KENTUCKY

AGRICULTURAL EXPERIMENT STATION

OF THE

STATE COLLEGE OF KENTUCKY.

BULLETIN NO. 72.

POTATOES.

1. **Experiments with Fertilizers.**
2. **Corrosive Sublimate and Sulphur for Potato Scab in 1896.**
3. **Corrosive Sublimate for Potato Scab in 1897.**

LEXINGTON, KENTUCKY.

FEBRUARY, 1898.

KENTUCKY

Agricultural Experiment Station,

Address of the Station—LEXINGTON, KY.

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ADDRESS:

KENTUCKY AGRICULTURAL EXPERIMENT STATION,

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1.—TESTS WITH FERTILIZERS.

BY M. A. SCOVELL.

The Season.

The season was unfavorable to the potato crop on account of the weather. The following table gives a summary of the rainfall, the mean temperature and the average per cent. of sunshine during the time specified :

1897. MONTH.	Rainfall. Inches.	Degrees Mean Temperature.	Per cent Sunshine.
April	5.80	53.2	37
May	4.48	59.4	47
June	4.77	72.1	41
July	4.34	75.7	40
August	3.21	73.8	54
September	.80	72.4	82
October	.38	63.9	76

THE SOIL.—The soil is derived from the Lower Silurian limestone, and is rich in phosphoric acid. The land is worn, having been in cultivation many years. The subsoil is a light-colored clay, so retentive as to make the soil deficient in natural drainage.

Explanations.—The leading elements of plant food are nitrogen, phosphoric acid and potash. Plants feed on other soil-elements besides these, and they are just as essential to plant life as these three, but generally speaking all but these ingredients are furnished to plants in abundance, and therefore in studying what to put on our soils to make them more productive, we need concern ourselves with only these three. Commercial fertilizers are manufactured and sold for the purpose of supplying nitrogen, phosphoric acid and potash, and the market prices depend upon these ingredients. Some fertilizers contain one of these ingredients, some two, and some all. Generally speaking, a commercial fertilizer is a mixture containing two of these ingredients, and sometimes all, the proportions varying greatly in the various brands and often in the same brand. It is at once seen to be a very difficult, if not an impossible task, to test all the various brands sold on a given soil in order to find out those that produce the best effect. It is an easy matter, however, to find out whether a given soil needs potash, phosphoric acid or nitrogen or any combination of these elements for a given crop. Having found out this by experiment, we have only to look to the analyses of the various fertilizers to tell which brands, if any, could be used to advantage on the soil and crop tested. If the experiment proved that potash was all that was needed on a given soil for the corn crop, all those fertilizers whose analyses show little or no potash would not produce favorable results, under whatever name sold.

The Experiments.

The potatoes used for seed were Empire State. They were immersed for ½ hour in a solution of mercuric chloride before being planted. This solution contained 4½ ounces of corrosive sublimate (mercuric chloride, or bichloride of mercury)

to 30 gallons of water. After drying, the potatoes were cut and planted. (As the above solution is poisonous, the work of treating the potatoes with the solution should never be done where stock might get to the solution or the treated potatoes.)

The size of the experimental plots was 1-10 acre each.

After the ground was well prepared with plow and harrow, the rows were marked out with a small plow. The fertilizers used were scattered in the row by hand and afterwards slightly mixed with the soil by a brush being dragged along in the row.

