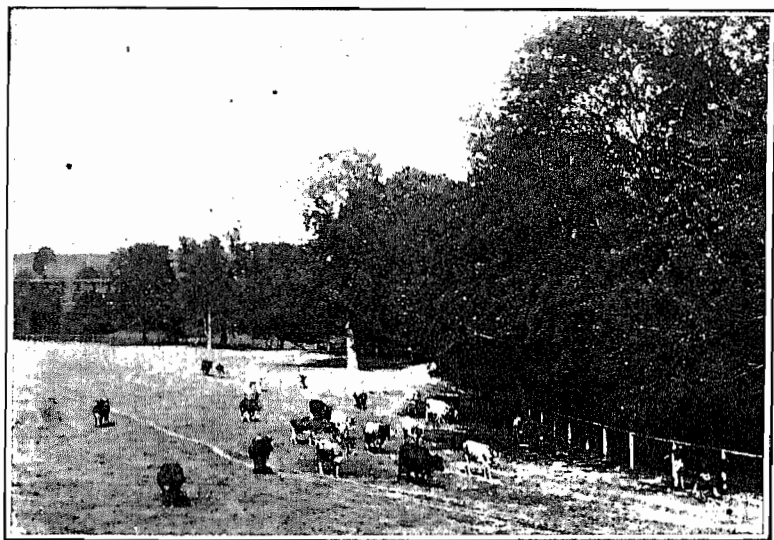


SEVENTEENTH ANNUAL REPORT
OF THE
Agricultural Experiment Station
OF THE
UNIVERSITY OF TENNESSEE
FOR 1904



PART OF THE DAIRY HERD IN BLUE-GRASS PASTURE

KNOXVILLE
UNIVERSITY OF TENNESSEE PRESS
1905

THE AGRICULTURAL EXPERIMENT STATION

OF THE UNIVERSITY OF TENNESSEE

CHARLES W. DABNEY, *President* (to Aug. 31)

BROWN AYRES, *President* (after Aug. 31)

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CHARLES A. MOOERS, *Chemist*

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JOHN R. FAIN,* *Assistant Agriculturist*

PHARES O. VANATTER,* *Assistant for Plat Work*

SAMUEL E. BARNES, *Dairyman*

SAMUEL H. ESSARY, *Assistant Botanist* (beginning July 1)

HENRY H. HAMPTON, *Assistant Chemist* (to July 31)

WALTER H. BROWN, *Assistant Chemist* (after July 31)

FREDERICK H. BROOME, *Librarian*

MISS ETHEL REESE, *Stenographer*

The Station has facilities for analyzing fertilizers and cattle foods; for testing milk and dairy products; for examining seeds with reference to their purity or germinating power; for identifying insects, grasses, and weeds; and for investigating insect enemies and diseases of fruit trees, grains, and other useful plants.

Packages by express, to receive attention, should be prepaid.

All communications should be addressed to the

AGRICULTURAL EXPERIMENT STATION,

Knoxville, Tennessee.

The Experiment Station building, containing the offices and laboratories, and the plant house and part of the Horticultural department, are located on the University campus, 15 minutes walk from the Custom House in Knoxville. The experiment farm, the barns, stables, dairy building, etc., are located one mile west of the University, on the Kingston pike. The fruit farm is adjacent to the Industrial School and is easily reached by the Lonsdale car line. Farmers are cordially invited to visit the buildings and experimental grounds.

Bulletins of this Station will be sent, upon application, free of charge, to any farmer in the State.

* Resigned Sept. 1.

LETTER OF TRANSMITTAL

KNOXVILLE, TENN., January 15, 1905.

To His Excellency, James B. Frasier, Governor of Tennessee:

