

FOURTH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATION

OF THE

UNIVERSITY OF TENNESSEE

TO THE GOVERNOR

1891.

KNOXVILLE, TENNESSEE.

1892.

KNOXVILLE, TENN., Jan. 4th, 1892.

To His Excellency, JOHN P. BUCHANAN,

Governor of Tennessee :

SIR :—We have the honor to submit herewith the Fourth Annual Report of the Agricultural Experiment Station of the University of Tennessee. This Report is made in accordance with the Act of Congress, approved March 3d, 1887, commonly known as the "Hatch Experiment Act," and the Act of the General Assembly of Tennessee, approved March 28th, 1887. Section 5 of the first mentioned Act contains the following: "It shall be the duty of each of said Stations, annually, on or before the first day of February, to make to the Governor of the State or Territory in which it is located, a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said Stations, to the Secretary of Agriculture and to the Secretary of the Treasury of the United States."

Hoping that the report will prove satisfactory to your Excellency, we remain, with great respect,

Your obedient servants,

O. P. TEMPLE, *Chairman of Board of Control.*

CHAS. W. DABNEY, JR., *President.*

J. W. GAUT, *Secretary of the Board of Trustees of the University of Tennessee.*

REPORT OF THE DIRECTOR.

To the Honorable the Board of Control of the Agricultural Experiment Station, and the Board of Trustees of the University of Tennessee :

GENTLEMEN:—I have the honor to present herewith, in compliance with the law establishing the Agricultural Experiment Station, the fourth annual report of its operations in detail, for the calendar year ending December 31, 1891, together with the Treasurer's report for the fiscal year ending June 30, 1891.

The working divisions of the Station are the same as reported last year, with the exception of the Entomological Division, which has been given up, entomological questions now being referred to the Assistant Director or to the Botanist.

The present staff of the Station is as follows :

F. Lamson-Scribner, *Director and Botanist.*

Chas. F. Vanderford, *Assistant Director.*

Chas. W. Dabney, Jr., *Chemist.*

J. Bolton McBryde, *Assistant Chemist.*

Paul F. Kefauver, *Agriculturist.*

R. L. Watts, *Horticulturist.*

E. E. Morris, *Librarian and Clerk to Director.*

Mr. R. J. Cummings, Superintendent of the Farm, resigned the first of October, and his duties were transferred to Mr. Kefauver. On the first of September, Prof Chas. F. Vanderford, professor of agriculture in the University, was made assistant director of the Station, and he was assigned the general management of the College Farm.

The assistant chemist, who has charge of the practical work in the chemical laboratory, resigned early in the season, but was reappointed the first of December; in the meantime his duties were satisfactorily performed by Mr. C. C. Moore, Jr., a recent graduate of the University in the chemical course.

On the first day of October, the then existing arrangement between the Experiment Station and the College Farm, as published in full in our last annual report, was slightly changed. At present everything connected with the Farm is under the immediate control of the Director or Assistant Director of the Station, and all the ordinary proceeds from the farm and from the horticultural department are credited to a separate Station fund, to be appropriated as other funds, for maintaining the farm and the horticultural department, each distinct, the Station guaranteeing the University, from these two sources, eleven hundred dollars.

An inventory of the property on hand at the Farm, October first, showed as follows:

Cattle, 42 head, valued at.....	\$2,915 00	
Work stock, horses and mares (6).....	615 00	
Berkshire boar (cost and supposed to be worth).....	30 00	
Total live stock.....		\$2,840 00
Farm machinery and implements.....	\$930 60	
Fixtures.....	12 00	
Supplies (ensilage, hay, corn, etc.).....	690 00	
Dairy utensils (belonging to Station).....	103 57	
		\$1,736 17
		\$4,576 17

The authority of the Station extends over 100 acres of the College farm, being that part lying south of the Kingston road, and upon which are located the farm buildings and dairy.

The work of the several divisions has been pushed forward with energy, and we believe as much has been accomplished in each as the circumstances would permit.

CHEMICAL DIVISION.

In the early part of the season, a considerable number of grasses and other forage plants growing in the experimental gardens were analyzed, with a view of using the data ascertained when an account should be published of these plants.

A geological and chemical study of the typical virgin soils of East Tennessee and the Cumberland Plateau was commenced during the summer, and is rapidly approaching completion. Mr. S. M. McCallie, Instructor in Geology in the University, was engaged to take the samples and make the geological observations. Mr. C. C. Moore, Jr., made a number of soil analyses, and the remainder will be completed at an early date by Mr. McBryde. This paper will be of permanent value.