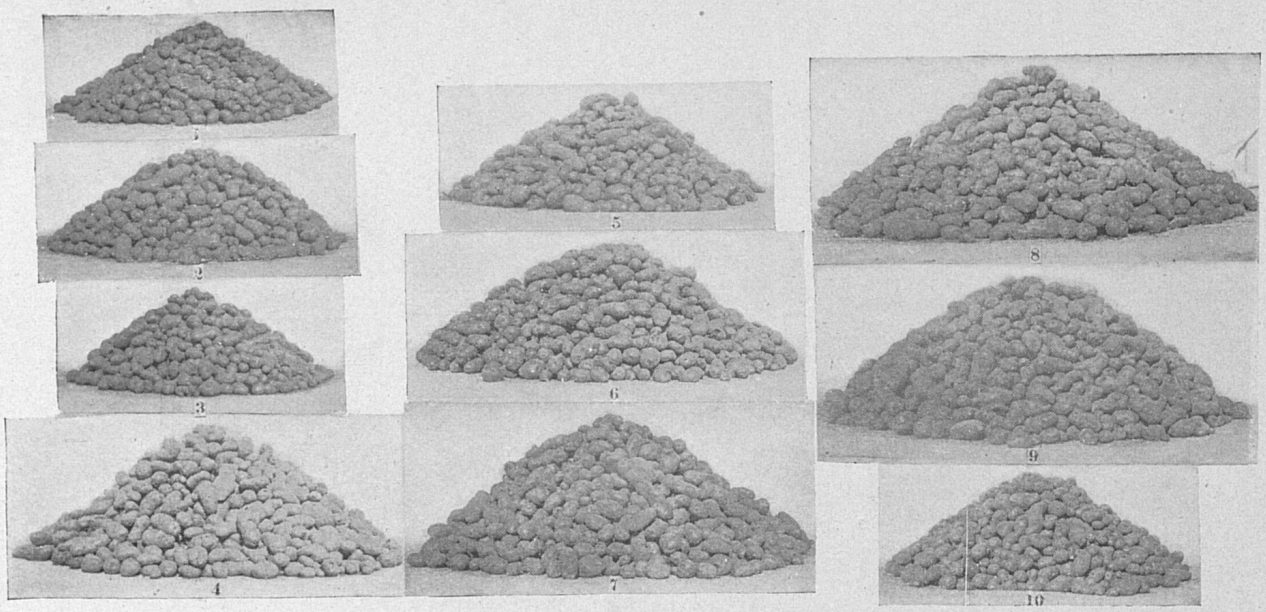
The fertilizers were applied and the potatoes planted April 24th.

The following table shows the kind of fertilizers applied to the various plots, their amount calculated per acre, the number of pounds of leading elements of plant food applied per acre, and the per cent. of these elements in the various fertilizers:

TABLE I—Showing fertilizers applied and per cent. of ingredients.

NUMBER.	FERTILIZERS USED.	No. of Pounds.	Number of pounds of the leading elements of plant food.			Per cent of the leading elements of plant food in fertilizers used.		
			Phosphoric Acid.	Potash.	Nitrogen.	Phosphoric Acid.	Potash.	Nitrogen.
1	No Fertilizer	....	....	....	....	....	....	....
2	Nitrate of Soda	160	0	0	25.6	0	0	5.5
3	Acid Phosphate	140	57	0	0	12.4	0	0
4	Muriate of Potash	160	0	80	0	0	17.	0
5	No Fertilizer	....	....	....	....	....	....	....
6	Acid Phosphate Nitrate of Soda	140 160	57	0	25.6	12.4	0	5.5
7	Muriate of Potash Nitrate of Soda	160 160	0	80	25.6	0	17.	5.5
8	Acid Phosphate Muriate of Potash	140 160	57	80	0	12.4	17.	0
9	Acid Phosphate Muriate of Potash Nitrate of Soda	140 160 160	57	80	25.6	12.4	17.	5.5
10	No Fertilizer	....	....	....	....	....	....	....

The following table gives the name and amount of fertilizer used and the yield of potatoes, calculated to the acre, for each plot :



1. No fertilizer.
2. Nitrogen.
3. Phosphoric acid.
4. Potash.

5. No fertilizer
6. Nitrogen and phosphoric acid.
7. Nitrogen and potash.

8. Potash and phosphoric acid.
9. Potash, phosphoric acid and nitrogen.
10. No fertilizer.

TABLE 2—Showing Results of Fertilizers on Potatoes.

No. of Plot.	FERTILIZER USED.	Amout per acre, pounds.	Yield per acre, bushels.	Comparative Scale.
1	No Fertilizer.....	.....	31.0	
2	Nitrate of Soda....	160	39.0	
3	Acid Phosphate...	140	27.2	
4	Muriate of Potash.	160	77.8	
5	No Fertilizer.....	.....	35.8	
6	Nitrate of Soda....	160	56.6	
	Acid Phosphate ...	140		
7	Nitrate of Soda....	160	83.6	
	Muriate of Potash..	160		
8	Acid Phosphate...	140	109.4	
	Muriate of Potash..	160		
9	Nitrate of Soda....	160	109.6	
	Acid Phosphate ...	140		
	Muriate of Potash.	160		
10	No Fertilizer.....	.....	35.3	

The accompanying plate is an exact reproduction of a photograph taken of the potatoes grown on each plot. Each pile was exactly the same distance from the camera when photographed, and therefore the difference in size of each pile is owing to the difference in yield.

