

# Ohio Agricultural Experiment Station.

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## BULLETIN 88

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WOOSTER, OHIO, DECEMBER, 1897.

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CO-OPERATIVE EXPERIMENTS  
MADE BY THE  
OHIO AGRICULTURAL STUDENTS' UNION,  
IN 1896.

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EXPERIMENT STATION, WOOSTER, OHIO.

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ORGANIZATION OF THE  
OHIO AGRICULTURAL EXPERIMENT STATION.

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BULLETIN  
OF THE  
**Ohio Agricultural Experiment Station.**

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NUMBER 88.

DECEMBER, 1897.

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CO-OPERATIVE EXPERIMENTS

MADE BY THE

OHIO AGRICULTURAL STUDENTS' UNION IN 1896.

COMPILED BY L. M. BLOOMFIELD AND J. S. HINE,

DIRECTORS OF THE AGRICULTURAL AND HORTICULTURAL DIVISIONS.

The Ohio Agricultural Students' Union is an organization of students and ex-students of the Ohio State University, formed for the purpose of continuing on the farm the habits of study and investigation formed while at college, following the idea suggested by the Ontario Agricultural and Experimental Union, an organization which has achieved great success in Ontario.

The first organization of the Ohio Union was effected on the 25th of March, 1895. The first year's work was undertaken with many obstacles in the way, and before all was in readiness it was late in the season; consequently not many experiments were attempted. A short report of the season's work was published in the *Agricultural Student* for March, 1896.

It was naturally felt to be mutually desirable that the Ohio Union should keep in close touch with the State University; and since its proposed work lay along lines already projected by the Ohio Agricultural Experiment Station it was felt to be equally desirable that the Union and the Station should work in co-operation. For these reasons the Trustees of the University agreed to contribute a small sum towards the general expenses of the Union for 1896, (postage, printing of circulars, etc.) and the Board of Control of the Experiment Station authorized the furnishing of fertilizers and seeds and the publishing of the results of the tests made.

The general plan of the work undertaken may be understood from the following lists of questions, which were sent out early in 1896 by the Directors of the Agricultural and Horticultural Divisions of the Union:

AGRICULTURAL DIVISION,  
 AGRICULTURAL STUDENTS' UNION.  
 L. M. BLOOMFIELD, Director,  
 COLUMBUS, OHIO.

### QUESTION SHEET.

#### CEREAL CROPS.

A circular of inquiry in regard to wheat will be issued at a later day.

1. Do you contemplate testing any new varieties of corn at your next planting?
2. In case you were furnished with seed would you be willing to make such tests?
3. Do you contemplate using any commercial fertilizers on your corn?
4. In case you were furnished with fertilizers would you be willing to test them on corn?
5. What variety of corn do you grow?

Answer the same questions as above and in the same order in regard to your next oat crop.

- |         |         |
|---------|---------|
| 1 _____ | 2 _____ |
| 3 _____ | 4 _____ |
| 5 _____ |         |

#### SOILING AND CATCH CROPS.

1. Do you contemplate growing any crops for green feeding?
2. If so, what crop or crops will you grow?
3. Do you contemplate growing Lucerne, Alfalfa, Millet, Cowpeas, Fieldpeas, Rape or Crimson Clover?
4. Will you be able to make any experiments with either of the above classes of crops?

#### COMMERCIAL FERTILIZERS.

1. Do you use commercial fertilizers?
2. On what crops do you use them?
3. What amounts per acre do you use?
4. What kinds of fertilizer do you use? Give brands and analyses if possible.
5. With what success have you used commercial fertilizers? Give data of any experiments you may have made with fertilizers.
6. Have you ever, or do you contemplate mixing your own fertilizers instead of buying them ready mixed?
7. Will you be able to make any experiments with home mixed fertilizers?

#### BREEDING AND FEEDING EXPERIMENTS.

1. Have you ever or do you contemplate making any experiments in the breeding or feeding of farm animals?
2. Give data of any such experiments you may have made.
3. Give any systems for practical work along either of these lines.

HORTICULTURAL DIVISION,  
AGRICULTURAL STUDENTS' UNION

J. S. HINE, Director,  
COLUMBUS, OHIO.

I. REGARDING FRUITS.

- (a) Have you any fruit trees that you are going to mulch, with straw or coarse manure, as a preventive against drouth?
- (b) Are you situated so you can test the qualities of gas lime as an insecticide?
- (c) Would you experiment with sulphide of potassium to prevent the mildew of gooseberries?
- (d) Would you try smoking to prevent the plum curculio?
- (e) Would you trim fruit trees at different seasons of the year in order to make observations regarding the effect on the trees, and healing of the wounds?

II. REGARDING POTATOES.

- (a) Would you treat seed potatoes with corrosive sublimate or Bordeaux mixture to prevent scab?
- (b) Would you try one or two commercial fertilizers on potatoes?

III. REGARDING VEGETABLES.

- (a) Would you test the value of one or two insecticides in combatting the cucumber beetle?
- (b) Would you test one or two methods of destroying cabbage worms?

The response to these circulars was most gratifying and resulted in the placing of about one hundred names of ex-students of the University and prominent farmers who signified a desire to assist in the work of the Union, upon the address list of the Agricultural Division. Many encouraging letters were also received, some of them containing suggestions as to the work which should first engage attention. Tabulations of the answers to the questions sent out to correspondents have been made and are particularly interesting.

Forty-two persons answered the questions in regard to the oat crop. Twenty-two different varieties of oats were mentioned as being grown, and twenty-eight made reply to the question in regard to the use of commercial fertilizers, thirteen saying that they used them on this crop. In answer to the questions in regard to the corn crop, seventy persons made reply, naming thirty-five varieties, with as many more local varieties without names. Twenty replied that commercial fertilizers were used by them on the corn crop.

In reply to the questions in regard to the growing of soiling and catch crops, fifty-seven said that they had grown or contemplated growing some, one or more, of this class of farm crops. Thirteen mentioned sweet corn, six sorghum, eight peas, three rape, seven clover and three alfalfa as being the particular crop they intended to grow. Out of fifty-five persons replying to the questions in regard to commercial fertilizers, forty-six replied that they used them regularly on one or more crops.

Of thirty-two persons replying to the question, "With what success have you used commercial fertilizers?" twenty-six replied with good success, three variable or fair, and three no results. Twenty-one replied that they had or contemplated trying home mixing of fertilizers.

Twenty-two persons replied that they were interested in breeding and feeding some class of live stock.

There were sent out from the Station forty-four sets of six sacks each of the fertilizers; also, two varieties of corn to fifty six addresses, and two varieties of oats to twenty-eight addresses. In all, there were over four hundred packages, representing a considerable outlay by the Station in actual cost of fertilizers, seeds, sacks to place them in, as well as labor in preparing them for shipment to the experimenters. On account of unavoidable delays in securing fertilizers, and the time required to prepare the packages for shipment, the seeds were not sent out until April 9, and the fertilizers on May 6. They therefore did not reach many until after all spring crops had been planted or until other arrangements had been made in regard to the fields. From these causes and also partly on account of the unfavorable season for crops in general, a comparatively small number of reports have been made.

A few reports of variety tests upon corn have been received, but most of these tests are of little value for purposes of comparison, the yields being very irregular and the stand of corn poor or partly destroyed in some cases. The general opinion of those reporting is that the Leaming corn is too late in ripening in the northern part of the state, but that on good soil with early planting and a long season it is a very desirable variety.