In accordance with an Act of the last General Assembly of Tennessee, the Station has made the analyses of commercial fertilizers for the Commissioner of Agriculture of Tennessee during this year. The Station was paid for this work by the piece, it being now thoroughly understood in this State that these analyses for the State inspection are no part of the regular official work of the Agricultural Experiment Station under the Hatch Act. This work has taken considerable time, and the calls for analyses have several times obliged us to stop or set aside regular investigations; but we believe, all things considered, that it is best that these fertilizer analyses should be made here.

Other work of this division will be noted under "Bulletins."

DIVISION OF FIELD AND FEEDING EXPERIMENTS.

As the entire management of the farm is practically conducted by this division, the amount of purely experimental work which it is enabled to perform affords us only a limited idea of the total amount of the work done. So far as it is possible to do so, we shall, while the existing arrangements continue, endeavor to turn the ordinary farm operations to some account as experiments. When the work is carefully done, and pains taken with all details it is often possible to do this, and much more can be learned than one would at first suppose.

Early in the Spring, plans were laid for testing grasses and other forage plants on quite a large scale, but the condition of the soil, the very unfavorable weather conditions, and insufficient help, prevented these experiments, honestly begun, from developing properly, and they were finally abandoned.

These grass experiments have been again undertaken upon a different plan. A strip of land 365 feet long by 59 feet wide has been selected and fairly well prepared for the experiments in grass culture. On this area, plots of one square rod have been staked off, and some of these have already been planted with roots of the varieties to be tested or sown with seed. The long period of Autumn drought prevented further work of this kind, but all the plots will be occupied at the proper time in the Spring. We hope to illustrate here the growth of grasses in pure culture, their behavior under different fertilizers, their power to withstand heat or drought, and their duration.

A feeding experiment now in progress, is being made to determine the comparative value of corn and oatmeal with cotton seed meal and bran for the production of milk. The details of these operations, and the results obtained, will be published in due season.

DIVISION OF BOTANY AND HORTICULTURE.

Much work has been done in this Division in systematic botany, and considerable material prepared for future investigations. In connection with the gathering of soil samples by the chemical division, the plants representing the flora where these samples were taken were also collected. Some important additions have been made to the herbarium, more especially among the lower plants. As complete a set as it was possible for us to obtain of Ellis's North American Fungi has been secured, and properly arranged in the herbarium. The mycological collections of Earle and Seymour make another valuable addition to our plant collections. Some time has been spent in completing a bulletin on the more important grasses of the State, the publication of which has been delayed for various reasons, but will be issued early the coming year.

The grass plots at the Station have been kept up. In October the seeds of twenty-five species of native grasses, chiefly Northwestern, were received from the Central Experiment Farm at Ottawa, Canada. These were at once sown, nearly all germinated, and are now doing well. *Bromus Pumpellianus*, *Agropyrum tenerum*, and *Poa Nevadensis* are making the most vigorous growth.

A photographic outfit for general purposes, and for photomicrography, has been purchased for this division, with a view of enabling it to freely and accurately illustrate the subjects investigated.

Early in the year, the testing of the seeds of vegetables designed for the Station garden was made by the Horticulturist. Variety-testing of vegetables formed an important feature of his work, two hundred and ten varieties of various sorts being tried. Full and complete notes were made upon all important points connected with these, an account of which will appear in the January Bulletin for 1892. An acre of early cabbage was successfully grown for market, and forcing experiments with lettuce were also made. About twenty varieties of apples have been added to our previous list, and during April forty varieties were grafted on native stock growing in Morgan County on the Cumberland Plateau.

An experimental vineyard has been established, in which there are three hundred and eighty-nine vines, including eighty-two varieties. The objects here in view are to determine the varieties best adapted to our soil and climate, the merits of fall compared with spring planting, to illustrate different methods of pruning and training, to make a com-

parative test of northern and southern stock, and to study means for combating the various insect and fungus foes that attack the vine. The adornment of the Station grounds has received some attention; 1,600 hardy plants and shrubs have been planted about the Station building. A horticultural herbarium has been started, the specimens being collected from plants on the campus, in the greenhouse and vegetable garden. This we deem an important work, as it affords a means of illustrating the most valuable flowers and vegetables now in cultivation, and it may be of service in studying the variations in plant growth which are constantly occurring.

