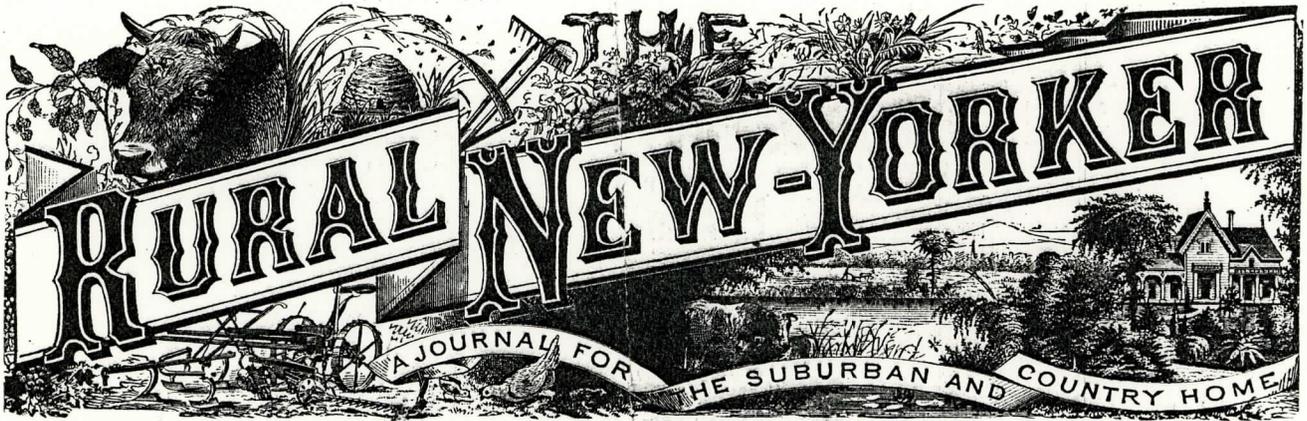


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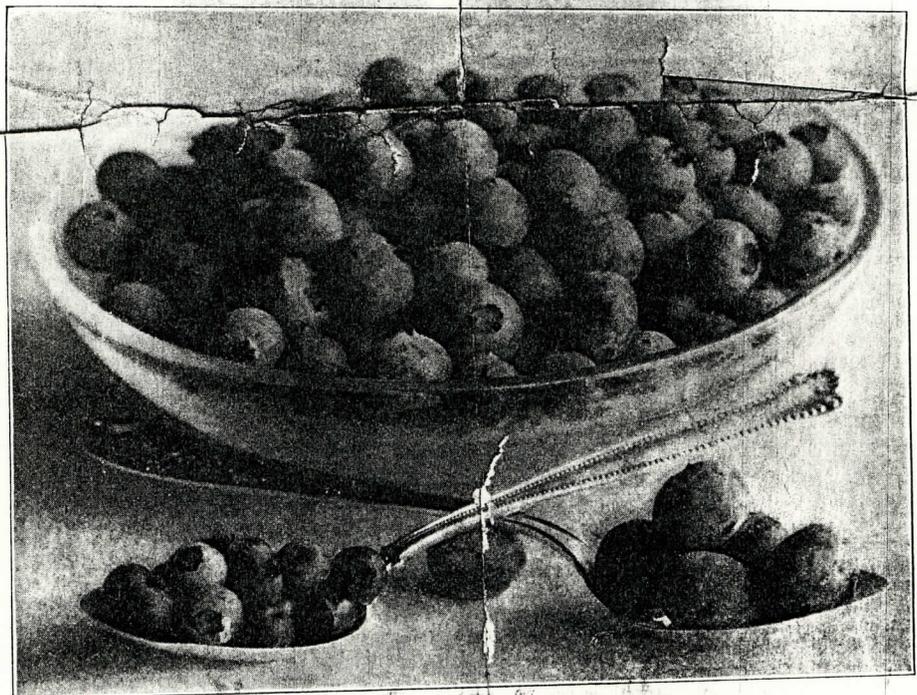
Culture of Blueberries in New Jersey

