. The line showing its advance during 1914 was accurately determined and the results mapped and published.

A number of mistaken recommendations as to easy means of destroying the weevil were tested and found to be a useless waste of time and money.

Live Stock and Poultry Investigations

Experimental work with hog feeding has been in progress in the Counties of Henry and Marion.

Experiments with dairy cattle were conducted, and are still in progress, in Bullock County to determine the relative values of certain foods, and the cost of raising dairy heifers.

The work in feeding beef cattle was conducted for several years in Sumter County in co-operation with the U. S. Department of Agriculture, and several valuable bulletins, giving the results of that work, have been published by the U. S. Department of Agriculture and by this Station. When early in 1914 the Department withdrew its help, in order to conduct its experiments in tick free territory, it was found best to transfer this work to a farm in Marengo County. In this latter location 60 head of steers are being fed during the winter of 1914-15 on a number of rations and under various conditions of protection from the weather.

Experimental work with poultry has been conducted both in Marion and Mobile Counties.

Local Work in Horticulture

Extensive tests have been made, in a number of localities, of vegetables suitable for the winter garden.

Fertilizer experiments with pecans, strawberries and other fruits are in progress on typical soils. An interesting test is being made in Baldwin County to determine whether the expensive "Shades," erected some years ago at a cost of several hun-

dred dollars per acre for the growing of wrapper tobacco, may be utilized in horticulture, and especially for the growing of ginseng.

The Satsuma orange has received much attention from this department; with it fertilizer and other field experiments are in progress, and much attention has been given to its culture and diseases.

The horticulturist has been heavily taxed in connection with the outbreak of citrus canker in the southern tier of counties.

Junior and Home Economics Extension Work

Boys' corn clubs and girls' canning clubs have been conducted under the Local Experiment Law for several years. Recently this work has been organized as the Department of Junior and Home Economics Extension. This constitutes one of the main divisions of the Extension Service of the Alabama Polytechnic Institute, which service also now includes farm demonstration work, and the activities of numerous specialists. The report of the Superintendent of Junior and Home Economics Extension Work gives the following enrollment in 1914:

Boys' Corn Clubs	3359
Girls' Canning Clubs	2015
Boys' Pig Clubs	1183

The work in the interest of farm women has been greatly helped by the employment of women agents in 19 counties to look after the interests of the canning clubs and of home economics work. As rapidly as practicable a change is being made by which these agents, heretofore employed for only a few months each year, are to give from 6 to 12 months of their time to the work for girls and women. It is planned to increase the number of women agents from year to year as funds permit.

Work With Plant Diseases

The plant pathologist has been active in the study of the citrus canker, a disease which, if unchecked by effective quarantine and by preventive and curative measures, would probably cause the loss of the growing citrus industry in the Gulf Coast counties of Alabama, as well as of other states.

The experiments with spraying peach trees to prevent brown rot and freckle have been successful, in some cases changing the amount of loss from nearly the entire crop to less than one per cent. of the fruit. Work has been done in connection with cotton anthracnose, generally known as one form of boll rot, strawberry leaf blight, and other plant diseases.

Treasurer's Report, Local Experiment Fund, for the Year 1914

RECEIPTS.

To cash balance from 1913.....	\$ 2959.06
To cash Animal Industry.....	161.37
To cash State.....	27000.00
	\$30120.43

DISBURSEMENTS.

By amount paid Agriculture.....	\$ 7911.42
By amount paid Horticulture.....	1461.35
By amount paid Animal Industry.....	3485.00
By amount paid Extension.....	5429.53
By amount paid Publications and Administration.....	2773.11
By amount paid Entomology.....	2300.00
By amount paid Drainage and Farm Machinery.....	1027.56
By amount paid Plant Breeding.....	840.01
By amount paid Plant Pathology.....	1068.93
By amount paid Poultry.....	764.66
By balance carried to 1915.....	3058.86
	\$30120.43

Respectfully,

M. A. GLENN, Treasurer.

Subscribed and sworn to before me this, the 20th day of February,
1915.

(Signed) B. L. SHI, Notary Public.

PART II

DETAILED REPORTS OF HEADS OF DEPARTMENTS

Report of Entomologist

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

Sir:—

I submit below a report of some of the most important phases of the work of the Department of Entomology in the Alabama Experiment Station, during the year ending Dec. 31, 1914.

During the year there has been no change in staff but at the present time I have to report that Mr. G. W. Ells has resigned to take effect Dec. 31st, 1914. No recommendation as to his successor can yet be made.

