

The Pennsylvania State College,
PRESIDENT'S OFFICE.

State College, Centre Co., Pa.

Feb. 19, 1887.

My dear Sir - The experiment-station bill is all ready to be acted on in the House, and I think we have a three-fourths majority in its favor, if it can be reached, before adjournment. I do not know the exact situation, but I am sure the Speaker could greatly facilitate Mr. Hatch's efforts to bring up the bill, if he were earnestly disposed to do so.

I write to ask if you cannot go to Washington, or at least write, with sufficient backing to impress upon Mr. Carlisle the importance of his giving the measure his active and energetic support.

If you could accomplish that, I think you would be doing an inestimable service.

Faithfully yours,

Geo. W. Atterton.

5-2-1887

Pres. Jas. K. Patterson:
Lexington Ky.

My Dear Sir:

In reply to your favor of the 29 ult. will state that we do not have a ^{state} Expt. station, & hence no director. We do a good deal in the way of field experiments, however - having about 75 acres under experiments each year. This field work is shared by the Profs. of Agr. & Hort.

Prof. Lrap - the Prof. of Hort. of course directs the Horticultural experiments. the Agr. Expts. are under my hands. The full Professors here get \$1600. per annum. Prof. Lrap does not now get that much as he is not a full Prof. yet. He richly deserves to be however.

I do not know what Prof. Crozier is getting, or what his chances ~~are~~ for promotion are.

I believe him to be a good man and feel sure that he will prove himself such in any work for which he is fitted. Should

you attend the Nat. Ed. Assoc.
at Chicago this year, I should be
glad to have you stop here on your way
back and see our Institution and our
field work.

Very truly yours

W.C. Latta

47-M-64

President's Rooms,
Cornell University,

Dictated.

Ithaca, N. Y., May 22 1887

Dear Sir:

Our experimental station has thus far been a rather incipient affair, and has not had a director. The work has been carried on in the departments of agriculture, Botany, Agricultural Chemistry, Entomology, and Veterinary Surgery, without a directing head. Such results in experiment as we have had worthy

of publication have been printed and issued as the work of the station, but we have not had a Director. What our policy will be when we get the appropriation made by Congress we have not yet determined.

Probably some one of our corps will be appointed director, but whether in addition to his present salary he will receive any considerable sum is yet to be settled.

The normal salary of a professor in this University is \$3000 a year.

Regretting that I am not able to give you more satisfactory information, I am

Very respectfully yours,

C. K. Adams

President J. H. Patterson.

COMMITTEE OF BOARD OF REGENTS
IN CHARGE OF THE STATION.

HON. HIRAM SMITH, CHAIRMAN,
SHEBOYGAN FALLS.

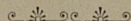
HON. H. D. HITT,
OAKFIELD.

HON. C. H. WILLIAMS,
BARABOO.

PROF. W. A. HENRY,
DIRECTOR.

PROF. H. P. ARMSBY,
ASSOCIATE DIRECTOR.

University of Wisconsin.



AGRICULTURAL EXPERIMENT STATION,

OFFICE AT

No. 16 AGRICULTURAL HALL, ON THE
UNIVERSITY GROUNDS.

Address all communications,
express parcels, exchanges,
etc., not to individual officers,
but to Agricultural Experiment
Station.

Madison, Wis., 5/2, 1889
President Jas R Patterson
State College of Ky
Lexington Ky
Dear Sir:

Dr Armsby & self each
get \$2000. salary. We teach during
winter short course ayl students -
(the only ayl. students in now here) from
one to two hours daily.

We look anxiously forward to the
time when we shall get Govt aid
for though it will probably not increase
our salaries it will give us something
to work with: as it is we feel very
cramped.

Most Cordially
W Attermy

CHAS. W. DABNEY, Jr., Ph. D.,
Director.
MILTON WHITNEY, Supt. Farm.
W. O. BAILEY, Signal Corps, U. S. A.

THE NORTH CAROLINA
AGRICULTURAL EXPERIMENT STATION
AND STATE WEATHER SERVICE.

B. von Herff, Ph. D.,
H. B. Battle, B. S.,
F. B. Dancy, A. B.,
W. A. Withers, A. M.,
Ass't Chemists.

Raleigh, May 2nd.,

1887

Prest. James K. Patterson,

Lexington, Ky.

Dear Sir:-

Referring to yours of the 29th:-

The salary of the Director of this Station is fixed at twenty five hundred dollars, without any other sources of income. This is about the average salary at the older Experiment Stations, though at some of them the directors hold a professor's or some other situation, in addition.

If Prof. Seovell leaves you, which I am sure you will regret, I would be glad to hear something about the place, the salary, equipment of the Station, &c.,

Mrs. Brent, who is with us and my wife, would I am sure join me in regards and respects; if they knew I was writing.

Very truly yours,

Chas. W. Dabney Jr.
Director.

NEW YORK AGRICULTURAL EXPERIMENT STATION.

Director, Dr. E. L. STURTEVANT.

C. S. PLUMB, B.S., First Assistant.
EMMETT S. GOFF, Horticulturist.
M. H. BECKWITH, Ass't Horticulturist.
J. C. ARTHUR, D.Sc., Botanist.
S. MOULTON BABCOCK, A.M., Ph.D.,
Chemist.
E. F. LADD, B.S., Assistant Chemist.
GEO. W. CHURCHILL, Farmer.
FRANK E. NEWTON, Stenographer.

Geneva, N.Y., May 18th 1887

Dr. Jas. K. Patterson
Lexington Ky.

Dear Sir,

Your letter

of May 5th in relation to the direction
ship of your Experiment station
is only just received, as I
have been absent from the station
more than two weeks -

I am very thankful for
the consideration which you have
given me, but as I do not desire
to sever my connection here, at
present, I will not be a candidate
for Director of your station.

If you wish to have your

47-A1-64

work under the direction of
a chemist, I would confidently
recommend my assistant Mr.
E. F. Ladd for the position. He
has been with me for the past two
years during which time his
work has been very commendable.

I think he would do credit to
any position of this kind.

Very truly yours,

J. M. Babcock

NEW YORK AGRICULTURAL EXPERIMENT STATION.

Director, Dr. E. L. STURTEVANT.

C. S. PLUMB, B.S., First Assistant.
EMMETT S. GOFF, Horticulturist.
M. H. BECKWITH, Asst. Horticulturist.
J. C. ARTHUR, D.Sc., Botanist.
S. MOULTON BABCOCK, A.M., Ph.D.,
Chemist.
E. F. LADD, B.S., Assistant Chemist.
GEO. W. CHURCHILL, Farmer.
FRANK E. NEWTON, Stenographer.

47-M-64
Geneva, N.Y., June 8, 188788

Pres. Jas. K. Patterson,

State College, Lexington, Ky.

Dear Sir: - Your favor of June 4 is received, stating that the chair of chemistry at the Kentucky State College is vacant.

Please send me a catalogue of the institution and a schedule, or statement, of the course in chemistry, or studies assigned to the chair of chemistry. If the course is as I presume it is, I should be pleased to make application for the Professorship and furnish references and testimonials.

Sincerely yours,

E. F. Ladd.

Kentucky Agricultural Experiment

—AT—

STATE COLLEGE OF KENTUCKY.

Officers.

M. A. SCOVELL, Director.
ROBERT PETER, Prof. of Chemistry.
A. R. CRANDALL, " " Botany.
A. E. MENKE, " " Agri. Chem. and Agriculture.
A. T. PARKER, Microscopist.
A. M. PETER, Assistant Chemist.

Board of Control.

W. B. KINKEAD.
R. J. SPURR.
PHILIP BIRD.
R. A. SPURR.
W. D. NICHOLAS.
JAS. K. PATTERSON.
M. A. SCOVELL.

Lexington, Ky., 188

A & M College

1887	To M. A. Scovell	Cr.	Dr.
June 4 th	To balance		97.60
" 11	Pay roll		34.10
" 18	" "		18.50
" "	By cash	\$197.60	
" 25	Pay roll		25.80
July 2	" "		26.70
" 9	" "		16.90
" "	For cutting 18.7 acs hay @ 1.25		<u>23.36</u>
			242.96
	Due M. A. Scovell	<u>45.36</u>	
		242.96	

Dr. M. Colley
in the north
M. H. Scott
July 15-1887
Rue M. H. 8405-36

47-M-64

Arkansas Agricultural Experiment Station,

—AT—

ARKANSAS INDUSTRIAL UNIVERSITY.

ALBERT E. MENKE, Director.

Fayetteville, Ark., Aug 17 1887

My dear Susan.

I have not the least fear that my friend could have had the thing revoked but I did fear if he heard of my good fortune that he would make ill natured remarks to my friends in New York & Washington. We have a new station here of which I am now Director & shall have my hands quite full. I received an exceedingly kind letter today from Gen Bull and also one from Major T. T. Johnston they could not be nicer and I am very proud of them. The term here is quite different from the regular one. The long vacation comes in winter from Dec 2 to Mar 5 then nothing but solid work to the ensuing Dec. The Legislature appropriated \$8000 for my Dept & \$7000 for the Mechanical to be spent wholly in improvements apparatus & machinery. I mean to have a well fitted up lab by this time. I sent Capt Melwens a statement closing my lab, also with the State College. I received a letter from Foster he tells me that he & Mrs Prescott & Evan are going to quit chemistry & that it is doubtful if Robt. Foster returns. I shall write to him & try to get him here. He is a good student. Best wishes to all.

Yours and
Albert E. Menke.

Kentucky Agricultural Experiment Station,

—AT—

STATE COLLEGE OF KENTUCKY.

Officers.

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ROBERT PETER, Prof. of Chemistry.
A. R. CRANDALL, " " Botany.
A. T. PARKER, Microscopist.
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Board of Control.

W. B. KINKEAD.
R. J. SPURR.
PHILIP BIRD.
R. A. SPURR.
W. D. NICHOLAS.
JAS. K. PATTERSON.
M. A. SCOVELL.

Lexington, Ky., Sept 30 1887

And M College in Ac with

M. A. Scovell.

Sept 1. Due M. A. Scovell \$55.50

" 3. Pay roll 15.75

" 10 " " 14.70

" 17 " " 10.50

" 24 " " 28.70

By cash received

By cash on hand

122.20 \$155.50

30.35
\$155.50

\$155.50

Approved

100 — sending direct

47-M-64 Kentucky Agricultural Experiment Station

STATE COLLEGE OF KENTUCKY

Mrs. Smith
of
Cocke's Island
H 3035

W. A. KIRK
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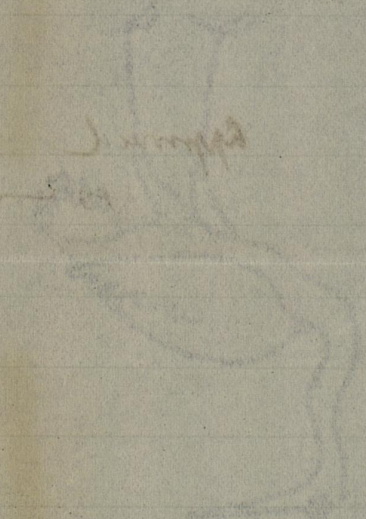
188

JAPANESE LUNCH

Japanese

86

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47-M-64

Association
OF
American Agricultural Colleges
AND
Experiment Stations.

CONSTITUTION

Adopted by a Convention of Delegates from Agricultural Colleges and Experiment Stations, held at the U. S. Department of Agriculture, Washington, D. C., Oct. 18-20, 1887.



NAME.

This Association shall be called The Association of American Agricultural Colleges and Experiment Stations.

OBJECT.

The object of this Association shall be the consideration and discussion of all questions pertaining to the successful progress and administration of the colleges and stations included in the Association.

MEMBERSHIP.

At any regularly called meeting of the Association each college established under the Act of Congress approved July 2, 1862, and each experiment station established under State or Congressional authority, and the Department of Agriculture, shall be entitled to one delegate; but no delegate shall cast more than one vote. Other institutions engaged in experimental work in the interest of Agriculture may be admitted to representation in this Association, by a majority vote, at any regular meeting of the Association.

OFFICERS.

The Officers of this Association shall be a President, five Vice Presidents, and a Secretary, who shall act as Treasurer. They shall be chosen by ballot, and shall perform the duties which usually devolve upon such Officers. They shall hold office from the close of

the meeting at which they were elected and until their successors shall be elected.

The President, Secretary, and five persons, to be chosen by the Association, shall constitute an Executive Committee, which shall elect its own chairman.

The Executive Committee shall determine the time and place of the next meeting of the Association; shall issue its call for said meeting, stating the general purpose thereof, not less than thirty days before the date at which it shall be held; shall provide a well prepared order of business and program of exercises for such meeting, and shall make seasonable issue of said program.

It shall be the duty of each institution included in this Association to present, at each regularly called meeting, a brief report of the work and progress of said institution, and such report shall be called for in the regular order of business.

The Executive Committee shall be charged with the general arrangement and conduct of the meeting called by it; at which meeting, before its adjournment, a new Executive Committee shall be chosen.

AMENDMENTS.

This Constitution may be amended, or changed, at any regularly called meeting by a vote of two-thirds of the delegates present.

REPORT OF COMMITTEE
TO
PROPOSE TO THE CONVENTION A SYSTEM FOR THE ORGANIZATION AND MANAGEMENT
OF
AGRICULTURAL AND EXPERIMENT STATIONS.

Adopted at a Convention of delegates from the above named Institutions held at the
U. S. Department of Agriculture, Washington, D. C. Oct. 18-20, 1887.

Your Committee is of the opinion that in those States which have established, or may hereafter establish, Agricultural Experiment Stations, by special charter or incorporation separate from any college or school, under district Boards of Control or Trustees, the organization may be assumed to be so separate and fixed, as to render unnecessary any consideration by this convention, of this class of institutions.

The Committee has therefore directed its attention solely to experiment stations connected with colleges and under the same general governing board.

After prolonged conference and full discussion of the many questions involved, your Committee have agreed, unanimously, with a single exception, to the following advisory proposition:—

1st That all appropriations received under what is known as "the Hatch bill," should be applied in good faith, to agricultural research and experiment and the dissemination of the results thereof among the people, and that any diversion of funds to the general uses of the colleges would be a direct violation of the plain spirit and intent of the law, and an inexcusable disappointment of just public expectation.

2nd That the experiment stations specially referred to should be so far separate and distinct from the colleges that it shall be possible, at any moment, to show to any authorized inspector or investigator, that all the funds derived from the United States under the Hatch bill, have been expended solely for the purposes of agricultural experimentation according to the intent of the law.

3rd That every department to be known and designated as an agricultural experiment station should be distinctly organized with its duties and control clearly defined and with a recognized official head, whose time shall be chiefly devoted to this department, who should be on an equal footing with the other heads of departments, or professor of the college, and whose compensation should recognize the fact that the duties of the position occupy every month of the year.

4th That the publications of the stations should be entirely separate from those of the colleges. The quartely, or more frequent bulletins, should give their readers the results of experiments as fast as completed, and only as completed, or as distinct chapters are completed. These bulletins should enlarge on those practical points, such as the improvements or restoration of soils, the development of plants and the breeding of stock, when suggested by work done, even to the extent of repeating well-known principles and facts, when these need to be taught.

For the Committee,

Henry E. Alvord,

Secretary.

WASHINGTON, OCT. 19, 1887.

Chas. W. Dabney, of <i>Tenn.</i>	}	COMMITTEE.
W. I. Chamberlian, of <i>Iowa.</i>		
Henry E. Alvord, of <i>Mass.</i>		
S. D. Lee, of <i>Miss.</i>		
Edwin Willets, of <i>Mich.</i>		

[with letter Oct. 26, 1887]

CONSTITUTION

ADOPTED BY A

CONVENTION OF DELEGATES FROM AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS,

HELD AT THE

U. S. DEPARTMENT OF AGRICULTURE,

WASHINGTON, D. C. OCTOBER 18-20, 1887.

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AMENDMENT.

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Railroad Depot, Freight and Ex. Office,
EAGLEVILLE.

Telegraph Office, WILLIMANTIC.

Storrs Agricultural College

AND
EXPERIMENT STATION,
STORRS, CONNECTICUT.

Telephone Connection at the College.

His Excellency, the Governor, *Ex-Off.*, PRESIDENT. Hon. W. E. SIMONDS, Canton, VICE-PRESIDENT. T. S. GOLD, West Cornwall, SECRETARY. H. C. MILES, Milford, Treasurer. J. M. HUBBARD, Middletown. Hon. E. S. HENRY, Rockville. Dr. A. HYDE, Norwich. F. E. BLAKEMAN, Oronoque. Prof. S. W. JOHNSON, *Ex-Off.*, New Haven. EXECUTIVE COMMITTEE, H. C. MILES, T. S. GOLD, A. HYDE.

OFFICERS OF THE COLLEGE:

B. F. KOONS, PRESIDENT.	Natural History.
A. B. PEEBLES,	Professor of Chemistry.
C. S. PHELPS,	Professor of Agriculture.
GEO. A. WATERMAN,	Professor of Veterinary Science.
A. G. GULLEY,	Professor of Botany and Horticulture.
Miss MARGARET KENWILL,	Lady Principal.
E. J. LEWIS,	Professor of English and Literature.
Miss H. LEZLA SMITH,	Professor of Domestic Science.
H. S. PATTERSON,	Instructor in Wood and Iron Shop.
Miss L. J. BARBER,	Instructor in Mathematics and English.
L. P. CHAMBERLAIN,	Farm Superintendent.
Miss ANITA LOOMIS,	Stenographer.

TRUSTEES:

OFFICERS OF THE STATION:

W. O. ATWATER, Director,	Middletown.
C. D. WOODS, Vice-Director and Chemist,	Middletown.
C. S. PHELPS, Agriculturist,	Storrs.
C. B. LANE, Assistant in Farm Experiments,	Storrs.

T. S. GOLD,
J. M. HUBBARD, } Executive Committee.
B. F. KOONS,

Norwich, Conn., Oct. 30th, 1895.

My Dear Sir:--

On behalf of the Board of Trustees of the Storrs Agricultural College of Connecticut, of which I am a member, I beg to ascertain from you the system in vogue at your institution of purchasing materials and supplies for college use. What we desire to know more particularly is, who does the purchasing, for instance: after it is decided by the proper authorities to make a purchase, does some officer of the institution act as purchasing agent, whose duty it is to do all the purchasing, or does the President of the college have the general oversight of the matter and allow the other officers of the different departments to do the purchasing for their departments? This latter plan is our system at present. The thought in making this inquiry is to evolve some economical business plan that will more thoroughly systemize the matter and put it, if possible, above criticism. Hoping to receive an early reply from you in regard to the custom at your College, together with your personal ideas on the subject, I am,

Very respectfully,

Please send Catalogue

A. Hyde

Arkansas Agricultural Experiment Station,

—AT—

ARKANSAS INDUSTRIAL UNIVERSITY.

ALBERT E. MENKE, Director.

Fayetteville, Ark., Nov 26 1887

My dear Doctor.

How are you all progressing at this time. I hope everything is going along smoothly. Am glad to say this place suits me exactly the people & the position all I could wish for. It was a very lucky thing for me that I happened went home that memorable day. Our vacation begins Dec 2 & lasts until Mar 5. We do not have any vacation in the summer. We have about 300 students. They are older & the standard is higher than in Tex. We graduate this year 4 C.E., 6 A.B. and 2 B.S. That is pretty good don't you think. The Engineering Dept is particularly strong. It has 6 instructors in it. The shops cost \$7000 fitting up. My Dept is in its first my adjunct was Dr Caldwell's assistant. He is a graduate of the Maine State Coll. he is a first class man and yet along splendidly. I wish you were out here with us. I have had enough ty. How does the Schuering suit you? I suppose Prof Machiavelli A. Scovell is scheming beautifully. Give my kindest regards to all. Write me soon.

Yours sincerely
Albert Menke

OFFICERS—1887-88.

PRESIDENT,

GEO. W. ATHERTON, LL. D.,
President Pennsylvania State College,
State College P. O., Centre Co., Pa.

VICE-PRESIDENTS,

GEN. STEPHEN D. LEE,
President Agricultural and Mechanical College of Mississippi,
Agricultural College P. O., Miss.

SELM H. PEABODY, Ph. D., LL. D.
Regent University of Illinois,
Urbana, Ills.

WILLIAM LEROY BROWN, M. A., LL. D.,
President State Agricultural and Mechanical College,
Auburn, Ala.

M. C. FERNALD, A. M., Ph. D.,
President State College,
Orono, Me.

GEO. H. COOK, LL. D.,
Director New Jersey Agricultural Experiment Station,
New Brunswick, N. J.

SECRETARY AND TREASURER,
CHAS. E. THORNE,
Director Ohio Agricultural Experiment Station,
Springfield, Ohio.

ASSOCIATION

OF

American Agricultural Colleges

AND

EXPERIMENT STATIONS.

OFFICE OF EXECUTIVE COMMITTEE.

EXECUTIVE COMMITTEE.
1887-88.

MAJOR HENRY E. ALVORD, C. E., CHAIRMAN,
Professor of Agriculture, Massachusetts Agricultural College,
Amherst, Mass.

GEO. W. ATHERTON, LL. D.,
President Pennsylvania State College,
State College P. O., Centre Co., Pa.

EDWIN WILLITS, M. A.,
President Michigan Agricultural College,
Agricultural College P. O., Mich.

JAMES K. PATTERSON, Ph. D., F. R. H. S., F. S. A.,
President Agricultural and Mechanical College of Kentucky,
Lexington, Ky.

DR. CHAS. W. DABNEY, Jr., Ph. D.,
President University of Tennessee,
Knoxville, Tenn.

CHARLES K. ADAMS, LL. D.,
President Cornell University,
Ithaca, N. Y.

CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Amherst Mass November 28th 1887.

Dr. Jas. K. Patterson.

Pres. A. & M. College of Kentucky—

My dear sir:— My letter is to make two special requests of you,—as a member of the Executive Committee of this Association:—

First:— That you will at once write to Judge Durham. First Comptroller of the currency and ask him if he has done these two things,—(2.) got an item into the estimates for the Urgent Deficiency Bill, covering the payments for the fiscal year 1886-87, under "the Hatch Bill,"—and (b.) done the same as to the regular estimates for 1887-88. And not only ask his reply to these points, but further, what he advises to be done, at the Capitol, in the interest of Stations. (We want a letter from, badly, to assist in our Washington campaign.)

Second:— That if you possibly can, you will personally come to Washington, arriving there not later than Decr. 7th. to remain a week or ten days—or a few days, anyhow. All necessary expenses will be paid.

It is manifestly important that a representation of our committee should be in Washn the first week of the session of the new Congress. We propose to establish H. O. of the Com. at the Ebbitt House. Dec. 5th—and then have someone there, continuously till our object is accomplished. Pres. Atherton will be there. Dec. 6th. to stay a while, but wants one or two associates, at once. I accordingly ask you. + Pres. Adams. My own engagements are such that Dec. 10th is the first day I can possibly be in Washn—and then only a day or two. But Decr. 15th. I will be there again to stay a month, if needed. If you can only cover Dec. 8th to 17th. I'll relieve you then. Pres. Willits is in Cal'—but will reach Washn. Jan'y 5th. free to stay some time. Dr. Dabney will also serve a tour of duty in Jan'y. Sec'y. Thorne. is held in reserve, to fill gaps.

Yours very respectfully— Henry E. Alvord.

47-11-64

50TH CONGRESS,
1ST SESSION.

S. 156.

IN THE SENATE OF THE UNITED STATES.

DECEMBER 12, 1887.

MR. SPOONER introduced the following bill; which was read twice and referred to the Committee on Appropriations.

A BILL

To amend an act entitled "An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto," approved March second, eighteen hundred and eighty-seven.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That section five of the act entitled "An act to establish agri-
4 cultural experiment stations in connection with the colleges
5 established in the several States under the provisions of an
6 act approved July second, eighteen hundred and sixty-two,
7 and of the acts supplementary thereto," approved March
8 second, eighteen hundred and eighty-seven, is hereby
9 amended so as to read as follows:

10 "SEC. 5. That for the purpose of paying the necessary
11 expenses of conducting investigations and experiments and

50TH CONGRESS,
1ST SESSION.
S. 156.

A BILL

To amend an act entitled "An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto," approved March 2, 1887.

1887—DECEMBER 12.—Read twice and referred to the Committee on Appropriations.

12 printing and distributing the results as hereinbefore prescribed,
13 the sum of fifteen thousand dollars per annum is hereby ap-
14 propriated to each State, and to each Territory entitled under
15 the provisions of section eight of this act, out of any money
16 in the Treasury proceeding from the sales of public lands, to
17 be paid in equal quarterly payments, on the first day of Jan-
18 uary, April, July, and October in each year, to the treasurer
19 or other officer duly appointed by the governing boards of said
20 colleges to receive the same, the first payment to be made on
21 the first day of October, eighteen hundred and eighty-seven:
22 *Provided, however,* That out of the first annual appropriation
23 so received by any station an amount not exceeding one-fifth
24 may be expended in the erection, enlargement, or repair of a
25 building or buildings necessary for carrying on the work of
26 such station; and thereafter an amount not exceeding five per
27 centum of such annual appropriation may be so expended."

1 SEC. 2. That there is hereby appropriated to each State
2 and Territory entitled under the provisions of said act, to be
3 paid as in said section five provided, the sum of three thous-
4 and seven hundred and fifty dollars, as the first payment under
5 said act for the quarter beginning on the first day of October,
6 anno Domini eighteen hundred and eighty-seven.

47-M-64

50TH CONGRESS,
1ST SESSION.

S. 156.

IN THE SENATE OF THE UNITED STATES.

DECEMBER 12, 1887.

MR. SPOONER introduced the following bill; which was read twice and referred to the Committee on Appropriations.

A BILL

To amend an act entitled "An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto," approved March second, eighteen hundred and eighty-seven.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That section five of the act entitled "An act to establish agri-
4 cultural experiment stations in connection with the colleges
5 established in the several States under the provisions of an
6 act approved July second, eighteen hundred and sixty-two
7 and of the acts supplementary thereto," approved March
8 second, eighteen hundred and eighty-seven, is hereby
9 amended so as to read as follows:

10 "SEC. 5. That for the purpose of paying the necessary
11 expenses of conducting investigations and experiments and

50TH CONGRESS,
1ST SESSION.

S. 156.

A BILL

To amend an act entitled "An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto," approved March 2, 1887.

1887.—DECEMBER 12.—Read twice and referred to the Committee on Appropriations.