ONE GROWER'S EXPERIMENTS.—For several years past we have told of the remarkable experiments in blueberry culture which have been conducted by Miss Elizabeth C. White of New Lisbon, New Jersey. Some years ago Miss White became convinced that it was quite possible to develop a new fruit industry by cultivating some of the remarkably fine blueberries to be found in the swamps of Central New Jersey. She worked in connection with the Department of Agriculture at Washington, and has met with unusual success in the work. For many years people have tried to domesticate the wild blueberry. The usual plan was to dig up the plants in pastures or swamps, and transplant them to a place in the fruit garden. Invariably this plan resulted in failure. Even when given the finest care the plant failed to live and thrive. It finally became evident that the trouble was that these wild plants do not find a congenial place in the rich soil of the ordinary garden. They are at home in acid soil. It is their nature to live under such conditions as surround them in the pasture or swamp, and in order to make them thrive away from their native haunts it is necessary to reproduce as far as possible the conditions which are found in nature. Acting upon this suggestion, Miss White has learned to propagate these plants and make them grow successfully. This is done by planting them in acid soil and keeping that soil in an acid condition, or as nearly as possible like the soil of the pasture and swamp. Considerable work has been done in breeding new varieties on the usual plan followed by plant breeders. It was also found that many superior plants were growing wild in the swamp and upland. Miss White offered prizes to the pickers who could locate and point out the bushes producing berries of a certain large size. A number of such berries were located, and the plants were identified and cuttings made from them. These were propagated, and in that way a number of very superior varieties have been secured.

IMPROVED BERRIES.—The whole story reads much like a romance. It is a very practical one, however, as the business has developed to large pro-

portions and bids fair to add a new industry to Central New Jersey. We give below some of Miss White's directions regarding the culture of these blueberries, and at Fig. 310 is a picture showing the striking contrast between the size of the old-fashioned huckleberry and the modern cultivated blueberry. This difference is not entirely in size. The cultured blueberries are very much finer in quality and are practically seedless. The recent freeze did great injury to the blueberry crop, which is not likely to be much over one-half of the normal this

To heavy soil a liberal amount of sand should be added, or a trench may be dug 2 or 4 ft. wide and about a foot deep, and filled with a mixture of two-thirds sand and one-third peaty material. *Never use lime or stable manure.* For peaty material we recommend partially rotted leaves, because excellent results have been secured by using them. Those which rot quickly, such as maple leaves, do not answer the purpose so well as those which rot slowly, like oak leaves, pine needles or laurel leaves. Probably the "peat" easiest for many people to obtain is partially-rotted sawdust or the partially-rotted chips and litter that are always to be found around an old wood-



Copyright, 1921, by Joseph J. White, Inc. Specimens of Cultivated Blueberries Grown in New Jersey. The Specimens are of Natural Size, One Spoon Containing Ordinary Berries, the Other the Cultivated Sorts. Fig. 310

year. Miss White says that there are striking differences in the ability of these cultivated plants to withstand the frost. In some cases, even in the same row, of the same parentage, there will be one plant entirely untouched by the frost between two that have been completely blackened. It may be possible that this will lead to the development of certain strains which are more or less frost-proof. Fig. 311 shows a packing shed where the pickers bring the berries for packing and shipment.

CULTURAL DIRECTIONS.—Blueberries require an acid soil, preferably one composed of peat and sand. The ordinary garden is not suitable, but a small space can be converted into an excellent blueberry patch very easily. In light, well-drained soil a 6-in. layer of peaty material should be spaded in and thoroughly mixed with the top 12 in. of soil.

