

TENTH ANNUAL REPORT

OF THE

Agricultural Experiment Station

OF THE

A. & M. COLLEGE,

AUBURN, ALA.



MONTGOMERY, ALA.:

THE BROWN PRINTING CO., PRINTERS AND BINDERS.

1898.

ALABAMA POLYTECHNIC INSTITUTE (A. & M. COLLEGE),
AUBURN, ALA., February 10, 1898.

Governor JOSEPH F. JOHNSTON,
Executive Department,
Montgomery, Ala.

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

The report of the Treasurer herewith included, is for the fiscal year ending June 30, 1897.

This report is made in accordance with the provision of the act of Congress (approved March 2, 1887), establishing Agricultural Experiment Stations in the several States and Territories.

It contains the report of the Botanist, the Chemist and associate, the Veterinarian, the Agriculturalist, the Biologist, the Horticulturist and the Entomologist for the year ending December 31, 1897.

Respectfully,

WM. LEROY BROUN,
President.

AGRICULTURAL EXPERIMENT STATION.

COMMITTEE OF TRUSTEES ON EXPERIMENT STATION.


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

STATION COUNCIL.

WM. LEROY BROUN.....	President.
P. H. MELL.....	Botanist.
B. B. ROSS.....	Chemist.
C. A. CARY, D. V. M.....	Veterinarian.
J. F. DUGGAR.....	Agriculturist.
F. S. EARLE.....	Biologist and Horticulturist.
C. F. BAKER.....	Entomologist.
J. T. ANDERSON.....	Associate Chemist.

ASSISTANTS.

C. L. HARE.....	Second Assistant Chemist.
R. G. WILLIAMS.....	Third Assistant Chemist.
T. U. CULVER.....	Superintendent of Farm.

 The Bulletins of this Station will be sent free to any citizen of the State on application to the Agricultural Experiment Station, Auburn, Alabama.

TRUSTEES.

His Excellency, JOSEPH F. JOHNSTON, President.....*Ex-officio*.
J. O. TURNER, Superintendent of Education.....*Ex-officio*.

J. G. GILCHRIST.....Hope Hull.
TANORED BETTS.....Huntsville.
WALTER C. WHITAKER.....Tuscaloosa.
JONATHAN HARALSON.....Selma.
THOS. WILLIAMS.....Wetumpka.
J. A. BILBROGadsden,
I. F. CULVER.....Union Springs.
T. H. FRAZERMobile.
H. CLAY ARMSTRONG.....Auburn.
R. H. DUGGAR.....Gallion.

J. T. GLENN, Treasurer.

J. H. DRAKE, M. D., Surgeon.

REPORT OF TREASURER.

TREASURER OF A. & M. COLLEGE,

In account with U. S. Appropriation,

Hatch Fund for the year 1896-97.

To cash received from U. S. Treasurer for the fiscal year
ending June 30th, 1897..... \$ 15,000 00

CR.

By Salaries.....	\$	7,829 97
Labor.....		1,070 66
Publications.....		1,325 94
Postage and Stationery.....		241 37
Freight and Express.....		378 66
Heat, Light and Water.....		203 55
Chemical Supplies.....		399 13
Seeds, Plants and Supplies.....		788 32
Fertilizers.....		320 62
Feeding Stuffs.....		209 52
Library.....		848 84
Tools, Implements and Machinery.....		59 17
Furniture and Fixtures.....		14 63
Scientific Apparatus.....		237 12
Live Stock.....		64 95
Traveling Expenses.....		259 55
Contingent Expenses.....		5 00
Building and Repairs.....		743 00—\$ 15,000 00

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

THE STATE OF ALABAMA, }
Lee County. } Personally appeared before me, Charles
Gachet, a Notary Public in and for said county and State, E. T.
Glenn, known to me as Treasurer of the Agricultural and Mechanical
College of Alabama, who, being duly sworn, deposes and saith that
the above and foregoing account is true and correct.

Witness my hand, this 8th day of Feb., 1898.

CHARLES GACHET,
Notary Public and Ex Officio J. 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
same.

WM. LEROY BROWN,
President A. & M. College.