During the year 1914 we have had no unusually severe insect outbreaks. Many of the common insect species have occurred in normal abundance. Through the use of our publications it has been possible to save materially in the matter of correspondence.

In the past year we have issued the following publications: Bulletin No. 176, "Reducing Insect Injury to Stored Corn"; Bulletin No. 178, "Boll Weevil Effect Upon Cotton Production"; Circular No. 28, "The Oak Scale and Its Control"; Press Bulletins Nos. 69, "Cotton Boll Weevil Infested Area in United States and Quarantine Line in Alabama, 1913 to 1914"; 71, "County Organization in the Campaign Against the Boll Weevil"; 72, "Cotton Worm Control", and 74, "Cotton Boll Weevil Infested Area and Quarantine Line in Alabama, 1914 to 1915". A Bulletin on "The Life History and Control of the Grass Worm", is ready for publication. In addition to the regular station publications, we have had numerous articles in the Journal of Economic Entomology, Proceedings of the Alabama State Horticultural Society and Southern agricultural papers dealing particularly with various phases of our station work and insect control.

We have delivered more than twenty-five public addresses on insects of economic importance, dealing most commonly with the boll weevil and the insects affecting stored corn.

In 1914 there occurred a rather extensive outbreak of the cotton worm (*Alabama argillacea*). The most extensive dam-

age occurred in the northern part of the State, particularly in the Tennessee Valley. Undoubtedly the extremely hot, dry weather occurring in the southern part of the State up to the middle or latter part of July, had a very important effect in decreasing the abundance of cotton worms in that section as it certainly had in decreasing the injury by the Mexican cotton boll weevil (*Anthonomus grandis*). As a result of this unusual seasonal condition, the boll weevil failed to advance in Southern Alabama much beyond the line reached by it in 1913. In the northern part of the State the advance was practically normal, reaching a maximum of about forty-five miles in the vicinity of Jefferson County. The boll weevil infested area now includes approximately three-fifths of the cotton growing area of Alabama. In the southwestern corner of the State where it has become thoroughly established, it has already greatly decreased cotton production. Our Bulletin No. 178 is designed to give a reasonably reliable basis upon which we may estimate the effect of the weevil upon cotton production in any particular section of Alabama.

There is urgent need for us to take up the following especially important lines of entomological investigation: A study of the life history, natural enemies and methods of artificial control of the boll weevil under Alabama conditions. The weevil has so changed in its habits during the past twelve years since its life history was studied, particularly in Texas and Louisiana, that this ground needs to be gone over again under local conditions. There are at the present time, some seven or eight million fruit and nut trees growing in Alabama. We need to be in position to give the growers of these trees much additional information in regard to the important insect pests found thereon and methods for their control. Another extremely important field of work is in the study of methods for controlling the typhoid fly and malarial mosquitoes, particularly as these insects have such an extremely important effect upon human health and efficiency.

In connection with the studies of the control of insects attacking stored corn, I may say that the loss hitherto caused by them to the farmers of Alabama has been at least \$4,000,000 annually. Through our investigations extending over the past four years, we have been able to determine methods of handling the corn crop so that it may be possible for Alabama farmers to save or prevent at least \$2,000,000.00 of this loss without using any insecticidal methods whatever. By adding some insecticidal treatment another million dollars of loss can

be prevented. The importance of this problem will steadily increase as corn production increases throughout the South. A summary of this work is presented in our Bulletin No. 176.

Respectfully submitted,

W. E. HINDS,
Entomologist.

Report of Drainage Engineer

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

Dear Sir:—

Herewith I respectfully submit a brief synopsis of the work done in Alabama by Drainage Investigation, Office of Experiment Stations, United States Department of Agriculture, during the year 1914. The work was done under the co-operative agreement with the Alabama Experiment Station.

During the year particular attention was given to the need of underdrainage, surveys for tile drainage being made on eighteen farms and tile drains constructed on six of the areas surveyed. Drains are to be constructed on five more of the tracts surveyed, during the winter and spring of 1915. The construction of the drains on the remaining seven of the seventeen tracts surveyed has been indefinitely postponed; on three because of the lack of a suitable outlet and upon four because of the existing financial stringency.

In addition to the above underdrainage the following work was performed during the year 1914.

An extended experiment, to determine the action of soil water in tiled and untilled prairie soil, was installed upon the W. E. Elsberry farm near Montgomery.

A system of terraces was surveyed for Mr. V. C. Miller, Knoxville, Green County, Alabama.

An experiment to determine the best method to control sand in tile drains, was installed upon the Frank Holman farm near York.