Mr. J. G. Laughlin, of Catawba, Clark Co., reports an experiment with Clarage, Leaming and Red River corn. The yield on equal areas was:

Leaming—1,200 pounds sound corn and 71 pounds of soft corn.

Clarage—430 pounds of sound corn and 325 pounds of soft corn.

Red River—750 pounds of sound corn and 350 pounds of soft corn.

He reports that had the season been favorable, the probable yield of the Leaming would have been 105 bushels per acre, Clarage 45 and Red River 90.

Mr. A. H. Gladding, of Windsor, Ashtabula county, reports a test of Leaming and Clarage upon a light soil, badly run, but fertilized with 300 pounds of superphosphate per acre. The yields upon one-fourth acre plots were: Leaming 27 bushels of sound corn and 2 pounds of soft. Clarage 20 bushels of sound corn and 1.6 pounds of soft corn.

In a test conducted by Mr. A. D. Spellman, of West Williamsfield, Ashland county, the following yields were obtained per acre:

Leaming—6,300 pounds of sound corn and 60 pounds of soft.

Clarage—4,090 pounds of sound corn and 50 pounds of soft.

King of Earlies—3,120 pounds of sound corn and 4 pounds of soft.

Three persons report concerning the varieties of oats, but only to say that the plots were nearly completely ruined by heavy rains or floods. Two report the successful treatment of seed oats for smut.

Ten experimenters reported the results of their work upon the corn crop with the sets of fertilizers sent out. These involved 105 plots, the number of plots in the individual experiments ranging from seven to twenty. There were in all thirty-nine unfertilized plots for comparison, five plots with barnyard manure, and four plots upon which various brands of commercial goods were used. Three experimenters reported the weights of stover as well as the yields of corn. The number of unfertilized plots in the individual experiments ranged from one to eleven. In several experiments the results are of little value, either because of great irregularities in the soil or from faulty arrangement of the plots. We may expect that the experience gained by the past year's work will largely reduce the number of reports of this character in the future. The tables given further on exhibit some of the anomalies not unfrequently present in work of this character. Care should always be taken to include a sufficient number of "nothing" plots; every other plot, or at least every fourth one should be of this character.

In the Horticultural Division fertilizers were distributed for experiments with potatoes, and in addition, members were asked to select one or more subjects for investigation from a list which included the following:

1. Treating seed potatoes with corrosive sublimate and Bordeaux mixture to prevent scab.
2. Mulching fruit trees.
3. Spraying gooseberries with Potassium sulphide to prevent mildew.

Twenty-eight members indicated a willingness to take part in the work, and each chose from one to four of the subjects.

The extremely wet season, fungous diseases and insects have had their influences, and perhaps other valid causes might be given. At any rate, we have not received reports from more than half of those who promised to aid in the work.

## CO-OPERATIVE EXPERIMENTS WITH FERTILIZERS.

INTRODUCTION, BY C. E. THORNE.

In planning an experiment with fertilizers for the Students' Union it seemed desirable to make the first experiment as simple as possible, and also to so arrange it that it should supplement in some direction the system of fertilizer experiments in operation at the Experiment Station.

Since these experiments have thus far thrown but little light upon the most economical use of potash in fertilizers it was decided to take up this question, and send out a series of fertilizers containing potash in different proportions.

For this purpose nitrate of soda, dissolved bone black and muriate of potash were mixed in such proportions as to give six mixtures having the following relative percentage composition :

Mixture No.	Percentage composition.		
	Phosphoric acid.	Ammonia.	Potash.
1.....	$8\frac{1}{2}$	$5\frac{1}{3}$	$3\frac{1}{2}$
2.....	$8\frac{1}{2}$	$5\frac{1}{3}$	$6\frac{2}{3}$
3.....	$8\frac{1}{2}$	$5\frac{1}{3}$	10
4.....	$8\frac{1}{2}$	$2\frac{2}{3}$	$13\frac{1}{2}$
5.....	$12\frac{1}{2}$	$2\frac{2}{3}$	$3\frac{1}{2}$
6.....	$8\frac{1}{2}$	$5\frac{1}{3}$	0

Mixtures No. 1, 2, 3 and 6 are directly comparable with each other, the potash being the only varying constituent. In No. 4 part of the ammonia of No. 3 is replaced by potash, and in No. 5 part of the ammonia of No. 1 is replaced by phosphoric acid.

These materials were mixed to a uniform bulk by the addition of sand, in order that they might be evenly distributed, and were put into numbered sacks and sent out with the following circulars of introduction prepared by Directors Bloomfield and Hine :

## (A.) GENERAL DIRECTIONS.

## I. MAPS AND PLANS OF FIELDS AND EXPERIMENT PLOTS.

Draw a map of each field upon which you intend to make a report and also plans of all experiment plots. Make these maps plain, drawing to a scale, or giving data so that such a map may be constructed. Designate the fields and plots by numbers so that reference can be made to them at any time by number. Keep duplicate copies of these maps for your own use. Indicate on the map or in your description the following features: (1.) Scale of the map. (2.) Compass directions. (3.) Actual boundaries of fields and plots by lines on the map. Measure the land actually in cultivation by means of chain, tape or other accurate measure; these measurements shall constitute the boundaries. (4.) Slope of the land and direc-



tion of the same. (5.) Drainage (a), natural, (b) artificial, giving approximate location of underdrains on the map. (6.) Give briefly the crops and nature of experiments being conducted on the fields or plots.

#### II. HISTORY OF THE LAND.

- (1.) How long has the land been cleared?
  - (2.) What kind of timber was the original forest?
  - (3.) How many years has the land been cropped?
  - (4.) How long has the land been pastured?
  - (5.) If it has been under a system of rotation, give the nature of such rotation.
  - (6.) Do you consider its fertility exhausted?
  - (7.) Have fertilizers been applied?
  - (8.) If so, give kinds, when, and on what crops have they been used.
  - (9.) Have commercial fertilizers proved of value on the land?
- What kinds have proved of the most value?
- (10.) Have barnyard manures been used on the land?
  - (11.) If so, when on what crops, how applied, etc. ?

#### III. CHARACTER OF THE SOIL.

- (1.) Apply the following appellations as descriptive of the soil: Sandy, clay, loam, sandy loam, clayey loam, gravelly, gravelly loam, muck, light, heavy, wet, cold, dry, compact, etc.
- (2.) What is the character of the subsoil?
- (3.) Give the characters of underlying strata that you may be acquainted with.
- (4.) Give whatever information you can in regard to movements of water and soil moisture in the soil and in the strata below.
- (5.) Secure samples of the distinctive soils and subsoils of your farm. (See directions for taking soil samples.)

#### IV. PREPARATION OF THE SOIL.

- (1.) What was the preceding crop?
- (2.) When was the ground plowed?
- (3.) How deep was it plowed?
- (4.) Describe the mechanical treatment after plowing, harrowing, etc.
- (5.) Commercial fertilizers, brands used, amounts used per acre, analysis, how applied, etc.

If home mixing is done give ingredients used, with guaranteed analysis, weight of each chemical used in the mixture, how mixed, prices paid, etc. Preserve a sample of the mixture. (See sampling commercial fertilizers and manures.)

- (6.) Barnyard manures, whether from horses, cattle, sheep or hogs, time, manner of applying, etc. Samples may be taken of the manure.
- (7.) Variety of seed used, how put in, date of planting.