A number of important improvements have been made in the greenhouse, chief of which is the replacement of the old furnace by a new Hitchings hot water boiler. This enables us to secure a more uniform temperature, which is of the greatest importance in investigating plant growth. Tomatoes are now being forced in the greenhouse under different methods of culture, training, etc. Plans have also been perfected for testing special commercial fertilizers upon plants—tomatoes and potatoes—in Wagner pots, where the food supplied and other conditions of growth are practically under control.

BULLETINS.

Five Bulletins, forming Volume IV, have been published during the year, covering 145 pages, illustrated by six full-page plates and twenty-six figures scattered through the text. The contents of these Bulletins are as follows:—

- NO. 1. CRAB-GRASS HAY, SORGHUM AS A FORAGE PLANT, Test of Feed Value of First and Second Crop 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, by L. P. Brown, formerly Acting Chemist. This Bulletin presents a thorough discussion of this crop, the territory where grown, the soils, and the amount and value of the crop, with a description of the plant, its varieties, method of cultivation, harvesting, and a complete chemical analysis of all its parts.
- NO. 3. THE TRUE BUGS, OR HETEROPTERA, OF TENNESSEE, by H. E. Summers, former Entomologist of the Station. In this Bulletin are given keys and descriptions of our true bugs, enabling one to identify the majority of the species of this group which are of economic importance or likely to attract attention. The Bulletin closes with a brief chapter on remedies.

- No. 4. SOME FUNGOUS DISEASES OF THE GRAPE, by F. Lamson-Scribner. The principal fungous pests which are destructive to the grape in this State are described and figured. Formulas for the preparation of materials for combating these fungi, and exact method of treatment, are given.
- No. 5. A CHEMICAL STUDY OF THE COTTON PLANT, by J. Bolton McBryde, Assistant Chemist. This contains chemical analyses of the different parts of the cotton plant, determinations of the proportion of each of these parts, calculations of the fertilizing constituents contained in the average crop, analyses of cotton seed and its products, and a discussion of the proper fertilizers for cotton and the feeding value of the various parts of the plant.

We have now in hand a detailed and illustrated report of the operations of the Horticulturist upon his work in the orchard, vegetable testing, etc. This will be published as Bulletin No. 1, of Volume V.

OUTSIDE WORK.

With a view of securing a closer relation with the farmers of the State, and gaining a personal acquaintance with their circumstances and needs, we have, so far as possible, sent representatives from the Station force to Farmers' Institute meetings. Through the active efforts of the Station a Horticultural Society has been organized, known now as the East Tennessee Horticultural Society, the first meeting being held at Harri-man, November 11th and 12th. It is hoped that in the near future a State Horticultural Society may be formed, having subordinate organizations in every county.

This summary of the work of the Station for the year 1891 is respectfully submitted for your approval.

[Signed.]

F. LAMSON-SCRIBNER,
Director.

REPORT OF THE TREASURER.

The Agricultural Experiment Station of the University of
Tennessee, in account with the United States.

<i>Dr.</i>	<i>Cr.</i>
1890 and 1891—from July	Salaries \$ 7,219 86
1st to June 30th.	Heat, Light and Water 679 41
To United States Treas-	Traveling Expenses 183 49
ury drafts for the fiscal	Publishing and Printing 762 90
year ending June 30th. \$15,000 00	Apparatus and Supplies 393 19
	Library account 220 84
	Stationery and Postage 52 29
	Contingent account 333 77
	Labor account 2,124 43
	Farm account 1,513 09
	Entomological Division 511 53
	Chemical Division 175 20
	Janitor account 80 00
	Building account 750 00
\$15,000 00	Total \$15,000 00

[Signed.]

JAMES COMFORT,
Treasurer.

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 30th, 1891, and find them correct, and that the above is a true balance sheet corresponding with said accounts.

(Signed): J. W. GAUT,
S. B. LUTTRELL,
F. A. R. SCOTT.

[SEAL.]

We hereby certify that Messrs. J. W. Gaut, S. B. Luttrell and F. A. R. Scott are the authorized Auditing Committee of this Board of Trustees.

(Signed): CHAS. W. DABNEY, Jr., *President.*

J. W. GAUT, *Secretary.*

Subscribed and sworn to before me this December 22d, 1891.

[SEAL.]

(Signed): L. H. SPILMAN, *Notary Public.*