BULLETIN

OF THE

AGRICULTURAL EXPERIMENT STATION,

OF THE

UNIVERSITY OF TENNESSEE,

STATE AGRICULTURAL AND MECHANICAL COLLEGE.

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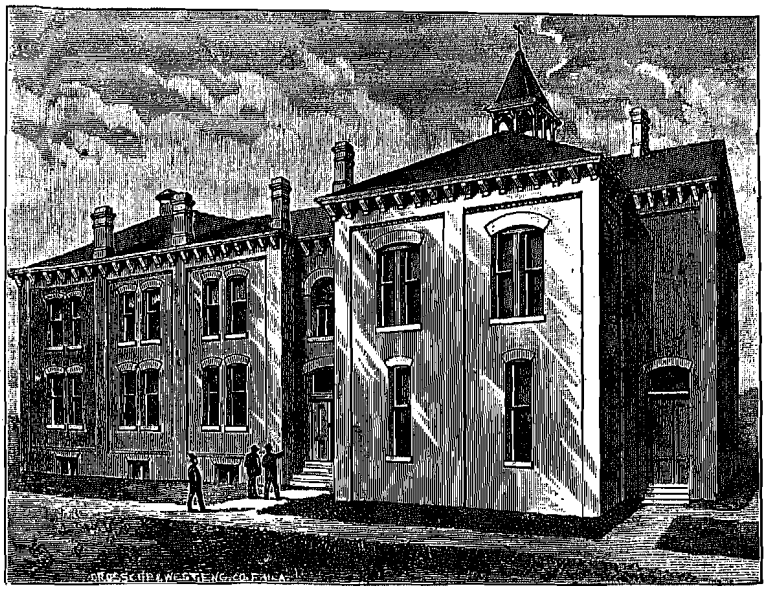
KNOXVILLE, TENNESSEE,
U. S. A.



NEW EXPERIMENT STATION BUILDING.

I.—THE EXPERIMENT STATION, BUILDING AND LABORATORIES.

BY THE DIRECTOR.

The past quarter has been occupied in making everything ready for the Station. The delay in the payment of the appropriation rendered it impossible to begin the building until the spring opened, but the work commenced on the first of March and has been pushed vigorously.

The announcement of officers elected indicates the lines of work which are to be taken up. The officers selected, besides the Director and Assistant Director, who is in charge of the field and feeding experiments, are: an agricultural and physiological chemist; a botanist who is a special expert in grasses, forage plants and the fungus diseases of fruits and plants generally; a biologist, who is a specialist in entomology and veterinary science and a general assistant in field work.

The Station already had the use of an excellent farm, (which is well provided with the ordinary appliances, buildings, etc.), but there were no suitable laboratories or apartments for library or offices. These had to be provided and equipped first of all.

The three thousand dollars out of the first year's appropriation for the Station, which was allowed to be used for this purpose,

was insufficient to provide a building to contain the needed laboratories. But the Board determined to put the Station immediately upon a broad foundation, and at some considerable sacrifice of other interests set apart ample additional funds for this purpose.