#### (C.) SPECIAL DIRECTIONS FOR PLOT EXPERIMENTS.

Furnish data as under (A.) I, II, III and IV. Select land as uniform as possible for plot work. The exact shape of the plots is immaterial; usually it is more convenient to have them long and narrow, but square plots may be used if desired. A convenient size for one tenth acre plots is one rod wide and sixteen long, or two rods wide by eight long. Apply fertilizers uniformly over the plots, either by drilling or broadcasting by hand; if by the latter method care should be taken to keep each fertilizer well within the limit of the plot for which it is intended. Avoid

applying by hand on a windy day. If a drill is used it may be set to put on nearly all of the fertilizer, the remainder being broadcasted.

The sets of fertilizers as furnished by the Experiment Station will be mixed with sand or similar material to bring them to the same bulk and the application of the fertilizers will be at the rate of 300 pounds per acre. They will be furnished in lots sufficient for one twentieth acre plots.

Owing to delays in receiving the fertilizers they were not sent until May 6, too late for oats and too late in the northern part of the state, to be used before planting the corn. It is probable, however, that the application of the fertilizer, especially when compounded of such easily soluble materials as those used in this test may be delayed without loss, possibly with advantage, until the latter part of May.

Thirteen reports of experiments with fertilizers have been received, ten on corn and three on potatoes. Several others who undertook to experiment with potatoes report the total loss of their work through the rotting of the crop during the excessive rains of July. Of these experimenters a few followed the plan of the test throughout, while the remainder varied from it in one or more important points. In several cases the plots consisted of single rows, planted three to three and one-half feet apart, with no vacant or unfertilized rows adjoining, or if there were such rows they were the only unfertilized plots, thus greatly increasing the probability of the unfertilized plants profiting by the fertilizer so near at hand. In such planting it was of course necessary to apply the fertilizer only in the drill or row, thus restricting the root range of the fertilized plants.

In other cases but one unfertilized plot was left; the careful study of these as published, and especially of those in which the unfertilized plots are duplicated, and which show the variation in even the most uniform soils, should convince the doubter that duplication of such plots is absolutely necessary if trustworthy results are desired.

These remarks are not made in captious criticism, but in the hope that by drawing attention to points that are essential to accurate work, the mistakes of the past year may be avoided in future.

Field experiment is costly work, and its results may be rendered nugatory or even worse than useless by omission of what may seem to be a small matter to one who has not had experience in this form of investigation.

We hope and trust that these first co-operative experiments of the Ohio Agricultural Students' Union may open the way for a system of such experiments which shall extend to every township in the state.

In most cases the experimenters have furnished full notes respecting the test, as requested in the circular. It has seemed unnecessary to publish all these notes in full, and therefore they have been condensed in most cases, but in one instance the entire report is published as an example of what is desired.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 1, BY P. HOMER WILSON, ORLAND, VINTON COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizer.			Yield of grain per acre.	Increase or decrease (—) per acre.*
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	None	.....	.....	.....	26.0	.....
2	1	8½	5½	3½	31.2	5.8
3	2	8½	5½	6½	26.2	1.4
4	None	.....	.....	.....	24.2	.....
5	3	8½	5½	10	24.6	—0.7
6	4	8½	2½	13½	32.0	5.5
7	None	.....	.....	.....	27.7	.....
8	5	12½	2½	3½	42.3	11.4
9	Manure*	.....	.....	.....	44.6	10.5
10	None	.....	.....	.....	37.4	.....
11	6	8½	5½	.....	40.5	3.1
Average yield of unfertilized plots .....					28.8	

\* 800 lbs. horse manure, = 8 tons per acre.

\* In this and the following tables the increase for the fertilized plots has been calculated on the assumption that if the yields of two neighboring unfertilized plots, 1 and 4, for example, were twenty-five and twenty-eight bushels, respectively, the unaided yield of the fertilized plots between, 2 and 3, would have been twenty-six and twenty-seven bushels. The "average yield of unfertilized plots" is given in each table for general comparison, but is not used in calculating the increase.

Notes by Mr. Wilson: The soil was a sandy loam, rock at 8 to 12 feet. Sub-soil clay resting on sand overlying the rock. The field was in meadow 7 years ago, sowed to wheat and mowed in '92, '93, '94, '95. The fertilizers were applied broadcast with a hand seed sower May 20th, and the corn was planted May 27th. The ground was wet and in poor condition; the stand poor and irregular; replanting did not produce ears. The test would have no doubt been more conclusive if the fertilizer had been drilled and the corn planted earlier. The variety of corn used was eight rowed. Plots  $\frac{1}{10}$  acre.

The locality was evidently the site of an Indian village, as indicated by dark colored, burned spots, these perhaps predominating in plots 9 to 11. They were avoided as much as possible in laying out of the plots.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 2, BY V. W. LEE, NEW PLYMOUTH, VINTON COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizer.			Yield of grain per acre.	Increase or decrease (—) per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	Manure	.....	.....	.....	42.0	6.0
2	1	8½	5½	3½	36.0	0.0
3	2	8½	5½	6½	32.0	—4.0
4	None	.....	.....	.....	36.0	.....
5	None	.....	.....	.....	28.8	.....
6	3	8½	5½	10	36.0	2.1
7	4	8½	2½	13½	36.0	—2.9
8	None	.....	.....	.....	44.0	.....
9	5	12¾	2½	3½	44.8	8.4
10	None	.....	.....	.....	28.8	.....
11	6	8½	5½	.....	36.0	7.2
Average of unfertilized plots .....					34.4	

Notes by Mr. Lee: The barnyard manure was applied to plot 1, as it was at the edge of the field. By mistake, the next two plots were fertilized. Land cleared about 35 years. Original timber chestnut. The land was pastured at first. In 1883 corn was planted, followed by corn then by wheat. It was seeded to timothy in 1885 and mowed in 1886 and '87. From '87 to '95 it was allowed to grow up and was grazed but little. The land seems to be badly worn except where pastured by sheep previous to 1883. Commercial fertilizers were first applied to wheat in 1884 and proved of value to the grass. The soil is clay with a little sand and a gravelly sub-soil. The coal measures are below. The previous crop was corn. The whole field was fertilized previous to planting with the Forest City brand, 300 lbs per acre. It was planted to a medium sized, white flint corn. Planted May 8th. The crop was injured by wet weather and hail. Fertilizers from the Union were not applied till after the corn was planted. Plots  $\frac{1}{20}$  acre.

The variation in yield of the unfertilized plots in this test is so great and so irregular, that it does not seem advisable to attempt to estimate the effect of the fertilizers.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 3, BY J. L. HUGHES, NEW PLYMOUTH, VINTON COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield of grain per acre.	Increase or decrease (—) per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	None	.....	.....	.....	84.5	.....
2	1	8½	5½	3½	86.8	1.6
3	2	8½	5½	6½	81.1	—5.0
4	None	.....	.....	.....	86.8	.....
5	3	8½	5½	10	84.6	1.6
6	4	8½	2½	13½	72.6	—6.6
7	None	.....	.....	.....	75.4	.....
8	5	12¾	2¾	3½	77.7	3.1
9	Manure	.....	.....	.....	74.8	1.0
10	None	.....	.....	.....	73.1	.....
11	6	8½	5½	0	69.1	—4.0
12	*	11	2	3	72.3	—0.8
Average of unfertilized plots.....					.....	.....

\*“Ohio Seed Maker.”