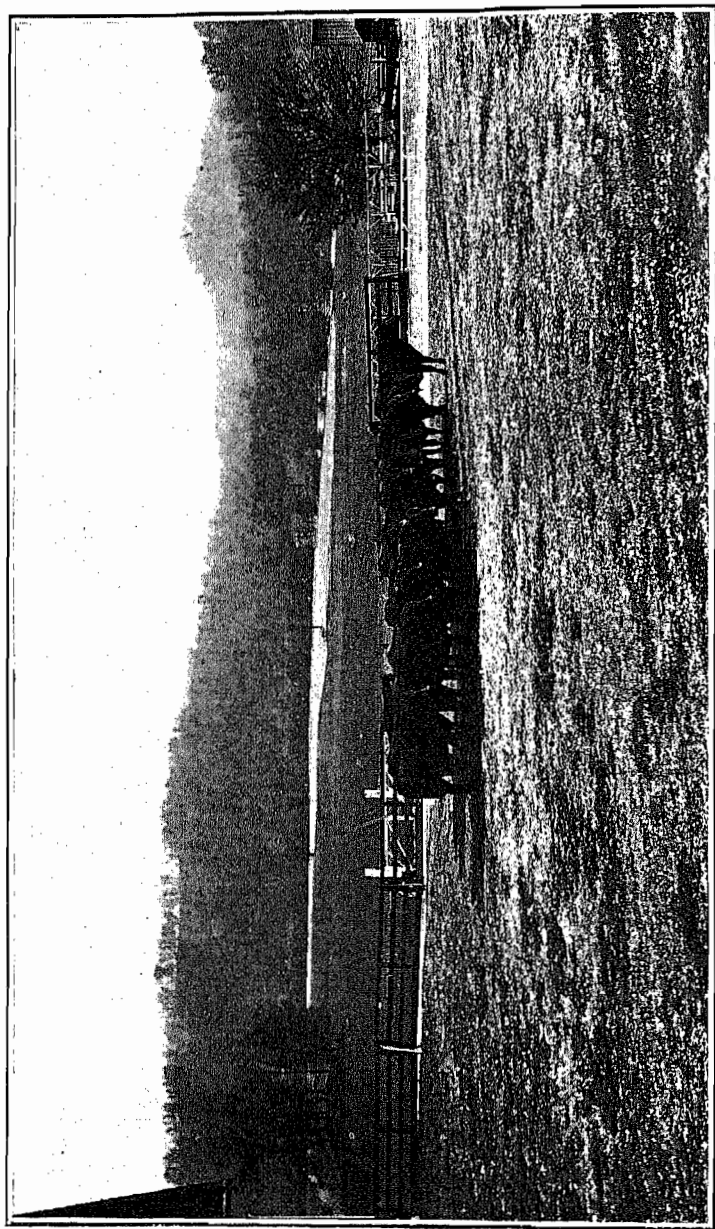
Sir:—I have the honor to submit herewith, on behalf of the Board of Trustees of the University of Tennessee, the reports of the various members of the staff of the Agricultural Experiment Station for the year 1904. This report is submitted in accordance with the requirements of the law that the Board having direction of the Experiment Station shall annually submit to the Governor of the State a report of its operations and expenses.

It is not possible for me to make the report as complete as it should be, from the fact that the office of the director of the Station has been vacant for some months. The new director, Professor H. A. Morgan, has held the position for so short a time that it is impossible for him to submit a proper report upon the work of the past year. We are glad to be able to report, however, that the Station is in excellent condition and that plans are now being matured for a large extension of its usefulness to the farmers of the State.

Very respectfully,

BROWN AYRES,

President.



GRADE POLLED ANGUS FEEDERS, WINTER OF 1904-05

INTRODUCTION

The operations of the Experiment Station for the major part of the year were directed by Professor Andrew M. Soule. The withdrawal of Professor Soule on September 1, 1904, and the simultaneous withdrawal of Professor John R. Fain, assistant agriculturist, and Mr. Phares O. Vanatter, in charge of the plat work, made necessary an immediate readjustment of the work of the Station so that its operations would not be seriously interfered with. The remaining members of the Station staff in the most loyal manner divided up the work among themselves, so that the operations of the Station were not interrupted. The fact that a change in the presidency of the University took place simultaneously with the withdrawal of the members of the Station staff, mentioned above, made unusual demands on the loyalty and ability of Professors Keffer, Mooers, and Barnes, especially. I desire in the fullest possible manner to acknowledge my obligations to these gentlemen for their cordial cooperation and helpfulness at that very trying time. Both in the Station work and in the work of agricultural instruction in the college, they assumed burdens which, at any other time, would have been entirely unreasonable. The conduct of the farm was devolved by me on Mr. S. E. Barnes, who has handled the work with conspicuous ability and success.

Naturally the most pressing question that confronted me on assuming my office at the University was the securing of a director of the Experiment Station. After prolonged correspondence with many of the best experts of the country, and personal interviews with the different men who had been suggested as suitable for the position, the Board of Trustees appointed as director of the Experiment Station, Prof. Harcourt A. Morgan, late professor of zoology and entomology at the Louisiana State University, secretary and expert of the Crop Pest Commission of Louisiana, and director of the Gulf Biologic Station in that State.