12 printing and distributing the results as hereinbefore prescribed,
13 the sum of fifteen thousand dollars per annum is hereby ap-
14 propriated to each State, and to each Territory entitled under
15 the provisions of section eight of this act, out of any money
16 in the Treasury proceeding from the sales of public lands, to
17 be paid in equal quarterly payments, on the first day of Jan-
18 uary, April, July, and October in each year, to the treasurer
19 or other officer duly appointed by the governing boards of said
20 colleges to receive the same, the first payment to be made on
21 the first day of October, eighteen hundred and eighty-seven:
22 *Provided, however,* That out of the first annual appropriation
23 so received by any station an amount not exceeding one-fifth
24 may be expended in the erection, enlargement, or repair of a
25 building or buildings necessary for carrying on the work of
26 such station; and thereafter an amount not exceeding five per
27 centum of such annual appropriation may be so expended."

1 SEC. 2. That there is hereby appropriated to each State
2 and Territory entitled under the provisions of said act, to be
3 paid as in said section five provided, the sum of three thous-
4 and seven hundred and fifty dollars, as the first payment under
5 said act for the quarter beginning on the first day of October,
6 anno Domini eighteen hundred and eighty-seven.

OFFICERS—1887-88.

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GEO. W. ATHERTON, LL. D.,
President Pennsylvania State College,
State College P. O., Centre Co., Pa.

VICE-PRESIDENTS.

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President Agricultural and Mechanical College of Mississippi,
Agricultural College P. O., Miss.

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Regent University of Illinois,
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Auburn, Ala.

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President State College,
Orono, Me.

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Director New Jersey Agricultural Experiment Station,
New Brunswick, N. J.

SECRETARY AND TREASURER.

CHAS. E. THORNE,
Director Ohio Agricultural Experiment Station,
Springfield, Ohio.

ASSOCIATION

OF

American Agricultural Colleges

AND

EXPERIMENT STATIONS.

SECRETARY'S OFFICE.

EXECUTIVE COMMITTEE.
1887-88.

MAJOR HENRY E. ALVORD, C. E., CHAIRMAN,
Professor of Agriculture, Massachusetts Agricultural College,
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President University of Tennessee,
Knoxville, Tenn.

CHARLES E. ADAMS, LL. D.,
President Cornell University,
Ithaca, N. Y.

CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Springfield, Ohio, Dec. 1st 1887.

President

James K. Patterson

State College of Kentucky,

Lexington, Ky.

Dear Sir: I am directed by the Executive Committee of the Association of American Agricultural Colleges and Experiment Stations to call upon you for one half (\$15-) the total amount (\$30-) pledged by you towards defraying the necessary expenses of said committee in promoting the objects of the Association.

It is expected that the entire amount pledged will be needed during the winter, and if you prefer to send at once the whole sum due from your institution, such portion as may not be required will be returned to you on or before the next annual meeting of the Association.

Respectfully,

Chas. E. Thorne

SECRETARY AND TREASURER.

IOWA AGRICULTURAL COLLEGE.

W. I. CHAMBERLAIN, PRESIDENT.

AMES, IOWA,

Dec 1

1887.

Dear Sir

To aid me in my work will you kindly answer, approximately, & by return mail if possible, the following questions:

1. The total amounts appropriated by your State Legislature for your Institution during the last two years? \$ _____
Ditto during the last four years \$ _____
2. What part of the above was for buildings & repairs? \$ _____ (two years)
\$ _____ (four years)
3. What connection has the President (Regent or Chancellor) had with presenting the claims of ^{your Institution} ~~the College~~ to the Legislature?
4. What connection has he had with the expenditures for buildings & repairs?

Respectfully Yours

W. I. Chamberlain

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EXPERIMENT STATIONS.

OFFICE OF EXECUTIVE COMMITTEE.

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CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Amherst, Mass., - Dec 3^d 1887.

Gas. K. Patterson, Ph. D.
Pres. State College of Ky.
Lexington.

My dear Doctor :- After much hesitation, Pres. Atherton and Adams have consented to take the first tour of duty at Washington - and are to be there for a week - beginning today. I will join Sat. 10th - but only for the day, - & will then return the 16th or 17th -

Now we must not waste our ammunition. Two at a time are enough. If you will permit me to change your plans, at so late a day, I would greatly prefer you to take week after next, - reaching Wash'g on Sat. 10th - or on Monday, 12 - to remain, if possible one week, when I will relieve you. -

Many thanks for your prompt attention to my recent letter - including your reply of 30th - today received.

Very respectfully,

Yours -

Henry E. Alvord

My compliments, please,
to your brother & to Prof. Scovil -

a

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CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Amherst, Mass., Dec., 3, - 1887.

Pres't. Jas. K. Patterson, Ph.D.

Agr'l. & Mech'l. College of Ky.

Lexington, Ky.

Dear Sir:--

A representative of this Association last week visited the Treasury officials at Washington and it was fully agreed that the amount necessary for the payments under the Experiment Station Bill for the fiscal year 1886-87, should be placed in the estimates for the Urgent Deficiency Bill, which must receive the early attention of the Fifteenth Congress. Comptroller Durham made the recommendation on the ground that "it was evidently the intention of the law to have the money paid this year and that some of the institutes had acted upon that interpretation and incurred expenses in good faith, under the provision of that law."

The first effort of the Executive Committee of this Asso'n., will therefore be to secure a place for this appropriation in the Urgent Deficiency Bill and to hold it there. In the Committee will need the assistance of every friend of the law.

You are urgently requested to immediately communicate with every Member of Congress from your State, stating this action by the Treasury Dep't., and asking his attention to the matter as it now stands. The special thing to be asked of every Member, is, that he will personally see that provision is made for these Station payments in the Bill named, and then that this item is held in that place till the bill is passed.

It is also important that the Ex. Com., which will hereafter be continuously represented at Washington, should be kept well informed of the assistance rendered from the several States. Please write soon, to acknowledge this and state what you have done, and especially state what you know of the views of any particular Member from your State, upon this subject. Later, please let us know of the responses you get.

Address until further notice:-- Ex. Com. A.A.A. Colleges & Stations, Ebbitt House, Washington, D.C. Some member of the Com. will be there after Dec., 5th, till the work is done. But we depend upon you to help.

For the Executive Committee:-- Yours respectfully,

Henry E. Alvord

Chairman.

Duplicate of this sent
during the week to every
College Point or Station Director in 37 States - a.

AGRICULTURAL EXPERIMENT STATIONS.

JANUARY 13, 1888.—Committed to the Committee of the Whole House on the state of the Union and ordered to be printed.

Mr. HATCH, from the Committee on Agriculture, submitted the following

REPORT

[To accompany bill H. R. 4881.]

The Committee on Agriculture, having in charge the bill (H. R. 4881) making an appropriation to carry into effect the provisions of an act approved March 2, 1887, entitled "An act to establish agricultural experiment stations, in connection with the colleges established in the several States, under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto," most respectfully report, having had the same under consideration, that the act under which this appropriation is asked has been construed by the First Comptroller of the Treasury as not making the appropriation for the current fiscal year evidently intended thereby.

A special act of appropriation is therefore necessary to make operative and effective the said act of March 2, 1887.

Accordingly, the Secretary of the Treasury, in a communication to the House of Representatives, dated December 22, 1887, relating to urgent deficiencies (H. R. Ex. Doc. No. 30, p. 7) makes an estimate for this purpose, as follows :

Agricultural Experiment Stations:

To carry into effect the provisions of an act approved March 2, 1887, entitled "An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto," \$585,000.

This communication is accompanied with copies of letters as follows (Ex. Doc. No. 30, p. 19):

[Estimates for urgent deficiencies.]

Appendix D.—*In relation to the estimate for "agricultural experiment stations."* (See page 7.)

TREASURY DEPARTMENT,
FIRST COMPTROLLER'S OFFICE,
Washington, D. C., December 3, 1887.

SIR: You may remember that there was some trouble about what was supposed to be an appropriation made by the last Congress for agricultural experiment stations in the act of March 2, 1887. (See 24 Stat., 440.) It was contended by some that section 5 of said act made an appropriation of \$15,000 a year to each one of said stations; but when the question was presented to me I decided that the act itself did not make an appropriation; that the fifth section only provided that Congress should, in the manner and to the amount therein specified, make appropriations from year to year. You may also remember that the agricultural convention, which met in this city in the month of September, waited upon you as well as myself, to confer as to the best method of effecting the purpose intended by the act; that said experiment stations were represented to have been established in many of the States, and that they were in need of money to meet obligations incurred under the belief that the act had made an appropriation. You will observe, also, that, under said fifth section, the first payment was stipulated to be made

on the 1st of October; and in view of the fact that nine months of the present fiscal year are not provided for in any of the appropriation bills, I beg to suggest to you the propriety of calling the especial attention of Congress to the matter, in order that at an early day it may make an appropriation for said nine months in a special bill, or by appending the same to a deficiency bill, which will, in all probability, be passed very early in the session.

I am led to make these suggestions to you from the fact that within the last few days I have received a letter from the chairman of the committee appointed by the late agricultural convention to look after this matter, asking me to call your attention to the subject, that an appropriation may be obtained from Congress at the earliest practicable moment.

Very respectfully,

M. J. DURHAM,

Comptroller.

The SECRETARY OF THE TREASURY.

STATE COLLEGE, CENTRE COUNTY, PA., December 8, 1887.

SIR: In reply to your verbal inquiry as to the number of States and Territories in which agricultural colleges or experiment stations have been so organized as to entitle them to the appropriation provided for by the act of Congress approved March 2, 1887, commonly known as the "Hatch Act," I beg leave respectfully to say that at least one such college or station has been established and is in operation in each of the thirty-eight States, and in the Territory of Dakota.

It is possible that one or more of the Territories besides Dakota may have established such institutions; but no information of such a fact has come to the notice of the Association of Agricultural Colleges and Experiment Stations, and I have no reason to suppose it to exist.

Very respectfully, your obedient servant.

GEO. W. ATHERTON.

The SECRETARY OF THE TREASURY.

The sum named in the bill now reported, viz, \$585,000, is thus in accordance with the estimate of the Treasury Department, and is to enable the payments to be made for the four quarters of the year ending June 30, 1888, as provided by the said act of March 2, 1887, and early consideration of this measure is asked, for the following reasons:

The act of March 2, 1887, providing for the establishment and maintenance of at least one agricultural experiment station in every State was hailed throughout the country as opening a new era in the development and progress of American agriculture. Everywhere the act was regarded as immediately operative and carrying with it the necessary appropriation for the new work to begin on the 1st day of July, 1887. Institutions in various States, thus interpreting the law, made suitable arrangements, providing buildings, purchasing equipment and materials, and engaging the services of competent men. Agricultural students and investigators resigned lucrative positions to engage in the work of the new stations. Thus every preparation was making for active operations to begin as contemplated by the law, when the decision of the officers of the Treasury Department caused a general suspension, with much embarrassment, more or less absolute loss, and wide-spread disappointment.

In several States trustees of these colleges are prohibited by law from incurring any indebtedness, and the great work provided by the said act of March 2, 1887, stands in abeyance until a special appropriation for the same is made. In agricultural experiments time is of the utmost importance, and the whole growing season of the year 1888 will be lost to the work in some of the States, unless action be taken by Congress before the end of the month of January.

The subject is, therefore, one of especial urgency and the public interests require its immediate consideration.

CENTRAL EXPERIMENTAL FARM,
DEPARTMENT OF AGRICULTURE,
OTTAWA; - - - - CANADA.

BULLETIN No. 2.

DECEMBER 15th, 1887.

TO THE HONOURABLE THE MINISTER OF AGRICULTURE :

SIR,

I have the honour to submit herewith, for your approval, the second bulletin of the Central Experimental Farm, in which will be found some details of the more important features of the work which has been undertaken in agriculture, horticulture and forestry since the issue of bulletin No. 1. Owing to a lengthened absence in the Maritime Provinces and in the North-West and British Columbia, the issue of this bulletin has been unavoidably delayed. Hoping that the marked progress made at the Central Experimental Farm will be so far satisfactory to you as to gain your approbation,

I have the honour to be,

Your obedient servant,

WM. SAUNDERS,
Director.

Ottawa, December 15th, 1887.

CENTRAL EXPERIMENTAL FARM,

DEPARTMENT OF AGRICULTURE,
OTTAWA, CANADA.

TESTING THE VITALITY OF SEEDS.

In the first bulletin issued from the Central Experimental Farm in February last, an invitation was extended to farmers, gardeners, horticulturists and others, interested in the quality and purity of agricultural seeds to send samples to the farm to be tested as to their vitality and germinating power. In response to this request 187 packages of seeds were received during the months of March and April, coming from many different sections of the Dominion, but the larger proportion of them from Ontario and Manitoba.

These seeds were found to vary as to their vitality, some being nearly perfect in this respect, while others were worthless from the loss of all their germinating power. The specimens of grain sent from Manitoba and the North-West Territories showed a higher average of vitality than those from the Eastern Provinces of the Dominion, an indication of the correctness of the opinion generally held, that grain grown in Northern countries possesses more vigour and vitality than that produced in more Southern latitudes, which makes it more valuable for seed. Comparing Manitoba and the North-West Territories with Ontario and the Provinces east, the few tests thus far made show the following averages :—

NORTH-WEST PROVINCES.		EASTERN PROVINCES.	
Proportion of Vitality.		Proportion of Vitality.	
Wheat.....	96 per cent.		92
Barley.....	97 “		73
Oats.....	95 “		65

It is proposed to undertake a much larger number of tests during the coming season, and in subsequent years, for the purpose of ascertaining whether these differences are normal and within what limits they vary.

The following table has been prepared to show the number of tests made of each sort, the highest and lowest degrees of vitality, as well as the average in each case:—

	No. of tests	Highest vitality.	Lowest vitality.	Average vitality.
Wheat.....	37	99	36	88
Barley.....	17	99	34	91
Oats.....	14	99	52	85
Corn.....	14	100	22	86
Peas.....	4	94	38	78
Timothy.....	4	97	89	94
Other Grass Seeds.....	12	89	00	42
Clover.....	6	95	70	83
Turnip.....	9	97	58	81
Mangold.....	11	97	39	74
Carrot.....	11	78	12	50
Cabbage.....	8	93	16	64
Beet.....	5	98	63	79
Tomato.....	5	72	44	61
Onion.....	5	80	28	59
Flax Seed.....	3	95	81	86
Parsnip.....	3	50	24	33
Radish.....	2	40	19	29½
Miscellaneous Seeds.....	17			

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The miscellaneous seeds included one sample each of Rye, vitality 90 per cent.; Rape seed, 98; Buckwheat, 80; Beans, 68; Celery, 10; Cauliflower, 48; Cucumber, 36; Lettuce, 65; Cress, 15; Sage, 23; Spinach, 8; Summer Savory, 10; Sweet Marjoram, 17, and Maple tree seed from British Columbia (*Acer macrophyllum*) 40 per cent. Also two samples of Melon seed and one of Squash, both of which entirely failed; these were said to be ten years old, and were supposed by the party sending them to be gaining in vitality by being kept.

Some very useful and practical results were reached by these tests, of which the following will serve as examples:—

A dealer in agricultural seeds, for whom some tests were made, writes thus: "Thanks for your careful report on seeds sent for testing; it will ensure the destruction of all of low average growth and thus directly benefit the people for whom the Experimental Farm was established."

A handsome sample of Cream Egyptian Oats, held for seed, was sent from Nova Scotia. These oats were plump and heavy, weighed about forty pounds to the bushel, and appeared to be in good condition. On being tested they showed a germinating power of only forty-seven per cent; the blades were weak and sickly, showing that the oats were quite unfit for seed. These had probably been injured in the mow by being taken in before they were thoroughly cured.

A sample was received from a lot of 125 bushels of garden peas grown for seed, which it was suspected had been injured in harvesting, on testing them they were found to have lost much of their vitality, only thirty-eight per cent sprouted.

There exists in the minds of some farmers a prejudice against the use of corn for seed, which has been stacked out all winter, many asserting that it will not grow. A sample sent by a correspondent to test this point showed a vitality of eighty-five per cent., which was about the average quality of the samples received.

Last season the house for seed testing was not completed until February, which made the time for work very short, and many did not hear of the advantages offered until it was too late to avail themselves of them. Seed testing for next season's sowing has already begun and will be continued throughout the winter. It is hoped that many will avail themselves of this opportunity and send their samples early. No charge is made for testing and samples addressed to the Central Experimental Farm, Department of Agriculture, Ottawa, pass free through the mail. The time occupied by each test is from ten to twenty days; the quantity of seed required will vary with the size of the individual grains, not less than 250 to 300 seeds should be sent.

IMPORTATION OF SEED GRAIN.

Early in the winter of 1886, correspondence was opened with reliable dealers in seed grain in England, Germany, France and

Northern Russia, with the view of securing a large number of varieties for comparative test. Wheat was sought from Northern Russia with the hope of obtaining a hard wheat of good quality, equal if possible to the Red Fife, so much esteemed, with an earlier ripening habit, so as to lessen the loss which early frost sometimes entails on the vast wheat crops of Manitoba and the North-West Territories. A large number of varieties of wheat, oats and barley, were obtained in Germany, England and France, gathered from all quarters of the world, for testing on the Experimental Farm at Ottawa, and one consignment of wheat from Riga, Russia, intended principally for distribution among the farmers in the more northern sections of the Dominion.

This wheat as received was of excellent quality, plump and hard, weighing sixty-one pounds to the bushel, and, when submitted to experts, was said to grade "No. 1, hard." There were distributed through the mail 167 sample bags of this grain, each weighing about three pounds; 277 of these were sent to Manitoba and the North-West Territories, and the remainder to the other Provinces, so that the value and period of ripening of this wheat might be ascertained under many varying conditions. Among the farmers in the Eastern Provinces some Manitoba seed-wheat of excellent quality was similarly distributed, which increased the number of samples sent out for trial to 1,149. Besides this there were sent to the Commissioner of Indian Affairs, Lieut.-Gov. Dewdney, about 1,200 pounds of the wheat from Northern Russia to be distributed among the Indian agencies, to be grown on their reserves, a portion also was kept to be sown on the Experimental Farm at Ottawa.

A copy of the following circular was sent with each sample of the Russian wheat:

"CENTRAL EXPERIMENTAL FARM,

"DEPARTMENT OF AGRICULTURE,

"Ottawa, 1887.

"DEAR SIR,—There has been sent to you this day by mail from the Central Experimental Farm, a sample bag of Spring wheat, which has been obtained under instruction of the Minister of Agriculture, from one of the Northern Provinces of Russia. This wheat has been ripened above latitude 56, more than 600 miles further north than the City of Ottawa, where the summer

season is very short; hence it is expected that it will ripen in Canada earlier than any of the varieties now in cultivation.

"You will oblige by testing this wheat and returning at the close of the season to the Central Experimental Farm, Department of Agriculture, Ottawa, by mail, in the bag herewith sent, a sample of the same as grown on your land, also state the character of the soil on which it was grown, the date of sowing, the time of ripening and the yield, with any other remarks relating to it which you may believe to be of importance. Tested at the seed house at the Experimental Farm, both in the soil and in the seed tester, this grain has produced a vigorous growth, 98 per cent. germinating promptly.

"WM. SAUNDERS,

"Director."

Only part of the returns have as yet been received, but as far as they have come in, they show a most gratifying success, establishing the fact that this wheat will ripen in Manitoba and the North-West from ten to fifteen days earlier than Red Fife, a gain which past experience would lead us to believe would be sufficient to secure this most important crop from all danger of frost. The shipment from Russia was not received until the seeding season in the North-West was nearly over, hence the wheat could not be sown early enough to give it a favourable chance; on this account it will require the experience of another year to establish with accuracy its period of ripening. This subject is of such vast importance to the future of the country that no pains will be spared in the endeavour to ascertain the true bearing of all the facts. Samples of this wheat as grown in the several Provinces are being submitted to eminent experts for their opinion as to its quality, it is also undergoing careful chemical analysis with other wheats for comparison, and if practicable a portion will be ground into flour and its value in bread making tested; a special bulletin on the subject will be issued as soon as all the desired information is available.

In the meantime the interest awakened in the subject in the North-West is very great, and so large a number of applications have been sent in for samples for spring planting, that a second consignment has been ordered from Riga, which supplemented by what has been grown here will, it is hoped, be sufficient to introduce this wheat into almost every locality and prepare the way for its general cultivation within two or three years.

The Manitoba wheat distributed consisted of Red Fife, White Fife and White Russian, all good samples. These were sent mainly to farmers in Ontario and Quebec, with the view of ascertaining whether seed wheat obtained from the north would manifest unusual vigour and fertility. The season in these Provinces has been so unfavourable that no very reliable data is likely to be obtained this year.

SPRING WORK.

On the second of May the ground was sufficiently free from frost to permit of work being begun on the Central Experimental Farm. The removal of internal fences, the gathering up of stone and the removal of stumps, necessarily delayed and limited other operations.

Ploughing was begun on the 2nd and seeding on the 6th of May. Many acres were brought under cultivation and seeding and planting were continued until the season was quite advanced.

GRAIN TESTING.

Sixty-seven varieties of spring wheat were sown, a large proportion of which were obtained from Europe, some from Russia, France, England, Hungary, Greece, Italy and Germany, also several from India, New Zealand, Australia, Japan, and others from the United States. Many samples were kindly donated by Prof. Lazenby of the Ohio Experiment Station at Columbus, and some by Prof. Brown of the Ontario College of Agriculture, Guelph. Owing to the great drought which prevailed this year during the growing period, the results have not been entirely satisfactory and another year's testing will be needed before the relative value of these varieties can be determined. Among the promising sorts the following deserve special mention: Pringle's Champlain, Improved Summer Cob, White Delhi, Californian White, Trimenia Sicilian Bearded, Galician Summer, Indian Hard Calcutta, Hungarian Mountain, Russian Hard Tag, Bearded Summer and Bearded March.

Thirty-one varieties of Barley have also been grown, among which the following are of much promise: Scholey's Chevalier, Hallet's Pedigree Chevalier, Swedish, English Malting, Danish, Californian, Screened French, Bestehorn's and Golden Melon. The Six-rowed Mandschurian and Large Two-rowed Naked are among the heaviest yielders.

Of oats sixty varieties have been tested, the most promising of which of the white sorts are: Scotch Angus, Tartarian White,

August White, Swedish, Egyptian, Waterloo, Australian, Hungarian White, Scotch Berwick and Georgia Early White, and among the black varieties Longfellow, Hallet's Pedigree Black Tartarian.

A large proportion of these varieties of grain were obtained in small quantities, and grown in plots of 20 by 40 feet; about thirty sorts were grown in one-fifth acre plots and the remainder in larger quantities.

POTATOES.

Two hundred and forty-five varieties of potatoes were also obtained, chiefly from Europe, but most of them in small quantities only. The most promising productive sorts among the newer introductions are August Kidney, White Star, Emperor William, Queen of Potatoes, Manhattan, Jackson's Improved, Niagara, Ganea, Paterson's Napoleon, Crimson Garnet, King's White Kidney, Erfurt Incomparable, Sugar and Giant. A very promising seedling originated by Mr. Thos. A. Sharpe, of Wakopa, Manitoba, was also tested, and proved to be an excellent cropper. As the yield from the small quantities of seed obtained was necessarily limited, it has been thought best to save the whole crop for seed and leave the question of quality for consideration next year, when the varieties composing this large collection can be more fully reported on.

OTHER FIELD CROPS.

That portion of the farm which had been seeded down to timothy and clover yielded a very good crop of hay, amounting in all to over 145 tons. Of the standard varieties of potatoes such as Early Rose, Beauty of Hebron and Chicago Market, very fair crops were obtained; the same may be said of the carrots, mangolds and turnips grown for stock. Several acres of peas of the variety known as the Golden Vine also yielded well.

None of the land could be got into fit condition for experiments with grasses or with fertilizers until it was too late in the season to undertake such work. It is proposed to carry on experiments in this direction during 1888.

HORTICULTURE.

Since the climate of Ottawa is very fairly representative of the larger part of Quebec and Ontario, it is of much importance that the fruit-growing capabilities of the district be ascertained as early and as fully as possible. With this end in view an extensive collection

of both large and small fruits has been brought together, special attention having been paid to those varieties which are likely to be very hardy, including all those of Russian origin which could be obtained, as the climate on account of its severity here, has hitherto been regarded as unfavourable for the growth of most kinds of fruits.

LARGE FRUITS.

The collection comprises 903 apple trees of 297 varieties, of which 174 are Russian sorts; 298 pear trees of 101 varieties, 45 of which are Russian; 197 plum trees of 72 varieties, 32 of which are Russian; 155 cherry trees of 71 varieties, 54 of which are from Russia and other parts of Northern Europe; 25 Peach trees of 11 varieties, American; 7 Apricots of 4 varieties, 2 Chinese and 2 European; and 26 crab apple trees of 12 varieties, chiefly American.

SMALL FRUITS.

The collection of small fruits includes 891 hardy grape vines of 127 varieties, 865 currant bushes, comprising 20 varieties of the standard named sorts, to which must be added nearly 100 new seedlings, some of which are very promising. In the collection of 251 gooseberries there are 30 named sorts and about 50 unnamed seedlings. The 3,650 raspberries are represented by 38 named varieties and about 200 unnamed seedlings, among them are many interesting hybrids, some of which, from this season's showing, give promise of great fertility. Among the 509 blackberry plants there are 20 named varieties, including all the hardier sorts obtainable, and in the strawberry beds there are 20,900 plants of 90 named sorts and about 50 unnamed seedlings, forming a collection of much interest and promise.

FORESTRY.

Eighty-eight thousand young forest trees and ornamental shrubs have been procured and planted, comprising both evergreen and deciduous sorts, including many native and foreign species. The total number of species and varieties exceeds 500, among which are many never before introduced into Canada; this collection will be largely augmented by the product of the seed beds. It is intended that such sorts as prove hardy shall be propagated for testing in other parts of the Dominion.

SEED DEPARTMENT.