REPORT OF BOTANIST.

Dr. Wm. L. Brown, President :

I have the honor of submitting herewith my annual report for the work done in the Botanical Department of the Experiment Station of Alabama for the year 1897.

The experiments on the improvement of the cottons have been continued and a bulletin on the subject was published in June: No. 83, termed Hybrids from American and Foreign Cottons. This bulletin shows the effects produced on foreign cottons by transferring them from one country to another, where conditions of soils and climate may be materially changed. It discusses also the steps required to secure perfect results in hybridization. A synopsis of the botanical characteristics of American and foreign plants is also given and conclusions are drawn concerning the results of the combination of the American and foreign cottons. The experiments so far conducted with the cottons indicate that a superior grade of long staple, well matured and adapted for upland cultivation will be secured. Another year's experiment, however, seems to be required to establish the types.

Considerable work in grass cultivation has been carried on in the Botanical garden to determine the species which are suited to Alabama, particularly in sandy soils and dry regions of the State. A large number of the wild species have been tested, besides many from foreign lands sent by the United States Department of Agriculture and also secured by the assistance of correspondents in Australia, Egypt and other lands. One hundred species of native trees and shrubs have been planted in the Botanical Gardens and quite a number of foreign seeds of trees have been sown to germinate for future transplanting.

The excellent Herbarium attached to my Department has enabled me to satisfactorily answer numerous letters from correspondents all over the State enclosing plants to be named. This Herbarium has grown considerably during the past year by the addition of many species of plants from Alabama and Florida.

As Librarian of the Station Library I have the following report to make: The Reading Room is receiving through subscription nearly all of the leading journals on agriculture and bulletins of experiment stations published in this country and abroad. Besides this the list is greatly enlarged through exchanges with agricultural journals and publications of many of the leading scientific societies in the United States and Canada. During the year there was added to the shelves of the Library 558 bound volumes and 225 pamphlets.

It gives me pleasure to mention in this connection the efficient service of Miss Reese, the Assistant Librarian. Besides other numerous duties pertaining to the Library she has made out a full and comprehensive index of Volume IV of the Alabama Station Publications and is now engaged in completing the card index of the Library.

During the year the following bulletins have been issued by the Stations and turned into the Library:

- Number 76. Experiments with Cotton.
- “ 77. The San Jose Scale and other Insects.
- “ 78. Co-operative Fertilizer Experiments with Cotton in 1896.
- “ 79. Some Horticultural Suggestions.
- “ 80. A Preliminary List of Alabama Fungi.
- “ 81. Meat Inspection.
- “ 82. Corn, Cowpeas and Wheat Bran for Fattening Pigs.
- “ 83. Hybrids from American and Foreign Cottons.
- “ 84. Turnips.
- “ 85. Japanese Plums.
- “ 86. More about San Jose Scale, Sweet Potato Pest, Carbon Bisulfid, Insecticides, etc.

Number 87. Soil Inoculation for Leguminous Plants.

“ 88. Experiments with Corn.

These comprise Volume V, consisting of 502 pages.

Permit me in closing my report to express my thanks to you for many courtesies and acts of kindness shown to me during the past year.

Respectfully,

P. H. MELL,

Botanist Experiment Station.

REPORT OF CHEMIST.

Dr. Wm. LeRoy Brown, President.

SIR:—I beg leave to submit the following statement with regard to the extent and character of the work performed by the Chemical Department for the year just closed:

A large proportion of the total analytical work of the laboratory consists of the chemical examination of the fertilizers sold in this State, and in the last Fertilizer Bulletin, issued in August, there were reported about 560 quantitative analyses of fertilizers and fertilizing materials.

In addition to these analyses, a large number of quantitative analyses of soils, foods and feed stuffs, marls, mucks and various agricultural and horticultural products have been made.

This Department is now completing the work of investigating the composition of foods and food materials sold in this State and has made analyses of all the principal food products found upon the markets. The results of a portion of this work has already appeared in a bulletin issued by the United States Department of Agriculture and the full results of the investigation will be embodied in the bulletin to be issued shortly by the Experiment Station.