Three vertical drains were installed upon the farm of B. F. Yarbrough near Montgomery, to determine the benefit to be received from this type of drainage.

Preliminary examinations and reports were made on the following overflowed swamp lands to determine the feasibility of reclamation by drainage:

1500 acres in Bear Heaven Swamp, Tuscaloosa County.

2500 acres along Big Sandy Creek, Tuscaloosa County.

7500 acres along Lubbub Creek, Pickens County.

19000 acres along Luxappalala River, Fayette and Lamar Counties.

15000 acres along Catoma Creek, Montgomery County.

32000 acres along Sipsey River, Fayette and Tuscaloosa Counties.

77,500 Total acres.

Below is given a complete list of all parties who have received assistance in tile drainage from this office under the co-operative agreement with the Alabama Experiment Station:

NAME.	P. O. ADDRESS.	COUNTY.	Year Ass't Given.	No. Acres Suv'd.	No acres Tile Dr's Installed.
J. T. Adams.....	Pine Apple	Wilcox	1911	12	12
R. J. Ennis	Livingston	Sumter	1912	10	10
Frank McLain	Montgomery	Montgomery	1911	5	5
W. E. Elsberry	Montgomery	Montgomery	1911	3	3
M. F. Smith	Marion Junction	Dallas	1912	3	3
J. C. Harper	Oak Hill	Wilcox	1912	40	12
Martin Invest. Co.	Bessemer	Jefferson	1912	60	15
T. B. Hill	Montgomery..	Montgomery	1913	200	12
J. F. Suttle	Felix	Perry	1913	25	25
Frank Holman	York	Sumter	1913	60	25
W. E. Elsberry	Montgomery	Montgomery	1913	320	100
I. E. Sarber	Elmore	Elmore	1914	60	10
McQueen Smith	Prattville	Autauga	1914	20	20
R. E. Lambert	Allenville	Wilcox	1914	40	20
A. F. Brooks	Ft. Deposit	Lowndes	1914	5	0
W. J & R. E. Beeland...	Greenville	Butler	1914	5	5
M. Rockhill	Elmore	Elmore	1914	80	0
H. H. Leland	Tuscaloosa	Tuscaloosa	1914	10	0
Aubrey Boyles	Mobile	Mobile	1914	1	1
N. J. Bell	Montgomery	Montgomery	1914	60	60 ^x
Geo. Fearn & Son	Mobile	Mobile	1914	300	33
W. D. Johnston	Boligee	Green	1914	100	40 ^x
J. T. Stokely	Demopolis	Marengo	1914	40	40
C. M. Kirk	Axis	Mobile	1914	80	10 ^x
B. W. Watson	Pine Apple	Wilcox	1914	100	0
R. D. Quisenberry	Montgomery	Montgomery	1914	200	60 ^x
B. G. Snyder	Uniontown	Perry	1914	20	0
Chas. Johnson	Uniontown	Perry	1914	3	0
Dr. H. T. Inge	} Mobile	Mobile	1914	40	25 ^x
W. H. Reynolds					
Mr. Hunter					

* To be constructed during the spring of 1915.

The above mentioned experiments have created a great deal of interest in underdrainage throughout the state and the work is rapidly spreading at the present time, in spite of the existing

financial stringency. It is impossible for this office to grant all the requests for assistance in the construction of tile drains that are being received.

There are numerous large projects in the state, involving the interest of two or more property owners, which could undoubtedly be profitably reclaimed if there were a state drainage law under which to organize the work. The need of such a law has become very apparent, and should be brought to the attention of the State Legislature now in session.

Very truly yours,

LEWIS A. JONES,
Drainage Engineer.

Report of Animal Husbandman

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

Dear Sir:—

I respectfully submit the following report of the Local Experiment work in the Animal Husbandry Department for the year 1914:

BEEF CATTLE

For a number of years the Bureau of Animal Industry at Washington has been co-operating with the Animal Husbandry Department in cattle feeding experiments in Sumter County. In March 1914 the Bureau discontinued the co-operative work in this state in order that it might take up work in a tick free district. Subsequently the Experiment Station has continued this line of investigation alone. This co-operative work is now being conducted on the farm of Judge B. M. Allen, Allenville, Marengo County. Judge Allen furnishes the cattle and the feed for the work while the Alabama Experiment Station provides a man, Mr. E. Gibbens, to live on the farm and have personal supervision of the experimental work. At present there are 60 steers on feed, divided into five lots of twelve steers each, fed as follows:

Lot 1—Cotton seed meal and cotton seed hulls.

Lot 2—Cotton seed meal and corn silage.