The seed beds consist of 278 frames, twelve feet long and four feet wide, in which there has been sown a large collection of the seeds

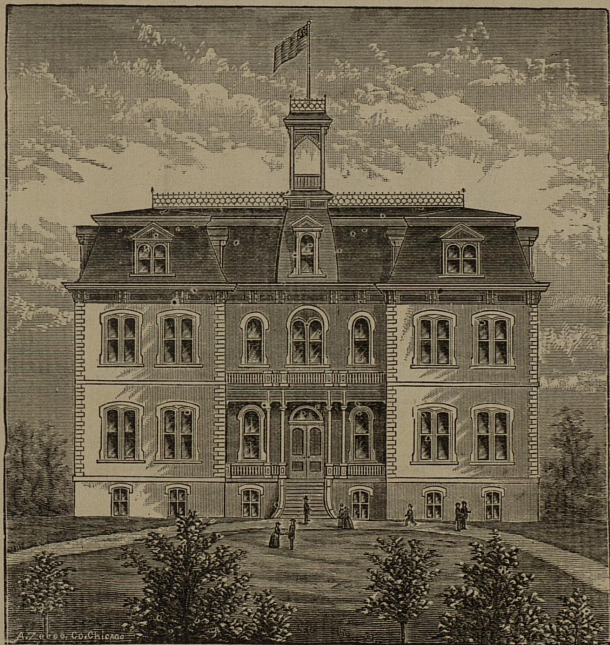
of trees, shrubs and plants. 335 packages were kindly sent from the Royal Gardens at Kew, London, England, a donation from the Director, W. J. Thistleton Dyer, Esq. This collection consisted almost entirely of ornamental shrubs and forest trees, many of them rare and valuable, from which it is expected that a large quantity of choice material will be obtained for future planting. Similar liberality has been shown by the Director of the Imperial Botanic Garden of St. Petersburg, Russia, Dr. E. Regel, who has sent 300 packages, about 100 of which were sent direct, the remainder to Mr. Chas. Gibb, of Abbotsford, Quebec, who very generously gave them to the Experimental Farm. In this assortment there were a large proportion of herbaceous and succulent plants from the Northern regions of Europe with seeds of a number of species of shrubs and trees from Turkestan and Siberia. Through the kindness of Prof. C. Sassaki, Director of the Botanic Garden of the Imperial College of Agriculture at Tokio, Japan, 110 sorts have been obtained from that interesting country. In the Japanese collection there were forty species of trees and shrubs from the most Northern Provinces of the Empire, where the temperature is severe and the snow fall heavy during the winter months. It is probable that some of these will prove hardy in this country. Besides these about 1,200 sorts have been secured by purchase in Europe and America. Seeds from native Canadian forest trees and shrubs have also been planted in considerable quantities, gathered in Ontario and Quebec, while smaller collections have been obtained from the North West Territories, British Columbia and other parts of the Dominion. A fair proportion of the seeds planted have started and made good growth, but as there are many sorts which remain over a year in the soil before germinating, most of the seed beds will be left undisturbed until the close of another season.



47-M-64



c/8871



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3. *The Normal School.*
4. *The Business Department.*
5. *The Academic Department.*

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Includes a thorough course of study in mathematics, natural science and the English language. Graduates of this school will receive the degree of Mining Engineer.

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Includes the fundamental branches of mathematics, natural science, the English language and observation and experiments connected with the farm and garden. Students in this school will be given an opportunity to defray a portion of their expenses by working on the University farm.

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Includes the studies pursued in the elementary and high schools of Nevada, the history of education and the theory and practice of teaching. Graduates of the Normal School will receive certificates valid in any public school of the State.

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Includes the study of arithmetic, bookkeeping, commercial law, business forms and the English language.

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Includes English, Latin, mathematics and natural science. Graduates of this department will receive the degree of Bachelor of Arts.

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Practice in reading, singing, declaiming, essay writing and public speaking is afforded by rhetorical exercises, conducted by the Professors and by the literary societies of the University.

Room rent and good board in respectable families can be had for less than \$25 per month.

THE NEXT TERM OF TWELVE WEEKS

Will open Monday, March 26, 1888.

For further information address

LEROY D. BROWN,
President of the University, Reno, Nevada.

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ASSOCIATION

OF

American Agricultural Colleges

AND

EXPERIMENT STATIONS.

Office of Executive Committee

Room 404, Ebbitt House—

Washington, D. C., Jan'y 15th 1888.

EXECUTIVE COMMITTEE.
1887-88.

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Amherst, Mass.

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CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Dr. Patterson—

My dear sir:— Spending a part of my Sunday in looking over the papers in this room— to see what may be destroyed I have found the enclosed letter, not seen by me forward, — and altho' I fear it is now pretty stale, — will forward it — as being your personal property. —

President Willits has been here a week with me, and we have got along well. We found you have prepared the way finely for us — with Judge Durham and Speaker Carlisle, — and everything moved along without a hitch, till Friday. But for a little misunderstanding, that day, between the leaders of the House, we should have had a special session yesterday, to pass our bill.

As it is, — we expect favorable action by the House, tomorrow or next day, and apprehend no trouble in the Senate.

I hope to send you definite and satisfactory news within a day or two.

Yours very respectfully —
Henry E. Alvord.

47-M-64

AMERICAN ASSOCIATION OF AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.
OFFICE OF THE EXECUTIVE COMMITTEE.

Ebbitt House, Washington, D. C., January 16, 1888.

Dear Sir:

Just before the assembling of the Fiftieth Congress of the United States, representatives of this Association waited upon the officials of the Treasury Department to remind them of the assurances given at the time of the October convention, and (except during the holiday recess) at least one member of this Committee has since been continually in Washington to watch the progress of events and do whatever was possible to secure early consideration by Congress of an appropriation to carry into effect the act of March 2d, 1887, relating to Agricultural Experiment Stations.

From the first, Members of Congress have, in general, been found interested in the measure, and there has been no doubt as to the ultimate result; but it is believed that this Committee, assisted by the many letters written in its aid, has been useful in constantly presenting the urgency of the case and exerting an influence in favor of early action.

The accompanying Congressional Committee report shows that the First Comptroller and Secretary of the Treasury duly caused the promised estimate to be made, in connection with other "Urgent Deficiencies" and this was referred to the House Committee on Appropriations, as soon as that committee was appointed.

It was supposed that the subject would be in charge of the Appropriations Committee, and attention was accordingly especially given to the gentlemen composing that body. In this the Committee on Agriculture heartily co-operated. On the very day the last named committee was organized, being Wednesday the 11th instant, a sub-committee was appointed to consider our interests. A conference was immediately held with the Committee on Appropriations, and an arrangement then

perfected by which the appropriations, present and prospective, to carry into effect the provisions of "the Hatch Act," were relinquished to the charge of the Committee on Agriculture.

There was some question as to this being in strict accordance with the rules of the House, and accordingly the subject was referred to the Speaker and the arrangement fully confirmed by his informal decision.

The way being thus cleared for immediate action by the Agricultural Committee, that body held a special meeting on the morning of Thursday, 12th instant, every member being present, a special appropriation bill was agreed upon unanimously, together with an explanatory report, and the same ordered to be promptly reported to the House.

A copy of this report (H. R., Report No. 13,) is herewith transmitted for your information, and it will be found to embody the features of the brief bill to which it refers. The report and bill were presented to the House on the 13th, ordered to be printed, and referred to the Committee of the Whole. That same day, by a strong vote, it was agreed to hold a session of the House on Saturday, 14th, for the special purpose of considering this bill. But owing to a misunderstanding on the part of some regarding this unusual Saturday session, it was deemed prudent to reconsider and put the matter over to the present week. Unless there be some detention entirely unforeseen, you may expect to hear of the passage of this bill, by the Lower Branch, in the general Congressional news of the present week.

This circular is for the personal information of yourself and your associates, but not for public use. Publication is inexpedient at this time,—we are not yet out of the woods.

For the Executive Committee:

Yours, very respectfully,

Henry E. Alvord.

Chairman.

477-M-69

The present investigation was undertaken to determine whether any of these poorer materials had been used in the manufacture of the fertilizers offered our farmers, and at the same time determine how much of the nitrogen present was immediately available for the use of the plant. The method of analysis used was that of digesting the fertilizer for a certain time in a solution of pepsin and determining the amount of the organic nitrogen dissolved by this solution. *Many experiments have shown that dried blood is very largely dissolved by this solution and that the larger part of the nitrogen of fish scrap, bone meal and slaughterhouse refuse is also dissolved, while hoof and horn meal and leather waste are scarcely acted upon. This furnishes a ready method therefore for separating these two classes of organic nitrogenous material.

Each brand of fertilizer, licensed for sale in the State during the year 1887, has been thus examined and the results are given in the subjoined table. By reference to this, it will be seen that the average solubility of the organic nitrogen is at least seventy per cent, showing that in the great majority of the fertilizers the best class of materials has been used. All the nitrogen from ammonia salts and from nitrates and all the organic nitrogen soluble in pepsin solution, may be considered as immediately available, and the sum of these three, *i. e.* columns 2, 3 and 5, forms column 8. Column 6 is found by dividing column 5 by column 4 and column 7 by dividing column 8 by column 1.

Copies of this and the succeeding bulletins will be sent free of charge to all who apply for them.

State Agricultural Experiment Station,
Burlington, Vt., Jan. 23d, 1888.

W. W. COOKE,
Director.

*The analytical method used was as follows: Equal quantities of at least three samples of each fertilizer were mixed and well pulverized. The pepsin solution contained 5 grams of "Golden Scale Pepsin" to the litre, and 0.2 per cent of muriatic acid. Two grams of fertilizer was digested with 200 c. c. of above pepsin solution at a temperature of 104° F.; after two hours' digestion, 0.1 per cent of muriatic acid was added; every three hours this was repeated, so that at the end of twenty-four hours' digestion, the quantity of muriatic acid present amounted to one per cent. The heating was not continuous, but the solution was allowed to cool at night, so that to obtain the twenty-four hours of actual heating, required parts of three days and two nights of cooling. The solution was then filtered, the residue washed thoroughly with water and dried. The amount of undissolved nitrogenous matter in this residue was determined by the Kjeldahl method.

STATE AGRICULTURAL EXPERIMENT STATION.

BULLETIN NO. 5.

It has often been claimed by farmers that the chemist in his analysis of commercial fertilizers, does not tell them enough about their composition. They say that the chemist gives them the commercial value only, while the agricultural value, which is the important thing to the farmer, is not shown.

With regard to phosphoric acid and potash, the present methods of chemical analysis are quite satisfactory and furnish a reliable basis for a judgment as to the agricultural value of these ingredients. But in the case of nitrogen, the complaint of the farmer has some foundation in fact. It is a fact that a fertilizer can be manufactured which shall analyze high in nitrogen and yet have very little value as a fertilizer. The ordinary method of analysis, such as is required by the State law, and has formerly been in use in this State and is commonly used in many other States, gives the total amount of nitrogen in the fertilizer without showing whether or not the nitrogen is in a form available for plant food. The principal use of commercial fertilizers in Vermont is to give an early and vigorous start to hoed crops. It is important then for Vermont farmers to know how much of the nitrogen in each of the fertilizers sold in the State is in such a form that it is available for this rapid growth.

Nitrogen is put into commercial fertilizers in three forms as nitrogen of *ammonia* salts, nitrogen of *nitrates* and nitrogen in combination with animal or vegetable matter, commonly called *organic nitrogen*. All ammonia salts and nitrates are soluble in water and hence immediately available to the plant. With organic nitrogen the case is quite different. The principal sources of organic nitrogen are dried blood, fish scrap, bone meal, slaughterhouse refuse, horn and hoof meal and leather waste. These materials have a very different agricultural value; dried blood, for instance, decays rapidly in the soil and yields its nitrogen to the crop, while hoof and horn meal and leather waste are almost worthless, resisting for a long time the process of decay.

No. of License.	BRAND OF FERTILIZER.	1	2	3	4	5	6	7	8
		Total Nitrogen.	Nitrogen from Ammonia Salts.	Nitrogen from Nitrates.	Organic Nitrogen.	Organic Nitrogen soluble in Pepsin solution.	Per cent of Organic Nitrogen soluble in Pepsin solution.	Per cent of total Nitrogen immediately available.	Whole amount of Nitrogen immediately available.
1	Soluble Pacific Guano.	2.48	0.32	....	2.16	1.59	74	77	1.91
2	Bradley's X. L. Superphosphate.	2.74	0.23	0.37	2.14	1.76	82	86	2.36
3	Bradley's Potato Manure.	3.30	0.11	0.42	2.77	2.30	83	86	2.83
4	Bradley's B. D. Sea Fowl Guano.	2.71	0.06	0.48	2.17	1.66	77	81	2.20
5	Cumberland Superphosphate.	3.11	0.15	0.74	2.22	1.49	67	76	2.38
6	E. Frank Coe's High Grade Superphosphate	2.19	0.55	....	1.64	1.27	78	83	1.82
7	Standard Fertilizer.	2.37	0.51	....	1.86	1.31	70	77	1.82
8	Standard Guano.	1.17	0.27	....	0.90	0.71	79	84	0.98
9	Bowler's Stockbridge Manure.	4.87	1.68	....	3.19	2.37	74	83	4.05
10	Bowler's Hill and Drill Phosphate.	2.92	0.49	....	2.43	1.85	76	80	2.34
11	Buffalo Ammoniated Bone Superphosphate.	3.22	0.12	....	3.10	2.04	66	67	2.16
12	Buffalo Potato, Hop & Tobacco Phosphate.	2.28	0.69	....	2.19	1.51	69	70	1.60
13	Buffalo Special Superphosphate.	1.97	0.08	....	1.89	1.31	69	70	1.40
14	Tucker's Bay State Bone Superphosphate.	2.88	0.10	....	2.78	1.26	45	47	1.36
15	Bay State Fertilizer.	2.66	0.88	....	1.78	1.24	70	79	2.12

No. of License.	BRAND OF FERTILIZER.	1	2	3	4	5	6	7	8
		Total Nitrogen.	Nitrogen from Ammonia Salts.	Nitrogen from Nitrates.	Organic Nitrogen.	Organic Nitrogen soluble in Pepsin solution.	Per cent of Organic Nitrogen soluble in Pepsin solution.	Per cent of total Nitrogen immediately available.	Whole amount of Nitrogen immediately available.
16	Homestead Superphosphate.	2.32	0.26	....	2.06	1.22	59	64	1.84
17	Americus Ammoniated Bone Superphosphate.	2.70	0.33	....	1.77	1.25	71	81	2.18
18	Americus Special Potato Fertilizer.	3.74	1.99	....	1.75	1.33	76	89	3.32
19	Cleveland Superphosphate.	2.51	0.45	....	2.06	1.56	76	80	2.01
20	Quinnipiac Potato Manure.	4.19	0.47	0.79	2.93	2.07	71	80	3.33
21	Quinnipiac Phosphate.	3.48	0.39	0.48	2.71	1.70	63	71	2.47
22	Pine Island Phosphate.	3.23	0.33	0.48	2.52	1.52	60	69	2.23
23	Common Sense Fertilizer, No. 1.	2.15	0.71	0.36	1.08	0.35	32	66	1.42
24	Common Sense Fertilizer, No. 2.	2.95	1.94	0.13	0.88	0.28	32	80	2.35
25	Common Sense Special Sol. Fertilizer, No. 22	3.01	0.99	0.14	1.88	1.29	69	84	2.52
26	Orient Complete Manure.	1.96	0.27	....	1.69	1.13	67	71	1.40
27	Bowler's Potato Phosphate.	3.01	1.34	....	1.67	0.77	46	70	2.11
28	Liebig's Ammoniated Bone Superphosphate.	1.79	0.54	....	1.25	0.70	56	61	1.09
29	Bowler's Ammoniated Dissolved Bone.	2.51	0.18	....	2.33	1.43	61	64	1.61
30	Cumberland Seeding Down Fertilizer.	1.97	0.35	0.35	1.27	0.97	76	85	1.67

47-M-44

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.
OFFICE OF THE EXECUTIVE COMMITTEE.

Ebbitt House, Washington, D. C., January 24, 1888.

Dear Sir:

The bill making the appropriation to carry into effect the Agricultural Experiment Station act, approved March 2d, 1887, passed the House of Representatives, on the 18th inst. That same day the bill was reported to the Senate and there referred to the Committee on Appropriations. That Committee considered the bill at its weekly meeting on Thursday, 19th, but because of some unexpected objections, the subject was laid over for a week. Efforts have been made to secure a special meeting of the committee to act earlier on this matter, but other committee meetings and engagements have prevented. The assurance has now been given that on Thursday next, the committee will not only consider this bill, but act upon it, and, with special assistance which has been sought, it is hoped that the Senate will be led to take up the bill and pass it before the close of this week.

It therefore seems desirable, in order to avoid delays in inaugurating this work in the several States, to call attention to certain features of it, and to the steps which are necessary to secure prompt payments from the U. S. Treasury to the institutions entitled thereto under the law.

The bill as it has passed the House, provides for the payments at the rate of \$15,000 a year, to date from July 1, 1887. As soon as this appropriation is approved by the President, there will be payable the two payments now overdue, or \$7,500, in every State. On the first of April next, \$3,750 more, and a like sum on July 1, 1888.

The provisions of the act of March 2, 1887, relating to the portion available for building, and repairs of buildings, remain unchanged. The appropriation for the year ending June 30, 1888, is the only one from which one-fifth, or \$3,000, can be used for building purposes.

Section 6, of the law, should also be noted: Any portion of the

\$15,000 appropriated for the current year, which "remains unexpended" on the 30th of June next, will be deducted from the appropriation for the next fiscal year.

In behalf of the members of this Association, and others interested, the Executive Committee have consulted the officers of the U.S. Treasury Department, and are thus authorized to make the following statements:

While the law remains in force, and the necessary appropriations are made to carry it into effect, the U.S. Treasurer will make quarterly payments thereunder, by transmitting his draft directly to "the treasurer or other officer duly appointed by the governing boards" of the institutions entitled to the same. No application by such officer will be necessary, and no receipt required other than the proper endorsement of the Treasury draft.

But certain preliminary action is necessary, that it may be properly determined who these treasurers or other officers are to whom the payments are to be made.

Every institution entitled to payments under the said law, or claiming the same, should, therefore, furnish to the Secretary of the Treasury the following papers in evidence: 1st. A copy of the act of the State Legislature, "assenting" to the grant under the conditions of the act of March 2d, 1887, or the certificate of the governor, as provided by Section 9 of said act; this paper should be duly certified, and bear the great seal of the State.

2d. Unless such act of the legislature, or governor's certificate, specifically designates the institution or institutions to which this grant is assigned, a further certificate is necessary to show what institutions in the State received the benefits of the land grant act of July 2, 1862.

3d. A copy of the charter or organic law of the State, establishing the "governing board"(s) of the institution(s) designated, to be similarly certified and sealed.

4th. A transcript from the minutes of the corporation or governing board of the institution designated, showing the organization of the board, and especially "the treasurer or other officer duly appointed" to receive these payments from the United States, his full

name and post-office address being given. This should be signed by the Secretary, and, if practicable, countersigned by the president, and should bear the seal of the corporation. A certificate of the secretary should be added, to the effect that this treasurer continues in office at the date given.

5th. If the regular report of the institution concerned is a legislative or public document, it will be well to send a copy thereof with the other papers.

It is desirable to furnish these papers to the Secretary of the Treasury as early as practicable, in order to avoid delays in the first payments.

The Executive Committee of this Association will be pleased to assist, in any manner possible, in the inauguration of the work of the new stations, at least until the U.S. Department of Agriculture is prepared to render such assistance. Address the chairman of the committee at Amherst, Mass.

For the Executive Committee,

Yours, very respectfully,

Henry E. Alvord.

Chairman.

47-M-64

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.
OFFICE OF THE EXECUTIVE COMMITTEE.

Ebbitt House, Washington, D. C., January 31, 1888.

Dear Sir:

The bill making appropriations for Agricultural Experiment Stations for the fiscal year ending June 30, 1888, was yesterday passed by the Senate, with an amendment. Just before adjournment for the day, Mr. Hatch secured the concurrence of the House. The amendment removes the restriction of payments to money "proceeding from the sales of public lands," and substitutes "out of any money in the Treasury not otherwise appropriated." The bill now goes to the President for his approval, and there can be no reasonable doubt of this, considering the passage of the bill unanimously in the House, and with but a single opposing voice in the Senate.

Aware of the annoyance arising from the order of the Post Office Department requiring the autograph signature of the director upon all bulletins and reports mailed free by Stations, under "the Hatch Act," this committee has secured from the Postmaster-General a modification thereof, which has been issued under date of January 27, 1888, as follows:

ORDER NO. 22.

Paragraph 3, of Section 419, of the Postal Laws and Regulations of 1887, is hereby so amended as to read as follows:

3. Only such bulletins or reports as shall have been issued after the station became entitled to the benefits of the act can be so transmitted free; and they must be inclosed in unsealed envelopes, or so wrapped as to admit of easy and thorough examination. On the exterior of the envelope or wrapper must be written or printed the name of the station and the place of its location, the designation of the inclosed bulletin or report, and the word "FREE" over the signature of the officer in charge of the station, to be written by himself or by some one duly deputed by him for that purpose. If any other matter, printed or written, be added, the whole will be unmailable free.

DON M. DICKINSON,
Postmaster General.

In explanation of this order, I am authorized by the Postmaster-General to state that the signature may be affixed by a fac-simile stamp, the director or other officer being expected to properly guard the use of the same. Also that the words "Bulletin," or "Annual Report," serve as a sufficient designation of the contents of the package mailed, without the addition of any date or number. The full regulations of the P.O. Department, as amended, can be obtained upon application to the Postmaster General. This franking privilege must be applied for, and special authority given to exercise it, in every case.

The question having been asked as to how far the several Stations must account to the U.S. Treasury Department for expenditures made under the Congressional appropriations, and also as to the nature of the expenditures that will be allowed, this Committee addressed a communication on these subjects to the First Comptroller of the Treasury, and a reply has been received, dated January 30, 1888, which contains the following:

"In response I will state, such annual financial statement with vouchers should not be sent to the Treasury Department to be audited here. See Sec. 3 of the Act. A copy, simply, of the report that is made to the Governor, is to be made to the Secretary of the Treasury. The answer to your first question being in the negative, disposes of the other questions contained in your letter."

Judge Durham stated verbally, in addition, that he regarded the whole question of regulating the expenditures of the Stations and auditing their accounts, as belonging exclusively to their respective governing boards.

This Committee will issue one more circular, within a few days, regarding methods of importing books, apparatus, etc., free of duty, and the Washington office of the Committee will then be discontinued.

For the Executive Committee,

Yours, very respectfully,

Henry E. Alvord
Chairman.

47-M-64

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.
OFFICE OF THE EXECUTIVE COMMITTEE.

Ebbitt House, Washington, D. C., February 7, 1888.

Dear Sir:

The act making appropriations for Agricultural Experiment Stations, for the current fiscal year, was approved by the President on the first day of February.

Payments under this act will soon begin in the manner described in a former circular. The Secretary of the Treasury desires to wait until all the institutions making claims under the law have filed their papers, but may direct payments to begin when the greater part of these papers have been received and found satisfactory. Up to this date only fifteen States have signified their assent or acceptance of the grant, and from several of these the papers sent are incomplete.

Attention is invited to that portion of a circular from this Committee, dated January 24, 1888, which relates to the evidence required by the Treasury Department from the institutions claiming the payments. Such institutions, which have not already done so, are urged to forward the papers described, with the least possible delay.

In a very recent letter addressed to the Secretary of the Treasury, by the First Comptroller, in regard to a special case, the latter expresses the opinion that legislatures in giving their assent should designate the institutions to which payments are to be made. Although it is not likely that, under this decision, the First Comptroller will, in many instances, insist upon further action in States where the legislatures have not made such designation, it is recommended that this matter receive attention in the cases where the legislative assent is still to be given.

The regulations of the Treasury Department regarding the importation of books, apparatus, etc., free from customs duties, transported by mail and otherwise, are very simple and will be furnished upon application to the Secretary. The existing circulars on this subject

which should be asked for, are Department No. 75, of June 27, 1882, and Department No. 140, of November 24, 1883. A new and condensed circular of information on this subject will probably be soon prepared by the Department for the guidance of members of this Association.

The publication of the Proceedings of the Convention in October, 1887, which resulted in the organization of this Association, has been unfortunately but unavoidably delayed, and the pamphlet cannot now be expected before the last of the present month. Recognizing the importance of placing in the hands of members of the Association and others, at the earliest day possible, the Catalogue of Useful Books prepared at the request of the convention by Dr. S. W. Johnson, of New Haven, a special circular embodying the same, and which is now in press, will be issued by the Commissioner of Agriculture in advance of the pamphlet of proceedings.

The Commissioner hopes to be able to soon establish in the Department of Agriculture an office of inter-communication between the several Colleges and Stations and the Department, as recommended by the Convention in last October. The permanency of such an office will depend upon the favorable action of Congress in connection with the annual appropriation for the Department of Agriculture. The Association charged this committee to give attention to this subject, but the general aid and co-operation of members of the Association will be useful, in the form of correspondence with Senators and Members of Congress.

The annual appropriation for Stations for the next fiscal year will be in charge of the Committee on Agriculture of the House of Representatives, and no trouble in that connection is apprehended. The first financial report from Stations will be due in February, 1889, and that will be expected to include the disbursements up to and including the last quarter of the current calendar year.

Please address the undersigned, until further notice, at Amherst, Mass.

For the Executive Committee,
Yours, very respectfully,

Henry E. Alvord
Chairman.

ARKANSAS INDUSTRIAL UNIVERSITY,
AGRICULTURAL EXPERIMENT STATION.

BULLETIN No. 3.

APRIL, 1888.

PRESS PRINTING CO., LITTLE ROCK.

ARKANSAS INDUSTRIAL UNIVERSITY,

AGRICULTURAL EXPERIMENT STATION.

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STATION COUNCIL.

The Board of Control. The President of the University. The Director of the Station.

STATION OFFICERS.

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WM. TRELEASE,	- - - - -	Consulting Botanist.
S. S. TWOMBLY,	- - - - -	Chemist and Vice-Director.
F. W. SIMONDS,	- - - - -	Microscopist.
S. H. CROSSMAN,	- - - - -	Entomologist.
E. H. RICHMAN,	- - - - -	Horticulturist.
R. R. DINWIDDIE,	- - - - -	Veterinarian.
C. B. COLLINGWOOD,	- - - - -	Chemist.
F. CORY,	- - - - -	Ass't at Pine Bluff.
R. L. MUNN,	- - - - -	Ass't at Jonesboro.
J. K. FITZGERALD,	- - - - -	Ass't at Texarkana.

In issuing this bulletin our aim has been to place in the hands of every fruit grower the best means of dealing with two of the worst pests of the orchard, the Peach Borer and the Codling Moth. We have given a short description of each insect, its life, history, methods of attack and remedies. Other bulletins will be issued from this department as material accumulates throughout the year.

The Peach Tree Borer—Egeria exitiosa, Say—The great pest of the peach is a native of America. The moth appears in this State from June to September. There is only one brood per year. The eggs are laid from June to September on the bark of the trees at the surface of the ground; they are deposited singly and glued to the bark. As soon as they are hatched the larvae or worms eat their way downward in the bark beneath the surface of the ground and feed upon the inner bark and sap-wood. The position of the larvae can be easily detected by removing the earth from the base of the tree. They always cause a copious exudation of gum from the tree, especially when they are very numerous. The gum becomes very thick and dark. In the spring larva of all sizes can be found between the gum and the bark. The full grown larva is over an inch long by one-fourth inch broad. It is a whitish-yellow grub with dark head. In the University peach orchard six trees were examined and five of them were more or less injured by the borers, while one of them was nearly destroyed. The trees were four years old. In some cases the insect attacks the trees at the forks of the branches—two cases of this kind were found in our orchard. The exuded gum will always mark the place of injury.