Financial Results.

The financial results obtained by the use of the fertilizers in various combinations may be seen in the following table. The acid phosphate costs at the rate of $3.30 per acre, the muriate of potash $3.60, and nitrate of soda $3.60. In these estimates the potatoes are rated at 50 cents per bushel, including the small potatoes:

TABLE 3—Showing Financial Results.

	FERTILIZERS USED.	Cost of Fertilizer used per Acre.	Value Potatoes per Acre.	Value of Increased Yield of Potatoes per Acre.	Profit or Loss.
1	No Fertilizer	.....	$15.50	.....	.....
2	Nitrate of Soda	$ 3.60	19.50	$ 2.48	$ 1.12*
3	Acid Phosphate	3.30	13.60	.....	3.30*
4	Muriate of Potash	3.60	38.90	21.88	18.28
5	No Fertilizer	.....	17.90	.....	.....
6	Nitrate of Soda Acid Phosphate	6.90	28.30	11.28	4.38
7	Muriate of Potash Nitrate of Soda	7.20	41.80	24.78	17.58
8	Muriate of Potash Acid Phosphate	6.90	54.70	37.68	30.78
9	Nitrate of Soda Acid Phosphate Muriate of Potash	10.50	54.80	37.78	27.28
10	No Fertilizer	.....	17.65	.....	.....

* Loss.

From results obtained it would appear that both potash and nitrogen are needed on our soil, for potatoes ; that potash alone greatly increases the yield ; that nitrogen does to some extent, but that the best results are obtained by a combination of the two. Trials for eight years have shown that potash greatly increases the yield of potatoes, when applied to our soil.

2.—CORROSIVE SUBLIMATE AND FLOUR OF SULPHUR FOR POTATO SCAB. EXPERIMENTS MADE IN 1896.

BY H. GARMAN, ENTOMOLOGIST AND BOTANIST.

To what extent the scabbing of potatoes is the work of a fungus introduced into soil with seed potatoes and what proportion is the work of organisms which live, for a longer or shorter time, in soil where no potatoes are grown, are questions of much importance to the grower of this crop. The first question is now pretty definitely answered, but the question how long the scab fungus, or fungi, persist in soil is yet to be settled. The experiments immediately following were made in the Vivarium of my Division with a view to getting light on the first question—Is the scab really transferred to soil on seed potatoes ?

May 13, 1896, a scabbed potato was planted in each of six 10-inch flower pots, the soil in all having been previously baked for several hours over a fire. They were subsequently kept on a slate-topped table. There was very little difference in the growth of plants in different pots.

No. 1. The potato to be planted was first rolled thoroughly in flour of sulphur. The tubers were taken up and examined August 21. In this pot they were twelve in number. Nine were more or less scabbed, three of them badly so, the rest not enough to injure them. Weight of scabbed potatoes 8½ ounces ; weight of not scabbed potatoes 1¾ ounces.

No. 2 (check on No. 1). The tuber planted in this pot was not treated. August 21 fifteen potatoes were taken from the soil; twelve of them weighing 8 ounces were scabbed, seven badly so. The three potatoes not scabbed weighed 2¾ ounce.

No. 3. The potato used for this was first soaked one hour in corrosive sublimate solution (4½ ounces in 30 gallons of water). Eight potatoes developed, six of which weighing 6 ounces were not scabbed, while two weighing 3¼ ounces were scabbed.

No. 4 (check on No. 3). Potato not treated. On August 21 five tubers were taken from the pot every one more or less scabbed. Weight 5¼ ounces.

No. 5. Potato soaked one hour in corrosive sublimate solution (4½ ounces in 30 gallons). Eight potatoes, weighing 6½ ounces, developed, none of them scabbed.

No. 6 (check on No. 5). Potato not treated. Twelve potatoes were obtained from this, six of them, weighing 4½ ounces, scabbed, while the remaining six, weighing 3 ounces, were not.

A single test of the flour of sulphur treatment is perhaps not sufficient as a basis for judgment on the effectiveness of this substance in checking the growth of the scab fungus, but as far as one test can decide the matter, this test indicates that sulphur does not check the scab very decidedly; for the percentage of scabbed potatoes to not scabbed is but slightly less in the treated number (75 per cent.) than in its untreated check (80 per cent.) However, there was a smaller percentage of *badly* scabbed potatoes in the treated number, these constituting 25 per cent. of the whole as against 47 per cent. in the untreated number.