As stated in the letter of transmittal to the Governor, Professor Morgan's appointment has so recently taken place that it is impossible at this time to make a definite statement in regard to the lines of development and investigation along which he proposes to carry the work of the Station. His extended experience will, however, enable him very rapidly to take up the study of local conditions and to bring about the most excellent results.

Professor Soule did not draw up the report of the work done during the nine months that he was in charge. No one other than the director could probably make such report. The present publication, therefore, contains only the reports of the different members of the Station staff. From them a very good idea of the character of the work being done may be gathered.

BROWN AYRES,
President.

REPORT OF THE BOTANIST

The work of the botanist for the past year has been directed along several lines.

At the request of the committee in charge of the exhibit of American Agricultural Colleges and Experiment Stations at the St. Louis Exposition, the botanist spent some time early in the year in the preparation of an exhibit of his work on the effect of fungicides on foliage (Tenn. Sta. Bul. Vol. XV, No. 2). A new series of protomicrographs was made and drawings, specimens, and apparatus of special design were shown. For this exhibit a gold medal was awarded.

It is a matter of some regret that the repeated failure of the peach crop in this region has prevented the thorough testing on a practical basis of the efficiency of the method of spraying peaches outlined in the publication above referred to. It appears that the crop is destined to be a failure again this year. It is the purpose of this Département to carry out these field experiments as soon as conditions render them practicable.

Last spring the botanist was asked by the National Department of Agriculture to assist in the investigation of the Plant Breeding Laboratory of methods for avoiding injury to cotton by the boll weevil. The matter was brought before the Board of Trustees and arrangements were made by which the botanist is absent from the University from August 15 to December 1 each year during this investigation. Part of these experiments in the improvement of early varieties are being carried out in Fayette County, Tenn., and also at the Station farm here, and it is hoped that results of practical value to the cotton-growing section of Tennessee will be obtained, even though the boll weevil may never reach the latitude of Tennessee. The cotton experiments carried out by the botanist are supported by and under the auspices of the Department at Washington.

Mr. S. H. Essary (B. S., Univ. of Tenn., '97) was chosen assistant in botany, and assumed his duties on July 1, 1904. Mr. Essary is rendering very efficient service as assistant in conducting experiments and other work connected with the Station.

The services of an assistant make it possible for the botanist to take part in farmers' institutes without interfering with his regular class work in the University. Farmers' institutes were attended by the botanist this year in nearly every county in East Tennessee, held under the auspices of Hon. W. W. Ogilvie, State commissioner of agriculture.

Within the past two years the methods of spraying for the prevention of diseases and insect pests of fruits have thus been illustrated by popular lectures in most of the counties in the State.

In addition to the work on cotton for the Department of Agriculture, above mentioned, the botanist and assistant botanist will the coming year be engaged in two other lines of investigation. The first and most important is the cause of the failure of the clover crop in Tennessee. This difficulty has been increasing for some years past, until it is now perhaps the most serious problem confronting the farmers of Tennessee. Some data have already been gathered, and the investigation is to be industriously

prosecuted during the coming season. The other special subject of investigation is the direct effect of spraying on the yield of Irish potatoes.

In the investigation of the clover problem above mentioned, considerable traveling will be necessitated, and it is hoped that as liberal an allowance as practicable will be made in the next year's appropriations for carrying out this work.

Several pieces of apparatus of permanent value, such as microscopic accessories, etc., have been added to the equipment in the past year.