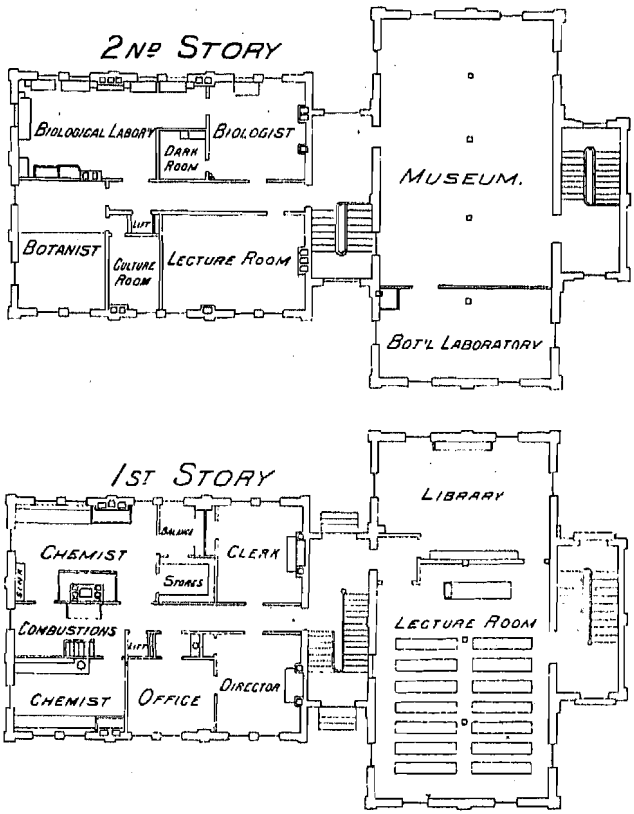
A building for the Agricultural Department of the University had been started some years since; but never entirely finished and not furnished at all. The walls, roof and wood-work were completed when the work on it stopped. It was determined to build a wing to this considerably larger than the original structure, and to complete and furnish the whole for the accommodation of both the Experiment Station and the Agricultural Department. The original building which forms the north end of the completed new building (see the engraving) was thirty by sixty feet, with a hall and staircase addition, and two stories high. The addition is sixty-two by fifty feet, with an entrance and staircase hall connecting it with the older building, two stories high, over a large, well-lighted and dry basement, which is really equal to another story. The walls are brick, the roof of slate and interior finish is in natural woods. The completed building will be a harmonious whole. Exterior decoration has been less considered; solidity, adaptation to the ends in view, perfect lighting, ventilation and warming were provided first. No more was expended in the structure proper than was necessary for permanence, solidity and a neat exterior; and all the spare funds were expended in the outfit and apparatus. In addition to the usual flues in the walls, the chemical and other laboratories are thoroughly ventilated through a stack constructed for this purpose. This stack is built after the well-known and admirable plan of Prof. Charles E. Wait, now of the University of Tennessee, and used by him first in the beautiful laboratory of the School of Mines of the University of Missouri. Connected with this stack are open and closed hoods, somewhat after Prof. Wait's plan * also. We consider these hoods in connection with this stack, a perfect solution of this difficult problem in chemical laboratory construction.

We can only mention some of the other features of this building. The balances will stand upon an independent brick pier. There will be an elevator for boxes and a drop for rubbish. The building will be completely equipped with gas, water, electrical and steam-heating apparatus.

The floor plans show the location and arrangements of the apartments. The chemist has two laboratories, perfectly furnished and equipped with the most approved desks, hoods, water, gas,

*For a detailed description of these hoods and the ventilating stack, reference is had to Prof. Wait's pamphlet on the subject and his paper in the proceedings of the American Institution of Mining Engineers.

steam and other apparatus, a combustion room, and a chemical store-room, besides a work-shop and store-room in the basement. There is a boiler-room, janitor's room and fuel room in the basement also. There are a couple of offices for the Director and the Assistant Director and a large office for the clerk, all on the first floor. A large assembly or lecture room is provided on this floor for meeting of farmers. Already two farmers' institutes have met here. A library and reading room completes this floor.



FLOOR PLANS OF EXPERIMENT STATION BUILDING.

On the second floor are the offices and laboratory of the Botanist, the office and laboratory of the Biologist, a large Museum Hall for these departments and that of Agriculture and a room for germ cultures. The apparatus for the chemical lab-

oratory was selected by our Chemist in person in Germany. A complete outfit of Zeiss, Leitz and other microscopes has been provided for the Botanical and Biological laboratories. The culture room is to have a fire-proof interior and fire-proof furniture so that it can be perfectly sterilized by fire, whenever desirable.

The corner-stone of this building was laid by the President and officers of the Tennessee Farmers' Association early in May. The building proper is nearly completed at this writing, and the apparatus and furniture will all be in place by the first of September.

II.—GERMINATION OF SEED CORN.

By C. S. PLUMB.

On December 1, 1887, circulars were sent to such farmers in Tennessee as addresses could be obtained of, requesting them to favor the University as follows: to send central sections, about an inch in length, from about five ears of corn, such as would be used for seed the next year, either from crib, field, or wherever the seed corn might be stored. Particulars were also requested concerning the location of the corn-field, soil upon which grown, method of harvesting, preservation, etc.