The corrosive sublimate on the contrary proved very decidedly effective in both of the tests. Including the potatoes of both treated numbers (3 and 5) only 12.5 per cent. was scabbed, while the two checks (4 and 6) averaged 64.7 per cent. scabbed. The absence of scab on the treated numbers is so marked, that, taken in connection with the fact that in every one of the three checks from 50 per cent. to 100

per cent. was scabbed, we cannot consider it the result of accident. That any scab at all occurred on the treated numbers was probably due to the fact that some portions of the fungus on the original potatoes was so deeply imbedded in the tissue that the corrosive sublimate did not reach it. A stronger solution (say 5 ounces to 30 gallons of water), or a more prolonged soaking, might be expected to exterminate the fungus more completely. But the adoption of either of these alternatives increases the danger of injuring the seed. I believe, however, from observation on the effects of the solution used in these tests (4½ ounces in 30 gallons) that potatoes can be safely soaked in it longer than they were immersed by me, say for an hour and a half, or possibly two hours.

Field Experiments With Corrosive Sublimate and Flour of Sulphur.

The same acre of ground used for potato scab experiments in 1895 was used in 1896. It was planted in 10 plots of about 1-10 acre each, eight rows, planted in the usual way, in each tenth. The eastern half of each plot was planted with treated seed, the western half being with untreated seed constituting a check. Early Rose potatoes were used, the seed being obtained in the local market. It was not first-class, the tubers feeling somewhat soft in the hand, though otherwise of good appearance. Since the object of the experiments was to learn the effect of the fungicides, the quality of the seed was not regarded as a matter of prime importance. The potatoes were only moderately scabby, not so much so as was desired. They were planted April 11.

The first four rows of Plots 1 to 5, inclusive, were planted with seed that had been immersed for one hour in a solution made by dissolving 4½ ounces of corrosive sublimate in two quarts of boiling water, then adding this to thirty gallons of water in a barrel. These plots are therefore duplicates as far as treatment goes.

The first four rows of Plots 6 to 8, inclusive, were treated

with 7½ pounds of flour of sulphur to each plot, the sulphur being dusted in the furrows before the seed was dropped.

The first four rows of Plots 9 and 10 were also treated with sulphur, but each plot received 9 pounds.

PLOTS 1 to 5.

Since these plots received the same treatment they may be conveniently considered together. On May 22, the plants were noted as having come up only fairly well, but in every plot the four treated rows were best in appearance and in regularity of stand. I tested on this point men on the farm who did not know the plan of the experiment and this was the invariable verdict. The corrosive sublimate must therefore have had a preservative effect on the seed, perhaps checking incipient rot, or destroying such insects as may have been disposed to injure the pieces in the soil. This seems the more likely because the weather for a time after planting was unfavorable to a prompt growth of the seed potatoes.

The same difference was observable throughout the season. The potatoes were dug September 19. In every case the treated half of a plot yielded more potatoes, by weight, than the untreated half, the five treated halves having the advantage by 401 pounds over the five untreated halves. This is a result which was not anticipated, since it was hardly to be expected that such a substance as corrosive sublimate would do more than check the scab. I am disposed to attribute it to the preservative effect of the poison on the seed after the latter was planted. More than once while examining the potatoes during the season I was struck with the soundness of such cut pieces as were unearthed, and it seems likely from the better stand obtained from treated seed that the seed of these rows was preserved from rotting, as has already been suggested.

In getting the percentage of scab, 100 potatoes were examined from each row, making for the five plots 4000 in all, 2000 treated and 2000 not. In every plot the treated half showed the lowest per cent. of scab, there being from 2 to 2½ times more in the untreated than in the treated plots. The differ-

ence is more marked still when the badly scabbed potatoes are considered alone, the untreated rows of one of the plots having more than 20 times as much scab as the treated rows of the same plot. The differences are so constant and decided that there can be but one conclusion with reference to the treatment with corrosive sublimate, namely that it had a decided beneficial effect in checking the development of scab upon the potatoes. The effectiveness of the treatment might possibly be increased by allowing the seed potatoes to remain for a longer time in the solution, or else by increasing the strength of the solution. Our experiments prove that 4½ ounces of corrosive sublimate in 30 gallons of water has not the slightest injurious effect upon the seed potatoes, in fact, it appears that it has a beneficial effect by preserving the seed from rotting in the ground.