Respectfully submitted,

SAMUEL M. BAIN, *Botanist.*

REPORT OF THE CHEMIST

Since the last report the Chemical Department has continued much the same lines of work as indicated the year previous. The soils of the Highland Rim of Middle Tennessee have received special attention. In the fall of 1903 samples both of soil and of subsoil from different counties of this region were collected by the chemist while assisting at farmers' institutes conducted by the commissioner of agriculture, Mr. Ogilvie. At the same time samples from the much more fertile Central Basin country were taken as opportunity was afforded. The analyses of all these specimens have since been made and have added much to our knowledge of the particular plant-food requirements of the different type soils of Middle Tennessee. In some instances the results have been of striking importance. For example, in Giles County were found certain soils which proved to be, perhaps, the richest in the world, in phosphoric acid. They analyzed from $1\frac{1}{2}$ to $1\frac{3}{4}$ per cent of this important element and were equally well supplied with lime, which was in large part combined with the phosphoric acid in the form of tricalcium phosphate. Phosphatic fertilizer materials on such soils would undoubtedly be wasted, though nitrogenous and possibly potassic materials might give excellent returns. These soils probably originated in large part from the decomposition of phosphate rock. The upland soils of the "barrens" type, on the contrary, were found to be exceedingly deficient in phosphoric acid, so that regardless of the method of farming followed, the use of phosphate on these lands is undoubtedly a necessity in order to bring them up to anything like a fertile condition. Since something like one-fourth of the State is covered with soils of this class, and since phosphates can be used profitably on about three-fourths of the balance, the importance of a cheap supply of phosphoric acid is apparent, and the conclusion that as a business proposition the State of Tennessee should own extensive phosphate deposits is clearly indicated.

The majority of the soils of the Central Basin country examined were found to be well supplied with phosphoric acid. In places, however, this element seemed to be somewhat deficient—a conclusion which was found to be verified in field practice. The analyses help to clear up the apparently contradictory results obtained from the use of fertilizers in this section of the State. In many instances the farmers report that they have been unable to notice any effect from an application of the usual commercial mixtures, which always contain a large amount of phosphoric acid but only small

amounts of other elements. Other farmers report marked increases in the yields of wheat, etc., where fertilizers were used. This section of the State will require the work of a geologist, and a much more extended survey and collection of samples than has been possible up to the present time.

The chemist has not been able to make personal observations and to collect soil samples through West Tennessee. The soils of this section of the State undoubtedly deserve our next attention. Samples, however, from time to time have been analyzed from different counties, as they were sent in by farmers. The general conclusion from the analyses thus made, so far as the amounts of plant food are concerned, is that the upland soils of West Tennessee resemble those of East Tennessee; that is, they are deficient in phosphoric acid, nitrogen, and vegetable matter, but are not specially in need of potash. As a result of this laboratory work the present time would seem to be favorable for the conducting of cooperative experiments in order to make practical tests of the conclusions drawn, and to investigate the most practical and economical methods of building up the fertility of these lands. Sub-stations located on some of the poorest and most extensive soil types appear very desirable, for there the experiments would be always under our control and could be continued until results of permanent value were obtained.

Investigations in regard to the plant-food requirements of the different soils and the increase and maintenance of soil fertility have been found to meet with the hearty approval of the farmers of the State, as is made evident at farmers' institutes and also from correspondence.

The analytical work of the fertilizer inspection has been done by this Department for the last two years. Mr. H. H. Hampton, an alumnus of the University of Tennessee, did this work in a most creditable manner till July, 1904, when he resigned to take a graduate course at the University of Cincinnati. Another alumnus of the University of Tennessee, Mr. W. H. Brown, was chosen to fill his place, and he has taken a hearty interest in the work, which requires much analytical skill, and is necessarily somewhat monotonous in character. It was found necessary to divide Mr. Brown's time between the University and Station laboratories, so that the Station has not been able to profit from his work to the same extent as from Mr. Hampton's work the year before.

In addition to the soil and fertilizer work, numerous minerals, mineral waters, feeding stuffs, etc., have been received for examination. In some instances complete analyses have been made. The mineral waters which are received every year from different parts of the State are largely Epsom waters, frequently containing large amounts of both magnesium and calcium sulphates. Occasionally waters containing sulphureted hydrogen are sent in. Chalybeate waters are not uncommon, and one containing good amounts of both manganese and phosphoric acid was received. Frequently, however, the samples are found to be nothing more than ordinary hard waters, such as are characteristic of limestone countries the world over. The minerals received for examination are of the most varied characters, from simple limestones to copper and gold ores. More samples of clay are received than of any other substance, but only the simplest burn-

ing and fusion tests can be made. Work of this kind, while not strictly of station character, has been done year after year largely as an accommodation to those sending the samples. Up to the present time, however, it has not been at all burdensome.

Occasionally samples of feeding stuffs have been received which upon examination indicated that an inspection of concentrated feeds sold in the State would be highly desirable. Feeds have been examined which could not be other than unprofitable, and some which would be classed as fraudulent.