It is intended to continue these investigations with a view to determining the extent and nature of the adulterations of the principal articles of food consumed in this State, and already some work in this direction has been commenced.

A number of samples of oleo-margarine have also been analyzed in conformity to the provisions of the State law prohibiting the sale of butter substitutes so colored as to imitate the genuine article, and the laboratory has recently added to its facilities for the examination of dairy products of all kinds, as well as the adulterations of the same.

A number of analyses of grapes grown on the Experiment Station were made during the past season, and the results will be included in the bulletin on foods above referred to. Several analyses of insecticides and fungicides were also made for the Entomological Department, with a view to determining their adaptability to the requirements of this section.

A series of investigations have been conducted by Mr. C. L. Hare, Assistant Chemist, with a view of determining the influence of the presence of formalin in foods (particularly milk) upon the digestion of animals, and some of the chemical work in connection with these experiments is still in progress.

In connection with the Agricultural Department of the Station, this laboratory is investigating the nature and characteristics of the fat of pigs fed on a number of different kinds of foods, special attention being given to a comparison of the results obtained from feeding on corn and peanuts, respectively.

In addition to the Annual Bulletin on Fertilizers prepared for the Department of Agriculture, this department has issued a press bulletin upon the subject of the manufacture of syrup by improved methods, and has in preparation another press bulletin upon the subject of the economic utilization of crude and commercial fertilizing materials.

Respectfully submitted,

B. B. Ross,
Chemist.

REPORT OF ASSOCIATE CHEMIST.

Experimental Work in Progress during 1897, and proposed
for 1898.

BY JAS. T. ANDERSON, ASSOCIATE CHEMIST.

1. A study of the *availability* of Plant Food in the soil. Metal cylinders imbedded in the soil in the open field are employed, and the amount of available plant food in the soil is determined by actual cultivation tests, using the cotton plant therefor. Each important constituent is tested separately, and care is taken to preserve the normal fertility of the soil as regards all other constituents by proper fertilization. Began in 1896, and to be continued.

2. A study of the Water Requirements of the Cotton Plant. Done in Metal Pots in the Vegetation House. The problem sought to be solved is, What is the optimum amount of water in the soil to insure the vigorous, healthy growth of the plant, and the production of a maximum harvest? In this connection is studied the probable relation of the amounts of moisture in the soil to certain diseases of the cotton plant, particularly to "shedding." To be repeated during the season of 1898. With the co-operation of Prof. Earle.

PLANNED FOR 1898.

3. A critical study of the sources of Nitrogen for leguminous Plants. A determination of the relative amounts of this valuable constituent furnished by the atmosphere and by the soil, is employed as a means of determining in definite terms the value of leguminous crops as soil renovators.

Done in metal pots in the Vegetation House and with the co-operation of Prof. Duggar.

4. The Determination of the *availability* of the phosphoric acid in the several sources from which this constituent is obtained for the fertilization of soils. Undertaken with the purpose of testing the relative value of these phosphatic materials as sources of Phosphoric acid. The experiments are conducted in clay cylinders imbedded in the soil in the open field. Known weights of soil and sub-soil in these cylinders are fertilized with the several phosphatic materials, and the facility with which they give up their phosphoric acid to the plant is determined by cultivating plants in them. Before we are ready to begin the tests proper, it is necessary to exhaust the soil of all available phosphoric acid already in it, by growing such plants as make a heavy draft on the phosphoric acid, and continuing this until plants refuse longer to grow for lack of phosphoric acid. While this exhausting of phosphoric acid is being done, care is taken to preserve the normal fertility of the soil as regards all other constituents by proper fertilization.

Respectfully submitted,

JAS. T. ANDERSON,
Associate Chemist.

REPORT OF VETERINARIAN.

Dr. Wm. Leroy Brown, President.

Sir :—The following is a brief summary of work done by this department during the year 1897.