When nearly a year old the larva is ready to change to a pupa. It then crawls to the surface of the earth and there

constructs its cocoon of castings, gum and silk. The cocoon is brown in color and oval in form; usually its upper end is slightly above the surface of the ground. It this state it remains for about three weeks, when the adult moth appears and is soon ready to begin laying its eggs; thus completing the generation.

REMEDIES.

Various methods have been proposed for destroying this insect. Some of them have been useless while others have a greater or less value. The following are some of the most important methods yet proposed:

Hand Picking and Killing—Either late in the fall or early in the spring, the earth is removed from the base of every tree as far as the roots. When there is any gum present the larvae are searched for and killed. This is a very slow method and it is very difficult to find them all, especially when they are as numerous as they are this spring in this locality. After the larvae have all been killed the earth should then be returned to the tree. If the work is thoroughly done this is a very effective method of dealing with this pest. Failures often result because the work was slighted.

Mounding the Trees—This method consists in mounding the trees to a height of several inches in late spring and not removing the earth until the moths are all dead in the fall. The great fault of this method is that it makes the bark of young trees too tender to endure the cold weather. Consequently, this treatment should not be used until the trees are four years old.

Bandaging the Trunk—In this remedy it is proposed to cover the trunk of the tree with straight straw, which is held in place by strings and earth. It is said to be quite effective.

Hot Water—This method has proved very effectual and is not hard to apply. In late fall or early spring the earth is removed from the base of the tree as in the first method. If any gummy substance is found it should be scraped from the

tree, and in particular all holes under the bark which are filled with gum should be cleaned out. Hot water is then to be thrown against the infested part of the tree. An ordinary pail may be used for throwing the water against the trees, but a force pump would throw the water into every hole. After the water has been applied the earth should be returned to the base of the tree. This method was tried April 2, on five trees in the University peach orchard. The earth was dug away and about one gallon of boiling water was applied to each infested tree; the earth was then returned. Two days afterwards a thorough examination was made of the five trees and only one tree was found to be infested with live larva. They were in the bottom of a hole covered with gum. This hole was overlooked before the hot water was applied.

The Codling Moth—Carpocapsa pomonella, Linn.—There are two broods of this insect per year. For the spring brood the eggs are laid in the blossom ends of the early fruit. They hatch in about a week and the young larva or worms eat their way into the fruit, usually causing it to fall prematurely. When fully grown the worms eat their way out through the apple and seek some secluded spot in which to spin their cocoons and undergo their transformations. In about two weeks the adult moth appears and soon begins to lay its eggs for the second brood in the blossom ends of the late fruit. When hatched the young larva eat their way into the apple, and like the first brood, when fully grown, they eat their way out through the apple and spin their cocoons in some secluded place. In this state they remain throughout the winter and in spring, about the time the apples come into bloom, the adult moth escapes and is soon ready to lay the eggs of the spring brood, thus completing the year. The moths lay their eggs at night and hide themselves during the day in some secluded place.

REMEDIES.

Various remedies have been proposed, and all except two have proved useless.

The Bandage Method—Bands of hay or cloth are tied around the trunk of the tree. When the adult larva escapes from the apple it crawls down the trunk of the tree and finds a good place under these bands to spin its cocoon. The bands must be all looked over at least once in ten days and all larvae or cocoons destroyed; this treatment should be kept up until the apples have been gathered. It has not been universally practiced because the labor is so great in a large orchard and oftentimes the fruitgrower would neglect the work. Moreover, the treatment does not protect the present year's crop while it would nearly always happen that some neglected orchard would always serve as a breeding place for the moths.

The Use of Poisons—This is much more effectual than the preceding method. It is done by thoroughly spraying the tree, at the right time, with Paris green or London purple and water.

In applying this remedy Prof. Cook recommends that the following suggestions be followed:

1st. The poisons should not be too strong. One pound Paris green to one hundred gallons water. Some entomologists recommend that the mixture be a little stronger.

2d. Care should be taken to procure Paris green or London purple that is not adulterated. Failures often result from the use of adulterated poisons. Purchase of reliable firms.

3d. The application of the poison should be made in time. The best time to apply it is just as the blossoms are falling off and before the apples droop. If applied too late the young larva will have eaten its way into the apple and will be out of the reach of the poison.

4th. The poison should be thoroughly applied. It should reach every flower on the tree.

With ordinary care there is no danger of being poisoned. All poisons should be labeled when not in use.

The size of the orchard must determine the kind, size and cost of the force pump to be used. There are various pumps upon the market and the orchardist must select one to meet his wants.

S. H. CROSSMAN.

Arkansas Agricultural Experiment Station,

—AT—

ARKANSAS INDUSTRIAL UNIVERSITY.

ALBERT E. MENKE, Director.

Fayetteville, Ark., Mar 1 1888

My dear Doctor.

Your letter to hand it is what I expected all along. I have a very vivid remembrance of our conversation a few days after they polished me off (Heaven bless them for it). Crandall & Potter never were friends of yours, about the others, Heilde & Shackelford I don't know. Scovell I guess has vowed & renewed protestations of friendship & affection. I owe him one that shall be repaid some time; I am only waiting for him to make a slip in any mortal thing. I would give five years of my life to get even with some of that crew and I will. The Courier Journal of recent date mentioned something about a Committee but had nothing personal in it. If I were in your position I would under no considerations resign at present. You are well off and can afford to indulge in a little of the wild justice of revenge. If you could only inspire the Committee with the idea that some of the malcontents want the Presidency for themselves it would spoil them. If they are successful & do manage to work your retirement you could very easily knock off the 1/2 cent tax. A pamphlet emanating from you in its unconstitutionality, no matter that they might say disappointment caused it would be

Arkansas Agricultural Experiment Station,

—AT—

ARKANSAS INDUSTRIAL UNIVERSITY.

ALBERT E. MENKE, Director.

Fayetteville, Ark., 188

a peg on which the College's enemies could build something. You can be pugnacious and I hope I trust you will defeat the whole combination. Here everything is smooth at present and I think we have a good future before us. They have treated me splendidly. My salary has been raised without any effort on my part & taking it all in all it was the luckiest thing that ever happened to me, nevertheless I haven't any of that infernal crew to thank for it & the more power & the more money I get the better able I shall be to repay them. With kindest regards to all your family.

Yours

Yours sincerely

Albert Menke.

47-M-64

ASSOCIATION of AMERICAN AGRICULTURAL COLLEGES and EXPERIMENT STATIONS,
Office of Executive Committee.

AMHERST, MASS., March 23, 1888.

DEAR Sir—

At the request of a number of the institutions interested, several questions regarding the accounts and obligations of Agricultural Experiment Stations, under "the Hatch Act," have been submitted to the First Comptroller of the Treasury Department at Washington. It seems unnecessary to give the written replies of Judge Durham in full, but from these decisions, here on file, the following condensed statement is presented for your information:—

1st. Under Section 237 of the Revised Statutes of the United States, all appropriations for Agricultural Experiment Stations and all expenditures and accounts of the same, must be for and limited by the fiscal year of the U. S. government, which ends June thirtieth.

2nd. The quarterly payments to Stations are held to be, not in advance, but for the calendar and fiscal quarters next preceding the days specified for the payments. The payment of July first, should therefore be regarded as belonging to the quarter ending the day before and should be included in the account for the year ending the thirtieth of June.

3d. The annual reports of Stations, which are due "annually, on or before the first day of February" * * * "including a statement of receipts and expenditures," may very properly include in the "reports," full descriptions of operations for the previous *calendar* year, but financial "statements," should be only for the *fiscal* year last preceding. Accordingly, the first report and statement, a copy of which will be expected by the Secretary of the Treasury of the United States, should be made in January, 1889, and should include the receipts and expenditures for the fiscal year ending June 30, 1888.

4th. The portion of funds unexpended, which reverts, as provided by Section 6 of the Act of Congress approved March 2d, 1887, will be the balance at the close of the fiscal year, as shown by the statement above described.

5th. The one-fifth proviso for building purposes, under Section 5, of "the Hatch Act," is held to apply to the annual appropriation for the fiscal year ending June 30, 1888, that being "the first annual appropriation" under said act.

It will be noted that according to these decisions the annual financial statement is not expected at Washington until more than six months after the close of the period covered thereby.

The list of books useful for Station workers, as prepared by Prof. Johnson of New Haven, has been published and if not yet received, copies may be obtained by addressing the U. S. Commissioner of Agriculture, at Washington.

The preliminary report of the Committee on Station Work, appointed at the convention of October, 1887, is nearly ready for issue as a special bulletin from the Department of Agriculture.

The Convention Proceedings are not yet in type and their appearance depends upon the possibilities and limitations of the public printing office.

You are respectfully requested to send to the undersigned a report of the organization of the Agricultural Experiment Station with which you are connected, or which is connected with your institution, as soon as the same is perfected, in order that a directory of Stations and station officers may be prepared for distribution.

For the Executive Committee,

Yours, very respectfully,

Henry E. Alvord
Chairman.

Arkansas Agricultural Experiment Station,

—AT—

ARKANSAS INDUSTRIAL UNIVERSITY.

ALBERT E. MENKE, Director.

Fayetteville, Ark., April 8 1888

My dear Doctor.

I have delayed answering your letter some time, as I wished to be sure about our election. The Board will not meet until December. I see the Mass Agr Coll is about to elect a President. How did everything turn out in Dec? I am very anxious to hear the result. We have now 408 students, not so bad, and will surely run up to over 500 before the year closes. Trusting you are all well. I am with very best wishes.

Very sincerely
Albert Menke

KENTUCKY AGRICULTURAL
EXPERIMENT STATION,

AT
State College of Kentucky.

M. A. SCOVELL, Director.

Lexington, Ky., May 29th 1888

Bulding Committee Experiment Station Building
at the College Lexington Kentucky

Gentlemen

I propose to build Experiment Station Building
according to plans & specifications for the sum of
Thirteen Thousand five hundred (13500) dollars, subject
to the following reductions from said plans to wit;

1. Use Limestone instead of Slate for Roof
2. Lexington Pressed Brick in place of Baltimore
3. Lexington Stone in place of Kentucky River or Bowling Green
4. Pressed Brick in place of cut stone except for ^{cellar} foundation & steps
1st & 2nd stories to be finished complete

Very Respectfully,

W. E. Grubb

Woodland Park Lexington Ky

KENTUCKY AGRICULTURAL
EXPERIMENT STATION,

AT

State College of Kentucky.

M. A. SCOVELL, Director.

Lexington, Ky., May 29th 1888

Building Committee, Experiment Station Building
A & M College Lexington Ky

Sir:

I propose to build Experiment
Station Building according to plans & Specifications
for the sum of Twelve Thousand (\$12,000) dollars
subject to the following reductions & alterations from
said plans & specifications viz; Make basement
the height shown on old plans of Lexington Sum. Stone,
use Lin in place of slate for roof; Lexington pressed
Brick instead of Baltimore Brick; Pressed Brick
in place of cut stone & cast window sills and
outside steps; First Story only to be finished
inside, Stairway to be completed from basement
to second floor; Brick Stack reduced to two feet in
diameter; The three highest stacks shown on plans to be
reduced 4 feet in height; Iron hearths in Office and
Library in place of tiling. Shafts of stacks showing
above roof plain instead of paneled as shown.

Very Respectfully W. E. Griffiths
Woodland Park Lexington Ky

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ASSOCIATION

OF

American Agricultural Colleges

AND

EXPERIMENT STATIONS.

Office of Executive Committee.

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1887-88.

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Springfield, Ohio.

DIOTATED

Maryland Agricultural College.

Prest. Jas. K. Patterson, LL. D.

St. A & M College of Ky.

Lexington, Ky.

July 10th., 1888.

My dear sir:

Nothing has been done about calling the next convention of our Association because, I supposed it was generally preferred to wait until after the heat of summer.

Propositions are now coming, however, for our Association to meet in August, in connection with other meetings in which many of our members are interested.

The Official Agricultural Chemists meet at Washington on Thursday August the 9th., and their Executive Committee invite our Association to meet at the same place, the same week.

On the 14th of August, the Am. As. Adv. Science meets at Cleveland and continues in session a full week. The Society for the Promotion of Agricultural Science, meets at Cleveland August 20th and 21st, to be immediately followed by the meeting of the Teachers of Agriculture and Horticulture. It is proposed that our Association should be called to meet at Cleveland on Wednesday or Thursday the 22nd or 23rd of August. We should thereby be able to take advantage of the Railroad and Hotel rates, arranged by the American Association.

It is doubtless true, that a meeting at Cleveland or at Washington, in Aug., as has been suggested, would accommodate many of our members, - and more at Cleveland than at Washington.

The question which the Officers and Executive Committee of our Association should now decide is, whether, for the reasons stated, to call our next convention in Aug., at Cleveland or Washington, or to wait until a later date.

Please let me have your views on this subject at once as the matter should be speedily settled.

Yours respectfully,

Henry E. Alvord.

New York Agricultural Experiment Station

PETER COLLIER, DIRECTOR.

BULLETIN NO. 11—NEW SERIES.

SEPTEMBER, 1888.

1. EXPERIMENTS IN CULTIVATION.
 2. EXPERIMENT IN ROOT GROWTH.
 3. EXPERIMENT WITH FERTILIZERS.
 4. EXPERIMENTS WITH INSECTICIDES.
 5. EXPERIMENTS WITH FUNGICIDES.
 6. EXPERIMENTS WITH THE POTATO.
 7. EXPERIMENTS WITH SORGHUM.
-

GENEVA, N. Y.

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WM. P. WHEELER,	-	-	First Assistant.
EMMETT S. GOFF,	-	-	Horticulturist.
M. H. BECKWITH,	-	-	Asst. Horticulturist.
E. F. LADD,	-	-	Chemist.
FRANK E. EMERY,	-	-	Sup't of Farm.
GEO. W. CHURCHILL,	-	-	Farmer.
FRANK E. NEWTON,	-	-	Stenographer.

The first nine bulletins issued in the new series are now nearly out of print, and copies cannot be supplied.

HORTICULTURAL DEPARTMENT.

EMMETT S. GOFF.

BULLETIN NO. 11 - - NEW SERIES.

INTRODUCTORY.

The bulletins now being issued are intended to meet a very natural and proper desire among the farmers of our state to know in what departments of work the Station force is engaged. The experiments outlined are for the most part now in progress, hence results cannot be given. These will be given in due time, either in future bulletins, or in the annual reports of the Station.

1. EXPERIMENTS IN CULTIVATION.

4. THE INFLUENCE OF THOROUGH AS CONTRASTED WITH SLACK CULTIVATION ILLUSTRATED.

This experiment is to be continued through a term of years on the same plats—fourteen in number, containing one-twentieth acre each.

The plats are all to be plowed at the same time and in the same

manner; plat *a* to receive no harrowing, *b* to be harrowed well once, *c* twice, *d* three times and so on up to *g*, which will be harrowed six times. Then the order will be reversed; *h* being harrowed six times, *i* five times, and so on, the last plat (*n*) not being harrowed at all. The plats, on which the crop will be varied from year to year, are to be treated in other respects alike, and the yields compared.

B. CULTIVATION OF CORN.

a. *The effects of root mutilation considered alone.*

Last season, it appeared* that cutting the roots of young corn plants to the extent accomplished by thorough cultivation, without the collateral effects of stirring the soil, reduced the yield more than twenty bushels per acre. This experiment is being repeated on two one-twentieth acre plats.

b. *Cultivation with respect to root mutilation.*

In this experiment it is assumed 1st, that root mutilation is injurious, and 2d, that the more the soil is worked without mutilating the roots, the more favorable will be the effect upon the plants.

Acting on this assumption, the ideal method of cultivation will be to cultivate the soil very shallow wherever it contains roots, and deeply where it contains no roots, in order to favor root growth to the utmost.

In order to eliminate in a great measure the influence of soil inequalities in different plats, in this, as in other experiments where practicable, *adjacent drills* are contrasted, rather than *adjacent plats*. The drills are planted upon plats of definite size for the sake of convenience.

This experiment is carried out in three duplicate series, each of which covers four one-twentieth acre plats. The plats each contain eight drills four feet apart, and an additional drill is planted between each two plats. As each drill to be considered in the ex-

*Report New York Agricultural Experiment Station for 1887, p. 93-94.

periment must be cultivated on both sides, only every alternate drill is available.

The plats will receive two cultivations; the first being given when the tips of the leaves, raised erect, are about four inches high, and the second when they are about twenty inches high.

First series—Surface cultivation contrasted with ordinary cultivation.

The second and sixth drills of each plat receive no other cultivation than that furnished by the garden rake and the necessary pulling of weeds.

The spaces on either side of the fourth and eighth drills are traversed twice in a place with an iron frame, steel-toothed cultivator, working as close to the plants as possible without injuring the stems or foliage.

Second series—Surface cultivation contrasted with ideal cultivation.

The second and sixth drills receive only surface cultivation as in the first series. The fourth and eighth drills are cultivated with the corn plow and garden rake. In the first cultivation the corn plow is passed four times through the spaces between the drills taking care that it comes at no time nearer than eight inches to the drill. At the second cultivation the plow is passed twice between the drills, keeping carefully at the center of the spaces. After each cultivation the surface is raked level, and on the part undisturbed by the plow, the crust is broken and pulverized with the rake.

Third series—Ordinary cultivation contrasted with ideal cultivation.

The second and sixth drills receive ordinary cultivation as in the first series and the fourth and eighth drills ideal cultivation as in the second series.

C. THE INFLUENCE OF CULTIVATION UPON SOIL MOISTURE.

A one-twentieth acre plat is subdivided into ten small plats of

equal size. On two of these plats the soil is left undisturbed except to pull the weeds. On a second pair the surface is raked over after every rain that is sufficient to puddle the surface. A third pair has the surface pulverized two inches deep after every rain and a fourth four inches deep. The fifth pair has the surface mulched one inch deep with oat straw.

Once each week a sample is taken to the depth of a foot from each of the ten plats and dried at 212° F. to determine the moisture. Each sample is then washed through a sieve of ten meshes to the inch and the parts which do not pass the sieve dried and their weight deducted from that of the fresh and dried sample.

2. EXPERIMENT IN ROOT GROWTH.

THE INFLUENCE OF DEPTH OF TILLAGE UPON THE DEPTH OF ROOTS.

Five small plats are worked to different depths; the first to the depth of two and a half feet, the second two feet, the third one and a half feet, the fourth one foot, and the fifth six inches. All are planted with Waushakum corn. After the plants have attained their growth the roots of sample hills on all the plats will be washed out to ascertain their average depth.

3. EXPERIMENT WITH FERTILIZERS.

THE FERTILIZING VALUE OF SWAMP MUCK SUPPLEMENTED BY COMMERCIAL PHOSPHORIC ACID AND POTASH, AS CONTRASTED WITH THAT OF STABLE MANURE.

This experiment is to be carried on through a series of years. Two series of plats were selected that have been similarly treated since the establishment of the station. One of these receives a moderate dressing of well rotted stable manure, and the other a moderate dressing of swamp muck supplemented by as much phosphoric acid and potash in commercial forms as is contained in the stable manure. The muck is supposed to supply the nitrogen and the lightening quality to the soil furnished by the humus of the manure.

4. EXPERIMENTS WITH INSECTICIDES.

A. SALT FOR ROOT-INFESTING INSECTS.

Common salt to be applied in solution to the roots of plants attacked by maggots, as the cabbage and radish, making the application sufficiently early so that the roots may have time to absorb a portion of the salt, if they are capable of doing so.

B. POTASSIUM SULPHIDE FOR ROOT-INFESTING INSECTS.

To be applied in solution at the rate of an ounce of the sulphide to a gallon of water, pouring a tablespoonful about the stem of each plant.

C. KEROSENE ATOMIZED DIRECTLY WITH WATER.

To be accomplished by the use of a special apparatus whereby the kerosene may be reduced to a fine spray in connection with water, and applied without the use of an emulsion.

E. LONDON PURPLE FOR THE PLUM CURCULIO.

The poison to be applied with water by means of the spraying pump and hose.

D. PARIS GREEN CONTRASTED WITH LONDON PURPLE AND THE "ZOEKTEIN" POISON FOR THE CODDLING MOTH.

All to be applied with water as above noted.

F. THE BEAN PLANT AS A REPELLANT FOR THE STRIPED BEETLE.

Seeds of the common garden bean to be planted with those of the squash and other cucurbits as a preventive of injury from the striped cucumber beetle.

5. EXPERIMENTS WITH FUNGICIDES.

A. POTASSIUM SULPHIDE FOR THE GOOSEBERRY MILDEW.

The foliage to be sprayed with a solution of half an ounce and smaller amounts of the sulphide to a gallon of water, the applica-

*See Report New York Agricultural Experiment Station, 1887, p. 98-99.

tion to commence as soon as the leaves appear, and to be repeated after every hard rain until mid-summer.

B. POTASSIUM SULPHIDE AND CALCIUM SULPHIDE CONTRASTED WITH HYPO SULPHITE OF SODA FOR THE APPLE SCAB.

To be applied in solution by means of the spraying pump. The applications to be made on the same day and on trees of the same variety, leaving half of each tree unsprayed as a check, and to be repeated after every hard rain until mid-summer.

6. EXPERIMENTS WITH THE POTATO.

A. THE USE OF FERTILIZERS ABOVE AND BELOW THE SEED.

The experiment to cover four one-twentieth acre plats, each plat to contain eight drills four feet apart, the first, third, fifth and seventh drills in each plat to be planted with the fertilizer placed below the seed tubers; the remaining ones to have the fertilizer placed above them. In the first series, the fertilizer is to be strewn in the bottom of the furrow; in the second the seed tubers to be placed in the bottom, covered with an inch of soil, over which the same amount of fertilizer is strewn.

B. IS CUTTING THE TUBER DETRIMENTAL?

Experiments made in 1886* and 1887 indicate that small whole tubers for seed yield as much as cuttings of the same weight from large tubers.

As a final test, thirteen one-twentieth acre plats are devoted to this experiment. Each plat contains eight drills four feet apart, of which the first, third, fifth and seventh are planted with whole tubers, and the remaining ones with cuttings from larger tubers, the average weight of the cuttings and whole tubers in each successive pair of rows being precisely the same.

*Report New York Agricultural Experiment Station, 1886, p. 151-153. 1887, p. 86-87

C. SPROUTED, CONTRASTED WITH UNSPROUTED SEED TUBERS.

a. A Field Experiment.

The experiment to cover four one-twentieth acre plats, each containing eight drills four feet apart. The first, third, fifth and seventh drills in each plat to be planted with seed tubers that have already formed shoots an inch or more long, the remaining ones with those that have formed no shoots. The seed tubers were selected very early in spring before the shoots had commenced to form. The average weight of the tubers to be planted in each successive pair of drills was precisely the same. The seed tubers for one of each pair of drills were then placed in the greenhouse to form shoots, while those of the remaining drill were placed in a cool part of the cellar, where the eyes did not start.

b. A Laboratory Experiment.

As collateral to the above test, an experiment has been conducted intended to show how much, if any, of the stored nutriment of the seed tuber is consumed by the shoots that form in a warm cellar, previous to planting time.

D. DOES REMOVING THE SEED END PROMOTE EARLINESS?

On two one-twentieth acre plats, each containing eight drills, a comparison is made between the date of maturity of tubers from which the seed end was removed at the time of planting, and others from which an equal amount was removed from the stem end, the tubers being of equal weight at the beginning.

E. DOES EXPOSING THE TUBES TO THE LIGHT, FOR A TIME BEFORE PLANTING, PROMOTE EARLINESS?

This experiment is made on three one-tenth acre plats. The date of maturity of *C* plants grown from seed tubers that had been placed on the floor of a light room until the eyes had commenced to start is compared with that of others kept in a dark cellar until

planting time; the two series of tubers weighing the same at the commencement

F. THE INFLUENCE OF TREATMENT UPON VIGOR.

a. *Is the influence of soil hereditary?*

The yield of tubers grown last season on very poor soil is compared with that of others grown on rich soil, the experiment to be continued through a term of years.

b. *Is the increased vigor due to selection of seed tubers from the most productive hills* cumulative through successive years?*

The yield of seed tubers taken from the most productive hills of last season is compared with that of tubers of equal weight taken from the least productive hills, the same selections to be continued through a term of years.

G. WHY IS THE NUTRIMENT OF THE SEED TUBER REMOVED MORE RAPIDLY ON RICH THAN ON POOR SOIL†?

On a plat of very poor soil planted to potatoes, a part of the hills is mulched with a layer of washed sand two inches thick, while the others are left unmulched. If the nutriment is removed more rapidly from the seed tubers of the mulched hills, it will be evidence that it is a dearth of moisture that retards the utilization of the nutriment on poor soil.

7. EXPERIMENTS WITH SORGHUM.

A. THE INFLUENCE OF SELECTION UPON THE SUGAR CONTENT.

With the view of increasing the sugar content, the per cent. of sugar in the juice of many individual plants will be determined, and seed will be gathered for planting only from those plants that show the highest sugar content.

B. THE INFLUENCE OF SPECIAL FERTILIZERS UPON THE SUGAR CONTENT.

Numerous small plats are fertilized with various fertilizers

*See Report New York Agricultural Experiment Station for 1887, p. 82-86

†See Report New York Agricultural Experiment Station, 1888, p. 158-159, Agricultural Science, II p. 27.

separately and combined, and their influence on the sugar content of the juice will be determined.

C. A TEST OF VARIETIES.

There are being grown upon the experimental plats over one hundred and fifty named varieties of sorghum all quite new to this country with the exception of a few well known standard varieties which are grown for purposes of comparison.

It is hoped that several of these new varieties may prove to be especially valuable as forage plants or for use in the silo, if not for the production of syrup, sugar and seed.

In addition to the experimental work noted above, the usual tests of varieties in fruits and vegetables are being carried on, and the investigation of the potato scab, commenced last season by the assistant horticulturist, is being continued by him.

The investigations upon the physical properties of soils in progress last year are also being continued.

New York Agricultural Experiment Station

PETER COLLIER, DIRECTOR.

BULLETIN NO. 12—NEW SERIES.

SEPTEMBER, 1888.

DIGEST OF THE FERTILIZER LAWS IN SEVERAL STATES.
STATISTICS OF FERTILIZERS.
THE MAYNARD BILL.