Lot 3—Cotton seed meal; cotton seed hulls one-half and corn silage one-half.

Lots one, two and three are on pavement and are provided with a shed.

Lot 4—Cotton seed meal and corn silage. Open sheds without pavement.

Lot 5—Cotton seed meal and corn silage. Open lots with out shelter or pavement.

The questions under observation in the above named lots are:

(1) To determine the relative value of cotton seed hulls and corn silage for fattening beef cattle.

(2) To determine the value of paved feed lots in fattening beef cattle.

(3) To determine the value of shelter for young beef cattle while being fattened.

(4) To determine whether or not there are any toxic effects on hogs following steers that are being fed cotton seed meal.

Lots one, two and three afford means of duplicating the feeding work carried on the preceding winter by this department in co-operation with the Bureau of Animal Industry. It is planned to conduct some other feeding experiments in co-operation with Judge Allen as to the best methods of wintering breeding cattle. Pasturage problems will also receive much attention.

DAIRY CATTLE

The co-operative dairy cattle experiments with M. W. Hall & Son, James, Bullock County, are being continued. The problems being studied are as follows:

- (1) Comparison of corn meal and rice polish as part of the concentrates for milk and butter fat production.
- (2) Comparison of cotton seed hulls and corn stover and cow pea hay as roughages for milk and butter fat production.
- (3) To determine the cost of raising dairy heifers to a producing age.

SWINE

The hog experiments for the past year were located in Marion and Henry Counties. The questions under consideration were as follows:

- (1) The work in co-operation with the Sixth District Agricultural School at Hamilton, Marion County, consisted of a test to determine the acre value in pork production of soy beans and peanuts, as well as to determine the proper amounts of concentrates to be fed with these crops.—Five lots of five pigs each were used in this experiment as follows:

Lot 1—Dry lot; corn two-thirds, shorts one-third.

Lot 2—Soy bean pasture, with one-fourth of a grain ration, consisting of corn two-thirds, shorts one-third.

Lot 3—Soy bean pasture; with a half grain ration, consisting of corn two-thirds, shorts one-third.

Lot 4—Peanut pasture; with a quarter ration of grain made up of corn two-thirds, shorts one-third.

Lot 5—Peanut pasture; with a half ration of grain, containing, corn one-third, shorts two-thirds.

- (2) The work on J. F. Yarbrough's farm in Henry County near Columbia was continued during the year. The problems under consideration in this work were: to determine the cost of raising and fattening hogs under farm conditions. Dr. Yarbrough furnished the hogs and necessary crops and feeds for this work, while the Station furnished the trained man, Mr. J.

A. McLeod, to personally supervise the experimental work. The work at this place is largely a test on Bermuda, rape, peanuts, velvet beans and such crops as are characteristic of the sandy soils of the State. A test has recently been completed to ascertain the amount of pork that may be produced on an acre of velvet beans. Three lots of five pigs were used in this test, as follows:

Lot 1—Dry lot; corn 10 parts, dried blood 1 part.

Lot 2—Velvet bean pasture; with a half ration of grain, consisting of corn 10 parts, dried blood 1 part.

Lot 3—Velvet bean pasture; with one-half grain ration, containing corn 10 parts, dried blood 1 part.

It is planned to duplicate this experiment next season.

Plans have been made to conduct some co-operative hog feeding work with Judge B. M. Allen of Marengo County. Judge Allen's farm is a representative farm of the Black Belt section. It is planned to test the carrying capacity and the amount of pork that may be produced per acre on such crops as are characteristic of this section of the State, such as alfalfa, melilotus, rape, Bermuda, oats, etc. Some of these crops have been planted. Mr. E. Gibbens, who has charge of the beef cattle work on the same farm, will personally supervise the experiments with hogs.

POULTRY

The co-operative experimental work with poultry at the Sixth District Agricultural School was continued during the year. The value of oat and rape pasture, as influencing the cost of egg production, is being studied at this place. Three lots of Rhode Island Reds were used in these experiments as follows:

Lot 1—Dry pen feeding.

Lot 2—Oat pasture with grain.

Lot 3—Rape pasture with grain.

The experimental work with Mr. Herman Schlueterbusch at Citronelle, Mobile County was continued throughout the year. The Mobile County experiment is a study of the various feeds to determine the cost of egg production. Four lots were used in this experiment as follows:

Lot 1—Dry mash, cracked corn and oats.

Lot 2—Dry mash and cracked corn.

Lot 3—Purina chowder.

Lot 4—Dry mash, cracked corn, and oats.

Yours very truly,

GEO. S. TEMPLETON,
Animal Hasbandman.