In May a Bulletin on "Meat Inspection" was issued. The object of the bulletin was to give plain and brief directions for inspecting animals on foot (*ante mortem*) and at the slaughter (*post mortem*). In this bulletin the most common diseases were discussed—giving in detail their symptoms and pathological lesions. As far as possible, directions were given for condemnations at the slaughter and on foot. A brief review of the most common animal parasites, as found in or on domestic animals, was given with illustrations of each parasite. It was our aim to adapt this bulletin to the needs or conditions presented in Alabama, and encourage the undertaking of meat inspection in the larger and smaller cities of this State. Whenever requested we gave our aid to the establishing and regulating the system of meat and dairy inspection in the city of Montgomery. So far the inspection in Montgomery has been very satisfactory to the officers in charge and to the people. We earnestly hope that Mobile, Birmingham, Selma, Anniston, Gadsden and all cities of Alabama, having a population of over 2,000 will establish efficient systems of meat and milk inspection. We offer our assistance to any municipality in Alabama that will establish Dairy and Meat Inspection.

During the year we have made in our laboratory and furnished the cities and veterinarians of Alabama over 2,500 c. c. of tuberculin. This is done with agreement that reports of all tests will be sent to us as soon as completed.

During the year several tests have been made by feeding to pigs, cotton seed and cotton seed meal, with a view to determine why they are toxic or produce death. If the work progresses favorably we expect to make a report, in bulletin form, on this work in the near future.

This department has also continued to collect animal parasites and data upon the diseases of this State. It is our aim to make a complete biological survey of the animal parasites that infect domestic animals of Alabama.

We have made a number of experiments upon cases of "big-head" (osteoparasis) in horses and mules. So far no treatment has given as satisfactory results as intra-venous injections of barium chloride. One gramme or 15 grains of barium chloride is dissolved in 10 c. c. or about $1\frac{1}{2}$ drams of sterilized distilled water and injected into the jugular vein with an hypodermic syringe. This is done once or twice per week. The horse or mule is fed oats and allowed to run at pasture for 3 or 4 weeks. As a rule this treatment will remove all stiffness and lameness, and harden, (but not remove) the bony enlargements of the face, lower jaw, etc. While such a recovery is not a complete restoration of normal health, it is the best that can be accomplished with our present knowledge of that disease.

We have attended, and delivered lectures at, nearly all of the farmer's institutes that were given in Alabama, under the direction of the State Commissioner Agriculture.

Our Saturday free clinic has been continued for the benefit of stock owners and the students in the agricultural course.

Respectfully submitted,

C. A. CARY,
Station Veterinarian.

REPORT OF THE AGRICULTURIST.

Dr. Wm. LeRoy Brown, President:

I have the honor to submit the following statement with regard to the work of the Agricultural Department for the past year.

The experiments made during the past year have covered a number of subjects. Much of the work has been a repetition of that of the preceding year, for repetition is needed in all field experiments in order to obtain trustworthy results. As stated in the last annual report, the main lines of permanent investigation mapped out for this Department are the following:

(1). The economical improvement of worn soils, involving an extended study of the most promising leguminous or renovating plants.

(2). Cotton culture.

(3). Pork production.

Other subjects on which extensive investigations have been made are corn and oats. Experiments have also been made with rye, cowpeas, peanuts, sweet potatoes, artichokes, chufas, Kaffir corn, and other sorghums, taro, tropical yam, cassava, etc., etc.

Among the indications furnished already by the study of leguminous plants are the following: The means of increasing the yield of clover, vetch, alfalfa, etc., on soils previously regarded as unfit for these plants; the resistance of beggar weed to attacks of nematodes and its probable value as a substitute for cowpeas on fields where this pest abounds; the value of velvet beans for soil improvement; the suitability of different varieties of cowpeas to different purposes; the character of silage made from cowpeas and

peanuts ; and the proportions of leaflets, stems, kernels and hulls of peanuts at different stages of growth.

The results of last year's work with cotton are now in the hands of the printer.

Feeding experiments with pigs have developed many points of interest and have been especially concerned with the following questions :

The financial returns from an acre of peanuts, cowpeas and sorghum, when converted into pork ; the relative nutritive values of rations made up of corn, cowpeas, peanuts, and of mixed rations of corn and cowpeas, corn and peanuts and sweet potatoes and cowpeas ; and the effect of these foods on the proportion of fat and lean meat.