The plan was to secure seed from as many persons as possible, and germinate. Every year many acres of corn have to be replanted, owing to improper methods of preserving seed. It was thought that by securing seed from various parties and germinating, we could get a fair general idea, from information furnished, of the best practical plan in use of keeping corn over winter for spring planting.

Seed was received from sixteen different counties and seventeen persons. Below is given the names of the parties sending us seed, with abstracts from their letters:

(*a.*) *Blankenship, D. E., Bradley county.* Grown on stiff, black bottom land. Was left in crib with shuck on.

(*b.*) *Bryan, L. C., Grainger county.* Planted late in season, owing to heavy rains. Drought occurred during roasting ear season, preventing proper maturity. Grown on creek bottom land, of a light sandy nature. Gathered as soon as the milk left the cob, and husked immediately. Never let ears stand in bulk unhusked over twenty-four hours in the field. While husking

select largest rough ears, and place in a building adjoining crib, and keep as dry as possible till planting time. Has kept his seed corn several years this way, and has supplied neighbors with seed, which has germinated most satisfactorily.

(*c.*) *Buckley, N. T., Chester county.* Grown on black sandy loam, quick and free in productive properties. Gathered from field in October when dry, and stored in house at that time. Has been well protected from weather ever since.

(*d.*) *Chesnutt, W. S., McMinn county.* Grown on upland, cleared six years. Gathered when fully dry and housed in the shuck. Finds corn keeps best in shuck, if gathered and cribbed dry.

(*e.*) *Cooper, M. L., Campbell county.* Grown on moderately dry, rich upland. Picked while husking, and stored in an upper room, in a heap on the floor.

(*f.*) *Gushee, H. H., Cumberland county.* Ears Nos. 1, 2, 3 and 4 cured in the crib or under cover, after taking from the shock. Nos. 5 and 6 left in the field to cure.

(*g.*) *Harwell, Dr. T. B., Giles county.* Grown on bottom land, gathered during dry weather and housed at once.

(*h.*) *Jackson, A. M., Scott county.* Grown on high clay. Gathered and stored first part of September. Husked and hung in dry shed.

(*i.*) *Link, E., Greene county.* Grown on upland, mulatto soil. Has selected corn for over thirty years, both in fall and at planting time. Keeps seed in high, airy place in crib.

(*j.*) *Reaves, S. J., Hickman county.* Grown on upland. Season dry. Harvested in October, placed in crib with shuck on and kept dry.

(*k.*) *Roberson, J. M., Bledsoe county.* Grown on upland. Cut 20th September. Kept in crib without husk.

(*l.*) *Stokely, David, Cocke county.* Grown on a valley limestone soil. Gathered October 1, and was tolerably dry. Put it up in the shuck in a latticed crib, where it was kept dry.

(*m*). *Williams, G. W., Monroe county.* Grown on level upland. Gathered November 1. Gathered when dry. Put up in shuck in log crib.

(*n.*) *Witt, J. N., James county.* Grown on upland. Harvested last of October, when thoroughly dry, and placed in crib husk and all.

(*o.*) *University Farm, Knox county.* Grown on river bottom alluvial. Allowed to dry on stalk, in husk, in the field. Taken to barn, husked and placed in an ordinary slat crib. Seed selected from top ears in crib.

(*p.*) *Anonymous.* This contained the ordinary white shoe peg corn and a broad dent corn. No mark was on the package by which to identify it.

These seed were tested in the greenhouse, under the benches, where the heat is quite constant, in Keim's seed tester. This is a German apparatus made of clay, burned like ordinary clay pottery. The seed tester is 8x8x1½ inches. In one flat side is cut a circle 6½ inches in diameter and 1½ inches deep. From within this circle rises a dish to the level of the highest part of the tester, that is 5 inches in diameter. Thus a groove nearly 1x1½ inches is formed. The seeds to be germinated are placed in this groove, and water is then poured into the clay dish, comprising the space within the groove. A clay cover with a small hole in its center is then placed over the tester. Every twenty-four hours water is placed in the dish. The clay being porous allows the water to pass through it and keep the corn moist enough to germinate, yet not wet. Before being placed in the tester, the seeds were kept under very equal conditions, in a dry room, that had no fire in it at any time.