It is quite possible that other vegetable matter could be substituted for the above—apple pomace or damaged beet pulp might serve. If any one has an opportunity to use such substances we should like very much to be informed of the results. During the first stages of decay vegetable matter furnishes the necessary acidity, and later as the decay proceeds it also furnishes plant food. When this disintegration is almost complete the acidity disappears. On wild blueberry lands the acidity is naturally kept up, but where soil has to be specially prepared for blueberries it is necessary to add fresh leaves or other vegetable matter each year to maintain the proper acid condition. Blueberry plants are most successful on soil that is always damp, but never soggy wet. They require a continuous supply of moisture, but become sick when they have "wet feet."

SETTING THE PLANTS.—The plants may be set out any time after frost is out of the ground. They should be placed at least 4 ft. apart, otherwise the branches are likely to interlace within three or four years and make picking difficult. If the soil is not prepared when the plants are received they may be heeled in where the sun does not strike them and where the ground is damp, or they may be put in a cool cellar. Never permit the roots to dry out. Set the plants about half an inch deeper than they were in the nursery; water thoroughly when they are planted. Before warm weather comes mulch the

around an old wood-way. It is quite possible that other vegetable matter could be substituted for the above—apple pomace or damaged beet pulp might serve. If any one has an opportunity to use such substances we should like very much to be informed of the results. During the first stages of decay vegetable matter furnishes the necessary acidity, and later as the decay proceeds it also furnishes plant food. When this disintegration is almost complete the acidity disappears. On wild blueberry lands the acidity is naturally kept up, but where soil has to be specially prepared for blueberries it is necessary to add fresh leaves or other vegetable matter each year to maintain the proper acid condition. Blueberry plants are most successful on soil that is always damp, but never soggy wet. They require a continuous supply of moisture, but become sick when they have "wet feet."

plants; that is, cover the surface of the ground, an inch or more deep with the same peaty material used to prepare the bed. Mulch as far out as the root can possibly reach the first year, and be careful not to smother the little plants. The acidity of the soil and the supply of plant food should be kept up by heavy mulches of fresh leaves each year. After the first season the mulch should be 4 to 6 in. deep and reach as far from the base of the plant as the top does above it. Note especially that *partially-rotted* leaves, wood or other vegetable matter is to be used in the first preparation of the soil, while *freshly fallen* leaves or other comparatively sound vegetable matter is needed for the annual mulch.

Experience in Successful Potato Spraying

PART II.

COMMERCIAL OR HOMEMADE BORDEAUX.— Shall the grower buy the chemicals and make his own Bordeaux solution, or shall he buy a commercial Bordeaux? One cannot improve on a well-made, home-prepared Bordeaux mixture. Some may be careless in preparing their Bordeaux mixture, but it is pure carelessness for which there is no excuse. Anyone can make a good Bordeaux mixture without much trouble. If he does not know how, he can find out from his Farm Bureau office. Commercial Bordeaux is one of many different grades, particularly as to the amount of copper contained. A commercial preparation that contains copper enough so that when used according to directions it will equal the equivalent strength in copper of 4-4-50, should give just as good results as the homemade preparation. It is largely a matter of getting the necessary amount of copper. There are some commercial preparations that when used according to directions will equal in copper strength a 3-3 or 4-4-50 formula, and it is so stated on the labels. There is other commercial Bordeaux solutions fall copper content. These are equivalent when used according to directions to 50 gallons of solution some of these commercial mixtures give varies from 2 or 3 lbs. to as low as one-half pound. Will one-half to three-fourths of a pound of copper sulphate to 50 gallons of solution control the late blight in a blight year? Personally, I would not care to take the chance.