GENEVA, N. Y.

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[The first nine bulletins issued in the new series are now nearly out of print, and copies cannot be supplied.]

DIGEST OF THE FERTILIZER LAWS IN SEVERAL OF THE STATES.

CONNECTICUT.

To all fertilizers retailing at ten dollars or more per ton the seller must affix a correct label and furnish to the Director of the Experiment Station a certified statement of its composition and a sealed sample must be deposited by the manufacturers or importers with the Director. The manufacturer or seller must deposit with the Director of the Experiment Station *an analysis fee of ten dollars* for each fertilizing ingredient which the fertilizer contains. Every person who sells or acts as agent for the sale of any commercial fertilizer shall annually, or at the time of becoming such seller, report to the Director of the Experiment Station his name, residence and postoffice address, also the brand of fertilizer sold. No person or party shall sell in the state any pulverized leather, raw, steamed, roasted or in any form, as a fertilizer, or as an ingredient of any fertilizer or manure without explicit printed certificates of the fact being conspicuously affixed to every package. The Director of the Experiment Station is authorized in person or by deputy to take samples for analysis.

MAINE.

For the purpose of protection from frauds in commercial fertilizers and from adulterations in food, feeds and seeds the Maine Fertilizer Control and Experiment Station was established. It provides that to every package of commercial fertilizer, the price of which exceeds ten dollars, there shall be affixed a certificate stating the number of net pounds in package, the name or trade mark of the brand, the name of the manufacturer, the place of manufacture and a chemical analysis of the fertilizer. For the sale of such fertilizer annually, by April 1, a license must be procured by the manufacturer, company or person selling in the state, from the Board of Managers for the Station. *A license fee of fifty dollars* for a single brand *and fifteen dollars* for each additional brand is required, and there must be furnished to the Secretary of the Board of Managers the names of all the agents authorized to sell the fertilizer in the state. The Director or his deputy is empowered to select annually fertilizers for analysis from these different packages, from three different sections of the state.

MASSACHUSETTS.

The new law, recently enacted in Massachusetts, provides that the manufacturer, importer, agent or seller shall, for any fertilizer which retails at more than ten dollars per ton, annually, before the first day of May, pay to the Director of the Experiment Station an analysis fee of \$5 for each of the three fertilizing ingredients—nitrogen, phosphoric acid and potash—claimed to exist in the brand. A printed statement must accompany each package giving the name and address of the manufacturer, also the chemical composition of the fertilizer. No person shall offer for sale any pulverized leather, raw, steamed, roasted or in any form as a fertilizer or ingredient of any fertilizer or manure without affixing a printed certificate of the fact to every package. The Director shall cause one analysis or more annually to be made of each brand of fertilizer and the results are to be published monthly.

NEW JERSEY.

Every commercial fertilizer offered for sale must be accompanied by an analysis and the method of stating the analysis is defined. The chemist of the State Board of Agriculture is the inspector of fertilizers and he must analyze annually one or more samples of every kind of fertilizer offered for sale. Any person interested may obtain an analysis, from the inspector, of any fertilizer, and for the certificate of analysis the parties must pay to the chemist a sum not exceeding fifteen dollars.

PENNSYLVANIA.

The law specifies that every package of commercial fertilizer offered or exposed for sale in the state shall have plainly stamped thereon the name of the manufacturer, place of manufacture, net weight of contents, and an analysis stating the per cent. Every manufacturer or importer must annually file with the Secretary of the Commonwealth an affidavit stating the amount of said fertilizer sold within the state during the preceding year. It is the duty of the Board of Agriculture to analyze such specimens of commercial fertilizers as may be furnished by its agents.

The license fee required is \$10 for every hundred tons sold, \$20 for 100 to 500 tons, and \$30 for above 500 tons.

NORTH CAROLINA.

The law in this state requires that the manufacturer or seller procure a license from the state treasurer for which he shall pay

a privilege tax of five hundred dollars for each separate brand or quality offered for sale. There must be also affixed to every package of fertilizer a printed label setting forth the name, location and trade mark of the manufacturer, also the chemical composition of the contents of each package. The Department of Agriculture may require the officers, agents or managers of any railroad or steamboat company to furnish monthly statements of the quantity of fertilizer, with the name of the consignor or consignee, delivered at any points in the state. They may even compel the company to submit their books for examination.

TABLE SHOWING STATES REQUIRING LICENSE, TAX, OR ANALYSIS FEE, FOR SALE OF FERTILIZERS:

STATE.	REQUIREMENTS*	AMOUNT REQUIRED.
Connecticut.....	Analysis fee..	\$10 per ingredient.
Delaware.....	Analysis fee..	\$30 to \$40.
Georgia.....	Tax.....	50 cts. per ton (for tags).
Indiana.....	Analysis fee..	\$2 and \$1 per 100 for tags.
Kentucky.....	Analysis fee..	\$15 and \$1 per 100 for tags.
Louisiana.....	Tax.....	50 cts. per ton.
Maryland.....	License.....	\$5 first 100 tons, \$2 for ea. add'l 100 tons.
Maine.....	License.....	\$50 first brand, \$15 each additional br'nd.
Massachusetts.....	Analysis fee..	\$5 each ingredient.
Michigan.....	License.....	\$20 per brand.
Mississippi.....	Analysis fee..	\$20. " "
New Hampshire.....	License.....	\$50. " "
New Jersey.....	Analysis fee..	\$15. " "
North Carolina.....	Privilege tax.	\$500. " "
Ohio.....	License.....	\$50. " "
Pennsylvania.....	License.....	\$10 for 100 tons, \$20 for 100 to 500, and \$30 above 500 tons.
Rhode Island.....	License.....	\$25.
South Carolina.....	Tax.....	25 cents per ton (for tags).
Tennessee.....	Tax.....	50 cents per ton.
Vermont.....	License.....	\$50.

* Recent legislative enactments may have slightly modified the law in some States.

In a few of the States the number of analyses made for the past year are given, and so far as known they are given below:

	No. analysis.
Massachusetts	110
Maine	86
Connecticut	291
New Jersey	150
Pennsylvania†	223
North Carolina	413
Georgia	186
Alabama	186

† The analyses of 226 substances are given in the report for 1886, but the total number of analyses made is above 400.

The tables just presented show that nearly every state using commercial fertilizers to any extent, except New York, require either a license to be taken out by the manufacturer or seller for the sale of commercial fertilizers, or that an analysis fee be deposited with the proper official.

In the South a tax is levied upon the fertilizer of 25 to 50 cents per ton, and in Georgia the tax amounts to more than \$100,000 annually. The analysis fee or license ranges from \$5 or more in Maryland to \$50 per brand in several of the states, while in North Carolina it is \$500.

While these other states give protection to the farmers against fraud in commercial fertilizers, and provide for their analysis, New York, whose farmers are expending fully \$3,000,000 annually for commercial fertilizers, are left to provide their own protection and take their chances of receiving what they pay for.

Fortunately for the farmer, the majority of the manufacturers of commercial fertilizers are sincere in their efforts to put upon the markets goods which shall be all that is claimed for them. There are those, however, who by using misleading terms in their analyses, terms with which the farmers are not all familiar, are no less guilty of intentional fraud than was the manufacturer of Mason's High Grade fertilizer which was analyzed in 1885 at the New York Agricultural Experiment Station and found to contain \$1.52 worth of fertilizing ingredients per ton, and yet this fertilizer was being sold at \$30 per ton to the farmers throughout this state. There are other fertilizers sold the present season in the state of New York which have fallen considerably below the guaranteed analysis.

The following statistics copied from the United States Census of 1880 will show the magnitude of this industry in several of the states. Only those are included, the sales of which aggregate over \$400,000 annually:

Cash value of commercial fertilizers.

Alabama	-	-	-	-	-	\$1,270,956
Connecticut	-	-	-	-	-	497,448
Delaware	-	-	-	-	-	467,228
Georgia	-	-	-	-	-	4,346,920
Maryland	-	-	-	-	-	2,838,465
Massachusetts	-	-	-	-	-	653,422
New Jersey	-	-	-	-	-	1,601,609
New York	-	-	-	-	-	2,715,477
North Carolina	-	-	-	-	-	2,111,787
Ohio	-	-	-	-	-	550,029
Pennsylvania	-	-	-	-	-	3,525,336
South Carolina	-	-	-	-	-	2,659,969
Virginia	-	-	-	-	-	2,137,283
						\$25,305,900

The following Bill was introduced into the Assembly at the last session of the Legislature by the Hon. Mr. Maynard on the 15th of March, 1888, read twice and by unanimous consent ordered to a third reading and printed:

AN ACT

TO PREVENT FRAUD IN THE MANUFACTURE AND SALE OF COMMERCIAL FERTILIZERS, AND TO PROVIDE FOR A CHEMICAL ANALYSIS OF THE SAME.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Before any commercial fertilizer or manure, the retail price of which is ten dollars or more per ton, is sold, offered or exposed for sale, the manufacturer, importer, or party who causes it to be sold or offered for sale within this State shall file with the Director of the New York Agricultural Experiment Station one certified copy of the certificate now required by section one of chapter two hundred and twenty-two of the laws of eighteen hundred and seventy-eight, to be affixed to each package of fertilizer or manure so offered for sale in this State, and shall deposit with said Director a sealed glass jar or bottle containing not less than one pound of the fertilizer or manure, accompanied by an affidavit that it is a fair average sample thereof; but only one certificate and affidavit need be filed, and but one sample deposited.

SEC. 2. The manufacturer, importer, agent or seller of any commercial fertilizer or manure, the retail price of which is ten dollars or more per ton, shall pay, on or before the first day of May annually, to the Director of the New York Agricultural Experiment Station, an analysis fee of ten dollars for each of the fertilizing ingredient contained or claimed to be contained in said fertilizer or manure; provided, that when the manufacturer, importer or other person shall have paid the fee herein required, no agent or seller be required to pay the fee named in this section. For any violation of this section the offender shall be liable to a penalty of two hundred dollars, to be sued for by the Director of the New York Agricultural Experiment Station, the recovery to go to the State.

SEC. 3. Every person in this State who sells or acts as local agent for the sale of any commercial fertilizer or manure, of whatever kind or price, shall, at the time of becoming such seller or agent, and annually thereafter, so long as he shall so act, report to the Director of the New York Agricultural Experiment Station his name, residence, postoffice address and the name and brand of said fertilizer or manure, with the name and address of the manufacturer, importer, or party from which such fertilizer or manure was obtained; and shall, on demand of the Director of the New York Agricultural Experiment Station, deliver to said Director a sample suitable for analysis, of any such fertilizer or manure then and there sold or offered for sale by such seller or agent. Any person violating the provisions of this section shall be liable to a penalty of ten dollars, to be recovered by action by any person to whom said fertilizer or manure shall be sold.

SEC. 4. Violations of Section One of this Act are misdemeanors, and on conviction the punishment shall be, for the first offence, a fine of not less than one hundred dollars; and for the second offence, a fine not less than two hundred dollars.

SEC. 5. The Director of the New York Agricultural Experiment Station shall pay the analysis fees received by him into the treasury of the state, and shall cause one or more analysis of each fertilizer or manure to be made and published annually, and shall mail at least one copy of such published analysis to each agent or seller of said fertilizer or manure, who shall have reported to him, as provided in Section Three of this Act. Said Director is hereby authorized, in person or by deputy, to take samples for analysis from any lot or package of fertilizer or manure which may be in possession of any agent or seller.

SEC. 6. This Act shall take effect on the first day of August, eighteen hundred and eighty-eight.

The above Act was amended so as to include ashes and to provide that only the excess of fees over the expenses incurred in carrying out the provisions of the Bill should be paid into the State Treasury.

A circular letter dated New York, April 5th, 1888, was signed by nearly every leading manufacturer and dealer in fertilizers doing business in this state, and sent to the members of the Senate and Assembly, earnestly protesting against the passage of the Bill which they characterized as "a tax which is unjust and a direct blow against the farming industry of this state." The protest closes by saying "We trust the enacting clause will be stricken out, and the Bill consigned to oblivion." It is noticeable that this protest in behalf of the farmers did not receive the signature of a single farmer. It will be seen that this Bill which received this earnest protest was entirely reasonable as compared with similar enactments which have received the sanction of neighboring states.

The farmers and their friends throughout the state should see to it that the next Legislature should speedily pass a bill such as, or similar to, the Maynard Bill, and thus protect their interests in this important matter of commercial fertilizers "so that our farmers may purchase these with the same confidence that they do sugar and nails and cloth."

OFFICERS—1887-88.

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State College P. O., Centre Co., Pa.

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Director Ohio Agricultural Experiment Station,
Springfield, Ohio.

ASSOCIATION

OF

American Agricultural Colleges

AND

EXPERIMENT STATIONS.

OFFICE OF EXECUTIVE COMMITTEE.

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1887-88.

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CHARLES K. ADAMS, LL. D.,
President Cornell University,
Ithaca, N. Y.

CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

To Members of

Agricultural College, Md. Oct. 4th. 1888.

The Executive Committee.

Gentlemen: It seems to be full time for this Committee to consider and determine the time and place of the next convention or annual meeting of the Association. The Constitution places this duty upon the Executive Committee.

Various suggestions have been received by the chairman. All but one express individual opinions. Nearly all favor a meeting in the Winter and at some more central point than Washington. The one letter received, representing concerted opinion and action, is as follows:-

"Dear sir:- I beg leave to inform you that at a meeting of the Teachers of Agriculture and Horticulture and Directors of Experiment Stations, held at Cleveland, Ohio, August 21st, 1888, it was resolved, that we respectfully recommend that the next meeting of The Association of American Agricultural Colleges and Experiment Stations be held either at Lexington, Ky., or Knoxville, Tenn. It is further recommended that the meeting be held either late in December of this year, or early in January, 1889. Yours very truly,
[Signed] L. P. Roberts, Chairman." *Twelve States were represented at this meeting*

Letters received indicate a very well attended convention, if satisfactorily placed, and there are numerous expressions in favor of a meeting for consultation and discussion of work and methods, rather than the reading and consideration of papers prepared in advance.

Members of this Committee are requested to write to the Chairman, at an early date, stating their views as to the time and place of the meeting and the proper steps to be taken by this Committee towards formulating a program.

As the undersigned was instructed to edit the proceedings of the convention a year ago, it should be explained that full half the record is still in short-hand notes, the Commissioner of Agriculture having been thus far unable to have it written in full for the printer.

Very respectfully yours,

Henry E. Alvord

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CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Agricultural College, Md. Oct'r. 15th. 1888.

Gentlemen of the

Executive Committee:-

Replies have been received to my recent letter from all of the Committee, but I think at least four should vote positively in favor of a certain place and date before the next convention is announced. At present the committee express themselves as follows:-

President Atherton, in favor of Columbus, O., first and Lexington second.

President Willits, in favor of Washington, very decidedly.

President Patterson, in favor of some place other than Lexington, this year.

President Dabney, in favor of Knoxville, decidedly.

President Adams, expresses no preference but refers to Prof. Roberts, who writes in favor of Knoxville. [This has not been counted as a vote.]

Director Thorne, our Secretary in favor of Knoxville.

Your chairman is in favor of Knoxville, although personally preferring Washington.

There being reasons why our good friends at Lexington do not want the convention there this year, while those at Knoxville urge us to meet at that place, it seems as if the question should be narrowed to this:-

Shall the next convention of the Association be called at Knoxville, Tenn., or at Washington, D.C.? Please vote, definitely; also, on the other question.

Shall the convention assemble Tuesday, January 1, 1889, or at some other date?

It seems to be the duty of this Committee to act mainly with reference to obtaining a well attended meeting and advancing the future interests of the Association.

I have written the original of this letter and authorized my assistant, Mr. Dunn to sign for me, the copies sent out.

Very respectfully yours,

Henry E. Alvord...
(per E. M. D.)

A.A.A.C. & E.S. *with letter Oct. 15, 1888*

Proposed Program, submitted for approval of the Executive Committee,
for the meeting at

Knoxville, Tenn. Jan. 1, 1889.

----- *** -----

Tuesday afternoon. Report of Executive Committee.

Action upon order of business or proposed program.
All resolutions to go to, - what Committee?

Tuesday evening. Relation of Colleges and Stations.

Peabody of Illinois. McBryde of S.C. Whitcher of N.H. Chamberlin of Iowa.

Wednesday morning. How can Central office assist the Stations?

Director Henry of Wis. Dr. Atwater of Washington. Pres't. Ingersol of Col.
Director Stubbs of La.

Wednesday afternoon. How can Stations co-operate?

Director Cook of N.J. Director Sanborn of Mo. Director Newman of Ala.
Dr. Collier of N.Y.

Wednesday evening. How can Stations reach and interest Farmers?

Director Johnson of Conn. Pres't. Lee of Miss. Director Gulley of Texas.
Dr. Bessey of Neb.

Thursday morning. Should the Hatch Act be amended?

Director Armsby of Pa. Director Shelton of Kas. Pres't. Goodell of Mass.
Director Jones of Ga.

Thursday afternoon. Business meeting of the Association.

Choice of Officers and Committees. Report of Committee on resolutions
and action thereon. Consideration of question of final adjournment.

Thursday evening. Station organization and methods.

Director Jordan of Me. Pres't. Smart of Ind. Director Roberts of N.Y.
Director Scoville of Ky.

Friday morning. General Conference of Station workers.

Note:- All speakers invited to open discussions, to be limited to twenty minutes
and advised to occupy but fifteen.

In general discussions the ten minute rule to be adopted.

No speaker to be recognized a second time, upon any one subject, while
others desire to speak thereon.

Copy taken

KENTUCKY AGRICULTURAL
EXPERIMENT STATION,

-AT-

State College of Kentucky.

M. A. SCOVELL, Director.

Lexington, Ky., Nov 10 1888

Per J. H. Patterson

please pay to J. B. Johnston \$2.25-

to the undersigned names as follows for Gathering Potatoes

J. M. Middleton	2 hours	20
J. S. Fousler	2 "	20
W. S. Page	3 1/2 "	35-
A. Neal	2 "	20
L. Lafore	2 "	20
L. V. Little	2 "	20
C. Brown	2 "	20
L. A. Beard	2 "	20
J. B. Johnston	2 "	20
L. R. Couperd	3 "	30
		2.25-

J. Murray

Paid Nov 12

OFFICERS—1887-88.

PRESIDENT.

GEO. W. ATHERTON, LL. D.,
President Pennsylvania State College,
State College P. O., Centre Co., Pa.

VICE-PRESIDENTS.

GEN. STEPHEN D. LEE,
President Agricultural and Mechanical College of Mississippi,
Agricultural College P. O., Miss.

SELIM H. PRABODY, Ph. D., LL. D.
Regent University of Illinois,
Urbana, Ills.

WILLIAM LEROY BROWN, M. A., LL. D.,
President State Agricultural and Mechanical College,
Auburn, Ala.

M. C. FERNALD, A. M., Ph. D.,
President State College,
Orono, Me.

GEO. H. COOK, LL. D.,
Director New Jersey Agricultural Experiment Station,
New Brunswick, N. J.

SECRETARY AND TREASURER.

CHAS. E. THORNE,
Director Ohio Agricultural Experiment Station,
Springfield, Ohio.

ASSOCIATION

OF

American Agricultural Colleges

AND

EXPERIMENT STATIONS.

OFFICE OF EXECUTIVE COMMITTEE.

EXECUTIVE COMMITTEE.
1887-88.

MAJOR HENRY E. ALVORD, C. E., CHAIRMAN,
Professor of Agriculture, Massachusetts Agricultural College,
Amherst, Mass.

GEO. W. ATHERTON, LL. D.,
President Pennsylvania State College,
State College P. O., Centre Co., Pa.

EDWIN WILLITS, M. A.,
President Michigan Agricultural College,
Agricultural College P. O., Mich.

JAMES K. PATTERSON, Ph. D., F. R. H. S., F. S. A.,
President Agricultural and Mechanical College of Kentucky,
Lexington, Ky.

DR. CHAS. W. DABNEY, JR., Ph. D.,
President University of Tennessee,
Knoxville, Tenn.

CHARLES K. ADAMS, LL. D.,
President Cornell University,
Ithaca, N. Y.

CHAS. E. THORNE, SECRETARY,
Springfield, Ohio.

Agricultural College, Md. Dec. 26th. 1888.

Notice

The members of the Executive Committee of the Association above indicated, are requested to meet in Knoxville, Tenn., at 7 o'clock P.M. on Monday, December 31st 1888.

The place of meeting to be a parlor reserved for this Committee at a Hotel to be designated by the Local Committee upon our arrival at Knoxville. Search for the Headquarters Hotel when you reach that city.

Respectfully

Henry E. Alvord
Chairman.

47-M-67



B. F. Stevens,
4, Trafalgar Square,
London, W.C. 29 Dec- 1888
Abbreviated Address for Telegrams & Mails London.

Prof J. K. Patterson
State College of Kentucky
Lexington Ky.

Dear Sir

I am in receipt of your
order of Dec 7 for various books
for Agric. Experimental Station,
amongst the orders is a set of
'Chemical Socy Journal' 1863-1887
£24- (Offered by W. F. Clay of Edinburgh)
This is not a complete set & provided
that you have not already got the
Vols for 1848-62 I think there would
be little or no chance of obtaining
these vols separate from a complete
set, I therefore think it advisable

to ask your further instructions before
buying. I send you a new Catalogue
of Clay which is just issued,
in which you will find a complete
set of the Journal offered on page
two of the Cover, you will also
find the set you mention on page 5.

Should you think best to
telegraph me three words will
suffice Usda London is sufficient

for the address & the word Chemical
will signify that I am to buy
the complete set, or Clay will
signify that I am to buy the 24
(incomplete) set, no signature to
the telegram will be necessary
as I keep a record of the above

I have not yet met with

a set of "Liebig's Annalen" but
hope to do so shortly

Always at your service

Yours faithfully
B. F. Stevens
MBB

A. A. A. C. & E. S.

Knoxville Meeting, January, 1889.

PROPOSED RULES OF ORDER.

1. The Executive Committee shall be charged with the order of business, subject to special action of the convention, and this Committee may report at any time.

2. All business or topics proposed for discussion, and all resolutions submitted for consideration of the convention, shall be read, and then referred without debate to the Committee, to be assigned positions on the program.

3. Speakers invited to open discussions shall be entitled to twenty minutes each.

4. In general discussions, the ten minute rule shall be enforced.

5. No speaker shall be recognized a second time on any one subject, while any delegate who has not spoken thereon desires to do so.

6. The hours of meeting and adjournment adopted with the general program shall be closely observed, unless changed by a two-thirds vote of delegates present.

7. The presiding officer shall enforce the parliamentary rules usual in such assemblies and not inconsistent with the foregoing.

GEO W. TICE.

FRANKLIN LYNCH.

Office of TICE & LYNCH,

N. Y. AGENTS OF

B. F. STEVENS,

American Library and Literary Agency,
LONDON, ENG.

Custom House Brokers,

Commission and Forwarding Agents,

No. 34½ PINE STREET,

Passports Procured.

New York, Jan 5th 1889

Prof. J. K. Patterson

President, State College of Kentucky Experiment Station
Lexington, Ky

Dear Sir -

Please execute the enclosed form of oath
and return the oath to us, as soon as possible.

The case was forwarded Dec 28th last, by

★ Union Line -

Respectfully Yours

Tice & Lynch
J. B.

47-M-64

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.
OFFICE OF THE EXECUTIVE COMMITTEE.

Agricultural College P. O., Md., January 12, 1889.

Circular.

An instance of the danger of playing with fire is related below, and it seems to emphasize the recommendation of the Executive Committee, adopted at the recent convention of this Association, advising the transaction of all business with the Government Departments at Washington to be through the Officers of the Association.

A delegate, while passing through Washington, on his way to Knoxville, called upon the First Comptroller of the Treasury, stated that in his State the Governor had certified assent to the Hatch Act, and the Legislature had since met and adjourned without action, and asked whether this was satisfactory to the Treasury Department. The Comptroller replied that his attention had not before been called to this point; but he then proceeded to once more examine the Hatch Act, and immediately decided that under Section 9 of said Act the Governor's action was temporary and provisional and must be followed by Legislative action on the first opportunity. He accordingly entered a ruling that in order to continue payments his office must be furnished evidence of such legislative action where only the Governor's certification is now on record.

The Comptroller added that as soon as information reached his office of the adjournment of a regular session of any State Legislature convened after March 2d, 1887, without assenting to the purposes of the Hatch Act, payments must be stopped to such State or States, his opinion being that the provisions of the Hatch Act no longer applied thereto. Orders were at once given to stop the January payment to the State represented by our friend, who evidently made one call too many, while in Washington.

The Comptroller, in the same connection, further decided that he would no longer allow payment to any States where the beneficiary in-

stitution was not specially designated by the Legislature.

The States involved in the first ruling above, being those shown by the Washington records to be receiving payments upon the certification of Governors, are as follows: Arkansas, California, Colorado, Georgia, Indiana, Michigan, Minnesota, Missouri, Nevada, Oregon, Pennsylvania, Vermont, West Virginia and Wisconsin. This information has been obtained directly from Judge Durham, who advised the issue of this circular.

Under these circumstances, the Executive Committee raises the question whether it will not be simpler and easier to obtain some declaratory action by Congress, even in the shape of an amendment to the Hatch Act, on this one point, than to await adjustments in so many different States.

It is true that the present First Comptroller may be replaced by a more liberal constructionist before the April payment, and new rulings may be thus obtained. But it is hardly safe to depend upon such an uncertainty. In States where a Legislature is now in session, action should be sought at once, if not already complete.

Excepting the one case already referred to, the January payments have all been made. Drafts were mailed on December 29th and 31st, and payments may be hereafter expected very nearly on the quarter days named in the law.

The circular regarding the annual report and form for the financial part of the same is in preparation and will soon be mailed, probably from the Office of Experiment Stations, U. S. Department of Agriculture.

For the Executive Committee:

Henry E. Alvord
Chairman.



POST OFFICE AND RAIL-ROAD STATION

ST. ANTHONY PARK.

Minnesota Experiment Station,

Dep't of Horticulture,
ST. ANTHONY PARK, - MINN.
CHAS. POUEROUILLIE,

ST. ANTHONY PARK, RAMSEY CO. MINNESOTA

May 7th 1889

To Honorable J. P. Patterson President of the
A & M. College, Lexington Ky.
Dear sir.