The following is a resume of the analytical work:

	No. of analyses
Soils	42
Fertilizers	218
Mineral waters	11
Miscellaneous feeds, etc.	10
Minerals	74

Respectfully submitted,

CHARLES A. MOOERS, *Chemist.*

REPORT OF THE DAIRYMAN

The Dairy Department of the Tennessee Experiment Station has just passed through a very successful year.

The experiment of replacing grain with alfalfa hay in a ration for dairy cows has been completed and the results have been published. This was a continuation of the series of experiments with feeding leguminous hay. Another experiment of this series, that of feeding soja bean hay, has been begun, but not finished.

The Experiment Station herd is about the same in number as has been previously reported, but is somewhat increased in efficiency. During the year there has been an average of 24 cows in milk. The average yield per cow was 6000 pounds of milk and 353 pounds of butter.

The total cost of feed during the year for the milking cows was \$1,060.00, making an average per cow of \$44.15. The herd is now composed of 30 mature cows, including 15 pure-bred Jerseys, 1 Holstein, and 14 grades of various kinds; 2 pure-bred Jersey bulls; 12 pure-bred Jersey heifers; and 2 small calves. The whole herd is now valued at about \$3,000.00. It is the intention to build up eventually to a pure-bred Jersey herd, and consequently all of the grade calves are sold for veal.

Respectfully submitted,

SAMUEL E. BARNES, *Dairyman.*

REPORT OF THE HORTICULTURIST

The growing season of 1904 was peculiarly unfavorable for vegetables and fruits, and the experiments of this Department were largely a failure in results, owing to late frosts and continued drought.

The freeze of April 20, coming when the peaches were the size of hazelnuts, completely destroyed what promised to be an exceptional crop.

The young growth of the grape, which was far enough advanced to show the fruit buds, was completely destroyed by the freeze. A second growth resulted in a partial crop, Lindley, Salem, Moore's Diamond, and Delaware yielding best, with Brighthon, Niagara, Agawam, Goethe, Concord, and Moore's Early following in the order named. Duchess, Elvira, and Brilliant yielded a very few bunches each. In all varieties except Diamond and Brighton the bunches were smaller and the berries more scattering than is usual on first growths. Lindley yielded three-fourths of a full crop; Delaware hardly more than half a crop. On most vines a majority of the new shoots bore no fruit. The second growth came so irregularly that it will be necessary to re-form many vines, especially among those trained to Munson, Kniffin, long-arm short-spur, and horizontal cordon systems.

A fertilizer experiment with strawberries in which 13 1-40 acre plats were used, with 12 different mixtures of fertilizers and an unfertilized (check) plat, gave only negative results. Experts and amateurs visiting the plats were alike unable to distinguish any difference between them. In foliage, yield, color, and firmness of fruit, no superiority was observed among the fertilized over the check plat. The conclusion reached was that the soil chosen for the experiment contained a full supply of plant food for strawberries. An adjacent field of the same character produced a good crop of sweet corn. Doubtless the very dry season contributed to the poor showing of the fertilized plats.

After the crop was gathered the entire bed was plowed, and the rows were reduced to single plants in width. Thorough tillage was given throughout the season, and during the last half of September all the weak plants were cut out of one half of each plat, the other half being left in matted rows. Observations will be continued through another season, and the experiment repeated in the light-colored shaly soil characteristic of much of the ridge land of Tennessee.

An experiment with fertilizers for Irish potatoes also suffered from the drought. For this experiment a sandy loam on the top of a high ridge was used. Early Triumph was the variety planted, second crop seed being used, cut to two eyes. The seed was planted March 4, 15 inches apart, in rows 3 feet apart. The plats were given uniform, thorough tillage, and were protected from the potato beetle by being sprayed with 4 ounces of Paris green and 3 pounds of lime to a barrel of water. The plats were sprayed twice and powdered with Paris green and slacked lime (one tablespoonful to the bushel) once; powder and spray being equally effective. In cultivating, the Hallock weeder was used until the plants were three inches high, and proved an effective implement. Thereafter the five-shovel and harrow-tooth cultivators were used, level culture being given. Dry weather checked the growth seriously in May. The crop was dug June 8-15. Without going into details, it may be said the best crop (55 bushels per acre of salable tubers) was secured from Plat 2, to which had been applied 600 pounds of cotton-seed meal, 600 pounds of acid phosphate, and 250 pounds of muriate of potash per acre. The first tubers sold at \$2.00 per bushel, wholesale, in the local market, and the least price obtained was \$1.50 per bushel. At the latter rate the value of the first crop was \$82.50 per acre.