During the past year encouraging progress has been made in collecting data, which in time will be useful in the preparation of a map of the State showing the character of the fertilizer chiefly needed on the most extensive soil belts of the State. With this end in view and with the hope of aiding farmers in many portions of the State to buy only the most appropriate fertilizers for their respective soils, thirty soil tests or fertilizer experiments with cotton were conducted in 1897 under the direction of this department.

The following bulletins were issued by this Department in 1897 :

BULLETIN No. 76.—EXPERIMENTS WITH COTTON.—In this bulletin are recorded results of tests of varieties, seed of different ages and from different latitudes, effects of rolling, barring off and subsoiling and fertilizer experiments.

BULLETIN No. 78.—CO-OPERATIVE FERTILIZER EXPERIMENTS WITH COTTON IN 1896.—Giving the results of tests made in twenty-one localities to determine the manurial needs of these soils and to ascertain the relative values as fertilizers of cotton seed and cotton seed meal and of acid phosphate and Florida soft phosphate.

BULLETIN No. 82.—CORN, COWPEAS AND WHEAT BRAN FOR FATTERING PIGS.—Discussing the results regarding the relative economy of the several rations and their effects on the quality of flesh and on the richness of the excrement.

BULLETIN No. 87.—SOIL INOCULATION FOR LEGUMINOUS PLANTS.—In which were discussed soil improving plants and the means which proved effective in increasing the yields of some of these plants on soils not naturally adapted to their growth.

BULLETIN No. 88.—EXPERIMENTS WITH CORN.—Giving the results for 1897, with varieties, fertilizers, character of seed, method of harvesting and thickness of planting.

Respectfully submitted,

J. F. DUGGAR,

Agriculturist.

REPORT OF THE BIOLOGIST AND HORTICULTURIST.

Dr. Wm. Leroy Brown, President:

Sir:—In the Horticultural Department work has been continued on much the same lines as in 1896. The work on turnips mentioned in my last report as begun in the Fall of 1896, was continued during the Winter and the Spring of 1897, and the results obtained were published as Bulletin No. 84.

A line of work with tomatoes was undertaken with the view of issuing a Bulletin on this important crop for the Southern truck farmer. Unfavorable weather in the Spring so much interfered with some features of this work that the publication of the Bulletin was deferred until a portion of the experiments can be repeated another year.

Work has been continued with the late Summer and Fall planting of vegetables to determine what kinds can be safely recommended for increasing the home supply of such foods during the Fall and early Winter. The worst drawback to this work is our frequently occurring fall drouths. Owing to the varying character of the seasons these experiments will need to be frequently repeated, before anything like final results can be obtained.

A number of experiments with celery have been tried during the year, but owing to the dry nature of our soil, the lack of a sufficient water supply for irrigation, and the extreme susceptibility of this plant to the nematode root knot disease, all have so far ended in failure.

The vineyard again produced a satisfactory crop on most varieties. No serious trouble was had from rot, mildew or any of the common leaf or fruit diseases, but an increased number of vines died from the obscure "root rot" disease, mentioned in my previous report. This vineyard is rapidly passing its period of usefulness and I have therefore made

plans for planting a new one during the present Winter. The old one will however be retained for a time for the purpose of studying farther this peculiar root disease.

The young orchard (planted spring of 1896) has made a very satisfactory growth. The plums and peaches are well set with fruit buds and promise a nice crop for 1898.

The Japanese plums in the old orchard gave a full crop this year. Some valuable notes were secured that are embodied in Bulletin No. 85 issued during the summer. It was discovered after the plums were in bloom in the Spring that this orchard had, unfortunately, by some unknown means become infested with the San Jose scale. It was then too late to apply any of the Winter sprays usually recommended. I therefore had the trunks and large limbs painted with undiluted kerosene emulsion. This, however, only gave temporary relief and finding after the crop was gathered that the scale was rapidly increasing it was decided to cut down the trees and clear the ground in order to make room for the proposed new vineyard. This was done the more readily since the varieties of plums were all duplicated in the new orchard on the other side of the farm and the few peach trees were of small value. Many of them being injured by root knot and by an application of "Dendrolene," a substance extensively advertized as a remedy for peach borer, but which proves very unsafe to use, at least in this climate.