Report of the Horticulturist

Prof. J. F. Duggar, Director,

Sir:—

Mr. G. V. Stelzenmuller, Field agent of the Horticultural Department, and directly engaged in carrying out the plans and work in horticulture under the Local Experiment Fund, at my request has submitted the following statement regarding the Local Experiment work in progress at several points in the State. This work includes, in addition to field experiments, the gathering of information about resources, adaptabilities and actual development along various horticultural lines in the various sections and counties. A considerable body of valuable information has been gathered for reference and use. Demonstrations and lectures have also been given by request at several points.

Very respectfully,

ERNEST WALKER,
Horticulturist.

Prof. Ernest Walker,
State Horticulturist,
Auburn, Ala.

Dear Sir:—

Succeeding Mr. H. M. Conolly, the present Field Agent has been in charge of the local experiment work in horticulture since July 1, 1913.

About the first of November of the year 1913, experiments with late fall gardens were established at Albertville, Wetumpka, Evergreen, and Fairhope. These tests included such vegetables as lettuce, cabbage, onions, collards, beets, turnips, rutabagas, radishes, etc., and were designed not only as fertilizer and variety tests, but also as demonstrating the possibilities of late fall gardening. The garden at Albertville was killed by frost, indicating the necessity for earlier planting in that part of the State. Excellent results were obtained in a private planting at Fairhope and in a more extensive planting at the Fifth District Agricultural School at Wetumpka. The results of the tests at Wetumpka were given in an article prepared by the Field Agent and published in a local newspaper. In the fall of 1914, winter gardens similar to those of 1913 were established at Camp Hill, Bolling, Fairhope, and Summerdale.

Summer tests with fertilizers and varieties of tomatoes, sweet corn, sweet potatoes, etc., were conducted at Wetumpka, point Clear, and Grand Bay. The past summer was so dry that most of these tests were failures in so far as yield of crops is concerned.

On the farm of the Tennessee Coal, Iron and Railroad Company, near Birmingham, Ala., is conducted a co-operative fertilizer and variety test with nine different kinds of vegetables, each supplied in turn with eleven different kinds and combinations of commercial fertilizers. On this two-acre test plot the different sources of nitrogen, phosphoric acid, and potash are being compared. The test is repeated every year.

Several varieties of new vegetables from Japan are being tested at a number of points in the State.

Twenty plots of strawberries near Castleberry, Conecuh County, are used in experiments to determine the best fertilizers, cover crops, and cultural methods for this horticultural crop.

Ginseng is being tried out in one of the many abandoned shaded areas near Summerdale. These were erected at considerable cost some years ago for growing a fancy grade of tobacco and are now in general disuse.

Tea-growing, which has proved to be more or less successful in South Carolina, is under experimentation at Summerdale, Alabama.

Studies of the effects of fertilizers on pecan production, size of nuts, susceptibility to disease, etc., are being conducted at Fort Deposit and Fairhope. And arrangements have been made for similar tests and for the study of varieties at Camp Hill, Tallapoosa County.

With the Satsuma orange there was begun at Fairhope in the spring of 1914 an extensive fertilizer and cover-crop test; in this there are twenty-three fertilizer plots and nine cover-crop plots.

Orders have already been placed for English walnut, Smyrna and other kinds of fig, jujubes, chestnut, olive, almond, and other trees to be tried out at three points in the State,—Camp Hill, Bolling, and Fairhope.

Arrangements have been made for testing several promising varieties of the basket-willow, where moisture conditions are favorable.

The growing of Easter lily, hyacinth, and other bulbs and flowering plants is under trial at Summerdale.

Much valuable information has been gathered from successful truckers and fruit growers throughout the State, and arranged in form for ready reference. Information along horticultural lines has been freely given in the way of formal and informal talks and demonstrations, and by correspondence.

Samples of new and promising fruits and nuts have been collected, and descriptions and notes made and filed.

A number of plans for the improvement of school and home grounds in the State have been drawn up.

Work of similar nature has been planned for the future. Arrangements have already been made or are being made for spring and summer tests and demonstrations in growing the various garden vegetables at several representative points in the State; among them being Pratt City, Thorsby, Camp Hill, Bolling, York, Evergreen, Atmore, Troy, Fairhope, and Summerdale. New varieties of strawberries including the so-called everbearers, will be tested at the several strawberry-growing centers. Further experiments in pecan culture have been arranged for at Camp Hill. Demonstration tests in the growing of flowers for the home garden are to be conducted. Plants yielding perfumes will be tested at Summerdale, and probably elsewhere.