Deducting the cost of fertilizers applied (\$20.10 per acre) gives a net income of \$62.40 per acre. The unfertilized plat yielded 3 1-3 bushels per acre, or less than the amount of seed planted.

For the second crop, salable tubers of the first crop were spread in the sun for a week after digging, but were covered with burlap the hottest part of the day. They were very slightly wilted when cut into four pieces, lengthwise, sprinkled with slacked lime, and planted without additional fertilizer in the same rows as the first crop, June 23. The ground was very dry when the second crop was planted, and the seed was covered 5 inches deep. Extra cultivation was given, but the drought caused slow and irregular sprouting, and the crop was very poor. The potatoes were dug October 10, the best yield being 49 bushels per acre. It should be remembered that the first crop was dug long before the tubers were mature, so that the second crop, of ripened tubers, was comparatively smaller than the figures indicate.

The second crop sold for 60 cents per bushel, wholesale. The most profitable plat was that noted for the first crop, its entire crop selling for \$107.25 per acre.

The dry season demonstrated the inefficiency of tobacco dust as a remedy for woolly aphis. For the past three years the apple trees in the experiment orchard have been treated to a heavy coating of tobacco dust on their main roots. The soil was removed for a distance of two to three feet from the base of the trunk, exposing the principal roots. Over these an inch of tobacco dust was spread, requiring from three to five pounds per tree. The soil was then replaced. Practically no injury has been found from woolly aphis during years of average rainfall. But the past season was unusually dry, the rainfall for the year being 12 inches below normal. Under these conditions tobacco has proved ineffective and our trees have become infested with this serious pest. The Station has heretofore reported favorably on this remedy for woolly aphis. It is still believed to be helpful, but it is not a specific.

The experiment orchard is in fine condition, and all varieties of fruit give promise at this date (December) of a good crop.

Respectfully submitted,

CHARLES A. KEFFER, *Horticulturist*

REPORT OF THE LIBRARIAN

The duties of the librarian have continued to be somewhat varied, including, besides the care of the library, general office work and photography.

There have been added to the library during the year, 175 bound volumes, making the total number now on the shelves 2,675. The accessions have been from the following sources: 46 volumes of periodicals obtained by subscription and exchange, and 26 volumes of *Comptes Rendus* purchased in bulk, were bound by the Station; 61 volumes were received from the U. S. Department of Agriculture, state experiment stations, and various scientific institutions; 11 were purchased; and 31 were donated. These

last came from Dr. Dabney and from the estate of Col. Perez Dickinson. There are 26 additional volumes of *Comptes Rendus* to be bound, besides the current volumes of periodicals subscribed for.

Several hundred pamphlets from institutions in this country and abroad have been received and placed on file. Fifteen journals, chiefly technical, are subscribed for, and a large and increasing number of agricultural papers are sent to the Station in exchange for bulletins. These papers are accessible to all persons interested in them, and are of special value to students of agriculture in the University.

About 250 pictures were taken during the year for use in illustrating our own publications and articles relative to the work of the Station that appear from time to time in agricultural papers. Considerable time was spent during the early part of the year in the preparation of photographs for the St. Louis Exposition. About 185 bromide enlargements were made for the Experiment Station exhibit and 90 5 x 7 prints for the exhibit of the University.

The revision of the mailing list has been completed. Last year cards were mailed with bulletins, containing blanks for name, postoffice, rural route, and county, to be filled out and returned by persons wishing to receive future publications. A second card has since been sent out for the benefit of those who may have overlooked the first, and the new list has been made up from all the cards returned. It is to be regretted that more than 4,000 persons to whom cards were sent, failed to return them, so that their names have had to be dropped from the list. Bulletins are now distributed as follows:

MAILING LIST

U. S. Dept. of Agr., Agr'l Colleges and Experiment Stations.....	1,195
Newspapers in Tennessee	197
Exchanges	186
Farmers, Gardeners, and Fruit Growers in Tennessee	4,743
Individuals in Other States.....	377
Foreign, Other than Exchanges.....	44
Total	6,742

Respectfully submitted,

FREDERICK H. BROOME, *Librarian.*

BULLETINS ISSUED BY THE EXPERIMENT STATION, 1888-1904

Star (*) indicates that bulletin is available.