PLOTS 6 TO 8.

The arrangement of rows treated with sulphur was the same as in the case of those treated with corrosive sublimate. In these plots 7½ pounds of sulphur were used on four rows of each plot, the other four rows being left without treatment, and serving as a check upon the former. The potatoes did not come up as well as in the case of those treated with corrosive sublimate. The stand in the rows not treated was not as good as in the treated rows, a fact which may be attributed to a preservative action of the sulphur, similar to that exerted by the corrosive sublimate. In every case the weight of potatoes taken from the treated rows was greater than in the untreated rows, but when we come to consider the scab, we get the surprising result that the untreated potatoes were less affected on the average than the treated, the treated rows of the three plots, having 54.42 per cent. marred by the fungus, while the untreated rows of these plots averaged only 43.42 per cent. injured. When we consider the badly scabbed potatoes alone of the three plots, the result is to some extent reversed, the treated rows having a per cent. of 10.83 injury, while the untreated rows have 11.75 per cent. a trifle more. It is just possible that in the examination of the potatoes from

treated seed, we mistook in some cases corrosive effects of the sulphur upon the skins of the potatoes for the scab, but we had this in mind at the time of examination, and I believe the results indicate that the sulphur was not effective in checking the scab.

PLOTS 9 TO 10.

The treatment of these plots was the same as that given the three preceding, excepting that four rows of each received nine pounds of sulphur instead of 7½. The plants of treated and untreated halves of plots showed no special difference that could be attributed to treatment. In plot 10, especially, they were quite uniform throughout the plot with the exception of the outside row which was not treated. This latter appeared to be injuriously affected by its position next a roadway. The yield of potatoes was greater from the two treated halves than from the two untreated, but the result as to scabbing agrees very closely with that obtained from plots 6 to 8. The per cent. for the treated halves of the two plots is 48.28. Of the potatoes from the two untreated halves, only 37 per cent. was scabbed. Of the badly scabbed potatoes of these two plots the per cent. was a trifle higher for the untreated halves than for the treated, but the difference is so slight as not to indicate any advantage for treatment.

SUMMARY OF RESULTS.

The conclusion to be drawn from these experiments with reference to corrosive sublimate is that it is a very useful agent for checking scabbing of potatoes. The results agree with those obtained by others, and we have confidence in commending the use of this substance to those who may be troubled with this disease of potatoes. Our practice was to dissolve the corrosive sublimate first in a small quantity of hot water, then transfer this to the larger quantity in a kerosene, or alcohol barrel. The seed potatoes in bags were immersed in the barrel, a bag at a time, afterwards were taken out, the potatoes spread upon the ground until dry, and then cut into pieces according to the usual practice. With reference to the sulphur treatment it must be said that our results do not indi-

cate any especial advantage from treatment with this substance. The results were a surprise to us, because others who have experimented with it have commended it very highly, claiming that it is even superior to corrosive sublimate as a check upon scab. Possibly further experiments will reverse our present opinion as to its usefulness.

The light total yield obtained from the whole acre was, I believe, the result of the use of wilted seed. The soil was in excellent condition at the time of planting and, thanks to the efficient oversight of Dr. Spurr, the plants had throughout the summer the best of care bestowed upon them. The season, too, was a good one in the main and some exceptionally fine crops of potatoes were raised in the neighborhood. The invariably better stand, and greater final yield, of treated plants as compared with those not treated is conclusive proof that neither of the fungicides used is chargeable with the light total weight of potatoes harvested.

The fungus causing the scab is the one observed in other parts of the country and described some years ago by Dr. R. Thaxter as *Oospora scabies*. A specimen from a home-grown potato was submitted to Dr. Thaxter last summer and was pronounced by him to be his species.

Showing Results of Treating Seed Potatoes With Corrosive Sublimate and Sulphur.