The production of horticultural crops is being studied to ascertain the exact costs and resulting profits per acre under average conditions.

The keeping of sweet potatoes through the winter is being studied to determine the most profitable and satisfactory methods to store crops of various sizes under the varying conditions existing on different farms. This includes a determination of the losses by shrinkage and decay and an estimate of the labor involved in each case.

A test of the effects of frosted vines in the flavor of sweet potatoes was carried out with the co-operation of several growers near Demopolis. The test embraced

- (1) Effects of frosted foliage (light frost).
- (2) Effects of frosted vines (severe frost).
- (3) Check, no frost.

In one series the vines were cut off before thawing of frozen parts took place. In the other the tops were not removed.

G. V. STELZENMÜLLER,
Field Agent.

Junior and Home Economics Extension

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

Dear Sir:

Below I am giving you brief reports on the following lines of work in progress in this department for the past year:

Boys' Corn Clubs
Girls' Canning Clubs
Boys' Pig Clubs.

BOYS' CORN CLUBS.

I. B. Kerlin,
Assistant State Agent in Corn Club Work.

Enrollment and Average Results

During the year 1914 we had well organized corn clubs in all the sixty-seven counties of the State, with a total of 3,359 active members. The average yield of the boys reporting was 48.39 bushels. This average is not as high as in some former years, but the season for growing corn was not as good. The average yield of corn for the entire State for 1914 was only 17 bushels per acre. It will be observed, therefore, that the corn club boys made an average of 31.39 bushels more than the average yield in the State. The average cost of raising corn, in the case of the boys, was 44 cents per bushel. Applying the same rules, when 17 bushels to the acre is the yield, we find that it cost the average farmer in 1914 seventy cents per bushel to produce his corn, or 26 cents per bushel more than it cost the average corn club boy. Estimating corn at \$1.00 per bushel, which is about the present market price, we find that the average corn club boy made a profit of \$27.10 per acre, while the average farmer made a profit of only \$5.10, or the average corn club boy made a profit of \$22.00 more than the average farmer.

Cooperative Work with the State Department of Agriculture

During the past year we have had most cordial and friendly co-operation with the Hon. R. F. Kolb, Commissioner of Agriculture and Industries. His department discontinued the gen-

eral corn contest, which it had conducted for a number of years, and offered all the prizes which it had formerly been offering for corn to the corn club boys through our organization. These prizes were converted into scholarships as follows:

First State Prize. This is a prize scholarship valued at \$250.00 to the State College of Agriculture in Auburn, Alabama, or to the agricultural school in the district where the winner lives.

Second State Prize. This is a scholarship valued at \$100.00 to a county high school.

County Prizes. In each county a prize scholarship valued at \$25.00 was given the boy making the best record. The winners of these prizes are to use the money, or as much as is necessary, to attend our Boys' Corn Club School of Practical Agriculture during the summer of 1915.

The average yield of the boys winning these county scholarships was 74.4 bushels per acre at an average cost of \$24.86, or an average of 33 cents per bushel. The average profit of each of these boys was \$49.54 per acre, estimating corn at \$1.00 per bushel.

Four Crop Contest

This contest is conducted in co-operation with the Central of Georgia Railway Company. The company offers the prizes and we organize the boys and instruct them.

If twenty-five or more boys entered the Four-Crop contest in a county, the prize offered was a pure bred Shorthorn bull valued at \$135.00. If between five and twenty-five boys entered the contest in a county, the prize was a pure bred Berkshire boar worth \$25.00. The capital prize for the boy making the best record in all of the counties along the lines of this railroad was a pure bred Percheron mare worth \$300.00. In this contest each boy entering had to grow four crops, using three acres of ground as follows: an acre to corn, an acre to cotton, and an acre to oats, cowpeas being planted after the oats were harvested.

We were able to organize this contest with twenty-five or more boys in only four counties, namely: Coosa, Geneva, Talladega, and Tallapoosa. The company purchased the prize bulls which were to be offered in these counties sometime in advance and loaned them to good farmers in the counties mentioned above, allowing the farmers in the community to have the free use of the animal until it was awarded the boy. The farmers having the use of this animal on his farm was required to build a dipping vat and to purchase at least one pure bred Shorthorn

heifer. We have learned that the offering of these prizes and the stationing of these bulls in the several communities resulted in the purchase of fifty-six pure bred bulls, and in one instance a man purchased a herd of pure bred Shorthorn heifers. The total profit of the four boys winning the four best prizes in this contest was \$721.21.

