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POTATO-SPRAYING EXPERIMENTS AT RUSH IN 1914.

F. C. STEWART.



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F. C. STEWART.

SUMMARY.

The potato-spraying experiments conducted at Rush, N. Y., in 1913 and reported in Bulletin 379 were repeated in 1914 on a somewhat larger scale. In each of 82 fields a portion of one row (one-fiftieth acre) was very thoroughly sprayed by hand every two weeks. At digging time the yield of this row was compared with that of an adjacent row which had not received the special spraying. In 56 of the fields no spraying was done by the owner. In these fields the test was a comparison between very thorough spraying and no spraying. In the other 26 fields more or less spraying was done by the owner. In these, the test was a comparison between very thorough spraying and the kind of spraying done by the owner.

In the 56 unsprayed fields the spraying done by the Station increased the average yield by 15.82 bushels per acre, or 8 per ct.; and in the 26 sprayed fields by 13.75 bushels per acre, or 5.5 per ct.

Owing to favorable weather, potato foliage was remarkably free from diseases and injuries of all kinds so that large returns from spraying were not to be expected. However, the absence of killing frost until late in October lengthened the usual period of growth and gave the bordeaux a good opportunity to exert its stimulative influence. Under these conditions, it seems as if the gain from spraying should have been larger.

A REPETITION OF THE EXPERIMENTS MADE IN 1913.

These experiments were conducted in the same manner as those made at Rush in 1913 and reported in Bulletin 379. In each of eighty-two potato fields a single row 290.4 feet long was sprayed with bordeaux mixture at intervals of two weeks throughout the season. In some cases seven applications were made and in others only six. The spraying was done very thoroughly by means of a knapsack sprayer. In fifty-six of the fields the owner used no bordeaux, but applied only such treatment as he considered necessary for the control of "bugs." In the remaining twenty-six fields more or less bordeaux was applied by the owner, the number of applications varying from one to seven.

At digging time the row sprayed by the Station and an adjacent row of equal length were dug by hand and the product sorted and weighed. All of the spraying and weighing and most of the digging were done by Mr. E. B. Keyes of Rush, a brother of the young man who conducted the experiments in 1913.

During July and August the rainfall was somewhat scant, but in September it was sufficient for the needs of the crop. There was no late blight (*Phytophthora infestans*), no rot, no early blight (*Alternaria solani*), but little tipburn and no serious damage by flea beetles. Throughout the season the foliage was remarkably free from blemishes of all kinds. As there was no killing frost until late in October the plants had ample time to complete their growth. In most respects the season was an exceptionally favorable one for potatoes.

Table I shows the yields in the fifty-six experiments which were in unsprayed fields, while Table II shows the results of the twenty-six experiments in sprayed fields.

TABLE I.—RESULTS OF THOROUGH SPRAYING OF SINGLE ROWS IN FIFTY-SIX UNSPRAYED POTATO FIELDS.

Number of experiment.	UNSPRAYED.			SPRAYED BY THE STATION.			Yield per acre; marketable tubers.	Increase per acre due to spraying.
	YIELD PER ROW.		Yield per acre; marketable tubers.	Times sprayed.	YIELD PER ROW.			
	Marketable tubers.*	Culls.			Marketable tubers.	Culls.		
	Lbs.	Lbs.	Bu.		Lbs.	Lbs.	Bu.	Bu.
1.....	178	0	148.3	7	295	0	245.8	97.5
2.....	239.5	0	199.5	6	318	0	265	65.5
3.....	244	0	203.3	6	311	0	259.1	55.8
4.....	169	0	140.8	7	233	0	194.1	53.3
5.....	159	7	132.5	7	211	6	175.8	43.3
6.....	273	0	227.5	6	321	0	267.5	40
7.....	222.5	7.5	185.4	6	269	8.5	224.1	38.7
8.....	183	4	152.5	6	229	3	190.8	38.3
9.....	286.5	0	238.7	7	330	0	275	36.3
10.....	278	0	231.6	7	317	0	264.1	32.5
11.....	316.5	0	263.7	6	355	0	295.8	32.1
12.....	281	0	234.1	6	319.5	0	266.2	32.1
13.....	190	9	158.3	6	227	8	189.1	30.8
14.....	300	0	250	6	334	0	278.3	28.3
15.....	231	0	192.5	7	263	0	219.1	26.6
16.....	267	0	222.5	6	298	0	248.3	25.8