Plot.	Treatment.	Weight of potatoes in pounds.	Per cent. scabbed.	Per cent. badly scabbed.	Total weight of treated potatoes in pounds.	Total weight of untreated potatoes in pounds.	Per cent. scabbed of all treated rows.	Per cent. scabbed of all untreated rows.	Per cent. badly scabbed of all treated rows.	Per cent. badly scabbed of all untreated rows.
1	Corrosive Sublimate.	303	39.	4.						
	None.....	210	70.	15.75						
2	Corrosive Sublimate.	234	27.	1.75						
	None.....	216½	60.25	15.25						
3	Corrosive Sublimate.	225	24.25	2.						
	None.....	135½	46.25	10.50						
4	Corrosive Sublimate.	216½	19.50	0.50						
	None.....	126½	51.25	9.						
5	Corrosive Sublimate.	252½	14.50	0.50						
	None.....	141½	53.25	10.75						
1–5	Corrosive Sublimate	.....	.....	.....	1231	.....	24.85	.....	1 75	
	None.....	.....	.....	.....	.....	830	.....	56.20	.....	12.25
6	7½ lbs. Sulphur ..	184¼	57.50	11.						
	None.....	147½	45.50	14.50						
7	7½ lbs. Sulphur ..	155½	60.50	13.75						
	None.....	145	47 25	13.						
8	7½ lbs. Sulphur .	111¼	45.25	7.75						
	None.....	88	38 91	8.09						
6–8	7½ lbs. Sulphur ..	.....	.....	.....	451	.....	54.42	.....	10.83	
	None.....	.....	.....	.....	.....	380½	.....	43.42	.....	11.75

Showing Results of Treating Seed Potatoes With Corrosive Sublimate and Sulphur.—(Continued.)

Plot.	Treatment.	Weight of potatoes in pounds.	Per cent. scabbed.	Per cent. badly scabbed.	Total weight of of treated potatoes in pounds	Total weight of untreated potatoes in pounds.	Per cent. scabbed of all treated rows.	Per cent. scabbed of all untreated rows.	Per cent. badly scabbed of all treated rows.	Per cent. badly scabbed of all untreated rows.
9	9 lbs. Sulphur.	108½	58.59	15.88						
	None.....	63½	42.87	11.04						
10	9 lbs. Sulphur.	247¼	38.25	5.						
	None.....	171	30.	8.						
9–10	9 lbs. Sulphur.	.....	.....	.....	382¾	.....	48.21	.....	9.05	
	None.....	.....	.....	.....	.....	234½	.....	37.	.....	9.32

3.—THE USE OF CORROSIVE SUBLIMATE FOR POTATO SCAB IN 1897.

BY H. GARMAN, ENTOMOLOGIST AND BOTANIST.

To learn what strength of corrosive sublimate solutions may safely be used on seed potatoes and what length of time potatoes will bear immersion in such solutions the following tests were made in 1897 on an acre of land that had for several years been planted in corn and hemp. Whether or not it had ever been in potatoes before I am unable to say. All the seed was planted April 24. The plants came up well and evenly on both treated and untreated rows, there being no perceptible difference in growth. They continued good for some time, but died prematurely either from the effects of drought or as the result of an application of a prepared fungicide and insecticide combination known as Laurel green, it was impossible to say which. The early decline of the plants

shortened the crop very much, but the results as far as checking scab were concerned were striking, so much so that one could while walking over the field when the potatoes were being harvested tell at a glance the heaps gathered from treated rows, by their freedom from scab.

Plot 1. One half (4 rows) of this plot was planted with seed potatoes that were soaked 1 hour in corrosive sublimate solution, consisting of 4½ ounces of the sublimate dissolved in 30 gallons of water. The potatoes were afterward dried and cut in the usual manner before planting.

The remaining half (4 rows) of the plot was planted with untreated seed to serve as a check on the four treated rows.

The potatoes from the treated rows were examined September 21. The total weight was 138 pounds. 51 per cent. was very slightly scabbed, none badly. Considering the season it was a very fair lot of potatoes.

The potatoes from the four check rows of this plot weighed 126½ pounds, and 93 per cent. was scabbed, many potatoes being badly injured and the whole lot was of inferior quality.

Plot 2. This is a duplicate of Plot 1 and the results are not very different. From the treated rows 140¾ pounds of potatoes were obtained, of which 35 per cent. was scabbed, none badly, and the lot averaging of good quality.

The four untreated rows of Plot 2 yielded 113 pounds of potatoes, 95 per cent. of which was scabbed, most of them being very badly injured by the disease.