The apple orchard joining this old plum and peach orchard was also found to be badly infested with the scale. The trees were so large that the chance for ridding them of the scale by any known means of treatment seemed very small and it was advised to cut them down also. This, however, was not approved by the trustees, so the orchard has been retained and will be used for testing certain lines of treatment for the scale after first removing some of the largest trees and giving all a heavy pruning. This decision was acquiesced in since there are no commercial orchards near to be in danger of infection from our grounds.

Plans have been made for considerable additional orchard planting including some seventy or more varieties of apples, ten or fifteen of cherries, fifteen or more of figs, a few plums and the fifteen kinds of peaches required for the co-operative test of the different races of peaches proposed by Prof. Price, of the Texas Experiment Station and endorsed by the association of the Agricultural Colleges and Experiment Stations and by the Division of Pomology of the U. S. Department of Agriculture.

A co-operative experiment in forest tree planting was undertaken on the invitation of the Division of Forestry of the U. S. Department of Agriculture. Seeds of black walnut, bur oak, honey locust, hackberry, box elder and ash from a number of widely different localities were planted side by side for the purpose of noting the behavior of the seedlings as to comparative vigor of growth, hardiness &c. Some interesting notes were secured tending to show that southern grown seed of these trees made a more vigorous growth than northern grown seed. A portion of each lot of seedlings has been transplanted to a spot where they can stand for some years in order to note their future comparative behavior, and another lot of seeds has been planted.

Three Bulletins have been issued from this department during the year. No. 79, called "Some Horticultural Suggestions," dealing with a number of topics of general horticultural interest including soils, fertilizers, methods of marketing and transportation, &c. No. 84 on Turnips, and No. 85 on Japanese Plums.

In the department of Biology much time was consumed in the early part of the year in completing the "Preliminary List of Alabama Fungi," mentioned in my last report. When ready for publication in April the list enumerated over eleven hundred species of Fungi as known to occur in the State, besides giving much historical and other matter of interest in connection with the study of our Fungi. This was published as Bulletin No. 80, but was headed "Science Contributions," and a limited number of copies were

printed. It was not forwarded to our full mailing list but only to such persons as it was thought would be specially interested in the subject.

At the beginning of the year the "Alabama Biological Survey" was organized by the members of the faculty who are interested in Natural History Studies. Large collections have been made during the season, mostly in the neighborhood of Auburn, in all groups of plants and the lower groups of animals. The mosses, lichens and fungi collected by the survey have been deposited in the herbarium of this department. A careful estimate shows that this material aggregates over ten thousand specimens which at the low price of five dollars per hundred would be worth over five hundred dollars. About half of this material has been named, placed in envelopes and labeled ready for making exchanges. The remainder is being worked over as rapidly as other labors will permit.

My last report showed that 9,882 specimens of fungi had been mounted in the department herbarium. During 1897 there have been added to this 1,272 specimens of fungi from various sources, 530 algæ, 452 lichens, and 200 mosses and hepatics, making a total now in the collection 12,336 specimens, besides the large amount of exchange material mentioned above, that will enable us to rapidly increase our collections during the present year.

Numerous diseases of cultivated plants have been under observation in the field and laboratory during the year. Diseases of cotton have received particular attention. The "Black Rust" was unusually prevalent and destructive in this part of the State. Numerous observations of its behavior under varying conditions suggested the idea of the intimate relation between this disease and the exhaustion of the soil humus. In order to gain more light on this important subject a circular letter was prepared and sent to cotton growers in all parts of the South suggesting a co-operative experiment to test the effect of applications of barn yard manure and of kainit; in preventing cotton rust,

and also asking for the past experience of the growers with this disease. Many very interesting replies have been received and it is intended to publish a Bulletin on the results of the investigation at the close of the present season.

In connection with the Entomologist work has been continued on the nematode Root Knot disease that has long been so troublesome on our grounds. Some results of value have been secured. The work will be continued during the present season, and it is hoped enough progress will be made to justify the publication of the results of our numerous experiments.