In ten other counties along this railroad between five and twenty-five boys entered the Four-Crop contest and the pure bred Berkshire pigs were offered. The total profit of the boys winning the pigs was \$1,188.88. The average profit of each boy was \$118.88.

The purpose of a contest like this is to stimulate the boys in better farming methods, to introduce pure bred livestock, and to encourage the boys to adopt a regular system of farming that is profitable and that will build up the soil.

Boys' Corn Club School of Practical Agriculture

On of the big features of the year in our work was the short course in agriculture held for our corn club boys, and known as the Boys' Corn Club School of Practical Agriculture. In this enterprise we had co-operating with us the state, county, and district agents in the Farmers' Co-operative Demonstration Work, county superintendents, county high school principals, agricultural school presidents, teachers in a number of the counties, judges of probate, courts of county commissioners, the State Bankers' Association, business men and bankers in almost every city and town in the State.

The State Bankers' Association, through the chairman of the agricultural committee, Judge C. E. Thomas, of Prattville, Alabama, paid the railroad fare of one boy from each county to and from Auburn to attend this school. The boys brought to the school were those who had been members of the corn club the previous year and had led in the club work in their respective counties. These trips to the school were given them as prizes.

We had in attendance on this school a total of 166 boys from all of the counties of the State except six. The school lasted from August 4 to 9.

The boys attending the school made a total of 8,862.73 bushels of corn at an average cost of 36 cents per bushel. The average yield was 53.39 bushels. Estimating corn at \$1.00 per bushel, the boys in attendance on this school made a profit of \$5,820.17, or an average profit for each boy of \$54.91.

While the boys were in Auburn they were entertained by the College of Agriculture, and given a splendid course of lectures and demonstrations along all lines of agriculture. We are still keeping in close touch with these boys and hope to stimulate them to be the leading farmers in their communities. The Boys' Corn Club School of Practical Agriculture will be a permanent feature of our work each year.

The Louisville Trophy

At the Conference for Education in the South in Louisville, Kentucky, last April, a prize trophy was offered for the State making the best showing with ten corn club boys. Below is a summary of the ten Alabama boys who entered this contest and won this trophy for Alabama:

Average number of bushels per boy.....	171.83
Average cost per acre or per boy.....	\$ 31.73
Average cost per bushel.....	.182
Average profit for each boy.....	\$140.14

This means that a profit of \$1,401.40 was made on the ten acres, estimating corn at \$1.00 per bushel. In fact much of this corn was sold for seed corn at a much better price.

GIRLS' CANNING CLUBS.

Madge J. Reese, State Agent in Girls' Canning Club Work.

There were organized in Alabama for Canning Club work from December, 1913, to December, 1914, 19 counties, with an enrollment of 2015 members, an increase of 9 counties and 882 members over the previous year. The counties organized were Autauga, Baldwin, Calhoun, Chilton, Conecuh, DeKalb, Etowah, Franklin, Jefferson, Macon, Marengo, Marshall, Mobile, Monroe, Pickens, Pike, St. Clair, Tuscaloosa and Walker.

These members were divided into 211 clubs. Each county had its canning club agent who supervised the work of the clubs. The county agent was employed for 4 months; for 15 days during the spring months to organize clubs, give instructions in planting and cultivating tomatoes and other vegetables; during the summer months, to visit garden plots, hold club meetings and give canning demonstrations, and for 15 days during the fall months to collect reports of the club members, award county prizes and submit an annual report to the State agent.

In organized counties, where no county agents were employ-

ed, 440 girls were sent circular letters of instructions from this office. These girls were encouraged to do canning for home use only and were not permitted to market canned products under the club label, as there had been no direct supervision of their work.

According to the annual reports sent in by the county agents of the 19 organized counties, the club girls reported 95,714 No. 3 tin cans of tomatoes and 58,714 glass jars of tomatoes, string beans, okra, figs, peaches, berries, and other fruits and vegetables.

Total value	\$27,318.21
Cost	8,097.50
Profit	19,012.26
Average cost per member	11.68
Average profit per member	27.43

Etowah county, which has been in the work three years, reports the greatest number of cans and jars filled.

Number filled	46,533
Tomatoes sold fresh	\$ 193.43
Money value	7958.65
Cost	1988.48
Profit	5970.17

The county had an enrollment of 136 girls, and of these 113 reported. In 1913 Etowah County led in record as a county in the fifteen Southern States doing canning club work. This year she ranks close to the top.