Notes by Mr. Hughes: Land cleared about forty years. Original timber oak and hickory. The rotation has been corn followed by wheat about every five years. Commercial fertilizers have been used on three or four crops of wheat with good results. The soil is rather a heavy clay with clay sub-soil underlaid with sand rock and limestone shale. The previous crop was winter oats which was a failure. Fertilizers applied one-half with drill, balance broadcasted. Planted May 16.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 4, BY R. W. DUNLAP, KINGSTON, PICKAWAY COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield of grain per acre.	Increase or decrease (—) per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	None	.....	.....	.....	64.8	.....
2	1	8½	5½	3½	64.3	—0.6
3	2	8½	5½	6½	64.6	—0.4
4	None	.....	.....	.....	65.1	.....
5	3	8½	5½	10	59.0	—5.8
6	4	8½	2½	13½	67.4	2.9
7	None	.....	.....	.....	64.3	.....
8	5	12¾	2¾	3½	60.3	—2.6
9	*Manure	.....	.....	.....	66.3	4.8
10	None	.....	.....	.....	60.1	.....
11	6	8½	5½	0	57.1	—1.3
2	None	.....	.....	.....	56.7	.....
Average of unfertilized plots.....					62.2	.....

\* 4 tons per acre.

Notes by Mr. Dunlap: Soil a black loam; has been cleared for about twenty years and cropped for more than twelve years. Sub-soil is blue clay. The rotation has been corn, oats, wheat and clover. Commercial fertilizers have not been used. Some barnyard manure has been used on the poor spots. The season was very wet and injured the crop. Yellow corn, probably a mixture of Leaming and Clarage, was planted May 7th. Crop was mature September 9th; was cut September 12th. Previous crop was clover. Plots  $\frac{1}{20}$  acre.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 5, BY R. Y. WHITE, CHANDLERSVILLE, MUSKINGUM COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.		Increase or decrease (—) per acre.	
		Phosphoric acid.	Ammonia.	Potash.	Grain.	Stover.	Grain.	Stover.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pounds.</i>
1	None	.....	.....	.....	43	1,340	.....	.....
2	1	8½	5½	3½	46	1,480	4 4	134
3	2	8½	5½	6½	43	1,600	2.7	247
4	None	.....	.....	.....	39	1,360	.....	.....
5	3	8½	5½	10	48	1,420	7 5	90
6	None	.....	.....	.....	42	1,300	.....	.....
7	4	8½	2½	13½	44	1,580	4.0	210
8	None	.....	.....	.....	38	1,440	.....	.....
9	5	12½	2½	3½	59	1,720	21.0	330
10	None	.....	.....	.....	38	1,340	.....	.....
11	6	8½	5½	0	48	1,440	11.0	180
12	None	.....	.....	.....	36	1,180	.....	.....
13	*	9	.....	1½	45	1,300	7.0	150
14	None	.....	.....	.....	40	1,120	.....	.....
15	*	13	1½	2½	44	1,120	6.0	20
16	None	.....	.....	.....	36	1,080	.....	.....
17	Manure	.....	.....	.....	44	1,260	10.5	230
18	None	.....	.....	.....	31	980	.....	.....
Average of unfertilized plots.....					38	1,249		

\*Ready mixed fertilizers.

Notes by Mr. White: Land cleared 60 years. Original timber white oak. The rotation has been, since 1890, corn, wheat, and clover. Acidulated goods have been used on wheat and have proved of value. Barnyard manure has been used on corn and on clover sod before being plowed for corn. The soil is clay. Previous crop was corn. White dent corn was planted May 13th. The crop was injured by the wet weather. Cut Sept. 13th., Oct. 15h, was husked and weighed. Plots 1-20 acre.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 6, BY C. A. HOYT, ROCK CREEK, ASHTABULA COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.		Increase or decrease (—) per acre.	
		Phosphoric acid.	Ammonia.	Potash.	Grain.	Stover.	Grain.	Stover.
		<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pounds.</i>
1	None	.....	.....	.....	19.7	1,222	.....	.....
2	1	8½	5½	3½	22.2	1,455	3.4	193
3	2	8½	5½	6½	19.6	1,357	1.6	55
4	None	.....	.....	.....	17.2	1,342	.....	.....
5	3	8½	5½	10	21.5	1,335	3.8	78
6	4	8½	2½	13½	18.8	1,312	0.6	140
7	None	.....	.....	.....	18.8	1,087	.....	.....
8	5	12¾	2¾	3½	24.2	1,275	5.1	128
9	Manure	.....	.....	.....	27.8	1,455	8.4	248
10	None	.....	.....	.....	19.8	1,267	.....	.....
11	6	8½	5½	0	26.1	1,530	6.4	278
12	None	.....	.....	.....	19.5	1,222	.....	.....
Average of unfertilized plots.....					19.0	1,228		

Notes by Mr. Hoyt: Land cleared about five years. Original timber hemlock and chestnut. Planted in corn for three years. Has never been pastured. No fertilizers have ever been used. The soil is a white or yellow clay, heavy and wet. Variety of corn used, an early white dent. Planted May 21st. The plots are thirty-three hills long, three feet, four inches apart both ways, four rows in each plot.



FERTILIZERS ON CORN.

EXPERIMENT NO. 7, BY A. E. DODDS, TRANQUILITY, ADAMS COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.		Increase or decrease (—) per acre.	
		Phosphoric acid.	Ammonia.	Potash.	Grain.	Stover.	Grain.	Stover.
		<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pounds.</i>
1	None	.....	.....	.....	28.0	1,420	.....	.....
2	1	8½	5½	3½	37.4	1,500	9.0	107
3	2	8½	5½	6½	44.2	1,960	5.3	594
4	None	.....	.....	.....	29.4	1,340	.....	.....
5	3	8½	5½	10	38.5	1,940	8.6	567
6	4	8½	2½	13½	40.5	1,680	10.7	274
7	None	.....	.....	.....	30.0	1,440	.....	.....
8	5	12¾	2¾	3½	48.8	2,520	18.3	1,057
9	None	.....	.....	.....	31.7	1,500	.....	.....
10	6	8½	5½	0	30.0	1,840	-1.7	340
11	*	10	3	1	43.1	1,700	11.4	200
Average of unfertilized plots.....					29.7	1,425		

\*"Big Three" fertilizer.

Notes by Mr. Dodds: Land cleared thirty-six years. The rotation has been corn, wheat, hay, pasture two years. Fertility almost exhausted. Wheat has been fertilized for five years. Barn-yard manure has not been used. Fertilizers have been of value. Soil is a dry, compact clay. Subsoil a blue clay, limestone underneath. Hay was the previous crop. Yellow dent corn was drilled May 18th. Season was very dry the first part, very wet the latter part. The chinch bug injured the crop. The corn was cut September 18th. Plots, ¼ acre.

## OHIO EXPERIMENT STATION.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 8, BY J. M. WALKER, MARLBORO, STARK COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield of grain per acre.	Increase or decrease (—) per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	1	8½	5½	3½	40.5	1.5
2	2	8½	5½	6½	37.5	—1.5
3	3	8½	5½	10	42.0	3.0
4	4	8½	2½	13½	43.5	4.5
5	5	12¼	2½	3½	45.0	6.0
6	6	8½	5½	.....	40.5	1.5
7	None	.....	.....	.....	39.0	.....