Having been informed by Prof Myers of
the West Virginia Expt. Station that you are in want of
a Horticulturist, I desire to present myself as an applicant.
I am 26 years of age, a native of France, graduated in
Horticulture, and Agriculture from French College in 1882
after my graduations spent five years in commercial greenhouses,
nurseries, vineyards, (in France) and three years ago, came from
France to the Experiment Station of the University of Minnesota
where I have been up to the present time. For any further information
as to my character, and qualifications for the position. I beg leave
to refer you to Prof E. D. Porter the Director of this Station under
whose direction I have been since coming to this country. I will
forward to you by the next mail some testimonials for your
consideration

In waiting your reply I remain
Yours Respectfully Chas Pouerouillie

AGRICULTURAL EXPERIMENT STATION,
—OF—
WEST VIRGINIA.

JOHN A. MYERS, Director,

Morgantown, W. Va., May 10th., 1889.

Dr. Jas. K. Patterson,
Lexington, Ky.

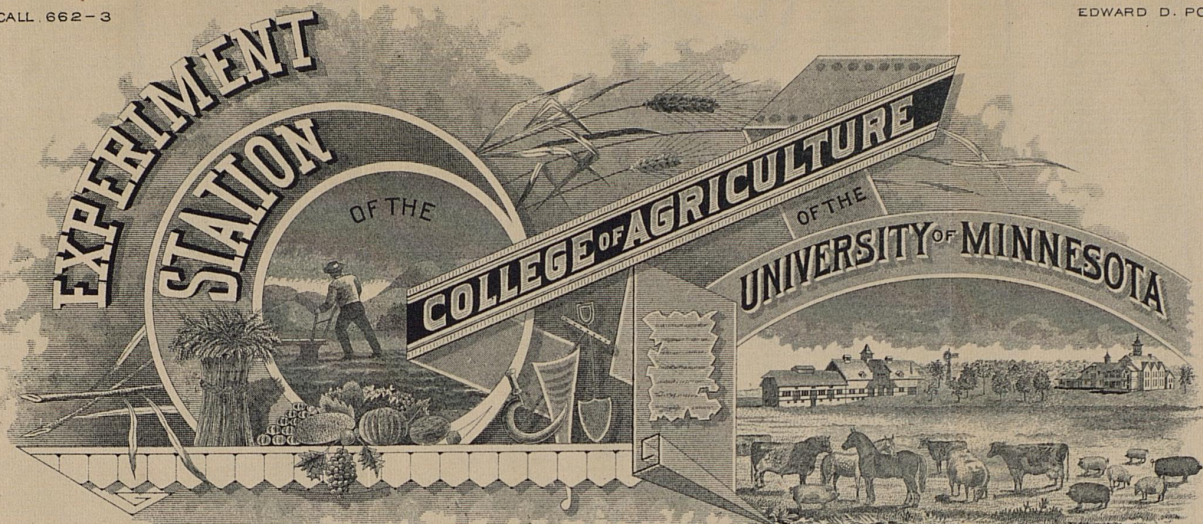
Dear Sir:-

I send to
you, by this mail, as per request of Mr. Charles Pomeroulie, his
testimonials which have been sent to this Station. Our Board
did not see fit to elect an Horticulturist at its last meeting, and I
presume that Mr. Pomeroulie desired employment is why he asked us
to forward his testimonials.

Dictated to S.V.M.

Respectfully yours,

John A. Myers,
m.



POST OFFICE AND RAIL-ROAD STATION
ST. ANTHONY PARK.

Minnesota Experiment Station,
Dep't of Horticulture,
ST. ANTHONY PARK, - MINN.
CHAS. POUEROUILLIE.

ST. ANTHONY PARK, RAMSEY CO. MINNESOTA

May 14 1889

Honorable J. S. Patterson
State College of Kentucky.

Dear Sir

Your favor of May 10th just received
In reply to your questions. I will say that I have
considerable experience in applied, but not much in
descriptive entomology. In regard to your second
question. I am like the great majority of Frenchmen
Catholic. In politics I am democrat and I am
still unmarried. During my connections with this
Station as well as in former positions, I naturally gained
considerable knowledge not only in horticulture, but in
Agriculture as well. You have doubtless received
a number of testimonials from Prof Myers of West Virginia
who wrote me that he had mailed them to your address.

Awaiting your reply. I remain

Yours Respectfully
Chas Pouerouillie

AGRICULTURAL EXPERIMENT STATION,
—OF—
WEST VIRGINIA.

JOHN A. MYERS, Director,

Morgantown, W. Va., May 28th., 1889.

Dr. James K. Patterson,
Lexington, Ky.

Dear Sir:-

I am informed that the Chair of Agriculture of your Institution will be made vacant by the resignation of the incumbent professor, and that there will be an election to fill the vacancy at the meeting of the Board of Control, in June.

I herewith respectfully present myself as an applicant for the position, and trust that you will present this, together with any letters that you may receive in my behalf, to the Board when it convenes to elect an Agriculturist.

Very respectfully,

A. Magruder.

AGRICULTURAL EXPERIMENT STATION,
—OF—
WEST VIRGINIA.

JOHN A. MYERS, Director,

Morgantown, W. Va., May, 30th., 1889.

Dr. James K. Patterson,

Lexington, Ky.

Dear Sir:-

Upon second consultation with Dr. Myers, Director of this Station, I have decided to withdraw my application for the position of Agriculturist of your College

You will please forward to my address any letters that you may receive in my behalf, and oblige.

Very respectfully,

A. A. Magruder.

AGRICULTURAL EXPERIMENT STATION,
—OF—
WEST VIRGINIA.

JOHN A. MYERS, Director,

Morgantown, W. Va., May 31st., 1889.

President Jas. K. Patterson,
Lexington, Ky.

My Dear Sir:-

Upon my return after an absence of some ten days in the East with a committee of our Board, studying the workings of the Experiment Stations, I find that our creamery-man, Mr. A.C. Magruder, has been convinced by Mr. Connell that probably there may be a more promising field in your Institution than where he is now, and that he has made application for the position made vacant by the resignation of Mr. Connell. I appreciate fully his feelings in the matter, as we have been paying him only a \$1000 a year and he is expecting \$1500, should he be elected to that position, which makes a very material difference in a young man's income. Mr. Magruder's work here has been very satisfactory, and I selected him from among our graduates in Mississippi for this position because I considered him the best man for the place, and I shall be sorry if our Board can not offer sufficient inducements to retain him in his present position. He has been doing good work here, and I know of no reason why we should not retain him except that, perhaps, we can not pay as liberal salaries as some other Institutions may be able to do. At my earnest request, he

AGRICULTURAL EXPERIMENT STATION,
—OF—
WEST VIRGINIA.

JOHN A. MYERS, Director,

Morgantown, W. Va.,

No. 2.

has agreed to withdraw his application for the position in your Institution, at least until after the meeting of our Board, which takes place June 8th, to 13th. It is my impression that our Board will endeavor to retain him at a salary equal to that offered elsewhere and I have promised to do all in my power to induce them to do so. Should they, however, not be disposed to pay what appears to be the market value of his skill, my duty to him would be to encourage him to accept a similar position elsewhere at the market value of his labor. I do not, at present, know of any one that I could find who would fill his place in this Station, and as the success of our work turns so largely upon making the creamery business a success here, I shall use every effort to keep him here, at the same time; it is justice to him that he should have the value of his work. I write this by way of explanation of what may appear at first sight to be a disposition upon his part to be changeable. Had I been at home, the application would probably not have been made, as it is probable that I could have presented matters to him in a light that would have convinced him that it was better, at least, to wait until some of the leading members of our Board could be heard from.

Wishing you all possible success in your work, and trusting that

State College of Kentucky,

J. K. PATTERSON, Ph. D., President.

J. H. CONNELL,

Chair of Agriculture and Horticulture.

—AND—

Agriculturist State Experiment Station.

99 S. Limestone, Lexington, Ky., June 4, 1889.

To -

The President
of State College of Kentucky.

Sir:

I have the honor to state my intention of quitting the service of your institution at the close of the present academic year; because of influences brought to bear upon me which were largely outside of your official jurisdiction.

Allow me to express my pleasure and personal gratification at the help and encouragement given me by yourself and those of the Trustees whom it has been my pleasure to meet. My relations with the

State College of Kentucky,

J. K. PATTERSON, Ph. D., President.

J. H. CONNELL,
Chair of Agriculture and Horticulture.

—AND—

Agriculturist State Experiment Station.

2.

99 S. Limestone, Lexington, Ky., 188

Colleagues have been most pleasant in section-room and field work; having met with nothing but kind assistance from those in authority. I regret very much to sever my connections with the institution of which you are the head.

I have the honor to remain,
Most truly Yours,

J. H. Connell,
Prof. of Agriculture,
Agriculturist Ex-
periment Station.

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

OFFICE OF EXECUTIVE COMMITTEE,

Agricultural College, Md., June 20, 1889.

CIRCULAR.

The attention of all concerned is respectfully invited to Circular No. 34, Miscellaneous Division, Treasury Department, dated Washington, March 26, 1889, relating to the withdrawal of Alcohol for Scientific Purposes.

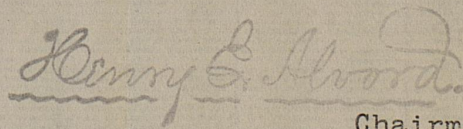
This circular, framed by the Department upon the application of the Executive Committee of this Association and in accordance with suggestions from that Committee, materially changes the regulations by which alcohol can be obtained by Colleges and Experiment Stations, free from U. S. Internal Revenue taxes.

Instead of an entire set of papers and a separate bond, filed for every barrel, or lot, of alcohol purchased, a "continuing bond" is provided. "And withdrawals may be made from time to time, under said bond, until the same shall have been revoked or canceled by order of the Secretary of the Treasury."

Copies of the circular can be obtained upon application to the Secretary of the Treasury.

Very respectfully yours,

For the Executive Committee:-



Chairman.

P. S.

The Quarterly Drafts for Experiment Stations will be mailed at Washington on or before the 29th inst. in all cases except one, where overpayment has been already made.



PROF. J. K. PATTERSON,
STATE COLLEGE OF KENTUCKY,
LEXINGTON. KY:

B. F. Stevens,
4, Trafalgar Square,
London, 188
W.C.

DEAR SIR,

29 JUNE 1889

I HAVE THE PLEASURE TO ACKNOWLEDGE THE RECEIPT OF YOUR
LETTER OF THE 14TH INSTANT, AND AS REQUESTED ENCLOSE HERewith A
STATEMENT OF MY ACCOUNT AGAINST YOUR EXPERIMENT STATION TO DATE,
SHOWING A BALANCE OF £32.17.0 TO YOUR DEBIT, WHICH I TRUST WILL
BE FOUND CORRECT.

RESPECTFULLY REQUESTING THE FAVOUR OF A REMITTANCE, AND
ALWAYS AT YOUR SERVICE,

I AM, DEAR SIR,

YOURS FAITHFULLY,

B. F. Stevens
MB

47-11-64

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

OFFICE OF EXECUTIVE COMMITTEE,
Agricultural College P. O., Md., July 1st, 1889.

Dear Sir:

Some action on the part of this Association seems advisable, in regard to the order of the War Department (Par. 17, Special Orders No. 96, Hd. Qrs. of the Army, April 25, 1889) of which you doubtless have received a copy, convening a board of officers "to consider the practicability of prescribing a uniform system of rules, regulations and course of study, for the guidance of officers detailed as professors of military science and tactics, at colleges, universities, etc., and to suggest and formulate such rules," etc.

There can be no objection to having a board of Army officers "consider" this subject, and the War Department has unquestioned authority to call upon officers serving at colleges, for replies to questions from this Board. Moreover, it can do no harm for college presidents if so disposed, to send their views on this subject to the president of the board of officers, as requested by his circular dated May 14th, 1889.

But it is deemed very injudicious, by the Executive Committee of this Association, for the colleges to admit that any board of army officers can be authorized to "suggest and formulate rules" to govern "the amount and character of the military instruction" or otherwise interfere with the interior affairs of the several institutions concerned in this order. It is therefore proposed that when the army board shall have completed its duty and submitted its report, and before action is taken thereon, the Secretary of War shall be petitioned to give a hearing in the premises to the presidents and other officers of the colleges interested.

Your Committee believes that every institution receiving benefits under the Land Grant Act of 1862, should require all its students to be instructed in military tactics, thereby complying, in spirit and letter, with the only mandatory passage in the act of 1862 relating to the character of instruction at the colleges founded and endowed by that law. But it is also believed that when, under later laws, an officer of the army is detailed to duty at a college, and has reported to its president, he becomes, for the period of such service, a

member of the Faculty, subject, primarily at least, to college control, and that all details as to "the amount and character of the military instruction," must be governed by the several institutions themselves, and must necessarily vary, according to varying conditions, as is the case with other departments of instruction.

In brief, certain colleges and universities are required by law to give military instruction; every one of these institutions is now entitled by law to the services of an army officer as military instructor, as well as to certain equipment and supplies. Beyond this, the whole subject is one which belongs to the several institutions to regulate and control, free from outside interference or dictation.

Having submitted these general views to the colleges belonging to this Association, or entitled to membership therein, the Executive Committee desire instructions to guide action in the premises.

You are especially requested to send to the undersigned, answers to the following questions:-

1. Shall any action be taken by this Association, upon the subject herein presented ?
2. Shall the matter be referred to the Executive Committee, to act for the Association, and all concerned ?
3. Shall a Special Committee be appointed for the purpose ?
4. Shall the subject be postponed, and a stay of proceedings be asked of the War Department, until after the next meeting of this Association ?

It is probable that the annual meeting of the Association will be held at Washington, early next November.

Very respectfully yours,

For the Executive Committee:-

Henry C. Abord.

Chairman.

OFFICERS 1889.

-o-o-

President.

GEO. W. ATHERTON, LL. D.,
President, Pennsylvania State College,
State College, Centre Co., Pa.

Vice Presidents.

S. W. JOHNSON, M. A.,
Director, Conn. State Agricultural Ex. Station,
New Haven, Conn.

C. L. INGERSOLL, M. S.,
President, Colorado Agricultural College,
Director, Col. Agricultural Ex. Station,
Fort Collins, Col.

L. L. McINNIS, A. M.,
Chairman of Faculty, A. & M. Coll. of Texas,
College Station, Texas.

E. H. MURFREE, A. M., LL. D.,
President, Arkansas Industrial University,
Fayetteville, Ark.

COL. W. BALLARD PRESTON,
Director, Virginia Agricultural Ex. Station,
Blacksburg, Va.

Secretary-Treasurer.

CHAS. E. THORNE,
Director, Ohio Agricultural Experiment Station,
Columbus, Ohio.

ASSOCIATION

OF

American Agricultural Colleges

AND

Experiment Stations.

Office of Executive Committee.

EXECUTIVE COMMITTEE
1889.

-o-o-

MAJ. HENRY E. ALVORD, C. E., CHAIRMAN,
President, Maryland Agricultural College,
Director, Maryland Agricultural Ex. Station,
Agricultural College, Maryland.

GEO. W. ATHERTON, LL. D.,
President, Pennsylvania State College,
State College, Centre Co., Pa.

W. A. HENRY, B. Agr.,
Director, Wisconsin Agricultural Ex. Station,
Madison, Wis.

I. P. ROBERTS, M. Agr.,
Director, Ag. Ex. Station, Cornell University,
Ithaca, N. Y.

J. M. McBRYDE, PH. D., LL. D.,
President, University of South Carolina,
Director, South Carolina Ag. Ex. Station,
Columbia, S. C.

HENRY H. GOODELL,
President, Massachusetts Agricultural College,
Director, Hatch Experiment Station,
Amherst, Mass.

CHAS. E. THORNE, SECRETARY,
Director, Ohio Agricultural Experiment Station,
Columbus, Ohio.

Agricultural College P.O., Md., *July 17th 1889.*

President Patterson

My dear sir: - Our Assocn Treasurer, Director Thorne of Ohio - has sent me your letter returning certain papers to him, - and he feels very badly about it. I write him - that, first, I feel sure you acted under a misunderstanding of the facts - and second, that you wrote facetiously on the subject - and with no thought to hurt - or offend. -

The two receipts he sent you - were the regular forms that have gone out this year - two to every State - one for College and one for Station - in accordance with special action of Knoxville convention.

The sum was set high on purpose to pay the old accounts - and it was only by collecting \$50. this year - from every State - that we felt safe in trying to pay all the old accounts.

It was agreed at Knoxville, among those to whom old bills were due, that their \$50. assessments, respectively, for this year - should not be called for - but credited on the old accounts.

You will recollect that I did not know you had this old claim, till you mentioned it to me at K. Very likely the above mentioned agreement, was prior to my knowledge of your old acct - and hence I may have omitted to speak to you about this part of the arrangement - If so - the omission or fault, was mine.

Association of American Agricultural Colleges and Experiment Stations.

ROOMS OF THE EXECUTIVE COMMITTEE,
EBBITT HOUSE, WASHINGTON, D. C., August 6, 1890.

DEAR SIR:

This circular letter is to be regarded as confidential at the same time it calls for immediate action.

Members of the Committee now here give you their personal assurance that the New Morrill Bill will be given a day for early consideration in the House of Representatives. It may be expected to come up the latter half of next week—August 13th to 16th.

Representatives of the National Grange at Washington have been unduly suspicious and, entirely without cause, are using their influence to secure a postponement of the bill till next session. This is for your information, and while it will be useless for you to mention this matter or do anything about it, the following request is based upon the situation as it now exists.

You are urged to at once communicate, personally and through active and trusted friends, with every member of Congress from your State and ask his presence and support of Senate Bill No. 3714, ("the Morrill College-Aid Bill,") whenever it comes up in the House—say 'probably about the middle of August.' And ask that the bill be passed as it came from the Senate, and has been reported by the House Committee, with "the Granger amendment" added,—*and no other amendments.*

To remove the last reasonable cause for objection your representatives here have arranged for the adoption of the amendment referred to and which is enclosed herewith on slips. We have the written assurance of Col. Brigham, of Ohio, Master of the National Grange, that with this amendment added he will be entirely satisfied with the bill.

While your Committee do not believe this amendment is necessary to make the bill a safe and satisfactory law, they do feel that circumstances make it a wise addition. Accordingly, the amendment is cordially supported by the representatives of our Association here, and you are asked to join heartily in this change,—and no other.

Now for a strong and united effort, and we feel confident in announcing within the month that \$15,000 stands awaiting your call (or that of your State officials) in the Treasury at Washington.

Very respectfully yours,

FOR THE EXECUTIVE COMMITTEE,

Henry E. Alvord.

Chairman.

*This is the final call
Let Ky. do all she can
for us. Alvord*

47-M-64

Handwritten signature

Lexington, Ky, Sept 14 1889

Kentucky Agricultural Experiment Station

To James Murray Dr.

DATE.

DOLLARS.

CTS

For Grading around Building

12 75

Received the 16 day of September 1889 of M. A. SCOVELL, Director, the sum of
Twelve \$ 75/00 Dollars.
in full of the above account.

James Murray

47-M-64

Voucher No.

Account of

Amount \$

Paid 188

I hereby certify that the within account is correct and just, and that the articles were purchased for the use of the station.

Director.

Lexington, Ky, 9-21 1889

Kentucky Agricultural Experiment Station

To James Murray Dr.

DATE.

DOLLARS. CTS

For Grading around new Building

10 10

Received the 24th day of September 1889 of M. A. SCOVELL, Director, the sum of

Ten ¹⁷/₁₀₀ Dollars.
in full of the above account.

James Murray

47-11-64

Voucher No.

Account of

Amount \$

Paid 188

I hereby certify that the within account is correct and just, and that the articles were purchased for the use of the station.

Director.

Lexington, Ky, Sept 28 1889

Kentucky Agricultural Experiment Station

To James Murray

Dr.

DATE.

DOLLARS.

CTS

For Grading
By overpay, (maddox)

16

45

14

55

Received the 30 day of September 1889 of M. A. SCOVELL, Director, the sum of
Fifteen & 55/100 Dollars.
in full of the above account.

James Murray

47-M-64

Voucher No.

Account of

Amount \$

Paid 188

I hereby certify that the within account is correct and just, and that the articles were purchased for the use of the station.

Director.

Lexington, Ky, Oct 1 1889

Kentucky Agricultural Experiment Station

To Ag. M. College

Dr.

DATE.			DOLLARS.	CTS.
Sept 1	For	Grading	12	90
" 9	"	"	16	50
" 14	"	"	12	75
" 21	"	"	10	10
" 28	"	"	14	55
July 2	"	"		
Oct 5	"	"	66	80
			8	95
			19	75
			95	50

Received the day of 188..... of M. A. SCOVELL, Director, the sum of

..... Dollars.
in full of the above account.

47-M-64

Grading,

Voucher No.

Account of A. M. College

Amount \$ 66.80

89

Paid 188

75.75

19.75

\$ 95.50

I hereby certify that the within account is correct and just, and that the articles were purchased for the use of the station.

W. S. Sewell,

Director.

Approved
Richard A. Spurr
Finance Com.

Lexington, Ky, Oct 5 1889

Kentucky Agricultural Experiment Station

To James Murray Dr.

DATE.

DOLLARS. CTS

For Grading

19 75

Received the 7 day of October 1889 of M. A. SCOVELL, Director, the sum of
Nineteen & 75/100 Dollars.
in full of the above account.

James Murray

47-M-64

Voucher No.

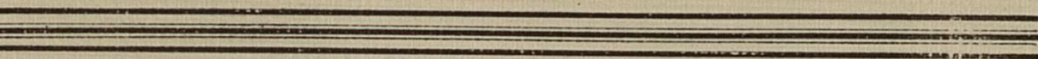
Account of

Amount \$

Paid 188.....

I hereby certify that the within account is correct and just, and that the articles were purchased for the use of the station.

Director.



Association of
American Agricultural Colleges
and Experiment Stations.

KNOXVILLE, TENNESSEE, JAN. 1-4, 1889.



PROGRAM

Proposed by the Executive Committee.



Program.

Tuesday, January 1, 1889.

- NOON. CONVENTION CALLED TO ORDER AT EXPERIMENT STATION BUILDING, UNIVERSITY OF TENNESSEE. ORGANIZATION. ADJOURN FOR LUNCH.
- 1.00 P. M. LUNCH AT THE UNIVERSITY.
- 1.30 P. M. REPORT OF THE EXECUTIVE COMMITTEE. ACTION UPON THIS PROGRAM, AND THE ORDER AND RULES OF BUSINESS PROPOSED BY THE EXECUTIVE COMMITTEE.
- 3.00 P. M. DISCUSSION—"The Relation of Colleges and Stations." Opened by Messrs. PEABODY of Illinois, JONES of Georgia and GOESSMANN of Massachusetts.
- 5.30 P. M. ADJOURNMENT FOR DINNER.
- 7.30 P. M. DISCUSSION—"How can Stations reach and interest Farmers?" Messrs. JOHNSON of Connecticut, NEWMAN of Alabama and ROBERTS of New York.
-

Wednesday, January 2.

- 9.00 A. M. DISCUSSION—"How can the Department of Agriculture assist the Stations?" Messrs. HENRY of Wisconsin, COOKE of Vermont, ATWATER of Washington and INGERSOLL of Colorado.

- 11.00 A. M. DISCUSSION—"How can Stations co-operate?" Messrs. COOK of New Jersey, SANBORN of Missouri and COLLIER of New York.

- 1.00 P. M. LUNCH AT THE UNIVERSITY.

- 1.30 P. M. DISCUSSION—"The Substance and Form of the Annual Station Report." Messrs. SMART of Indiana, STUBBS of Louisiana and BESSEY of Nebraska.

- 4.00 P. M. INTRODUCTION OF NEW BUSINESS AND RESOLUTIONS.

- 5.30 P. M. ADJOURNMENT FOR DINNER.

- 7.30 P. M. PUBLIC MEETING AT THE OPERA HOUSE. Annual Address by the President of the Association. DISCUSSION—"This Association, its meaning and its future." Messrs. LEE of Mississippi, CHAMBERLAIN of Iowa and MCBRYDE of South Carolina.
-

Thursday, January 3.

- 9.00 A. M. DISCUSSION—1. "Does the Hatch Act need amendment?" 2. "If so, in what respect?" 3. "Should amendment be sought at once, or after more experience?" Messrs. ARMSBY of Pennsylvania, SHELTON of Kansas and GOODELL of Massachusetts.

- 11.00 A. M. DISCUSSION—"Station organization and methods." Messrs. JORDAN of Maine, MYERS of West Virginia, SCOVELL of Kentucky and GULLEY of Texas.

- 1.00 P. M. LUNCH AT THE UNIVERSITY.

47-M-64

- 1.30 P. M. BUSINESS MEETING OF THE ASSOCIATION — Choice of officers and committees; Report and consideration of resolutions; Question of final adjournment. General business.
- 7.30 P. M. ADJOURNED BUSINESS MEETING (if necessary) — General conference of Station workers; Questions and answers.
-

Friday, January 4.

- 9.00 A. M. MEETING OF SPECIAL WORKERS, IN SECTIONS.
- 11.00 A. M. GENERAL AND PUBLIC MEETING, FARMERS SPECIALLY INVITED. DISCUSSION — “The practical work of Colleges and Stations.” Messrs. PORTER of Minnesota, WHITCHER of New Hampshire and BATTLE of North Carolina.



ASSOCIATION OF
AMERICAN AGRICULTURAL COLLEGES
And Experiment Stations.

Knoxville Meeting, January, 1889.

PRELIMINARY CIRCULAR.

The Executive Committee of this Association, in the interest of systematic economy of time, have arranged the accompanying program for the Knoxville meeting and will submit the same at the opening session, for the approval of the convention.

The gentlemen named in this program are hereby requested, without other notice from the Committee, to prepare to take part in opening the discussion of the topics respectively assigned them, each speaking from ten to twenty minutes, but not more.

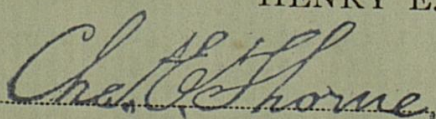
The Committee will also submit to the association for action at the opening session, the accompanying rules of procedure, framed simply to facilitate the work of the Convention.

It is deemed by this Committee, to be highly important to the several institutions, and their work as a whole, that the Knoxville convention should be attended by one or more delegates from every institution in America entitled to membership in this association. (See notice of the meeting, dated Oct. 15, 1888.)

Existing circumstances seem to make it important that the Knoxville meeting should consider Experiment Station matters, rather than College affairs, except as the latter involve the former. It is therefore suggested to the several institutions interested, that the delegates to this convention should particularly include Directors and Staff-workers of Experiment Stations.

The Committee recommends that the Annual Reports due under the Hatch Act before February 1st, 1889—and especially the financial statements incorporated therein—be withheld until after the return of the Knoxville delegates to the several Stations. By order of the Executive Committee.

HENRY E. ALVORD, Chairman.



Secretary.

December 1st, 1888.