Plots 1 and 2. Since these two plots are alike in the matter of treatment an average of the results will give a fairer idea of the benefit resulting from treatment than will the plots when considered separately. The eight treated rows yielded 278¾ pounds of potatoes, with 43 per cent. scabbed. The eight untreated rows yielded 239½ pounds of which 94 per cent was scabbed. The difference in weight is in favor of the treated potatoes and amounts to 38½ pounds. Scab was reduced 51 per cent. But this last statement does not convey a fair idea of the result, for every scabbed potato, however

slightly affected with the disease, was counted. The scab on the treated lot was often scarcely perceptible and was never very bad, so that the market value of the potatoes was not affected by it. The potatoes of the untreated lot were on the contrary badly scabbed and if offered for sale side by side with the others would not have sold as readily, or for as good a price.

Plot 3. The arrangement of this plot and of those following was the same as in Nos. 1 and 2, but the treated rows in this case were planted with seed that had been soaked one hour in a solution consisting of 5 ounces of corrosive sublimate in 30 gallons of water.

The weight of the potatoes from the four treated rows was in this plot 137¼ pounds, with 34 per cent. of them marked with scab, none badly, however.

The four untreated rows furnished 158½ pounds, with 93 per cent. scabbed, many of them being badly injured and some completely worthless.

Plot 4. This is a repetition of the test made in plot 3, the proportion of corrosive sublimate and water being 5 ounces to 30 gallons, the seed remaining in this solution one hour.

The treated rows yielded 145¾ pounds with 12 per cent. scabbed, while the untreated rows produced 172¾ pounds of which 94 per cent. was scabbed.

Plots 3 and 4. Taking these plots together, as was done in the case of Nos. 1 and 2, it will be seen that the difference in weight between the yield of treated and untreated rows is in favor of the latter and amounts to 48¼ pounds. In the matter of scab the showing is more decidedly in favor of treatment than in the case of Nos. 1 and 2. Only 23 per cent. showed scab in the treated lot, and these were but lightly touched, while the eight untreated rows yielded 93.5 per cent. of scabbed potatoes. The treatment thus saved 70.5 per cent. from the disease.

Plot 5. The result here is in favor of the treatment both as regards scab and with reference to yield by weight. The treated rows were planted with seed that was soaked one hour in a solution consisting of 6 ounces of corrosive sublimate and

30 gallons of water. The treated rows yielded 159½ pounds, of which 31 per cent. was slightly scabbed, most of them very badly.

Plot 6. This repeats the test made in Plot 5, with the result with reference to scab in favor of the treatment, but with the weight of potatoes from the untreated rows greater than from the others.

107½ pounds were obtained from the treated seed, with 32 per cent. scabbed.

142¾ pounds were produced by the untreated rows, of which 94 per cent. was affected with the disease.

Plots 5 and 6. Taken together these plots give as a result an advantage by weight of 26½ pounds to the eight untreated rows, but the advantage with reference to scab is still with the treated parts of the plots, by 66.5 per cent.

Plot 7. The treated potatoes of this and the following plots were soaked only half an hour in the sublimate solution. In this case 7 ounces of corrosive sublimate were dissolved in 30 gallons of water. The weight of potatoes from the treated seed was 185¾ pounds, while the percentage scabbed was only 18. The untreated rows yielded 141½ pounds, with 97 per cent. scabbed, many of them very bady.

Plot 8. This is a duplicate of Plot 7, and gave similar results, although the percentage of scabbed potatoes from treated rows was higher. The treated rows yielded 156½ pounds, as against 113¼ pounds from the four untreated rows; 35 per cent. of the potatoes from treated rows was scabbed, while 95 per cent. of the potatoes from the untreated rows showed the disease.

Plots 7 and 8. An average of the results from these two plots points the same way as averages made from the preceding numbers. By weight the result is in favor of the eight treated rows, these rows producing 87½ pounds more than the eight untreated rows. In the matter of scab the result is much the same as when the potatoes were soaked longer in weaker solutions, the percentage scabbed from treated rows being 26.5, while from untreated rows it was 96.

Plot 9. 8 ounces of corrosive sublimate dissolved in 30

gallons of water were used for half of the seed potatoes of this plot and they were soaked one-half hour. By weight the advantage is with the untreated rows this time, the four treated rows yielding 93½ pounds, to 112 pounds from those which received no treatment. Only 26 per cent. of the potatoes from the treated rows was scabbed, while 88 per cent of the untreated lot was affected.

Plot 10. This repeats the work done in Plot 9. The advantage by weight lies with the treated rows, however, by 43¼ pounds; 23 per cent. of the treated potatoes was scabbed; 81 per cent. of the check lot was scabbed.