Notes by Mr. Walker: The land has been under cultivation 75 to 100 years, and was completely worn out when I came in possession a few years ago. I have applied barnyard manure and commercial fertilizers in rotation with clover, corn, oats and wheat. The soil is clay loam; was in corn last season.

## FERTILIZERS ON CORN.

EXPERIMENT NO. 9, BY JOHN R. MOODY, MECHANICSBURG, CHAMPAIGN COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield of grain per acre.	Increase or decrease (—) per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	1	8½	5½	3½	57.1	10.0
2	2	8½	5½	6½	61.4	14.3
3	3	8½	5½	10	50.0	2.9
4	None	.....	.....	.....	47.1	.....
5	4	8½	2½	13½	51.4	4.3
6	5	12¾	2½	3½	54.2	7.1
7	6	8½	5½	.....	54.2	7.1

Notes by Mr. Moody: Land cleared about 30 years. Original timber, oak, elm, ash, black walnut and hickory. It has been cropped about ten years and pastured 20 years. The rotation since 1892 has been corn, wheat and clover. Commercial fertilizers have been used on wheat and have proved of value. The soil is clay underlaid with limestone. The fertilizers sent were drilled with wheat drill. The previous crop was wheat. Yellow dent corn was planted May 28th. Cut Oct. 1st. Weights were taken Nov. 25th. Plots  $\frac{1}{20}$  acre.

## FERTILIZERS ON CORN.

SUMMARY OF EXPERIMENTS 1 TO 9.

*Increase or Decrease (—) in bushels per acre.*

Experiment No.	Sack No.						Manure.
	1.	2.	3.	4.	5.	6.	
1	5.8	1.4	-0.7	5.5	11.4	3.1	10.5
2	0.	-4.0	2.1	-2.9	8.4	7.2	6.0
3	1.6	-5.0	1.6	-6.6	3.1	-4.0	1.0
4	-0.6	-0.4	-5.8	2.9	-2.6	-1.3	4.8
5	4.4	2.7	7.5	4.0	21.0	11.0	10.5
6	3.4	1.6	3.8	0.6	5.1	6.4	8.4
7	9.0	5.3	8.6	10.7	18.3	-1.7	.....
8	1.5	14.3	2.9	4.3	7.1	7.1	.....
9	10.0	-1.5	3.0	4.5	6.0	1.5	.....
Average.....	3.9	1.7	2.6	2.6	8.6	3.3	6.9

It will be seen, from the average results of these experiments, that the increase or decrease in the percentage of potash has apparently had no effect upon the crop; but when the phosphoric acid is increased, as on the plots fertilized from Sack 5, a marked increase of crop is shown.

The irregularities in the results obtained show the great necessity for repetition in work of this character, and the danger in drawing conclusions from a single test [C. E. T].

## FERTILIZERS ON POTATOES.

EXPERIMENT BY J. H. SCROGGIE, OLMSTED FALLS, CUYAHOGA CO.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.	Increase per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
13	<i>a</i>	9	3½	1	143	6
12	<i>b</i>	.....	.....	.....	141	4
1	None	.....	.....	.....	137	.....
2	1	8½	5½	3½	142	14
3	2	8½	5½	6½	140	22
4	None	.....	.....	.....	109	.....
5	3	8½	5½	10	142	18
6	4	8½	2½	13½	167	27
7	None	.....	.....	.....	155	.....
8	5	12¾	2½	3½	165	18
9	Manure	.....	.....	.....	156	16
10	None	.....	.....	.....	132	.....
11	6	8½	5½	0	157	25

*a.* Forest City Fertilizer.

*b.* Soft and hard wood ashes, 25 bushels per acre.

## REPORT BY MR. SCROGGIE.

*History of the land:* 1. The land has been cleared over twenty years.

2. The original forest consisted of Elm, Maple, Oak and Hickory.

3. It has been cropped for about twelve years.

4. It has been pastured about eight years.

5. It has not been under a perfect system of rotation because of having been pastured; however, our regular rotation where used has been wheat, clover and potatoes, and once or twice through several years we had corn, oats and clover.

6. Its fertility is not exhausted.

7. Fertilizers have been applied.

8, 9, 10, and 11. Forest City first on oats and wheat. Though different ones have been used as tests, yet none seem to give much satisfac-

tion. Barn yard manure of horses, cattle and sheep has been used and has proved beneficial; I have also tested hen manure and have obtained the best success from that. Manure has never been used on wheat and seldom on oats.

*Character of the soil:* 1. The soil is gravelly loam.

2. The subsoil is clay.

3. Underneath is blue clay, quicksand and sandstone. The sandstone is about twenty-seven feet below the surface, with four or five feet of quicksand on top.

*Preparation of the soil:* 1. The preceding crop was clover and timothy hay.

2 and 3. The ground was plowed May 9, eight inches deep.

4. After plowing, the ground was dragged with a drag made of oak scantling, 4 by 4, bolted together cornerwise, with a 4 inch block between. The ground was pulverized with a cutaway harrow, going over it once or twice lengthwise and once crosswise, leaping half way each time; then it was again leveled with the scantling drag and planted with an Aspinwall potato planter.

5. Fertilizers applied with grain drill at the rate of 300 pounds per acre.

6. Barnyard manure was from horses, cattle and hogs.

7. Potatoes were planted with the Aspinwall planter on May 22d.

*Meteorological and soil conditions during the germination and growth of the crops:* 1. The ground had sufficient moisture at the time of the germination of the seed. The growing season was quite wet all through and quite warm most of the time. About July 5, 7, 8, three inches of water fell within the three days and in about a week two inches of water fell within twenty-four hours. In regard to temperature I can say but little except that there was but little variation, most of the season being quite warm. The unusual rainfall had a bad effect because the land was not perfectly level and for that reason the results will not be as fair between the plots.

*Data concerning cultivation:* On account of the wet weather the cultivation was not what it should have been and did not have much effect, but there were no weeds to speak of during the season. The potatoes were harrowed with a light drag made for the purpose, with the teeth slanting backwards, on May 27th, but I could not go over them again with the harrow. They were cultivated once in a row with an iron cultivator, soon after they were up, then in a few days they were cultivated twice in the row, care being taken to have the tooth of the cultivator pass as closely to them as possible without moving the plant, and as deep as possible. They were cultivated once more twice in the row, though not as close as the first time. As soon as they began to droop they were hilled up with a shovel plow which was followed by the cultivator, drawing in very narrow. In nearly all cases the cultivation was followed by

rain, some times very heavy, so the soil could not be kept loose very long.

*Data concerning growth:* The seed germinated about May 26th and would have been up about June 1st, had it not been for the heavy rains which detained them for two or three days. About three weeks after planting, or June 10th, they averaged one foot in height, and in a week more were two feet. After they had attained a height of two feet or a little more the plants dropped, completely covering the ground.

I could see very little difference between the different plots while growing; however, plots Nos. 5 and 6 seemed a little in the lead, but I think it was due to the slight elevation of these plots above the others. In regard to the maturity would say that they blighted the first week in September and were ripe in a little less than two weeks after blighting:

*Data concerning harvest and yield:* The potatoes were harvested about one week after maturity, on September 24th and 25th, and weighed 64 pounds to the bushel.

Plots 5, 6, 7, and 8 were slightly higher than the rest of the land. Plot No. 6 had 85 % of marketable potatoes and 15 % of small potatoes. The other plots in proportion to their yield. The tubers were of nice shape and smooth. None were treated for scab and none was found. Plots  $\frac{1}{10}$  acre.