Monroe County has the following record reported by 71 girls:

Number jars and cans filled.....	15,482
Tomatoes sold fresh	\$ 71.00
Money value	2559.51
Cost	949.42
Profit	1610.09

The work of several other counties deserves special mention. Chilton County Club girls reported 9580 cans and jars, Marshall County 13481, and Tuscaloosa 6498. In Pickens, a county just started in the work last spring, 17 club girls filled 6236 cans and jars. The Autauga County clubs sold fresh tomatoes to the value of \$995.39.

The best records of club girls were made by Hester Sartain, of Walker County, and Kathleen Hubbard, of Marshall County.

No. cans and jars tomatoes.....	1620
No. cans and jars fruit.....	1047
Money value	\$221.35

Cost	75.15
Profit	146.20
No. cans and jars tomatoes.....	1269
No. cans and jars fruit.....	288
Money value	\$164.65
Cost	40.32
Profit	124.33

The county agents have traveled during the four months on duty 14,510 miles, held 198 club meetings, visited 2,073 club members and 353 rural schools. Miss Tappan, of the Montevallo Girls' Technical Institute, my associate in the club work, has traveled from September 1 to December 30, 2,905 miles. I have traveled from August 1 to December 30, 7,345 miles, including travel to and from Washington and the Carolinas.

Farm demonstration agents, county superintendents of education and rural teachers have heartily co-operated with the county club agents. Commercial clubs, business men, county fair associations, county boards of revenue and women's clubs of the State have been very generous in donating club prizes and have assisted the county agents in marketing the canned products of the club girls. Our markets are good and all of the clubs have marketed their products in their own counties.

We shall probably not organize more than two or three new counties in the club work for 1915, but we have increased the term of our county agents from an average of 4 months to 8 months in the 19 counties. In the counties where our agents are on from 9 to 12 months the agent will also have charge of the Home Demonstration Work for Farm Women. We are planning to teach our farm women more about home sanitation, proper methods of cooking, the making of good butter, poultry raising, home gardening, labor saving devices and home conveniences.

Our Department will conduct a series of Movable Schools of Agriculture in 20 counties during the winter and spring months. A short course in Home Economics for farm women and girls will be offered. Practical demonstrations in various phases of Home Economics will be given by Miss Tappan and me at these Movable Schools.

The educational value of the club work and the power gained by the club girls in doing things in a scientific way and in feeling that they play a part in the big commercial world cannot be measured in dollars and cents. For the year 1915 our appropriation from state, federal and county sources amounted to \$7,270.50. We have to record in actual profits \$19,012.26. For

every dollar expended in the Canning Club Work a profit of \$2.61 was realized.

BOYS' PIG CLUBS.

J. C. Ford, State Agent in Pig Club Work.

The Pig Club work was carried on during 1914 in the following counties:

Baldwin, Bullock, Butler, Chilton, Clay, Colbert, Cullman, Lamar, Lauderdale, Macon, Marshall, Pike, Shelby, Tallapoosa, Tuscaloosa, Walker.

The following tabulation shows at a glance the scope of the work in the State:

No. counties.	No. boys enrolled.	Value of prizes offered.
17	1,183	\$675.00

In addition more than fifty boys living in unorganized counties have received literature and instructions from this office. Some of these have reported excellent results.

For the work of 1915, we are adding to our list the following counties: Fayette, Geneva, Henry, Lee, Marion and Pickens. Other counties will be added each year until the work has been extended over the entire State.

Respectfully submitted,

L. N. DUNCAN,

Supt. of Junior and Home Economics Extension Department.

Report of Plant Pathologist

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

Dear Sir:

I am herewith submitting a brief statement relative to the Local Experiment Work in the Department of Plant Pathology for the past year.

A very considerable amount of time was devoted during the first part of the year to a study of citrus canker, a new disease occurring in the Gulf Coast States. The serious nature of this disease can best be appreciated, perhaps, when it is known that the Federal authorities have issued, because of fear of the further introduction of citrus canker, a quarantine against the world on the importation of all citrus nursery stock. Florida and Louisiana had previously issued such quarantine affecting not only foreign countries, but also neighboring States.

The demonstrations conducted in several places upon the use of self-boiled lime sulphur in the control of peach brown rot and freckle have been very successful. One report states that less than one per cent of loss occurred on trees the crop of which had been a total loss during the previous year.

The reports on egg plant rots and a leaf disease of Persian walnuts have been published during the year as technical papers in *Mycologisches Centralblatt*. A concise account of strawberry leaf blight has been prepared and published in the Proceedings of the Alabama State Horticultural Society.

Inquiries, during the past year, relative to plant diseases and their control have been more numerous than during 1913.

Very respectfully submitted,

FREDERICK A. WOLF,
Plant Pathologist.