1888. Vol. I, No. 1. Dehorning Cattle. History and Reorganization.
 No. 2. The Experiment Station: Building and Laboratories. Germination of Seed Corn. Analyses of Commercial Fertilizers.*
 No. 3. Weeds of the Farm.*
1889. Vol. II, No. 1. Notes on Fertilizers and Fertilizing Materials.*
 No. 2. Diseases of the Irish Potato.
 No. 3. Cotton-seed Hulls and Meal as Food for Live Stock.
 No. 4. Grasses of Mountain Meadows and Deer Parks. Chemical Composition and Tests of Varieties of Strawberries.*
1890. Vol. III, No. 1. Experiments in Growing Potatoes.
 No. 2. Field Experiments with Barley, Corn, Oats, Wheat, Sorghum, and Clover.
 No. 3. Points about Country Roads.
 No. 4. Practical Experiments in Reclaiming "Galled" or Washed Lands, with Notes on Mulch and Mulch Materials.
 No. 5. Fruit Trees at the Experiment Station.
 No. 6. Index to Volumes I, II, and III.*
1891. Vol. IV, No. 1. Crab-grass Hay. Sorghum as a Forage Plant. Test of Feed Value of First and Second Crops of Clover. Pasture Grasses. Black Knot of the Plum and Cherry. Pruning Fruit Trees. The Glassy-winged Soldier Bug. Diseases of Live Stock. Experiment Station Record.
 No. 2. The Peanut Crop of Tennessee: Statistics, Culture, and Chemistry.
 No. 3. The True Bugs, or Heteroptera, of Tennessee.*
 No. 4. Some Fungous Diseases of the Grape.*
 No. 5. A Chemical Study of the Cotton Plant.*
1892. Vol. V, No. 1. Fruit Trees and Experiments with Vegetables.*
 No. 2. Grasses of Tennessee.—Part I.
 No. 3. A Contribution to the Study of Economics of Milk Production.
 No. 4. Experiments with Fruit Trees and Vegetables.*
1893. Vol. VI, No. 1. Some Injurious Insects of the Apple.
 No. 2. The Rational Use of Feeding Stuffs. Winter Dairying in Tennessee.
 No. 3. Small Fruits: Strawberries, Raspberries, Blackberries, Grapes.
 No. 4. Field Experiments with Tomatoes and Onions.
1894. Vol. VII, No. 1. Grasses of Tennessee.—Part II.
 No. 2. Fruits: Grapes, Strawberries, Raspberries, Blackberries, Pears, Apples, and Peaches.
 No. 3. Cooperative Experimentation.
 No. 4. Dehorning Cattle. Notes to Correspondents.
1895. Vol. VIII, No. 1. Spraying Apparatus. Insecticides. Fungicides. Spraying Calendar.
 No. 2. The Wild Onion.
 No. 3. Some Experiments with Fungicides on Peach Foliage.
 No. 4. The Chinch Bug.
1896. Vol. IX, No. 1. Apples of Tennessee Origin.
 No. 2. Strawberries.
 No. 3. A Contribution to the Study of Southern Feeding Stuffs.
 No. 4. Varieties of Grapes.
1897. Vol. X, No. 1. Apples of Tennessee Origin (Second Report).
 No. 2. Pot Culture of Lettuce.*
 No. 3. The Soils of Tennessee.*
 No. 4. Scale Insects: San Jose and Other Species.*
1898. Vol. XI, No. 1. Persimmons.
 No. 2. Grasses and Forage Plants: I. Domesticated Grasses.*
 No. 3. Grasses and Forage Plants: II. Leguminous Plants.*
 No. 4. Grasses and Forage Plants: III. Meadows and Wild Pastures.*

1899. Vol. XII, No. 1. Stock Interests.*
 No. 2. Soil and Fertilizers.*
 No. 3. Horticultural Work.*
 No. 4. Forage.*
1900. Vol. XIII, No. 1. Frost Protection. Climate of Tennessee.
 No. 2. Experiments with Winter Wheat.
 No. 3. Fertilizer Experiments on Potatoes, Corn, Cowpeas, Peanuts.*
 No. 4. Feeding Native Steers.
1901. Vol. XIV, No. 1. Experiments with Corn, Forage Crops and Spring Cereals.
 No. 2. Winter Wheat.
 No. 3. Winter Cereals and Legumes.*
 No. 4. The Early Growth and Training of Apple Trees.
1902. Vol. XV, No. 1. The Value of Corn, Skim Milk and Whey for Fattening Swine.*
 No. 2. The Action of Copper on Leaves.*
 No. 3. Feeding Native Steers.
 No. 4. The Relative Values of Protein in Cotton-seed Meal, Cowpea Hay and Wheat Bran.*
1903. Vol. XVI, No. 1. Fertilizer Experiments.*
 No. 2. San Jose Scale.*
 No. 3. Corn, Wheat and Soy Bean Meal with Skim Milk for Pork Production.*
 No. 4. Influence of Climate and Soil on the Composition and Milling Qualities of Winter Wheat.*
1904. Vol. XVII, No. 1. Crops for the Silo.*
 No. 2. Increasing the Yield of Corn. *
 No. 3. Training and Pruning Fruit Trees and Vines.*
 No. 4. Replacing Grain with Alfalfa in a Ration for Dairy Cows.*