#### FERTILIZERS ON POTATOES.

EXPERIMENT BY D. O. FRAGER, GREENWICH, HURON CO.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.			Increase per acre.
		Phosphoric acid.	Ammonia.	Potash.	Large.	Small.	Total.	
		<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	None.	.....	.....	.....	167.5	35.0	202.5	.....
2	1	8 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{1}{2}$	187.5	30.0	217.5	37.5
3	2	8 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{2}$	181.2	37.5	218.7	54.5
4	None.	.....	.....	.....	90.0	45.0	135.0	.....
5	3	8 $\frac{1}{2}$	5 $\frac{1}{2}$	10	172.5	40.0	212.5	74.2
6	4	8 $\frac{1}{2}$	2 $\frac{3}{4}$	13 $\frac{1}{2}$	185.0	30.0	215.0	73.3
7	None.	.....	.....	.....	105.0	40.0	145.0	.....
8	5	12 $\frac{3}{4}$	2 $\frac{3}{4}$	3 $\frac{1}{2}$	182.5	58.7	241.2	103.7
9	6	8 $\frac{1}{2}$	5 $\frac{1}{2}$	0	170.0	30.0	200.0	70.0
10	None.	.....	.....	.....	97.5	25.0	122.5	.....
11	a	10	3 $\frac{1}{2}$	0	160.0	27.5	187.5	65.0
12	b	10	3	3	165.0	20.0	185.0	62.5
13	c	10	3 $\frac{1}{2}$	0	175.0	30.0	205.0	82.5
14	d	10	3	3	170.0	35.0	205.0	82.5

a Champion, 300 lbs. per acre.

b Ammoniated bone, 300 lbs. per acre.

c Champion, 600 lbs. per acre.

d Ammoniated bone, 600 lbs. per acre.

Notes by Mr. Frazer. The land has been cleared about fifty years. Timber mostly beech and maple, with some white wood, oak, white ash, elm, walnut, cherry, etc. Land quite level, with slight descent to the north and west. East third rather flat and draining to the north, balance draining to the west. No underdrains or open ditches. Previous to 1877 land was in grass for 15 years. In 1877 a light crop of wheat. In 1878 wheat, 28 bushels per acre, no fertilizer. In 1879 wheat, 26 bushels per acre, fertilized with barnyard manure. In 1880 wheat, 25 bushels per acre, no fertilizer. Was then pastured and mowed, mostly pastured, till 1891, when it was plowed and planted to fodder corn on June 27th. In the fall it was sown to rye and seeded down; was pastured in 1892 and mowed in 1893 and then pastured.

The potatoes were harrowed June 13th, potatoes coming up nicely. Cultivated June 20th with Buckeye walking cultivator, four shovels, bull-tongues on the inside set deep. Plot 8 showed the largest vines. Were cultivated again June 23rd, bull-tongues set outside, deep. Plot 8 still in the lead and all fertilized plots looking better than unfertilized. Blossom buds showing. Wet weather prevented farther work till the vines were too large. Ground was clean at digging time. Colorado bugs were worse to contend with than I ever knew them and finally the beetles killed the vines before they were ripe and evidently reduced the yield somewhat. Soil samples were taken Oct. 12th, from various unfertilized plots.

Plot 1 was quite perceptibly the best land, it being the outside of the field and sometime in the past the ground had been turned up there at successive plowings. It probably had some advantage in drainage. It was next to road and ten or twelve feet from a bank two or three feet high, with tile at the bottom of the bank.

Plot 4 was poorest, being along the line of a dead furrow some time back. Otherwise I could see no difference in the plots unless possibly the favorable effects of No. 1 extended to No. 2 to a limited extent. Below I give yields in measured bushels, dug Oct. 10th, 12th, and 14th. The ground was quite damp and we measured in preference to weighing. Weighed a few bushels of the cleanest and they averaged fifty-seven pounds for the merchantable and fifty four for the unmerchantable.

Wet whether affected the east end of the plots somewhat more than the others, consequently only the west half of the plots were measured. Plot 8 had the largest vines and an excessive number of tubers and the potatoes inclined to be a little "nubby."

The land was laid off in plots eleven rods long east and west and twelve feet north and south, with rows three feet apart, making four rows to the plot. The potatoes were cut mostly to one eye pieces; variety used was Livingston's Banner. The pieces were dropped about eighteen inches apart and where fertilizer was to be used the potatoes were given a light covering with the Planet Jr. double wheel hoe with

mold boards. The fertilizer was sown along the row by hand after mixing thoroughly with about half a bushel of soil.

Plots 1 to 10 were fertilized as per the plan of the test.

Plots 10 to 12 had but 2 rows each and Plots 13 and 14 but one row each. Plot No. 11 with Champion fertilizer, 300 pounds per acre. Plot No. 12 with ammoniated bone, 300 pounds per acre. Plot No. 13 Champion, 600 pounds per acre. Plot No. 14 ammoniated bone, 600 pounds per acre. These fertilizers were carried over from last fall. The ground was manured mostly with sheep manure at different times from January to April. It was manured crosswise of the plots so that the kind of manure and time of applying would make no difference in the comparative yield.

### FERTILIZERS ON POTATOES.

EXPERIMENT BY JAMES BOGUE, ORWELL, ASHTABULA COUNTY.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.	Increase per acre.
		Phosphoric acid.	Ammonia.	Potash.		
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	1	8½	5½	3½	211	71
2	2	8½	5½	6½	205	65
3	3	8½	5½	10	205	65
4	4	8½	2½	13½	171	31
5	5	12½	2½	3½	205	65
6	6	8½	5½	0	158	18
7	None	.....	.....	.....	141	.....
8	None	.....	.....	.....	139	.....

Notes by Mr. Bogue: Land timbered with beech, maple, basswood, hickory, elm and ash. Clay soil with subsoil of what is termed hard pan from one to two feet below the surface and Erie shale 10 to 15 feet below. Sloping to the east, west half 3 feet to the 100, east half about one foot to the 100. It was pastured until the stumps were well rotted, probably about twelve years, cleared and planted to corn for three years, sown to oats the fourth year and then to wheat, seeded to clover; two crops mown last season, but killed out badly last winter. The only fertilizer used was 150 pounds of Crocker Buffalo phosphate on the wheat.

The plot of ground was planted to potatoes on May 15, 1896. The rows are forty rods long and three and one-fourth feet between the rows. The potatoes planted were the Rural New Yorker No. 2, cut to two and three eyes and dropped fifteen inches apart in the row in grooves three to four inches deep, and covered with cultivator with shovel turned to throw a ridge over them, two horses being used so that they



might travel between the rows. Each sack of fertilizer was put in the rows according to their numbers and was distributed by hand. The ground was plowed seven inches deep two days before planting, harrowed and rolled and also rolled after planting.

The potatoes were cultivated and weeded June 19th and July 11th. Shovel plowed July 18th. Potatoes dug September 19th.

[It will be observed that the land apparently increases in fertility from Plot 1 towards Plot 8, but since the unfertilized plots are both on one side of the strip it is impossible to form any estimate of this natural increase. C. E. T.]

## FERTILIZERS ON POTATOES.

EXPERIMENT BY S. K. KRAVER, WINDFALL.