NEW HAMPSHIRE EXPERIMENTS.—How this works in actual practice is shown in the following results: During the season of 1919, while in New Hampshire, arrangements were made with James Monahan of East Kingston, one of our Farm Bureau members, to carry on some potato spraying work in co-operation with the State College of Agriculture. The purpose was to emphasize the value of thorough spraying and to compare the results of two grades of the commercial Bordeaux with the homemade. The work was conducted under the supervision of Prof. O. H. Butler of the New Hampshire State College of Agriculture. In this demonstration, as with others reported in this article, a triplex pump sprayer was used capable of maintaining 180 to 200 lbs. pressure. The spray booms used were shown on first page last week. Four rows at a time were sprayed, using three nozzles to a row. Two grades of commercial Bordeaux were used. One, which we will call No. 1, was a combination Bordeaux and arsenic paste. It was guaranteed to contain not less than 1.5 per cent of metallic copper. When this was used according to the directions it gave the equivalent of nearly three-fourths of a pound of copper sulphate to 50 gallons of solution. The other preparation, which we will call No. 2, was a Bordeaux paste. This gave an equivalent strength to the homemade Bordeaux used in this demonstration. An average of 135 gallons of spray solution was applied per acre in each application. In this particular case four applications were made during the season.

Two things were brought out in this work. The commercial Bordeaux of an equivalent strength to the homemade mixture gave slightly better control than the homemade Bordeaux. Its cost, however, was twice as much per acre. Where solution No. 1 was used there was four times as much loss from

rot as from No. 2 and homemade Bordeaux, yet it cost twice as much per acre as No. 2 and nearly four times as much as the homemade 4-4-50. The check row showed nearly 25 per cent loss from rot. The total yield per acre, including rot infected tubers, averaged 209 bushels.

RESULTS.—The amount of rot per acre and the cost of spray material is shown in the following table:

TABLE No. 1

Material	Per Cent Late Blight Rot	Spray Material Per Acre	Cost
Sol. No. 1.....	14.3		\$24.27
Sol. No. 2.....	3.2		14.93
4-4-50 (homemade).....	3.6		7.50
Check (not sprayed).....	24.6		....

Did the above results on the farm of James Monahan pay? Let us see. The difference as shown in Table No. 1 between the loss from rot with a 4-4-50 homemade Bordeaux as compared to the check rows was 21 per cent. That means a loss of 44 bushels per acre out of the 209 bushel yield, by not spraying. Since potatoes were selling out of the field that season at digging time at \$2 per bushel, the money saving was \$88 per acre, or a total on the three-acre piece of \$264. The spray material cost



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Packing Shed on a New Jersey Blueberry Farm. Fig. 311

\$7.50 per acre, or a total of \$22.50. Deducting the cost of the spray material from \$264 leaves \$241.50 to pay for the labor of spraying and the new machine costing approximately \$200. This result on three acres more than paid for his sprayer the first year. Last Fall Mr. Monahan wrote that the sprayer was still working fine, and he said: "My potatoes are still green and growing, while my neighbors' fields are dead." Later still he wrote: "I had a yield of over 333 bushels per acre, and practically no rot."

IN CENTRAL NEW YORK.—So much for New Hampshire. Now let us look at some results in spraying in Central New York during the 1920 season. In the Spring of 1920 the Onondaga County Farm Bureau, under the management of County Agent R. E. Deuel, started out on an organized campaign to demonstrate what thorough spraying would do. Two potato spraying associations were organized, one of about 54 acres and another of 58 acres, at Baldwinsville and Little Utica. There were from 20 to 23 farmers in each association. The average acreage per farm was 2 1/2 acres, and varied from as low as one-half acre to five acres. Each association purchased a new sprayer of the type described in the previous article. A man was hired to operate each machine for the season. Spraying started the forepart of July and ended in September. It was

planned to make four or five applications per acre at intervals of about every 14 or 15 days. This would make the last application come during the first half of September. The way the season turned out it would have paid to make a sixth application the last half of September, as there was no killing frost before November.