Kentucky Agricultural Experiment
Station.

AT THE STATE COLLEGE OF KENTUCKY.

Board of Control.

W. B. KINKEAD, Chairman Executive Committee.
R. J. SPURR.
PHILLIP BIRD.
W. D. NICHOLAS.
R. A. SPURR.
J. K. PATTERSON, President of the College.
M. A. SCOVELL, Director.

Officers:

M. A. SCOVELL, Director.
ROBERT PETER, Prof. of Chemistry.
A. R. CRANDALL, Prof. of Botany.
A. E. MENKE, Prof. of Agri. Chemistry and Agriculture.
A. T. PARKER, Microscopist.
A. M. PETER, Assistant Chemist.

BULLETIN No. 9.

MARCH 1st. 1887.

Experiments With Potatoes.

Irvine, Br., Lexington.

NOTICE.

This series of bulletins is issued for the benefit of the farmers of Kentucky. Explanations and definitions are given that the technical terms may be properly understood by all. Repetitions may often be made in future bulletins, yet it would be well for those interested to preserve the early issues for the definition and explanation of terms.

The bulletins of the Station will be mailed to any citizen of Kentucky who sends his name and address to the Station for that purpose.

Kentucky Agricultural Experiment Station.

BULLETIN No. 9.

MARCH 1st. 1887.

Experiments With Potatoes.

The work of the Station last year in field experiments with potatoes was limited, for want of sufficient land in proper condition, to the following experiments:

1. Test of varieties.
2. Preparation of seed.
3. Application of fertilizers.

The ground for all the work was prepared the same. The land had been in cultivation for three years. It had never received an application of manure. The soil is a typical blue-grass soil, a medium loam, two to three feet in depth, resting on a porous, reddish subsoil of the same nature as the surface soil. This subsoil rests on blue limestone, quite cavernous, producing

a fine natural drainage. The subsoil varies in depth from three to ten feet. Previous to these experiments the land had been in cultivation two years in tobacco, followed by a potato crop. The plot had been plowed the previous fall, and was re-plowed, harrowed and dragged just before planting. In all the experiments the potatoes were planted in rows 3 feet apart by 14 inches in the row and four inches deep. The cultivation was shallow, but in the third cultivation the dirt was thrown toward the row. The bugs were picked off of all plots at the same time, and great care was taken to have all conditions alike.

Test of Varieties.

Our endeavors were put forth to give each variety an impartial test. They were all planted the same day. All seeds cut to two eyes a few days before planting, and planted, cut-side down, exactly 14 inches apart in the row and covered to the depth of four inches. The different sorts were so planted that any errors arising from the contour of the land were obviated as much as possible, and all plots were cultivated the same day each time. All the varieties were planted April 18th.

Description of Varieties Tested.

Charter Oak.—Obtained from Peter Henderson & Co., New York. Tuber large, irregular oval, and typical ones slightly flattened; skin smooth and white, eyes large, shallow and pink. Vines large, stout, erect, very vigorous and fully two feet high.

Burbank.—Tubers long and flattened, smooth, light color, medium size. Vines strong and erect growth, about twenty inches high.

White Star.—(Henderson). Tubers resembling Burbank, very white, smooth, medium size. Vines strong, erect, about 20 inches high.

Clarke's No. 1.—(Henderson). Tubers resembling Early Rose, but lighter in color; somewhat flattened, smooth, medium

size, tending to large. Vines strong growth, vigorous, slightly drooping.

Vanguard.—(Henderson). Tubers long, medium size, color resembling Early Rose; eyes few and shallow. Vines not very strong, about 18 inches high.

Early Rose.—(Ohio grown). Tubers of medium size, smooth, longish, reddish-brown. Vines not very vigorous and of medium growth.

Rochester Favorite.—(Henderson). Tubers oval, tending to long; light, smooth and medium size. Vines vigorous, and about 22 inches high.

Empire State.—(Henderson). Tubers large, white and smooth. Vines vigorous.

Pearl of Savoy.—(Henderson). Tubers oblong, large, smooth, light rose tint.

Perfect Peachblow.—(Henderson). Tubers globular form, large, uniform, rough; eyes pink, small, slightly indented. Vines of medium growth, compact.

Dakota Red.—(Henderson). Tubers small to medium size, reddish, irregular. Vines medium.

Early Ohio.—(Ohio grown). Tubers nearly round, smooth to rough, reddish-brown, medium size. Vines vigorous and erect.

St. Patrick.—(Henderson). Tubers long, smooth, white, resembling Burbanks, large. Vines vigorous.

Jumbo.—(Henderson). Tubers globular, somewhat flattened, rough, light color, some very large. Vines vigorous, spreading.

White Elephant.—(Henderson). Tubers long, large, white, and resembling the Burbank. Vines not very vigorous, about 18 inches high.

Extra Early Vermont.—(Henderson). Tubers medium in size, smooth, longish, rose colored, resembling the Early Rose. Vines of medium growth.

(4)

Beauty of Hebron.—(Henderson). Tubers medium in size, smooth, shallow eyes, rose color, resembling Early Rose. Vines vigorous and of medium height.

Early Sunrise.—(Henderson). Tubers long, brownish-red, smooth, medium in size. Vines of medium growth.

Triumph.—(Henderson). Tubers long and somewhat flattened, smooth, light colored, medium in size; eyes numerous and pinkish.

Of these varieties, the Vanguard, Early Vermont, Beauty of Hebron, Early Rose, Early Ohio, Early Sunrise, Pearl of Savoy, St. Patrick and Clarke's No. 1 are early sorts; the Burbank, Rochester Favorite, White Star, White Elephant, Charter Oak, are medium, and the Perfect Peachblow, Jumbo, Dakota Red and Empire State are late in coming to maturity.

(5)

Yield of the Varieties.

The following table shows the yield of the different varieties calculated on the basis of an acre. The varieties are named in order of their yield:

Name of Variety.	Yield per Acre in Bushels.		Total Yield
	Large Tubers.	Small Tubers.	
Charter Oak	271½	27½	299
Burbank.....	230½	32	262½
White Star.....	209	30½	239½
Clarke's No. 1.....	193½	36½	230
Vanguard.....	172	44½	216½
Early Rose—			
(Ohio grown).....	153½	20½	174
Rochester Favorite	146½	34½	181
Empire State.....	140½	11½	152
Pearl of Savoy.....	132	43	175
Perfect Peachblow	114	25½	139½
Dakota Red.....	98	21	119
Early Ohio.....	90½	29½	120
St. Patrick.....	90	20½	110½
Early Rose (Henderson)	88½	14½	103
Jumbo.....	85½	26½	111½
White Elephant...	75	8½	83½
Ext. Early Vermont	55	21½	76½
Beauty of Hebron	55	12½	67½
Early Sunrise.....	32½	5½	38
Triumph.....	31½	18	49½

The results show that the new potato, *Charter Oak*, ranks first as to yield, exceeding by 41 bushels the Burbank, which ranks second. The fact that a variety shows a yield a few bushels greater or less than another one year, is not conclusive that it will do so year after year. Such experiments, to be of much value, should extend over a series of years. In this table the yield

of early and late potatoes is compared. The Vanguard is very early, while the Charter Oak is considered a late potato. The difference in the growing season of the two potatoes might have caused the difference in yield, although to appearances the season was favorable to the early potato. Again, the variation in size of the seed, and the cuttings, might have caused a difference in the yield, as will be seen further on. The endeavor was to so cut the potatoes that the comparisons would be alike. Two eyes were left to each piece, yet the pieces were not all of the same size; and in some instances the want of proper food might have greatly retarded the young plant, and thereby injured its yield.

The last four varieties are hardly comparable with the others, as but very small quantities of each were planted.

The Quality of the Different Varieties.

The yield, while it has its influence, is not so much sought after in a potato as its quality. A good yielder may be worthless on account of its poor quality. It is essential, therefore, to test the eating as well as its producing qualities.

The quality of a potato is supposed to depend on the amount of starch it contains, or as the *dry substance* of a potato is mostly starch, this is often taken as a standard of quality in ripe and well preserved potatoes.

To determine the dry substance, well selected potatoes were cut in two and a slice cut from either half until one pound of slices was obtained. These were dried in a current of warm air, then ground, and the last traces of water driven off by heating at the boiling temperature of water.

The following table shows the relative quality of the different varieties of potatoes Sept., 1886, as depending upon the dry substance found:

Name of Variety.	Dry Substance in 100 Parts.	Water in 100 Parts.
Charter Oak	22.87	77.13
Perfect Peachblow.....	22.63	77.37
Early Rose (Ohio grown)	22.57	77.43
Early Rose (Henderson)	22.05	77.95
Rochester Favorite.....	21.98	78.02
Beauty of Hebron.....	21.85	78.15
Clarke's No. 1	21.75	78.25
Extra Early Vermont.....	21.74	78.26
Burbank (Ohio grown)	21.66	78.34
Empire State	21.40	78.60
Triumph	21.38	78.62
Early Rose (home grown)	21.32	78.68
White Elephant	21.25	78.75
Early Ohio.....	20.85	79.15
Vanguard	20.70	79.30
Pearl of Savoy	20.66	79.34
St. Patrick.....	20.30	79.70
Early Sunrise	19.97	80.03
Shaker Russet.....	19.93	80.07
White Star.....	19.66	80.34
Jumbo.....	19.64	80.36
Dakota Red.....	18.97	81.03

From this table it appears that the Charter Oak ranks first in quality, being superior to the Perfect Peachblow and the Early Rose, while the Dakota Red is at the foot of the list.

Taken as a whole the table shows that the quality of potatoes produced here this year is not of the best. A good potato should contain 25 per cent. of dry substance.

The season here was not favorable to the production of the best quality of potatoes. At the ripening season dry weather was prevailing, and probably did not allow of proper maturity. Especially can this be said of the late varieties, including the Charter Oak. The vines dried up rather than ripened.

The Keeping Qualities of the Different Varieties.

To ascertain the keeping qualities of the different varieties of potatoes, one-half bushel of each sort was placed on a ground floor of a good warm cellar and left there until early in February, when they were taken to the laboratory for analysis. Two days before they were taken from their winter quarters, a severe rain storm flooded the cellar, and the potatoes were completely submerged for that length of time.

In the laboratory the specific gravity of each variety was noted, and the amount of solid matter ascertained as had been done in the fall. As was anticipated, this had not changed to any great extent in any of the varieties. In the fall of the year, while the potatoes are in perfect condition, it may do to judge of their quality by the amount of dry substance they contain; but in the spring, especially when the potatoes are sprouting, the starch is being changed without material effect on the amount of solid matter. As this change takes place more rapidly in some varieties than others, it becomes necessary to test the quality by the amount of starch found, rather than by the amount of dry substance.

The following table shows the amount of starch, sugar and dry substance found in the different varieties of potatoes Feb., 1887. The varieties are named in order of the amount of starch found:

Name of Variety.	Per Cent. of Starch.	Per Cent. of Sugar.	Per Cent. of Dry Substance.	Per Cent. of Water.
1 Empire State.....	15.48	0.88	22.40	77.60
2 Charter Oak.	15.33	1.49	22.91	77.09
3 Clarke's No. 1	15.29	1.06	22.35	77.65
4 Perfect Peachblow	15.12	1.32	22.22	77.78
5 White Star.....	15.11	0.81	21.82	78.18
6 Triumph	15.09	0.76	21.80	78.20
7 Pearl of Savoy.....	15.07	1.06	21.86	78.14
8 Burbank.....	14.98	0.74	21.46	78.54
9 Vanguard.....	14.76	0.87	21.03	78.97
10 Early Rose... ..	14.57	0.97	21.72	78.28
11 Beauty of Hebron...	14.56	0.94	21.29	78.71
12 Early Ohio.....	14.35	0.77	21.10	78.90
13 St. Patrick.....	14.29	0.74	20.20	79.80
14 Jumbo.....	14.20	0.84	20.45	79.55
15 Shaker Russet.....	13.91	0.84	20.42	79.58
16 Dakota Red.....	12.05	1.10	19.21	80.79

In all probability the results would have been more striking if the potatoes could have been kept until later in the spring before making the tests. As it is, the table indicates that the first nine varieties would be good for spring use; that the next six varieties are poor in quality, and that the last might be said to be unfit for use.

Preparation of Seed.

Only three experiments were undertaken in this line. The Burbank potato was the variety used. The seed was taken from home-grown potatoes. The three plots received exactly the same treatment as to preparation, planting and cultivation.

The first experiment was made with whole potatoes too small for eating purposes. The second with marketable potatoes cut to two eyes. The third with whole potatoes of large size.

The plots were 1-10 acre in size. The potatoes were planted in rows three feet apart by 14 inches in a row, and covered to the depth of four inches.

The following table shows the yield calculated per acre:

Seed.	Yield of Large Tubers.	Yield of Small Tubers.	Total Yield.
Small, whole seed.....	145	48	193
Cut to two eyes.....	120	30	150
Large, whole seed.....	210	50	260

The results show the advantage of planting whole potatoes of large size. Even small whole potatoes are to be preferred as seed to cut potatoes.

Application of Fertilizers.

The soil for these experiments is similar to that for varieties. The plots were 1-10 acre each. The method of planting was identical to that described under varieties, and the previous treatment of the soil was the same.

The fertilizers were applied to each plot separately—one-half broad-cast, and the other half distributed equally in the furrows. The Burbanks were used as seed, cut to two eyes, the seed end not being used.

The following table gives the fertilizers used per acre and the yield of potatoes:

The yield of potatoes.		Yield Per Acre in Bushels		Total.
Plot No.	How Treated.	Large.	Small.	
56	None.....	120	30	150
58	{ Nitrate of Soda—300 Superphosphate of Lime—600 Sulphate of Potash—200 }	170	43	213
59	{ Nitrate of Soda—300 Superphosphate of Lime—600 Chloride of Potassium—200 }	198	48	245
60	{ Superphosphate of Lime—600 Sulphate of Potash—200 }	203	35	239
61	{ Superphosphate of Lime—600 Nitrate of Soda—300 }	213	35	248
62	{ Nitrate of Soda—300 Sulphate of Potash—200 }	198	35	233
63	Mapes Complete Potato Manure—600	195	45	240
64	None	138	53	191
65	Stable Manure about 1½ tons.....	170	30	200
66	Homestead Tobacco Grower—600	183	33	216
67	Limestone Dust—1,000.....	135	35	170

The essential ingredients of fertilizers are *nitrogen phosphoric acid* and *potash*. In these experiments the fertilizer applied to furnish nitrogen was nitrate of soda, which contained 15 per cent. of nitrogen; superphosphate of lime, containing 18 per cent. of phosphoric acid, to supply phosphoric acid, and sulphate of potash, containing 40 per cent. of potash, to supply that substance. Some soils are deficient in all three of these elements, while others are lacking in only one or two. In our experiments plots No. 58 and 59 received all three of these essential ingredients, or what is called a complete fertilizer. On plot No. 59 the muriate of potash was substituted for sulphate of potash simply to find out which potash compound could be used to best advantage. In plot No. 60 the nitrogenous fertilizer (ni-

trate of soda) was left out, with no appreciable effect on production. In plot No. 61 the potash was left out with apparent advantage, but the variation in the soil was probably the cause of the small increase in yield.

From the above it would seem that as neither the nitrogenous fertilizer nor the potash increased the yield, the phosphoric acid was the element lacking, but in plot No. 62, with this element left out and potash and nitrogen applied, the yield was about the same as in any of the fertilized plots. While the results show conclusively that the application of fertilizers greatly increased the yield, they fail to show which of the ingredients was the most effective. The Mapes fertilizer, presented for trial by the Mapes Formula and Peruvian Guano Co., New York, and the Homestead Tobacco Grower, presented by the Michigan Carbon Works, Detroit, answer the purpose as well, considering the amount applied, as the other mixtures. The stable manure fell short of the artificial fertilizers, and the limestone dust had no appreciable effect.

It must be borne in mind that these experiments were made on comparatively new and very rich ground, having been in cultivation only three years. In a soil long in cultivation, or of poor quality, the results would have undoubtedly been more striking. Again, as shown by plots No. 56, 64 and 67, the field varied in fertility, and makes conclusions more difficult. But this variation happens in all soils, and often makes the most carefully carried-out plot experiment of little value. Well weighed and accumulative evidence is needed before general conclusions can be reached with safety. The judicious application of commercial fertilizers for nearly all crops would, with scarcely a doubt, be a paying investment to the farmer. Certain it is that this subject needs careful consideration and attention.

The Effect of Fertilizers on the Quality of Potatoes.

The following table shows the effect of the different fertilizers on the quality of the potato—the potato having the most starch being considered the best:

Plot No.	Fertilizer Used.	Per Cent. Starch.	Per Cent. Sugars.	Per Cent. Dry Substance.	Per cent. Water.
56	None	15.34	0.63	21.31	78.69
58	{ Nitrogen Phosphoric Acid Sulphate Potash }	15.28	0.68	21.50	78.50
59	{ Nitrogen Phosphoric Acid Muriate Potash }	15.20	0.75	21.04	78.96
60	{ Phosphoric Acid Potash }	15.97	0.95	21.75	78.25
61	{ Phosphoric Acid Nitrogen }	15.13	0.65	21.60	78.40
62	{ Potash Nitrogen }	15.80	0.93	22.38	77.62
63	Mapes Potato Manure	15.56	0.74	22.15	77.85
64	None	15.98	0.88	22.74	77.26
65	Stable Manure.....	14.65	0.88	21.33	78.67
66	Homestead Tobacco Grower	14.69	0.92	21.58	78.42
67	Limestone Dust.....	15.43	0.96	21.85	78.15

The following conclusions seem warrantable from the results as shown in the table:

1. That the application of stable manure greatly injures the quality of the potato.
2. That the application of nitrate of soda is injurious to the quality of the potato. This will probably hold good to the application of any nitrogenous fertilizer. The Homestead Tobacco Grower probably contains too much nitrogen for the production of the best quality of potatoes.
3. The inference is, based upon one trial, that the result in the quality of the potato is the same, whether sulphate or muriate of potash is used, at least in combination with nitrate of soda and superphosphates.

M. A. SCOVELL, *Director.*

LEXINGTON, Ky., March 1, 1887.

47-M-64

Bulletins

Kentucky Agricultural Experiment Station.

AT THE STATE COLLEGE OF KENTUCKY.

BOARD OF CONTROL.

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R. J. SPURR.
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M. A. SCOVELL, Director.

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A. R. CRANDALL, Prof. of Botany.
A. E. MENKE, Prof. of Agri. Chemistry and Agriculture.
A. T. PARKER, Microscopist.
A. M. PETER, Assistant Chemist.

BULLETIN No. 10.

MAY, 1887.

FERTILIZER ANALYSES.

F. K. IRVINE, PRINTER.

NOTICE.

This series of bulletins is issued for the benefit of the farmers of Kentucky. Explanations and definitions are given that the technical terms may be properly understood by all. Repetitions may often be made in future bulletins, yet it would be well for those interested to preserve the early issues for the definition and explanation of terms.

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Kentucky Agricultural Experiment Station.

FERTILIZERS.

Valuable Elements of Fertilizers.

The primary use of manures, or fertilizers, is to supply the elements of plant food that are wanting in the soil. These may be: 1. *Nitrogen*, 2. *Phosphorus*, 3. *Potassium*, 4. *Calcium* and 5. *Magnesium*.

1. *Nitrogen*—The plant is unable to assimilate the free nitrogen of the atmosphere, but must receive its supply from nitrogen in chemical combination with other elements, as: 1. *ammonia* which is nitrogen chemically combined with the element hydrogen—17 parts of ammonia containing 14 parts of nitrogen; 2. *nitric acid*, a chemical combination of nitrogen with oxygen;

and 3. *organic nitrogen*, which is the nitrogen of animal and vegetable matters. Ammonia and nitric acid are the most active forms of nitrogen. Organic nitrogen varies as to its activity as a fertilizer. In blood and meat it is highly active; in hair and leather it is comparatively slow in its effect on vegetation. In finely ground bones the nitrogen is readily assimilable by the plant, but in unground bones or bones coarsely ground it takes a long time for it to become available to the plant.

Sources.—Ammonia salts, nitre, nitrate of soda, and the organic nitrogen of bones, blood, hair, fish, flesh, horn, and of oil cakes in general, and guanos are the chief sources of nitrogen for fertilizers.

Nitrogen in a form that can be assimilated by plants is the most valuable element of plant life. It is also the element usually soonest exhausted in the soil.

2. *Phosphorus*.—Next in importance to nitrogen as a plant food comes Phosphorus. It occurs in most soils in comparatively small proportions. It is so found principally in combination with calcium and oxygen, as phosphate of lime. Phosphate of lime is the principal constituent of bones and a variety of phosphatic minerals as South Carolina phosphates and Canada apatite, and is also found in guano. These are the principal sources of phosphatic manures. The value of these manures depends not only on the amount of phosphoric acid, but also on whether it is more or less readily assimilable by crops. Thus while bone dust or fine ground bone and guano can be used with good effect as suppliers of phosphoric acid to the plant, coarse ground bones and rock phosphates will have no immediate effect. In order to make these various phosphates more rapid in their action, they are often treated with sulphuric acid (oil of vitriol). This treatment converts the insoluble phosphate of lime into a soluble salt of lime called *superphosphate of lime*, sulphate of lime or gypsum being formed at the same time.

These superphosphates supply to the plant phosphorus, calcium and sulphur.

When freshly treated with sulphuric acid in sufficient quantity the phosphorus is in a form soluble in water. After a time, however, or when applied to the soil it is changed into what is called *reverted* phosphoric acid.

When sulphuric acid is not added to phosphatic manures, or when added in insufficient quantities, we find what is called *insoluble phosphoric acid*. This last form of phosphoric acid is much cheaper in the markets, but is not as available to the plant.

In making an analysis of a fertilizer, therefore, we separate the phosphoric acid into the three divisions of *soluble*, *reverted* and *insoluble phosphoric acid*, and give to each its value.

The "soluble" and "reverted" forms of phosphoric acid are both readily assimilable by plants, and hence are sometimes included under the common name "available phosphoric acid." The "available phosphoric acid" in an analysis is equal to the sum of the "soluble" and the "reverted" phosphoric acid.

3. *Potassium*.—Potassium ranks next to phosphorus as a valuable food for plants. Plants consume this element in comparatively large quantities, and some soils are unable to supply the demand; especially is this the case with light sandy soils.

Primarily the plants obtain potash from the decomposition of minerals or rocks containing potash. Thus, feldspar contains from 10 to 16 per cent. of potash. It is potash combined with silica and alumina. As such it is insoluble, and not available to the plant. In the decomposition of this rock clay is formed and a soluble potash salt, which then becomes available. This decomposition goes on gradually, and thus in most clay soils available potash salts are being continually

liberated for the use of the plant. Stirring the soil accelerates this decomposition and the presence of lime or gypsum increases decomposition. In such soils, therefore, the application of lime has another use besides that of plant food.

Plants vary largely as to the amount of potash they require. For example, an acre of wheat yielding 20 bushels requires about 28 pounds of potash; while an average crop of potatoes requires 100 pounds of potash per acre, and an acre of tobacco yielding 3,800 pounds of leaves and stalks assimilates over 200 pounds of potash. It is evident, therefore, that the continual cropping of soils with potatoes or tobacco will in time exhaust the potash supply. Light and sandy soils require this element from almost the start.

Sources.—Wood ashes contain potash, and are therefore used sometimes to supply this element to the soil. Sulphate of potash and the muriate of potash are also used in fertilizers to supply Potassium.

Calcium.—This element combined with oxygen is called *lime*, and in this state is most familiar to us. It is supposed to be an important element of plant food. Experience has shown that when a soil is deficient in lime, other fertilizers have little effect. Besides supplying the soil with an element of plant food, lime acts in another beneficial way: it prevents loss of other elements, as ammonia and potash, by drainage.

Lime is generally applied to soils in the form of gypsum, or plaster, quicklime and chalk.

Magnesium.—This element is of but slight importance to fertilizers.

In the case of superphosphates and the various fertilizers made from bones, lime and magnesia are always found in abundance. So in fertilizing with these substances, we need concern ourselves with only nitrogen, phosphorus and potassium.

COMMERCIAL VALUE OF FERTILIZERS.

The commercial value of all kinds of fertilizers, with the exception, perhaps, of lime in its various forms, barnyard manure, and other cheap grades, should depend upon the amount and commercial value of *nitrogen*, *phosphorus* and *potassium* they contain and their availability as food for crops.

Taking as a basis the retail price of fertilizer ingredients in Louisville, March 1, 1887, the Director has estimated. soluble and reverted phosphoric acid in fertilizers at 10 cents per pound; insoluble phosphoric acid at 4 cents; nitrogen at 18 cents; and potash at 5 cents per pound. The estimated value per ton of the fertilizers given in the tables to follow, is calculated from the analysis by the use of these figures.

FERTILIZER LAW.

The General Assembly of this State, at its last session, passed a Fertilizer law which went into effect July 1, and which repeals all previous legislation on this subject.

1. The law provides that every package of fertilizer sold in this State, whose retail price is more than ten dollars per ton, shall have attached to it a label bearing a certified analysis from the Director of the Kentucky Agricultural Experiment Station. It holds the seller responsible for affixing the official label. The penalty is a fine of one hundred dollars for each offense.

2. It provides that a sample of every fertilizer sold in the State shall be submitted to the Director for analysis with affidavit that it is true and fair sample of such fertilizer. These samples are to be furnished yearly.

3. It instructs the Director to make an analysis of all such samples, and to compute from the analysis the value of the fertilizer, and to print these results on the official label.

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4. It authorizes the Director to inspect personally or by deputy fertilizers exposed for sale in the State, and to prescribe and enforce such rules and regulations as he may deem necessary to carry fully into effect the true intent and meaning of the law.

5. It authorizes any farmer or purchaser of a fertilizer to take a sample of the same, under the rules and regulations of the Director, and forward the same to the Experiment Station for analysis. This analysis shall be *free of charge*.

Here follows the law in full:

CHAPTER 638,

AN ACT to regulate the sale of Fertilizers in this Commonwealth and to protect the agriculturist in the purchase, and use of same.

Be it enacted by the General Assembly of the Commonwealth of Kentucky.

§ 1. On or before the first day of May in each year, before any person or company, shall sell, offer or expose for sale, in this State, any commercial fertilizer, whose retail price is more than ten dollars per ton, said person or company shall furnish to the Director of the Agricultural Experiment Station, inaugurated by the Agricultural and Mechanical College of Kentucky (which station is hereby recognized as the "Kentucky Agricultural Experiment Station") a quantity of such commercial fertilizer, not less than one pound, sufficient for analysis, accompanied by an affidavit that the substance so furnished is a fair and true

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sample of a commercial fertilizer which the said person or company desires to sell within the State of Kentucky.

