Potato Fungicide Experiments in 1946[1]

By
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EXPERIMENTS with some of the newer fungicides were conducted at Park River and Grand Forks, North Dakota, in 1945 to determine the effectiveness of these new materials in preventing early, **Alternaria solani** (Ell. & Mart.) Jones & Grout, and late, **Phytophthora infestans** (Mont.) de By., blights of potatoes. More extensive tests were carried on at Grafton in 1946 in order to confirm the previous work and to obtain information on other new products, but the absence of early and late blights prevented an evaluation of the various fungicides. The yields were obtained in order to determine if any of the treatments affected the yield in the absence of these two diseases.

Materials and Methods

Certified Bliss Triumph seed was used to plant a 3½-acre plot May 21 and 22, 1946. The 15 different treatments and one check were each replicated 6 times. Each of the 96 plots was 2 rows wide and 80 ft. long with 2 untreated rows on each side. The plot arrangement (Triple lattice) and the details concerning the analysis of variance have been omitted from this report.

The dusts were applied with a 2-row, tractor-mounted Niagara duster, having 3 nozzles to the row, at approximately 35 lb. per acre. A 2-row, power-take-off, Bean sprayer, having 3 nozzles to the row, was used to apply approximately 125 gal. of spray per acre at 400 lb. pressure. The average height of the plants was 10 inches when the first of 6 treatments, at 10- to 12-day intervals, was made July 12. The last application was made September 3, and one month later yields were obtained by digging each entire plot. It was not necessary to consider wheel injury to plants. Such damage was negligible this year on account of insufficient moisture for large vines.

The materials and concentrations used are indicated in table 1. Five per cent DDT was added to each dust and 1 lb. of DDT to each 100 gal. of spray. The quantity of each fungicide per 100 gal. of water is also given in the table. Assuming that early blight would be present, plot 5D was treated with 5 per cent DDT in order to compare its yield with plots receiving fungicides and DDT. In case early blight had appeared, Zer-

[1] Commercial companies cooperating in this work included the Agricultural Supply Company, Grand Forks, N. Dak., Tennessee Copper Company, Rohm and Haas Company, B. F. Goodrich Chemical Company, E. I. du Pont de Nemours and Company, and United States Rubber Company.

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late was to be included in the DDT dust being applied on plot 6D as soon as infection was observed. Since the disease was absent, plot 6D had the same treatment as 5D. HE-178 (Zinc Ethylene Bisdithiocarbamate) and the Zinc Ethylene Bisdithiocarbamate applied on plot 14S were similar materials supplied by different companies.

Experimental Results

In order to determine the effect of the fungicides on yields when early and late blights were absent, the plots receiving fungicides and DDT were compared to the 2 plots (5D and 6D) just receiving 5 per cent DDT. When such comparisons were made there were 2 plots that yielded the same, 5 that yielded less and 6 that yielded more than the plots receiving only DDT. The difference between any 2 yields of treated plots was not statistically significant. The low yield of the check plot (16) was due to the presence of the Colorado potato beetle, **Leptinotarsa decemlineata** (Say), the potato flea beetle, **Epitrix cucumeris** (Harr.), the potato leafhopper, **Empoasca fabae** (Harr.) and the 6-spotted leafhopper, **Macrosteles divisus** (Uhl.).

Sweepings[5] made on the plots at various times throughout the summer indicated these insects were more numerous on the check plots than on the plots receiving fungicides and DDT. In years such as 1946 the results indicated it was necessary to apply only DDT for insect control. It is questionable whether the application of a fungicide would ever significantly increase the yield when early-blight infections were light.

Although the difference between the yield of any plot receving a fungicide and DDT, and either of the 2 plots just receiving DDT was not statistically significant, it was inter-

Table 1. Yields in the absence of early and late blights.

Plot	Materials	Bushels per acre[1]
	Dust Treatments	
1D	HE-178 (Zinc Ethylene Bisdithiocarbamate) 7%, DDT 5%	159
2D	Copper Compound A 6%, DDT 5%	156
3D	Zerlate 10%, DDT 5%	162
4D	Tribasic Copper Sulphate 7%, DDT 5%	158
5D	DDT 5%	161
6D	DDT 5%	161
	Spray Treatments	
7S	Phygon 1 lb., DDT 1 lb.	157
8S	Tribasic Copper Sulphate 4 lb., DDT 1 lb.	154
9S	8-8-100 Bordeaux mixture, DDT 1 lb.	168
10S	Dithane D-14 2 qt., Zinc Sulphate 1 lb., Lime ½ lb., DDT 1 lb.	174
11S	HE-178 (Zinc Ethylene Bisdithiocarbamate) 2½ lb., DDT 1 lb.	169
12S	Polyethylene Polysulfide 2 qt., DDT 1 lb.	161
13S	Polyethylene Polysulfide 1 qt., Phygon 1 lb., DDT 1 lb.	161
14S	Zinc Ethylene Bisdithiocarbamate 2 lb., DDT 1 lb.	169
15S	Manganese Ethylene Bisdithiocarbamate 2 lb., DDT 1 lb.	162
	No Treatment	
16	Check	141

[1] Adjusted bushels per acre obtained from an analysis of variance.

esting that plots 10S, 11S and 14S, sprayed with zinc-containing fungicides, had the highest yields. When zinc-containing materials (HE-178 and Zerlate) were applied as dusts, the yields were approximately the same as plots 5D and 6D. It was also of interest to note that the Bordeaux-sprayed plots had the fourth highest yield. This fungicide has been reported as being injurious to potatoes causing a reduction in yield.

Conclusions

1. Some of the newer fungicides were applied to Bliss Triumph potatoes at Grafton, North Dakota, in order to determine their effectiveness in preventing early blight, and late blight in case the latter occurred. In the absence of these 2 diseases the yields were obtained to determine if the treatments had any effect.
2. No statistically significant difference existed between the yields of any plot receiving a fungicide and DDT, and either of the 2 plots just receiving DDT.
3. The low yield of the untreated plot was due to the presence of the Colorado potato beetle, the potato flea beetle, the potato leafhopper and the 6-spotted leafhopper, and indicated the necessity of applying DDT to reduce the insect population.
4. Plots 10S, 11S and 14S, sprayed with zinc-containing fungicides, had the highest yields.
5. Six applications of Bordeaux mixture had no apparent effect in reducing the yield.

IMPROVING FARM AND RANCH TENURE IN THE NORTHERN PLAINS

Report No. 1 of the Tenure Committee of the Northern Great Plains Agricultural Advisory Council has been issued under the foregoing title as Bulletin 436 of the Montana Agricultural Experiment Station. The North Dakota Agricultural Experiment Station has purchased a limited number of them for distribution. Copies of the bulletin will be sent by the North Dakota Station to all inquirers as long as the supply lasts. Address your request to Information Department, State College Station, Fargo, N. Dak. and ask for Mont. Bulletin 436.

[5] Insect collections, determinations and tabulations were made by Mr. Arden Aanestad, Field Assistant, North Dakota Agricultural Experiment Station.