APPLICATION.—A 4-4-50 homemade Bordeaux was used for the first applications. After the middle of August this was increased to a 6-6-50. The drop nozzle boom shown in Fig. 300 was used while the plants were small, after which the type of boom shown in Fig. 302 was used. An average of a little over 100 gallons per acre of spray solution was applied for each application, and at intervals of about 14 to 18 days. As it turned out, only a few of the fields received the fifth spraying during September. The results would have undoubtedly been better if more thorough work had been done in September. The number of spray applications made and intervals between applications are not for an instant set up as a possible standard to follow. Every grower left check rows, usually four, through the middle of the field. These rows were not sprayed with Bordeaux, but were kept free from bugs by the grower. At digging time a check on 30 fields was secured of the yield of sound and also rotted potatoes from both sprayed and unsprayed rows. These results are summarized in Table No. 2.

STUDYING RESULTS.—A careful study of these results brings out many important points. The season of 1920 was a very favorable one for all crops, and we know that the average yield of sound potatoes on the sprayed fields was 251.4 bushels per acre; on the unsprayed rows it was 176.9 bushels per acre. This is not so good by 74.8 bushels as where spraying was done. There was an average increase, due to spraying, of practically 75 bushels. This increase was obtained at an actual cost of \$13.50 per acre. This includes the cost of spray material, labor and that part of the cost of the new spray machine chargeable to the above crop. This cost does not include such assistance as the grower gave in preparing the spray solution and in filling the spray machine tank. Potatoes from these fields have been sold from \$2 per bushel down to 35 cents per bushel. Even at 35 cents there is something left besides the cost of spraying, and we are only speaking in terms of the average. These results are not startling or unusual. They would have been better in many cases if more thorough spraying had been done in September, as planned, the September spraying being the most important. It is interesting to note that the summary by the New York State College at Cornell of 50 potato spraying demonstrations throughout the State in 1920 showed an average increase of 71 bushels per acre. That is very close to the 74.8 increase in Onondaga County.

VARIATIONS IN INCREASE.—A little further study of the table shows the increase due to spraying varied from 19 1/2 bushels all the way up to 205.3 bushels per acre.

TABLE No. 2
Onondaga County, N. Y., Potato Spraying Demonstrations
Season 1920

Field No.	Rotted		Yield Per Acre Sound Potatoes		In-crease
	Check Bu. per Acre	Sprayed Bu. per Acre	Sprayed	Check	
1.....	...	...	222.3	191.8	30.5
2.....	13.2	5.25	183.8	126.	57.8
3.....	18.9	3.53	441.3	236.	205.3
4.....	6.9	1.8	253.3	222.9	30.4
5.....	12.3	4.	192.	195.	75.
6.....	20.6	13.3	183.7	137.2	28.5
7.....	78.3	12.1	374.8	197.	77.6
8.....	17.3	2.8	283.	190.	93.
9.....	16.2	2.5	286.1	165.2	120.9
10.....	12.6	2.5	141.4	113.1	28.3
11.....	33.7	1.1	195.6	130.4	65.2
12.....	27.6	13.0	234.3	195.2	39.1
13.....	23.6	1.2	285.7	194.7	91.0
14.....	33.3	1.7	308.	130.8	105.2
15.....	5.3	2.7	323.4	178.2	145.2
16.....	15.0	6.4	327.6	234.0	93.6
17.....	10.5	3.5	294.6	257.	30.8
18.....	40.3	2.4	297.2	237.6	59.7
19.....	69.4	...	344.6	242.	102.6
20.....	*135.	*132.9	118.1	59.1	59.1
21.....	37.6	3.	307.	191.3	115.2
22.....	24.3	8.1	283.5	160.9	122.6
23.....	33.8	19.3	231.	200.2	30.8
24.....	...	...	175.5	156.	19.5
25.....	6.7	1.7	255.3	177.6	77.7
26.....	...	...	274.4	159.3	115.1
27.....	4.4	0.7	161.3	125.5	35.7
28.....	26.8	17.6	125.3	71.6	53.7
29.....	18.7	10.5	246.4	168.	78.4
30.....	7.1	2.0	214.2	163.8	50.4
Average.....	26.7	9.5	251.4	176.9	74.8

* Last spray made August 27. Field on low ground. Had no protection in September.