* A row 290.4 x 3 ft. = one-fiftieth acre. In some fields the rows were less than three feet apart. Nevertheless, in the computation of the acre yields given in Tables I and II the area of a row is assumed to be one-fiftieth acre in all cases.

TABLE I (continued).

Number of experiment.	UNSPRAYED.			SPRAYED BY THE STATION.			Yield per acre; marketable tubers.	Increase per acre due to spraying.
	YIELD PER ROW.		Yield per acre; marketable tubers.	Times sprayed.	YIELD PER ROW.			
	Marketable tubers.*	Culls.			Marketable tubers.	Culls.		
	Lbs.	Lbs.	Bu.		Lbs.	Lbs.	Bu.	Bu.
17.....	180	0	150	6	211	0	175.8	25.8
18.....	240	0	200	6	270	0	225	25
19.....	295	0	245.8	6	325	0	270.8	25
20.....	204	8	170	6	232	9	193.3	23.3
21.....	175	0	145.8	7	200	0	166.6	20.8
22.....	200	0	166.6	7	224	0	186.6	20
23.....	172	0	143.3	6	195	0	162.5	19.2
24.....	272	0	226.6	6	294	0	245	18.4
25.....	280	0	233.3	6	302	0	251.6	18.3
26.....	264.5	0	220.4	7	284	0	236.6	16.2
27.....	286	0	238.3	7	303	0	252.5	14.2
28.....	287	0	239.1	6	304	0	253.3	14.2
29.....	245	0	204.1	6	261	0	217.5	13.4
30.....	238	6	198.3	6	254	6	211.6	13.3
31.....	319	0	265.8	7	333	0	277.5	11.7
32.....	131.5	0	109.5	5	145.5	0	121.2	11.7
33.....	171	0	142.5	6	185	0	154.2	11.7
34.....	145	0	120.8	6	159	0	132.5	11.7
35.....	223	5	185.8	7	233	3	194.1	8.3
36.....	177	0	147.5	6	186	0	155	7.5
37.....	300	0	250	6	309	0	257.5	7.5
38.....	314	0	261.6	6	323	0	269.1	7.5
39.....	254	0	211.6	6	262.5	0	218.7	7.1
40.....	115	0	95.8	5	123	0	102.5	6.7
41.....	92	0	76.6	7	100	0	83.3	6.7
42.....	227	0	189.1	6	234	0	195	5.9
43.....	291	0	242.5	6	298	0	248.3	5.8
44.....	247	0	205.8	7	254	0	211.6	5.8
45.....	198	5	165	6	199.5	7	166.2	1.2
46.....	241	0	200.8	6	242	0	201.6	0.8
47.....	355	0	295.8	6	355	0	295.8	0
48.....	271	0	225.8	6	263.5	0	219.5	†-6.3
49.....	214	0	178.3	6	205	0	170.8	-7.5
50.....	279.5	5.5	232.9	6	269	5	224.1	-8.8
51.....	215	0	179.1	6	195	0	162.5	-16.6
52.....	220	0	183.3	6	199	0	165.8	-17.5
53.....	191.5	0	159.6	6	165	0	137.5	-22.1
54.....	385	0	320.8	6	350	0	291.6	-29.2
55.....	255	5	212.5	7	217	4	180.8	-31.7
56.....	341.5	0	284.5	7	298.5	0	248.7	-35.8

Average yield of unsprayed rows, 198.32 bu. per acre.

Average yield of the rows sprayed by the Station, 214.14 bu. per acre.

Average increase in yield per acre, 15.82 bu. or 8 per ct.

* See note on p. 336.