Special Bulletins

1889. A. The Army Worm: How to Prevent Its Ravages on Cotton.
 B. Analyses of Commercial Fertilizers.
1890. C. Treatment of Certain Fungous Diseases of Plants.*
 D. Potash and Paying Crops.
 E. The Cotton Worm. The Hessian Fly.*

Press Bulletins

1899. No. 1. Value of Leguminous Plants.
 No. 2. Home-made Fertilizers.
 No. 3. Farmers' Institutes.
 No. 4. How the Experiment Station Can Help the Farmers.
 No. 5. The East Tennessee Farmers' Convention and Farmers' Institute.
 No. 6. Sheep Husbandry.
 No. 7. The Saving of Soil Moisture.
 No. 8. Farmers' Institute to be Held at Boons Creek, Washington County, Tenn.
 No. 9. Liming Soils.
 No. 10. Farmers' Institute to be Held at Rogersville, Hawkins County, Tenn.
 No. 11. The Fertilizer Question.*
 No. 12. Cowpea Vine Hay.*
 No. 13. A Short Course in Agriculture.
1900. No. 14. Grades on Country Roads.*
 No. 15. Calf Feeding.*
 No. 16. Live Stock Problems.
 No. 17. Winter Gardening. Winter Violets.*
 No. 18. Advantages of Dairying.
 No. 19. Formulas for Spraying Mixtures.*

TREASURER'S REPORT

JULY 1, 1903, TO JUNE 30, 1904

The Agricultural Experiment Station of the University of Tennessee

IN ACCOUNT WITH THE UNITED STATES

	Dr.	Cr.
To unexpended balance on hand July 1, 1903.....	\$ 18.34	
To United States Treasury Draft July, 6, 1903.....	3,750.00	
" " " " October 5, 1903....	3,750.00	
" " " " January 7, 1904....	3,750.00	
" " " " April 10, 1904.....	3,750.00	
By Salaries		\$ 8,313.34
Labor		2,613.90
Publications		981.69
Postage and Stationery.....		262.51
Freight and Express		48.39
Heat, Light and Water.....		309.85
Chemical Supplies		213.40
Seeds, Plants and Sundry Supplies.....		369.48
Fertilizers		160.55
Feeding Stuffs		99.60
Library		230.72
Tools, Implements and Machinery.....		221.55
Furniture and Fixtures		26.25
Scientific Apparatus		184.99
Traveling Expenses		183.34
Contingent Expenses		66.93
Building and Repairs		713.42
Balance		18.34
Totals	\$15,018.34	\$15,018.34

This is to certify, that, as the authorized Auditing Committee of the Board of Trustees of the University of Tennessee, we have examined the accounts of the Treasurer of the Agricultural Experiment Station for the fiscal year ending June 30, 1904, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show no more than \$713.42 was expended for building and repairs, and that there is \$18.34 cash balance.

C. DEADERICK,
WM. RULE,
Auditing Committee.

We hereby certify that C. Deaderick and Wm. Rule are the authorized Auditing Committee of the Board of Trustees of the University of Tennessee.

BROWN AYRES, *President.*
WM. RULE, *Secretary.*

STATE OF TENNESSEE, COUNTY OF KNOX:

Before me, Thos. D. Morris, a Notary Public in and for said State and County, personally appeared the foregoing signers, personally known to me to be trustees and officers of the University of Tennessee, who made oath, in due form of law, that the above statements are true to the best of their knowledge, information and belief.

Witness my hand and official seal at office in Knoxville, Tennessee,
this 9th day of December, 1904.

THOS. D. MORRIS,
Notary Public.