Four public addresses have been given at different points in this State during the year and one before the Georgia State Horticultural Society. Portions of two Press Bulletins have been prepared and some articles contributed to various Horticultural papers. The great increase in my Station correspondence and the frequent calls for the Bulletins issued show a gratifying increase of interest in the work being done by the station.

Respectfully submitted,

F. S. EARLE,
Biologist and Horticulturist.

REPORT OF DEPARTMENT OF ENTOMOLOGY.

Dr. Wm. LeRoy Broun, President:

SIR:—I have the honor to present the following report of work done, under way, and projected, in the Department of Entomology:

A careful study of all injurious insects occurring in this locality is carried on by both the field and laboratory methods. Work has been done and is now in progress in connection with the cabbage worm, cabbage louse, turnip worm, tomato worm, San Jose scale, peach borer, fruit bark beetle, cotton mite, and with the insects instrumental in producing rot of cotton bolls. Field experiments in the application of various remedies and preventives, have been constantly in progress.

Now that the turnip is coming into unusual favor as a field and garden crop, a serious pest in the form of the turnip worm is also making its appearance. It will require careful study and experimentation.

The spread of the nematode worm continues. The presence of this root attacking pest over such wide areas in this State is a matter of the gravest possible nature. We are now no nearer the discovery of a remedy applicable on a large scale than we were a year ago, but our results now show that it is probable we have a remedy which can be used over small areas by the market gardener, and in the treatment of cold frames, hot beds, greenhouse benches, etc. The experiments in connection with this pest has been carried out in conjunction with Prof. F. S. Earle, according to the following schedule:

I. Starving out (in field).

- a. By leaving land entirely fallow.
- b. By continuous cropping with various plants nearly or quite immune from the attacks of the worm.

II. Trapping (in field).

By planting crops most readily affected, these to be harvested entire and either fed out entire or burned; also to be rapidly maturing crops and harvested as often as possible.

II. Killing the worm directly by use of various substances which may act as vermicides (in pots).

a. By use of any commercial fertilizers.

b. By use of Carbon disulphid, Hydrocyanic acid gas, Benzine, or Sulphur.

The office work is the most time-consuming of any in connection with this department. Few of the many letters received relating to insect troubles can be answered without more or less extensive office and laboratory investigation.

Three bulletins have been prepared: No. 77 with contents as follows:

I. The San Jose scale.—A Warning to the Fruit-growers of Alabama.

II. Some other Insect Pest.

a. The Tomato Worm.

b. Grape Leaf-hoppers.

c. Cabbage Worms.

No. 83, with contents as follows:

I. More about the San Jose scale.

II. A Sweet Potato Pest.

III. Regarding Carbon Bisulphid.

IV. Insecticides and Pumps in general.

No. 90, with contents as follows:

I. The Peach-tree Borer.

II. The Fruit Bark Beetle.

It is greatly to be regretted that better facilities cannot be afforded for getting about over the State. The greatest market garden, orchard, nursery, and farm interests are in other portions of the State. Insect outbreaks are usually more or less local. Where the nature of these outbreaks is but

little known, field work on the spot is absolutely necessary to the understanding of the case and safe recommendation of remedies. I have been enabled to make a few important trips through the assistance of the State Department of Agriculture, and through the kindness of the officials of the Louisville and Nashville Railroad and the Western of Alabama. I have visited Huntsville twice in the capacity of Acting State Entomologist, inspected the large nurseries there and issued certificates to the nurserymen, admitting their stock to such States as New Jersey, Delaware, North Carolina, etc., which have laws governing such matters. In this way many hundreds of dollars worth of stock have passed out of this State under my certificates. A trip to the country surrounding Mobile was made for the purpose of investigating some matters relative to the terribly destructive pear blight. Several days were spent in the vicinity of Dadeville, investigating the boll rot which caused a loss of one-fourth or one-third of the crop over an area twenty-five miles long by some ten to fifteen broad. It is of the utmost importance that much more time *in the field*, be given all these subjects. The small expenditures necessary for such investigations, are more than amply justified by the thousands of dollars annual loss sustained through these agencies by our horticultural and agricultural communities.

Respectfully submitted,

C. F. BAKER.

Entomologist.