The following table gives, in the first column, small letters, which, if referred to those noted above, will give the necessary information concerning the sources of the seed and the conditions under which it was grown and stored, so far as we have been informed. The next column gives the number of seeds tested, and the third column the date the seed was placed in the tester. The succeeding columns relate to the quantity of seed that germinated, etc. A seed was considered germinated after it had broken through the exterior covering of the grain, and showed a portion of the embryo or young plant:

SEED SOURCE.	No. Seed Te-ted.	Put in Tester.	First Seed Germinated	Last Seed Germinated	Seeds Germinated	Seeds Not Germinated	Per Cent. Germinated
c.,	500	Dec. 31	Jan. 5	Jan. 15	498	2	99.6
h.,	200	" 31	" 5	" 15	200	0	100.0
"	200	" 31	" 5	" 13	198	2	99.0
"	50	" 31	" 5	" 25	50	0	100.0
i.,	200	Jan. 5	" 9	" 19	198	2	99.0
"	300	" 5	" 9	" 18	234	66	78.0
l.,	75	Dec. 31	" 5	" 8	75	0	100.0
"	75	" 31	" 5	" 8	75	0	100.0
"	75	" 31	" 5	" 8	73	2	97.3
"	75	" 31	" 5	" 9	75	0	100.0
"	100	" 31	" 5	" 7	84	16	84.0
m.,	200	Jan. 5	" 9	" 21	199	1	99.5
"	200	" 5	" 9	" 17	197	3	98.5
"	100	" 5	" 9	" 18	100	0	100.0
n.,	250	" 5	" 9	" 17	250	0	100.0
"	250	" 5	" 9	" 17	287	3	98.8
a.,	250	" 20	" 26	" 15	248	2	99.2
"	250	" 20	" 26	" 14	249	1	99.6
b.,	200	" 20	" 25	Feb. 2	197	3	98.5
"	200	" 20	" 26	" 2	197	3	98.5
"	200	" 20	" 25	" 2	200	0	100.0
d.,	200	" 20	" 25	Jan. 31	200	0	100.0
"	100	" 20	" 26	" 31	94	6	94.0
"	200	" 20	" 26	Feb. 5	199	1	99.5
e.,	175	" 20	" 25	" 4	174	1	99.4
"	200	" 20	" 25	" 5	193	7	96.5
"	200	" 20	" 25	" 2	194	6	97.0
"	200	" 20	" 25	Jan. 31	200	0	100.0
j.,	100	" 20	" 26	Feb. 4	100	0	100.0
"	200	" 20	" 25	" 5	199	1	99.5
"	200	" 20	" 25	" 3	198	2	99.0
k.,	250	" 20	" 25	" 4	237	13	94.8
"	100	" 20	" 25	Jan. 30	100	0	100.0
"	100	" 20	" 26	Feb. 2	100	0	100.0
f., (1)	80	Feb 10	Feb 17	Jan. 30	79	1	98.7
" (2)	95	" 10	" 17	" 31	93	2	97.8
" (3)	100	" 10	" 17	" 31	99	1	99.0
" (4)	100	" 10	" 17	Feb. 11	97	3	97.0
" (5)	150	" 10	" 17	Mch. 5	149	1	99.3
" (6)	100	" 10	" 17	Feb. 28	93	7	93.0
g.,	100	" 10	" 17	Mch. 6	99	1	99.0
"	200	" 10	" 17	Feb. 23	197	3	98.5
"	100	" 10	" 17	" 25	100	0	100.0
"	100	" 10	" 17	Mch. 6	96	4	96.0
"	100	" 10	" 17	" 5	99	1	99.0
Anonymous,*	100	" 10	" 22	" 13	99	1	99.0
"	90	" 10	" 17	" 6	96	4	96.0
"	200	" 10	" 17	Feb. 22	200	0	100.0
o.,	500	" 10	" 28	Mch 19	497	3	99.4
Mr. Wallace, Anderson Co. †	200	Dec. 31	Jan. 5	Jan. 16	179	21	89.5
" " "	100	" 31	" 7	" 15	63	37	63.0
	200	" 31	" 5	" 15	197	3	98.5

*Name of sender not known, or circumstances connected with corn.
†No information sent concerning corn.