Plots 9 and 10. On averaging results from these two plots it is found that the advantage lies with the treatment, both by weight and by percentage of scab. The treated rows have a larger yield by 24¾ pounds, and 60 per cent. more potatoes of the untreated lot was scabbed.

Summary of Results.

1. The scab was greatly reduced by treatment in every case, the percentage scabbed from treated seed ranging from 12 to 51 (averaging 29.7), while seed of untreated rows furnished from 81 to 100 (averaging 93) per cent. scabbed potatoes.

2. In no case were the potatoes from treated seed badly scabbed, the affected spots being small as a rule, and not affecting the value of the potatoes for the market.

3. The percentage of scab diminishes with increase in strength of the solution used on seed potatoes. The treated potatoes of the first four plots averaging 33 per cent. scabbed, while the average from plots 5 and 6 is 31 per cent. and from 7 to 10, inclusive, only 25.5 per cent.

4. Short exposure of seed potatoes to strong solutions of corrosive sublimate checks the scab as effectually as long exposures to weaker solutions. Thus the average per cent. of scabbed potatoes from seed soaked one hour in solutions containing from 4½ ounces of sublimate to 6 ounces is 32.5, while the average from seed soaked only one-half hour in solutions containing 7 to 8 ounces of corrosive sublimate is 25.5

per cent., the advantage being in favor of the short exposure.

5. Judging by the weight of potatoes obtained from the different plots there is some indication of an injury to the seed and a consequent reduction of yield from treatment with very strong solutions when the exposure is prolonged. Thus in plots 1 and 2, where only 4½ ounces of sublimate was used, the weight from treated rows was greater than from untreated rows, but in plots 3 to 6, inclusive, where from 5 to 6 ounces of corrosive sublimate was used, the exposure being the same, the reverse is true, the untreated rows having an advantage by weight. In plots 7 to 10, however, where the exposure was only half as long but the solution stronger, the treated rows yielded more by weight than their untreated checks.

That the strong solutions and prolonged immersion were to some extent responsible for the reduced yield of treated rows is rendered more probable by the fact that in 1896 when only 4½ ounces of sublimate in 30 gallons were used the treated seed in every case yielded more than the untreated.

Conclusion.

Soaking seed potatoes for an hour in a solution consisting of 4½ ounces of corrosive sublimate in 30 gallons is an effective treatment for the fungus disease known as scab.

Stronger solutions used for the same length of time may injure the seed.

Stronger solutions (7 to 8 ounces of sublimate in 30 gallons of water) may be used with as good effect as weaker ones, provided the seed remains in them for only a short time (½ hour, or possibly less.)

NOTE.—When bought of druggists corrosive sublimate costs about $1.00 per pound. One of the foremost dealers in chemical supplies in the country gives a list price of 85 cents per pound.

Corrosive sublimate is a deadly poison, and both the solutions and the soaked potatoes must be kept where stock cannot reach them.

Table Giving Result of Treatment with Corrosive Sublimate in 1897.

Plot.	Treatment of Seed.	Weight of Potatoes in pounds.	Per cent. Scabbed.	Badly Scabbed
1	1 hr. 4½ oz. sublimate. 30 gals water...	138	51	None.
	None.....	126½	93	Many.
2	1 hr. 4½ oz. sublimate. 30 gals water...	140¾	35	None.
	None.....	113	95	Most.
3	1 hr. 5 oz. sublimate. 30 gals water.....	137¼	34	None.
	None.....	158½	93	Many.
4	1 hr. 5 oz. sublimate. 30 gals water.....	145¾	12	None.
	None.....	172¾	94	Many.
5	1 hr. 6 oz. sublimate. 30 gals water.....	159½	31	None.
	None.....	150¾	100	Most.
6	1 hr. 6 oz. sublimate. 30 gals water.....	107½	32	None
	None.....	142¾	94	Many.
7	½ hr. 7 oz. sublimate. 30 gals water.....	185¾	18	None.
	None.....	141½	97	Many.
8	½ hr. 7 oz. sublimate. 30 gals water.....	156½	35	A few.
	None.....	113¼	95	Many.
9	½ hr. 8 oz. sublimate. 30 gals water....	93½	26	A few.
	None.....	112	88	Many.
10	½ hr. 8 oz. sublimate. 30 gals water.....	121½	23	A few.
	None.....	78¼	81	Many.