Plot No.	Fertilizer sack No.	Composition of fertilizers.			Yield per acre.			Increase per acre.
		Phosphoric acid.	Ammonia.	Potash.	Large.	Small.	Total.	
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1	Manure	.....	.....	.....	229	9	238	118
2	1	8½	5½	3½	157	19	176	56
3	2	8½	5½	6½	186	16	202	82
4	3	8½	5½	10	157	7	164	44
5	None	.....	.....	.....	105	15	120	.....

Notes by Mr. Kraver: This lot was a slight knoll in the center of a field where a timothy sod had been killed out. It had been mowed three previous seasons, and had had no manure for five years or more. Soil, a clay loam with yellow subsoil.

June 28th, Plot 1, appeared to be the best. No noticeable difference in the three plots where commercial fertilizers were used. The unfertilized plot was poorest. Ground very wet and continued so for some time. The fertilizers were drilled in before planting, at the rate of about three hundred pounds per acre. Rural New Yorker No. 2 was the variety planted.

[The remaining fertilizers were used in this test on different soil, part of them with a different variety of potatoes, and part with different methods of application, hence the results cannot be compared. C. E. T.]

## FERTILIZERS ON POTATOES.

EXPERIMENT BY S. D. AYERS, HARTSGROVE, OHIO.

My experiments were limited to the fertilizer tests on potatoes. The ground was plowed during the last part of May and while the soil was in good condition for plowing. The soil was a brown clay loam, with a

good grass sod on it. Immediately after plowing there followed a very heavy rain and then about two weeks of very dry weather. The soil was kept harrowed as often as seemed advisable, usually after such shower, up to the time of planting. Planted June 21st and June 22d, which was about one week later than past results indicate to be the best time of planting, in this section. I planted according to the plan sent out by the Union along with plots fertilized with manure and unleached ashes. The crop was given a very thorough cultivation.

The potatoes were up only one week when a great difference was apparent between the fertilized and unfertilized. The fertilized plots looked 50 per cent. better during the entire season, or up to nearly the time for ripening, when the plants on the unfertilized plot seemed to gain on the fertilized plots except Plot No. 8, with fertilizer No. 5, which took the lead all the season in thrift and in size of tops.

A farther report is of no value as nine-tenths of the potatoes rotted and only half of the piece was dug. This was a general complaint in this part of the state.

#### PREVENTION OF POTATO SCAB.

EXPERIMENT WITH "CORROSIVE SUBLIMATE," BY E. E. REECE,  
BUCYRUS, OHIO.

According to agreement I experimented with "Corrosive Sublimate" for preventing scab on potatoes. The seed used was very badly covered with the scab, in fact it was the unsalable potatoes culled out of those sold to a seedsman for planting.

These were treated with a solution consisting of 4 ounces corrosive sublimate in thirty gallons of water.

The potatoes were allowed to remain in the solution one hour, then were spread out to dry before cutting. (It was found that potatoes would grow after being in the solution twelve hours, but were a little slow in coming up.)

The potatoes treated as first given produced new tubers almost entirely free from the scab.

We consider that it would pay to treat them thus for the gain in salable potatoes for one year alone. And the benefit will not end there, but the crop will be of much better quality no doubt for several years without another treatment. By repeated treatment we believe the potatoes would become practically free from the scab.

#### POTATOES—COMPARISON OF VARIETIES AND OF FALL AND SPRING PLOWING.

EXPERIMENT BY J. F. GECKLER, BEEBETOWN OHIO.

Our ground was three acres oat stubble, plowed late in the fall in 1895, and six acres of old meadow, two acres plowed late in the fall of 1895 and four acres plowed in the spring of 1896. The ground was well worked

with disc harrow and furrowed out three feet apart, with plow. Took a one horse corn drill to drop the phosphate (Bradley's Special) in at rate of three hundred pounds per acre. The potatoes were dropped by hand and covered with shovel plow; they were cut to two eyes and dropped about 14 inches apart in the rows.

The potatoes were harrowed twice before coming up; used cultivator as often as the weather would permit; bugs were plenty; used one pound of Paris green and half a barrel of slacked lime and made three applications. Hand weeded them the latter part of July, and Sept. 20th started the two horse digger; there was not a weed to be seen, but the vines were partly green yet, showing that the blight did not affect them at all.

## RESULTS.

Two and one-half acres Rural New Yorker No. 2, on oat stubble, yielded .....	500 bushels.
One-half acre Sir William, on oat stubble yielded .....	40 "
Two acres old meadow, fall plowing, yielded .....	300 "
Four acres old meadow, spring plowing, yielded .....	390 "
Total .....	1,230 "

On the last four acres a small creek had drowned about half an acre. I had 1,040 bushels for market, bringing an average price of thirty-three and one-third cents, and 100 bushels about egg size for planting next year. The balance are small and will be used for pig feed.

This is the second year for the Sir William and no more of them. In the spring of 1895 I bought a barrel of them and planted them beside the Rural New Yorker No. 2, ground and treatment alike. The Rural New Yorker No. 2, yielded 200 bushels per acre. From the barrel of Sir Williams which were cut to one eye, ground not measured, I received 45 bushels of salable potatoes.

[Mr. Geckler's experience with the Sir William has been quite different from that of the Experiment Station. See Bulletin 66—C. E. T.]

## POTATOES—SUBSOILING AND VARIETY TESTS.

EXPERIMENTS BY CLARENCE J. NORTON, MORANTOWN, ALLEN COUNTY, KANSAS.

Having the honor of being a member of the Agricultural Student's Union, I herein submit my first report:

I had a plot of land sloping to the southeast, just enough to surface drain, that was composed of alluvial mould about 16 inches deep without any perceptible sand, underlaid with water-tight, yellow clay. The general character and fertility of the soil was all exactly alike. One half of this field was deeply subsoiled with the Perine plow, that breaks up the hard undersoil without throwing any out, in the fall of 1894, the subsoiling being done crosswise of the field, or east and west, and the other half being left without subsoiling. During the winter of 1895 and

1896 the field was manured with stable manure at the rate of fifty loads per acre, both the subsoiled and unsubsoiled parts; during the last week in March, 1896, the field was plowed 7 inches deep, going north and south, or crosswise of the subsoiling, the harrow following the plow the same day. The land was then boated and harrowed again and on April 2d was planted in potatoes, using an Aspinwall planter, planting four inches deep and sixteen inches in the drill, the rows being thirty-two inches apart and crosswise of the subsoiling, so the half of each row was on subsoiled and the other half on unsubsoiled land.

This land has been in use about twenty-four years without any manure or green crops being plowed under, and has had a variety of crops grown on it; in 1895 the subsoiled part had melons and the unsubsoiled part had flax that went 16 bu. per acre.\* Two acres of the potatoes were of the Early Ohio and one half the seed used was of the Red River seed, cut to one eye, while the other half was planted with small, whole potatoes of my own raising, that had passed through a one and one-half inch. screen. The seed was all dusted while damp with flour of sulphur, using about 15 or 16 pounds per acre, or about  $\frac{2}{3}$  to 1 and  $\frac{1}{2}$  pounds per bushel of seed. The result was a surprise to me.

The Early Ohios were planted April 2d, while the land was in fine condition and the daily mean temperature was 38.5. The temperature rapidly increased to above the normal, reaching a daily mean temperature of 63.5 in five days, touching a mean of 73, 74, 75, and 76 before the month was out. The monthly mean was 62, or 5.2 above the normal. The rainfall for April was 4.49 inches, or 8.4 above the normal, and fell on nine different days. April had ten clear days, 5 partly cloudy and 15 cloudy days, with only one frost and that on the night that the potatoes were planted. The maximum was 84, minimum 21. This favorable weather brought the potatoes up rapidly, the small seed coming up first, then the northern grown seed, all being up in fifteen to twenty days from planting.