A careful examination of these figures, and comparison with the different methods of harvesting, give us no positive information as to which of the preceding methods of storing is the best. Almost all of the seed had a high germinative power. The seed of poorest vitality was from Mr. Anderson, but just how that gentleman stored his corn we are not informed. Mr. Link stored his seed in a high place in an airy crib, yet there is a difference of as much as 21 per cent. in germination, with seed from the same source. This high seed vitality corresponds with the excellent vegetation of seed planted over the State the past spring, there being almost no complaint to our knowledge of the necessary replanting of corn fields. In the case of *f*. there is no appreciable difference in seed vitality between that cured in the crib, and that in the field. However, had the fall season been a very damp one, no doubt the seed cured under cover would have had the highest vitality.

In storing seed corn, some leave the husk on the ears, while others remove it.. Comparing the two methods of preserving, we get the following figures:

Source of Seed.	With Husk.	Without Husk.
h.,	. .	99.6
l.,	96.2	. .
m.	99.3	. .
n.,	99.4	. .
a.,	99.4	. .
b.,	. .	99.0
d.,	97.8	. .
e.,	. .	98.2
j.,	99.5	. .
k.,	. .	98.2
o.,	. .	99.4
Average,	98.4	98.8

The average of the above figures, though favoring not keeping the husk on the ear of seed corn, gives so small a variation with the other, as to make almost no practical difference between the two; so that if these figures were to hold true, it would be better to husk the corn rather than allow the husk to occupy room in the crib. Farther, the ear-corn that is in the husks, if at any time, it gets wet after picking, runs a much greater risk of moulding, than it would if husked.

A summary of the above results would indicate:

1st. That, so far as sample seed corn from sixteen different counties in Tennessee give a fair average of the condition of the seed of the State, the vitality of that produced by the crop of 1887 is high;

2d. The evidence is in favor of storing ear-corn without the husk, for seed purposes, though the results coming from the two methods differ very slightly, and to no practicul extent.

3d. That it is customary for farmers to preserve their seed corn in as dry condition as possible, under shelter, preferably in a high, airy place.

III. ANALYSES OF COMMERCIAL FERTILIZERS.

SEASON 1887–8.

The following fertilizers have been analyzed since July 1st, 1887. The samples were forwarded by the Commissioner of Agriculture, Hon. B. M. Hord:

1. Buena Vista Grain Fertilizer, manufactured by the Buena Vista Plaster Company, Saltville, Virginia.

2. Swann Island Guano, sold by John L. Reese & Co., Baltimore, Maryland.

3. Furman's Farm Improvement Company's Acid Phosphate, Adair Bros. & Co., agents, Atlanta, Georgia.

4. Buffalo Bone Guano, manufactured by Adair Bros. & Co., Atlanta, Georgia.

5. Furman's High Grade Guano, manufactured by Adair Bros. & Co., Atlanta, Georgia.

6. Adair's Ammoniated Dissolved Bone, manufactured by Adair Bros. & Co., Atlanta, Georgia.

7. Farish Furman Formula, manufactured by Furman's Farm Improvement Company, Adair Bros. & Co., agents, Atlanta, Georgia.

8. I. X. L. Ammoniated Bone Superphosphate, manufactured by George W. Miles & Co., Milford, Connecticut.

9. Planters' Soluble Guano, manufactured by Adair Bros. & Co., Atlanta, Georgia.

10. Furman Ammoniated Soluble Bone, manufactured by Furman Farm Improvement Company, Adair Bros. & Co., agents, Atlanta, Georgia.