† A minus sign indicates reduced yield.

TABLE II.—RESULTS OF THOROUGH SPRAYING OF SINGLE ROWS IN TWENTY-SIX SPRAYED POTATO FIELDS.

Number of experiments	SPRAYED ONLY BY OWNER.				SPRAYED ALSO BY STATION.				Increase per acre due to extra spraying by Station.
	Times sprayed.	YIELD PER ROW.		Yield per acre; marketable tubers.	Times sprayed by Station.	YIELD PER ROW.		Yield per acre; marketable tubers.	
		Marketable tubers.	Culls.			Marketable tubers.	Culls.		
		<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>		<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Bu.</i>
57.....	5	153	3	127.5	7	229	3	190.8	63.3
58.....	4	254	4	211.6	6	327	8	272.5	60.9
59.....	1	245	4	204.1	7	297	5	247.5	43.4
60.....	1	327	0	272.5	6	374	0	311.6	39.1
61.....	2	315.5	0	262.9	6	359	0	299.1	36.2
62.....	5	197	0	164.1	6	239	0	199.1	35
63.....	5	300	0	250	6	329	0	274.1	24.1
64.....	5	333	0	277.5	6	360	0	300	22.5
65.....	4	214	0	178.3	6	240	0	200	21.7
66.....	5	231.5	0	192.9	7	255	0	212.5	19.6
67.....	6	266	14	221.6	6	289	11	240.8	19.2
68.....	1	341	0	284.1	7	363	0	302.5	18.4
69.....	2	231	0	192.5	6	249	0	207.5	15
70.....	1	248	0	206.6	7	261.5	0	217.9	11.3
71.....	4	325	0	270.8	6	335	0	279.1	8.3
72.....	4	317	0	264.1	6	326	0	271.6	7.5
73.....	3	265	0	220.8	7	272	0	226.6	5.8
74.....	6	227	5	189.1	7	231	4	192.5	3.4
75.....	6	315	0	262.5	7	318	0	265	2.5
76.....	2	266	0	221.6	5	266	0	221.6	0
77.....	2	289	0	240.8	7	287	0	239.1	-1.7
78.....	7	338	0	281.6	7	334	0	278.3	-3.3
79.....	4	306	6.5	255	6	292	5.5	243.3	-11.7
80.....	2	295	0	245.8	7	275	0	229.1	-16.7
81.....	4	351	0	292.5	6	324	0	270	-22.5
82.....	2	235	0	195.8	7	182.5	0	152.1	-43.7

Average yield of rows sprayed only by owner, 230.25 bu. per acre.

Average yield of rows sprayed also by the Station, 244 bu. per acre.

Average increase in yield per acre, 13.75 bu. or 5.5 per ct.

COMMENTS ON THE RESULTS.

The results are difficult to interpret. They are extraordinary. The increase in yield was smaller than it was in 1913 when the conditions were, apparently, much less favorable. Of course, spraying can not be expected to produce a large increase in yield in a season in which potato foliage is so free from diseases of all kinds as it was at Rush in 1914. But the writer's previous experience has led him

to believe that with such thorough spraying a considerable increase in yield is to be expected under any and all conditions provided the season is long enough for the plants to complete their growth. In the absence of disease it is the stimulation of the bordeaux which brings about the increase in yield by prolonging the life of the plants. Hence, the beneficial influence of bordeaux is likely to be most marked in a long growing season.

In several of the experiments the unsprayed row outyielded the sprayed row. The same thing happened in 1913 and the explanation of it was discussed at some length in Bulletin 379. At present it is sufficient to say that this is to be ascribed to original inequality between the two test rows rather than to any injurious action of the bordeaux. It shows how great is the chance of error in experiments of this kind.

The results of the experiments at Rush during the past two years can not be expected to encourage the practise of spraying potatoes. Proof that spraying is profitable must be sought in the results of other experiments of which there is an abundance.* As has often been said, spraying is a form of insurance. Although unprofitable in certain years it is highly profitable on the average.

* See Bulletin 349 of this Station.