The planter left the ground in ridges that were harrowed with an Eagle all steel harrow with 74 teeth, once lengthwise and once crosswise of planting, before the tops were up, the last harrowing being just before the sprouts showed above the ground. The month of May gave us an excess of temperature of 6.16 above the normal or a mean of 70.26; 4.89 inches of rainfall distributed on 13 different days, with four clear, two partly cloudy and 16 cloudy days. Such weather made weed killing difficult and caused me to cultivate them more times than I should had it been drier. Having only four clear days and rainfall every other night caused me to cultivate nine times in all, laying by the last part of May. The first cultivating was done deeply, using the John Deere eagle claws

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\*This previous cropping may possible have had as much to do with the results of the experiment as the subsoiling. C. E. T.

adjusted on a Planet Jr. 12 tooth harrow cultivator and pulverizer combined, using seven teeth or shovels. Then the weeder was run through and all subsequent cultivation was done with the Planet Junior 12 tooth, going only one and one half inches deep and using perfectly level cultivation. The temperature of June was 1.7 below the normal, or a daily mean of 72.6. The June rainfall was 2.80 inches, or 1.97 below the normal, falling on ten different days; with 15 clear days, 7 partly cloudy and 8 cloudy days.

The vines were dead on July 2d, or ninety days from planting, the Bovee, Coburn No. 1, Early Morn and Acme being the only varieties that ripened earlier or as early. The greatest of care was used in estimating the yield, and only weights used and not measures.

Comparative yields.

Northern seed, subsoiled land.....	200 bu.; 176 mer., 24 unmer.
Small seed subsoiled land.....	280 bu.; 228 mer., 52 unmer.
Northern seed, unsubsoiled land.....	188 bu.; 176 mer., 12 unmer.
Small seed, unsubsoiled land*.....	200 bu.; 172 mer., 28 unmer.

A comparison shows that subsoiling helped the small seed more than the large seed. Scabby potatoes 5 per cent. Other varieties treated the same as the northern grown Ohios gave the following comparative yields :

	Total	Large.	Small.
Coburn No. 1.....	230	163	67
Bovee .....	224	176	48
Coburn No. 2.....	220	192	28
Early Morn .....	182	139	43
Acme .....	176	164	12
Ohio Northern seed .....	194	176	18
Ohio Small seed .....	240	200	40

The different varieties stand as follows in percentage of merchantable and small potatoes :

	Large.	Small.
Acme .....	93.18	6.81
Northern Ohio .....	90.72	9.28
Coburn No. 2.....	87.28	12.72
Ohio Small.....	83.34	16.66
Bovee ..	78.57	21.43
Early Morn .....	76.38	23.62
Coburn No. 1.....	70.87	29.14

SOWING GERMAN MILLET AMONG LATE POTATOES

EXPERIMENT BY CLARENCE J. NORTON, MORANTOWN, KANSAS.

The ground was well fertilized with yard manure, and subsoiled 16 inches deep with a new process Perine plow, that heaves up but does not throw out the subsoil; in the fall of 1895 it had gathered unto itself the

\*See Bulletin 76 of this station, p 33. C. E. T.

entire rainfall of 21.65 inches since subsoiled until the millet was sown, as none of the rainfall had run off. The soil is an alluvial mould, underlaid at twenty inches with hard yellow clay that retards the sinking of the water. The potatoes were planted the first week in April and the millet seed was sown on June 3d, when the potatoes were being laid by. The seed was sown with a hand seeder and the crop laid by with the Planet Jr. 12-toothed cultivator and pulverizer.

Only .40 of an inch of rain fell for seventeen days after sowing and about one third of the millet dried up and died, but as I had sown it rather thick the stand was fair. In ninety days from sowing the millet crop was ready to cut and was of uncommonly good quality, having short stems and extraordinarily long heads, many of which would measure a foot in length and 4 to 6 inches in circumference, being the largest I ever saw. The mean daily temperature for June was 72.6 or 1.7 below the normal. The rainfall was 2.80 or 1.97 inches below the normal. .16 of the rain came in the first two days before the sowing of the seed. July had a mean temperature of 78.03 or .17 below the normal, while the rainfall was 4.39 inches or .55 above the normal. The first three days of August were without rainfall and had a mean temperature of 81. The crop of millet was cut on the third of August and gave two and one-half tons per acre, of dry feed. The millet sprouts and grows about two to three inches tall by the time the potatoes are commencing to die. No millet grows in the rows of potatoes, but in the space between, and it furnishes ample shade for the tubers during the hot weather and the potatoes can be left in the ground until October in our climate, the evaporation of moisture through the millet preventing any rot of the potatoes. Here is my estimate of the cost of growing ten acres of potatoes and millet

Plowing and subsoiling.....	\$15 00
Harrowing.....	50
Rolling.....	75
Seed (80 bushel @ 40).....	32 00
Cutting seed.....	4 00
Planting with an Aspinwall planter.....	3 00
Two harrowings.....	1 00
Once with weeder.....	75
Cultivating crop.....	12 00
Digging crop.....	50 00
Millet seed used.....	1 25
Cutting millet.....	3 00
Stacking millet.....	6 00
Total cost.....	\$129 25
Twenty-five tons of millet at \$3 00.....	\$75 00
Actual cost of ten A. potatoes.....	54 25

The actual yield of potatoes was 2,000 bushels, raised, sorted and stored at a net cost of 2 and 7125-10,000 cent per bushel or say 3 cents.

Millet has a habit of improving the mechanical texture of the soil.

## EXPERIMENTS WITH FLOUR OF SULPHUR UPON SEED POTATOES

BY CLARENCE J. NORTON MORANTOWN, KANSAS.

My attention was first called to using sulphur on seed potatoes by the New Jersey Station's report of their experiment in 1895. They made the statement that sulphur greatly reduced the scab and also added to the keeping qualities of the potato.

I used sulphur on the fresh cut seed at the rate of from two-thirds to one-half pounds per bushel. Planted the potatoes on April 2d, and dug with a machine digger on July 9th and 11th. The mean daily temperature at the time of digging was 75.6.

The potatoes were left to dry about one hour and then were picked up into half bushel baskets and then turned into bushel all-slatted crates. These crates were in turn put into the wagon and transferred to the barn, where they were put into a bin made on the same principle as the all-slatted crate, a car load being piled in a bin eight feet wide by sixteen feet long. The heat was above the normal, and the potatoes were not all moved till the 20th of August. They kept perfectly while my neighbors potatoes that had no sulphur all rotted when piled together in the same way. In fact this is the first time they were ever known to keep here in our warm climate. The mean temperature for July was 78.03 and the maximum reached 96, twice; 94, once; 92, once; 91, four times; and 90, three times. In August the heat was still greater, touching 102 twice; 101, once; 99, five times; 97, twice; 96, once; 95, once; 93, once; 91, once; and 90 four times. The maximum never falling below 90, while the minimum never went below 70 but seven times and then only to 69. An occasional tuber rotted, but they did not appear to shrink any. It is a new thing to crib up potatoes in our climate in the summer and without any cellars. It looks as if the sulphur preserved the potatoes from rot and from severe shrinkage, while it certainly adds greatly to the yield.

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†New Jersey Agricultural Experiment Station, Bulletin 112.

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