§ 2. It shall be the duty of the Director of the Kentucky Agricultural Experiment Station to make, or cause to be made, a chemical analysis of every sample of commercial fertilizer, so furnished him, and he shall print the result of such analysis in the form of a label; such label shall set forth the name of the manufacturer, the place of manufacture, the brand of the fertilizer, and the essential ingredients contained in said fertilizer, expressed in terms and manner approved by said Director, together with a certificate from the Director, setting forth that said analysis is a true and complete analysis of the sample furnished him of such brand of fertilizer, and he shall also place upon each label, the money value of such fertilizer computed from its composition as he may determine. The Director shall furnish such labels, in quantities of five hundred or multiple thereof, to any person or company desiring to sell, offer or expose for sale, any commercial fertilizer in this State.

§ 3. Every box, barrel, keg or other package or quantity of any commercial fertilizer, whose retail price is over ten dollars per ton, in any shape or form whatever, sold or offered for sale in this State, shall have attached to it, in a conspicuous place, a label bearing a certified analysis of a sample of such fertilizer, from the Director of the Kentucky Agricultural Experiment Station as provided in the foregoing sections of this act.

§ 4. Any manufacturer or vender of any commercial fertilizer, who shall sell, offer or expose for sale, any fertilizer, without having previously complied with the provisions of this act herein before set forth, shall, upon indictment and conviction, be fined one hundred dollars for each violation or evasion of this act, which fines, less the percentage of the Prosecuting Attorney fees, shall accrue to the benefit of, and be paid into the State Treasury.

§ 5. The Director of the Kentucky Agricultural Experi-

ment Station shall receive for analyzing a fertilizer and affixing his certificate thereto, the sum of fifteen dollars; for labels furnished, one dollar per hundred.

§ 6. The Director of said Kentucky Agricultural Experiment Station shall pay all such fees received by him into the Treasury of the Agricultural and Mechanical College of Kentucky, the authorities of which shall expend the same in meeting the legitimate expenses of the Station, in making analysis of fertilizers, in experimental tests of same, and in such other experimental work and purchases as shall inure to the benefit of the farmers of this Commonwealth. The Director shall, within two months of the biennial meeting of the General Assembly, present to the Commissioner of Agriculture a report of the work done by [him], together with an itemized statement of receipts and expenditures for the two years preceding under the operations of this act.

§ 7. The Director of said Experiment Station is hereby authorized in person or by deputy to take samples for analysis from any lot or package of any commercial fertilizer which may be in the possession of any dealer in this State. And he is hereby authorized to prescribe and enforce such rules and regulations as he may deem necessary, to carry fully into effect the true intent and meaning of this act; and any agriculturist, a purchaser of any commercial fertilizer in this State, may take a sample of the same under the rules and regulations of the Director of said Experiment Station, and forward the same to the Experiment Station for analysis, which analysis shall be made free of charge.

§ 8. This act shall be in force from and after its passage, and all acts in conflict with this act are hereby repealed.

Approved April 13th, 1886.

RULES AND REGULATIONS.

By authority of Section 7 of the fertilizer law the Director makes the following Rules and Regulations concerning the sale of Fertilizers in this State:

1. The SELLER is responsible for affixing the *official* label to fertilizer packages, unless the manufacturer has provided and attached them.

2. All labels, to be official, must emanate from the Director of the Kentucky Agricultural Experiment Station. Persons attaching other than official labels for official labels, are evading the law and are subject to the penalties thereof.

3. Official labels are issued only to persons guaranteeing by affidavit that the fertilizer to which they are to be attached is true to the sample on which the results of the analysis and the commercial value are determined. Persons attaching labels to goods misrepresenting the fertilizers, or the sample for which they are issued, are subject to the penalties of the law for each offense.

TO PURCHASERS OF FERTILIZERS.

It is estimated that from four hundred to five hundred thousand dollars are expended annually in this State for fertilizers. It becomes, therefore, of vast importance to the State that the fertilizers sold should be of the quality represented. To this end the Director would advise farmers purchasing fertilizers:

1. To purchase with a guarantee that the fertilizer is as represented by the official tag attached.

2. To take a sample, especially if purchasing in large quantities, and send it to the Director for analysis to see whether the fertilizer is as represented by the seller.

In order to obtain a fair sample for this purpose, the following directions should be carefully observed:

* a. 'Select at least two average packages of the fertilizer preserving the labels to send with sample. Open these packages and mix well together the contents of each, down to one-half its depth, emptying out upon a clean floor if necessary and crushing any soft, moist lumps, in order to facilitate mixture, but leaving hard, dry lumps unbroken, so that the sample shall exhibit the texture and mechanical condition of the fertilizer.'

* Connecticut Experiment Station.

TABLE 2.
Complete Fertilizers, Superphosphates, etc.—Analysis and Valuation.

Station Number	Name and Address of Manufacturer.	Name of Brand	Pounds in the Hundred					Estimated value	
			Moisture	Soluble	Inverted	Insoluble	Nitrogen		Potash
219	Amor Smith & Co., Cincinnati, O.	Ammoniated Superphosphate of Lime.....	17.97	0.61	6.99	15.08	2.38	2.89	\$35.83
208	Cincinnati Desiccating Co., Cincinnati, O.	Pure Acidulated Bone.....	7.51	2.89	8.35	8.97	4.23	5.14	44.89
209	Same.....	Gilead Phosphate.....	7.40	2.84	4.36	3.07	3.63	4.41	31.28
212	Cleveland Dryer Co., Cleveland, O.	White Barley Tobacco Fertilizer.....	6.88	10.39	0.78	3.39	3.15	3.82	39.23
213	Same.....	Connecticut Valley Tobacco Fertilizer.....	6.90	10.21	0.68	2.94	3.29	3.99	40.76
214	Same.....	Buckeye Phosphate.....	4.50	11.05	1.20	3.53	3.19	3.87	39.00
215	Same.....	Ammoniated Dissolved Bone.....	10.22	6.67	2.57	3.43	1.68	2.04	27.27
216	Same.....	Square Bone.....	5.14	4.06	4.25	9.27	4.55	5.52	40.42
217	Same.....	Ohio Seed Maker.....	9.97	6.96	2.47	3.08	1.83	2.22	27.91
171	Currie Fertilizer Co., Louisville, Ky.	Falls City Tobacco Grover.....	9.36	4.38	5.03	2.47	2.62	3.11	36.30
191	Same.....	Falls City Corn Grover.....	12.91	6.75	3.38	2.87	1.79	2.17	30.08
192	Same.....	Falls City Ammoniated Dissolved Bone.....	11.15	7.36	2.06	2.35	1.14	1.38	26.93
194	Same.....	Falls City Wheat Grover.....	6.26	4.32	5.46	4.96	2.45	2.97	33.43
195	Same.....	Falls City Phosphate.....	12.44	6.65	3.25	3.08	1.89	2.29	30.16
197	Same.....	Falls City Raw Bone Meal.....	6.25	4.20	5.32	5.65	2.27	2.76	32.78
198	Same.....	Falls City Bone Flour.....	7.24	3.77	4.03	5.95	1.44	1.75	27.62
193	Same.....	Curries Raw Bone Superphosphate.....	13.42	1.62	6.73	5.33	4.33	5.61	37.95
202	D. Duckwall & Co., Louisville, Ky.	Bromophyte.....	4.70	0.23	1.90	0.34	1.08	1.31	8.80
220	Wm. A. James & Read, Richmond, Va.	"Regular Roanoke" Ammoniated Superphosphate.....	13.92	8.09	1.79	1.84	1.86	2.26	31.05
179	Michigan Carbon Works, Detroit, Mich.	Homestead Tobacco Grover.....	11.49	9.63	0.75	0.47	3.83	4.65	39.83
180	Same.....	Homestead Corn and Wheat Grover.....	14.88	7.89	2.20	0.91	2.37	2.88	31.08
181	Same.....	Jarves' Drill Phosphate.....	11.78	7.87	1.70	4.02	1.29	1.57	27.00
185	Same.....	Jarves' Tobacco Grover.....	12.17	5.37	1.93	1.07	1.83	2.22	24.64
170	P. B. Mathiason & Co., St. Louis, Mo.	St. Louis Fertilizer.....	13.50	2.74	2.65	5.18	2.14	2.60	23.02
184	Same.....	Ammoniated Bone Superphosphate.....	9.90	8.09	2.06	2.43	3.66	4.44	36.95
221	Memphis Fertilizer Co., Memphis, Tenn.	Memphis Fertilizer.....	8.81	5.74	3.15	2.56	2.14	2.60	30.41
163	North Western Fertilizing Co., Chicago, Ill.	Tobacco Compound.....	11.01	6.06	2.08	4.78	2.75	3.34	31.64
164	Same.....	Challenge Corn Grover.....	12.51	6.36	2.09	5.14	2.31	2.81	33.79
165	Same.....	National Bone Dust.....	12.36	7.46	2.04	4.96	2.14	2.60	33.96
166	Same.....	Ralston's Bone Meal.....	13.81	3.61	3.75	5.87	2.04	2.48	26.76
167	Same.....	Prairie Phosphate.....	15.13	5.25	1.71	8.28	1.29	1.57	25.18
168	Same.....	Twenty-six Dollar Phosphate.....	14.96	5.21	1.78	8.34	1.29	1.57	25.29
206	National Fertilizer Co., Nashville, Tenn.	Tobacco Fertilizer.....	8.42	2.84	3.37	5.05	3.19	3.87	42.50
204	Same.....	Corn Grover.....	8.34	8.01	2.83	0.55	1.65	2.00	32.23
205	Same.....	Rock City Superphosphate.....	12.04	7.38	1.80	1.54	2.75	3.34	32.49
203	Same.....	Tennessee Superphosphate.....	15.50	6.40	2.18	1.54	2.67	3.24	33.02
175	Pacific Guano Co., Boston, Mass.	Dissolved Bone Phosphate and Potash.....	2.30	9.69	4.28	2.46	0.19	0.23	32.50
176	John S. Reese & Co., Baltimore, Md.	Soluble Pacific Guano.....	13.28	7.14	1.87	2.47	2.60	3.16	32.40
186	Wm Skene & Co., Louisville, Ky.	Skene's Improved Louisville Superphosphate.....	5.96	0.52	6.08	8.16	1.66	2.02	32.41
187	Same.....	Ky. Bone Meal with Potash.....	4.86	1.23	7.51	5.46	1.21	1.47	29.97

TABLE 2—Continued.

Station Number	Name and Address of Manufacturer.	Name of Brand	Pounds in the Hundred						Estimated Value	
			Moisture	Phosphoric Acid			Nitrogen	Equivalent to Ammonia		Potash
				Soluble	Reverted	Insoluble				
172	Thompson & Edwards, Chicago, Ill.	Sure Growth Phosphate.....	6.59	5.85	3.55	6.86	1.37	1.66	.....	29.29
173	Same	World of Good Tobacco Grower	5.39	5.21	3.38	6.58	2.82	3.44	.....	32.59
174	Same.....	Dissolved Bone Meal.....	8.38	4.75	3.36	8.76	1.79	2.17	.....	29.67
199	Walton & Whann Co., Wilmington, Del.	Diamond Soluble Bone.....	11.05	7.36	5.29	3.56	0.33	0.40	....	29.34
200	Zell Guano Co., Baltimore, Md.	Zell's Ammoniated Bone Su- perphosphate.....	10.20	6.42	1.28	4.91	1.91	2.32	1.63	27.84
201	Same.....	Zell's Calvert Guano.....	10.30	7.94	2.45	1.83	0.71	0.86	1.47	26.27
211	Same	Zell's Dissolved Bone Phos- phate.....	11.26	10.86	1.89	2.70				27.66

May 30, 1887.

M. A. SCOVELL, DIRECTOR.

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State College of Kentucky.

KENTUCKY AGRICULTURAL EXPERIMENT STATION.

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A. M. PETER, Assistant Chemist.

NOTICE.

This series of bulletins is issued for the benefit of the farmers of Kentucky. Explanations and definitions are given, that the technical terms may be properly understood by all. Repetitions may often be made in future bulletins, yet it would be well for those interested to preserve the early issues for the definition and explanation of terms.

Samples of wheat, corn, oats, barley and other grain that would probably be of interest for experimental purposes will be gladly received and their value tested.

The bulletins of the Station will be mailed to any citizen of Kentucky who sends his name and address to the Station for that purpose.

KENTUCKY EXPERIMENT STATION.

BULLETIN No. 8.

LEXINGTON, KY., Sept. 25th, 1886.

EXPERIMENTS WITH WHEAT.

Last fall, under the direction of Dr. R. J. Spurr, some experiments were undertaken in wheat culture. At the time the Experiment Station had not been organized, and as Dr. Spurr was unable to devote very much time to the experiments, he planted with a view of confining the experiments mainly to two lines of investigation:

1. Comparative test of selected varieties.
2. Effect of cultivation.

The experiments were conducted on a piece of land used formerly as a fair ground, but now belonging to the College. The land had been in cultivation for three years. It had never received an application of manure. The soil is a typical blue-grass soil, a medium loam, two to three feet in depth resting on a porous, reddish subsoil of the same nature as the surface soil. This subsoil rests on blue limestone, quite cavernous, producing a fine natural drainage. The subsoil varies in depth from three to ten feet. Previous to these experiments the land had been in cultivation two years in tobacco, followed by a potato crop.

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Ten varieties of wheat were selected for the experiments. Each variety was planted in drills 18 inches apart. This unusual distance between drills was given in order to cultivate the wheat in the spring, should the weather permit. Before planting the ground was ploughed and thoroughly harrowed, but not rolled. The following table gives the names of the different varieties, time of planting, area planted of each variety, and date of coming up of each variety. The amount of wheat sown was at the rate of forty pounds per acre:

No.		Area Planted.	Time of Planting.	Up.
1	Martin's Amber.....	0.1967	Oct. 5	Oct. 9
2	McGhee White.....	0.1140	Oct. 5	Oct. 9
3	Extra Early Oakley.....	0.1530	Oct. 5	Oct. 9
4	Diehl Mediterranean.....	0.0938	Oct. 7	Oct. 11
5	4-rowed Sheriff Wheat from Russia	0.1424	Oct. 26	Nov. 3
6	White Crimean.....	—	Oct. 5	Oct. 9
7	Indian.....	—	Oct. 5	Oct. 9
8	Genoese.....	0.0482	Oct. 5	Oct. 9
9	Egyptian.....	—	Oct. 5	Oct. 9
10	Hick's California.....	0.1317	Oct. 5	

Below are given notes made upon each variety during different periods of growth.

No. 1. MARTIN'S AMBER.—Fall growth stout and vigorous; stood the winter well. Spring growth strong and close to surface of ground; straw erect, stout. May 21, heading; May 27 in bloom; June 27, grain in hard dough; standing fairly well; straw averaging 4½ feet in height. June 28, harvested. Heads beardless, flattened, abruptly pointed, averaging 3½ inches in length; spikelets 16-20, averaging 18; two to three grains in spikelet, generally two. Grains white, of medium size and generally plump.

No. 2. MCGEE WHITE.—Fall growth very good; slightly winter-killed. Spring growth small; not very erect. Straw very weak, averaging in height 4 feet. May 14, in

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head; May 20, in bloom. Cut June 28; very badly lodged; seed in hard dough. Heads smooth, square, or somewhat flattened, slightly tapering, averaging 2½ inches. Spikelets compact, 12-17 in head, usually 15; grains per spikelet two to three, mostly three; grains nearly white; good, medium size, short and plump.

3. EXTRA EARLY OAKLEY.—Fall growth very good. Stood the winter better than any variety except the Diehl Mediterranean. Although a little slow in starting, the spring growth was excellent and erect. Straw very erect and stout, not lodging; height averaging 4 feet. In head May 5; in bloom May 13; ripe June 9. Heads smooth, averaging 2½ inches in length, tapering somewhat; spikelets 12 to 16, averaging 14; grains in spikelet two to three, usually three; red, large, and mostly plump.

4. DIEHL MEDITERRANEAN.—Fall growth very good. Spring condition the best of any of the varieties. Did not winter kill in the least. Took a very early and vigorous spring growth. Foliage profuse; color dark green. Straw not very erect, spreading; strong, but growth so heavy that it lodged in places before ripe. Average length to straw 4½ feet. In head May 13; in bloom May 26; ripe June 21. Heads bearded, square, averaging 2½ inches in length. Spikelets compact, eighteen to twenty-two in head, averaging twenty. Grain per spikelet, in most instances, three, sometimes only two; red, not very plump, of average size.

5. FOUR-ROWED SHERIFF (from Russia).—Fall growth tender. Stood the winter well. Spring growth very backward. In head June 4th; in bloom June 11th. Taken by rust. Did not ripen.

6. WHITE CRIMEAN.—Fall growth good; winter killed. No spring growth whatever.

7. EGYPTIAN.—Fall growth good. Entirely winter-killed.

8. GENOESE.—Fall growth fair. About 40 per cent. winter-killed. Spring growth erect; straw erect and very strong, averaging about 4 feet in length. In head May 14; in bloom May 22; ripe June 30. Heads somewhat rounded, beardless, loose. Spikelets per head 14-18. Grains per spikelet two to three, usually two. Red wheat; grains large; somewhat shriveled.

9. HICKS.—Fall growth good; stood the winter well. Spring growth profuse and grass like. Straw erect and strong. Did not lodge. In head May 14; in bloom May 21; ripe June 28. Heads beardless, square, averaging $2\frac{1}{2}$ inches in length. Twelve to sixteen spikelets in a head, averaging fourteen. Grains per spikelet from two to three. Grain red, hard, long and of average size.

10. INDIAN.—Fall growth good. Completely winter-killed.

Following are given the data of the time of cutting, yield per plot of grain and straw, and the estimated yield of same per acre:

Variety.	Time of Cutting.	Yield of Grain.— Lbs.	Yield of Grain per Acre —Bu.	Wght of Grain per Bu.	Yield of Straw— Lbs.	Yield of Straw per Acre
Martin's Amber....	June 28	311½	26.5	59½	1551.5	7887
McGhee White.....	June 28	191½	28	62½	817½	7168
Extra Early Oakley	June 9	297	32½	62½	773	5052
Diehl Mediter'nean	June 21	175	31	61½	677	7217
Genoese	June 30	77	27.3	60½	231	4792
Hicks.....	June 28	186	23½	62½	765	5809

CONCLUSIONS AS TO VARIETIES.

1. The Crimean, Egyptian and Indian Wheats are valueless in this section of the country, because they are unable to stand the severity of our winters. Last winter was a fair winter on wheat, yet these three varieties were entirely winter-killed, while most of the other varieties stood the winter well, growing in adjacent plots.

2. The Genoese probably will be unable to stand the majority of winters here. Otherwise it is a good wheat. It will be tried again this year.

3. McGhee White is defective in having a weak straw, and easily lodges. Probably on uplands it would succeed well.

4. The Martin's Amber, by this year's trial, proved to be an excellent white wheat, standing the winter fairly well; fine straw and a good yielder. It deserves further trials.

5. The Four-rowed Sheriff proved valueless, as it was overtaken by rust. Unfortunately this variety was not planted at the time of planting the other varieties, but twenty days later, and the late planting undoubtedly had much to do with the fatal effects of the rust. Although a total failure, the experiment is valuable in showing the danger of very late planting.

6. The Diehl Mediterranean is a most excellent bearded wheat, and stood the winter the best of any variety. The straw is a little too heavy for low lands in such a season as that of last, but nevertheless it is very strong. It was laid flat by several storms, but partially rose again.

7. The Extra Early Oakley proved to be a most excellent variety this year. Its early maturity prevented the attack of rust entirely. Its straw is strong and erect, not lodging in the least. It proved to be the best yielder of any variety, and the wheat is plump and of the best in quality.

8. It should be stated that the yield of all the varieties, with the exception of the Diehl Mediterranean, a bearded wheat, was materially lessened by the ravages of the English sparrow. An attempt was made to keep these pests off, but it was almost useless, as in some places they took every grain from the head. The Extra Early Oakley in particular suffered. It is estimated that fully one-fourth of the wheat was wasted by these birds.

CULTIVATION.

As before stated all the varieties of wheat were planted in drills eighteen inches apart, for the purpose of trying the effect of spring cultivation. The season was very unfavorable for the experiment. The main object was to give the wheat a good start and a continued vigorous growth. The wet spring was very favorable for the growth of wheat, and it was in the best of condition without the application of the cultivator. Again the ground was too wet to cultivate until the wheat was nearly knee high, and by that time the ground was already shaded. Nevertheless one-half of each variety was cultivated twice—the first time when the wheat was nearly knee high, and again ten days afterward.

No appreciable difference could be distinguished in the growth or maturity of the wheat cultivated and that of the wheat uncultivated, except the cultivated wheat at maturity was, generally speaking, about three inches the taller.

The cultivated and uncultivated portions of two varieties were harvested separately and the grain weighed separately, with the following results:

	Yield per Acre— Bushel.	Cultivated Yield per Acre.	Uncultivated Yield per Acre.	Gain in Cultiva- tion.
Martin Amber.....	27.1	27.8	21.4	1.4
Deihs Mediterranean.....	31	32.2	30.9	1.3

The gain by cultivation is too small to justify the statement that it pays to cultivate wheat. These experiments must cover the various seasons before any definite conclusion can be reached in this respect. Undoubtedly in a dry spring the results would have been much more striking.

APPLICATION OF FERTILIZERS.

The ground received no manure of any kind in the fall, but in the spring some experiments were made with fertilizers on the land not intended for future plot experiments

for the purpose of giving the wheat an early start in the spring. It was applied more as a tonic than as a food.

On a plot of wheat one-fourth was not fertilized; one-fourth received an application of nitrate of soda, at the rate of ten pounds of nitrogen per acre; one-fourth received an application of sulphate of ammonia, at the rate of 10 pounds of nitrogen per acre, and the last one-fourth superphosphate of lime, at the rate of 100 pounds per acre. The fertilized plots soon showed the effects of the fertilizers by a more vigorous growth, a darker green, and in every respect got an early and better start, the portion fertilized with sulphate of ammonia showing the best results.

The depredations of the birds prevented any accurate estimate of yield of each plot, but there was constantly a marked effect in starting the growth in spring. In seasons where the wheat comes through the winter in a weak condition, this tonic would certainly be worth the trial.

SMUT.

This disease caused much damage to wheat this year in our State, and many inquiries have been made as to the treatment of the seed-wheat before sowing. The following interesting article on this subject by Prof. Wm. H. Brewer, is taken from the Census Report of 1880:

"The general name *smut* is used in this country to designate a class of diseases which attack the seed, known in other countries under various names, 'bunt,' 'charbon,' 'coal,' etc. The effects are seen in the grain, which is entirely changed in its character where the disease has been complete, and in the case of wheat the kernel is changed somewhat in its appearance—is shorter, plumper and slightly darker in color, and when opened the interior is found to be entirely filled with a black or very dark brown powder, fine as lampblack and somewhat greasy to the feel. The starch and gluten of the interior of the grain have been entirely consumed by this parasite, and its place

is occupied by the spores and *mycelium* of the fungus, which together form the black powder spoken of, only the bran of the original grain remaining.

We have a more definite knowledge of this disease than of rust, and the whole life history of the plant is reasonably well known. It was long ago known that sowing smutty seed produced smutty grain. * * * *

Modern experiment has proved that the disease is ordinarily communicated through the seed. Wheat moistened and rolled in smut before sowing may be so completely infected that nearly every grain of the next harvest will be diseased. All the smuts belong to the genus *ustilago*; wheat smut to the *ustilago segetum*. Its spores are rough, sticky, as if greasy, and only one twenty-eight hundredth of an inch in diameter—a minuteness one finds it difficult to appreciate. Eight millions of such spores can stand on a square inch of surface. When smutted wheat is threshed the grains burst and these spores adhere to the sound grain; and when this is sown as seed they enter the young plant and develop within during the growth of the wheat, and, like a poison, circulate with the juices, and ultimately fix themselves in the kernel, which they change in nature and fill with the black powder already spoken of, consisting mostly of spores ready to produce a new generation. The ordinary farmer first sees symptoms of this disease in the ripening grain, but the experienced observer can find its traces long before, particularly in the flower, where the *mycelium*, like minute spiders' webs, entangle the stamens and pistil. The mature seed also changes in shape and is shorter and bluer at the base; the parasite, however, comes to maturity with the maturity of the grain.

The remedies which are efficacious are applied to the seed-grain, and, fortunately, for this disease we have several complete remedies. They all consist in soaking the seed in some solution which will kill the spore without in-

juring the vitality of the seed itself. Many methods have been used from time to time, but two are so much superior to all others thus far devised that there are scarcely any others now used, at least in this country. Both are effective. The most common is to wet the seed-wheat before sowing in a solution of copper sulphate (called also sulphate of copper, blue vitriol and blue-stone), using at the rate of two to four ounces of the sulphate per bushel of seed wheat. * * * There are several ways of applying it. Sometimes the sulphate is dissolved in water to a saturated solution. This is then diluted with an equal volume of water and sprinkled over the wheat in a pile, which is then stirred and shoveled until all the grain is moistened. This is the least effective way of doing it. In one or two cases I have known a small stream of such solution to be run in a trough along which wheat was moved by an endless screw, which stirred it up. Another method, particularly where wheat is grown on a large scale, is to have the solution in a large quantity of about the strength of half saturation in a large tub, say a hog-head, sawed in two. The wheat, in sacks or in a basket, is lowered into this solution until entirely wet. It is then removed, the surplus allowed to drain off, and the grain thrown in a pile or left standing in the sack until the next day before sowing—this last being simply that the grain may be in a better condition to sow.

The second process, also practically effectual, is to use a solution of strong brine, instead of sulphate of copper. This method has been known for centuries, and is said to have been discovered by sowing wheat for seed which had been accidentally wet in salt water by the sinking of a vessel. To be effective the brine needs to be strong and the grain thoroughly saturated with it. Where this process is used it is quite common that the brined grain be thrown out upon the floor and carefully limed by sifting slaked lime over it. The process is undoubtedly a good

one for the crop, but so far as the smut is concerned, the lime is unnecessary."

Dr. Spurr recommends the following method for the application of the sulphate of copper:

Five pounds of blue-stone in lumps are placed in a tub or half-barrel; water is added until the tub is about two-thirds full; the mixture is stirred with a stick and allowed to stand for a while. The seed-wheat to be treated is placed in a basket and basket and wheat are lowered into the solution, allowed to stand for a few moments, then raised, drained and the wheat emptied on a floor. Should sowing be delayed, the wheat can be spread and dried and sowed at any time.

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