11. Dissolved Bone, manufactured by Slingluff & Co., Baltimore, Maryland.

12. High Grade Acid Phoshate, manufactured by Slingluff & Co., Baltimore, Marylaud.

13. Ammoniated Bone, manufactured by Slingluff & Co., Baltimore, Maryland.

16. Export Bone Meal, manufactured by C. and F. Singer, Nashville, Tennessee.

17. Ralston's Bone Meal, manufactured by the Northwestern Fertilizing Company, Chicago, Illinois.

18. Fine Raw Bone, manufactured by the Northwestern Fertilizing Company, Chicago, Illinois.

19. Challenger Corn Grower, manufactured by the Northwestern Fertilizing Company, Chicago, Illinois.

20. Tobacco Compound, manufactured by the Northwestern Fertilizing Company, Chicago, Illinois.

No.	Name.	Moisture.		Total Phosphoric Acid.		Available Phosphoric Acid.		Potash.		Ammonia.	
		Guarante'd Per Cent.	Found. Per Ct.	Guarante'd Per Ct.	Found. Per Ct.	Guarante'd Per Ct.	Found. Per Ct.	Guarante'd Per Ct.	Found. Per Ct.	Guarante'd Per Ct.	Found. Per Ct.
1	Buena Vista Grain Fertilizer, . .	6.16	11.9	6.43	7.30	1.57	1.83	3.05	3.97	4.25	3.79
2	Swan Island Guano, ...	. . . .	12.24	. . . .	24.08	19.14	2.14	. . . .	. . .	. . . .	. . .
3	Furman's Acid Phosphate, . . .	10 to 14	15.21	15 to 19	14.40	13 to 15	13.21	. . . .	. . .	. . . .	. . .
4	Buffalo Bone Guano, ...	10 to 14	8.04	8 to 16	11.12	8 to 12	8.24	2 to 3	3.18	2 to 3	2.71
5	Furman's High Grade Guano, . .	10 to 14	11.49	12 to 16	10.08	10 to 12	9.16	1½ to 2	3.30	2½ to 3	3.54
6	Adair's Amm'd Dissolved Bone, .	10 to 14	15.48	10 to 16	11.69	8 to 12	11.02	. . . .	. . .	2 to 3	3.50
7	Farish Furman Formula, ...	10 to 14	18.41	12 to 17	10.51	10 to 13	9.90	2½ to 3	3.57	. . . .	. . .
8	I X L Amm'd Bone Superphosph'e	. . . .	12.39	9 to 15	10.35	8 to 12	9.15	1 to 3	1.92	2½ to 4	2.87
9	Planter's Soluble Guano, ...	10 to 14	14.07	10 to 15	12.32	8 to 11	8.06	1 to 2	1.35	2 to 3	2.02
10	Furman's Amm'd Soluble Bone, .	10 to 14	11.71	12 to 16	11.66	10 to 12	10.56	1 to 1½	1.83	1 to 1½	1.03
11	Dissolved Bone, . . Slingluff & Co.	14	15.03	11	16.02	10	14.66	1½	1.17	½	1.53
12	High Grade Acid Phosphate " "	15	9.33	11	19.50	10	17.65	. . . .	. . .	. . . .	. . .
13	Ammoniated Bone, " "	14	15.90	9	11.98	8	10.78	1	1.72	2	2.31
16	Export Bone Meal, ...	. . . .	9.51	. . . .	17.43	. . . .	. . .	3	1.08	3½ to 5½	5.02
17	Ralston's Bone Meal, N.W.Fert.Co.	. . . .	8.51	. . . .	14.18	. . . .	. . .	. . . .	. . .	. . . .	2.96
18	Fine Raw Bone, " "	. . . .	8.92	. . . .	22.99	. . . .	. . .	. . . .	. . .	. . . .	4.68
19	Challeng'r CornGrower, " "	. . . .	11.37	. . . .	14.03	. . . .	7.83	. . . .	1.48	. . . .	3.09
20	Tobacco Compound, " "	. . . .	14.21	. . . .	13.27	. . . .	7.46	. . . .	2.44	. . . .	4.23

REMARKS.

No. 1. Well up to guarantee.
No. 2. Available, very deficient.
No. 3. Equal to minimum guarantee.
No. 4. Nearly equals minimum guarantee.
No. 5. Above guarantee in ammonia and potash; below in phosphoric acid.
No. 6. Above minimum guarantee.
No. 7. Below guarantee on phosphoric acid.
No. 8. Limits of guarantee too wide; above minimum guarantee.
No. 9. Above minimum guarantee.
No. 10. Above minimum guarantee.
No. 11. Above guarantee.
No. 12. Above guarantee.
No. 13. Above guarantee.
No. 16. Below on potash.
No. 17. No guarantee.
No. 18. No guarantee.
No 19. No guarantee.
No. 20. No guarantee.