POTATO-FUNGICIDE EXPERIMENTS IN 1948[1]

By
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Seven dusts and 9 sprays were included in the 1948 potato fungicide experiments. The plot was located in a 160-acre field o Cobblers belonging to Art Nelson, Northwood, North Dakota. Al plots, including the check (1D), were treated with DDT to reduc the injury caused by the common potato beetles and leafhoppers.

The purpose of the investigation was to determine the effective ness of the various fungicides in controlling *Alternaria solani*, th fungus causing early blight, and *Phytophthora infestans*, the fungu causing late blight. In case both diseases were absent or a sligh amount of one or both occurred, attention was to be given to th effect of certain zinc- and copper-containing materials on yields Traces of early and late blights were first observed August 18 bu no further late-blight infection occurred because of the unfavorabl dry and warm weather. Early blight never became prevalen enough to compare the effectiveness of the different fungicides.

The experimental procedure:

Planting dates: June 9 and 10.

Soil:[3] Bearden very fine sandy loam.

Fertilizer: 4-12-8 applied at 440 pounds per acre.

Design: Triple lattice.

Replications: Each treatment 6 times.

Plots: Each 2 rows wide and 80 feet long with 2 untreated rows o each side.

Row width: 38 inches.

Sprayer: Two-row, tractor-drawn, Bean sprayer with 350 pound pressure.

Rate of spray application: 100 gallons per acre for the first 3 treat ments using 3 nozzles per row and 150 gallons per acre for the las 3 applications using 5 nozzles per row.

Duster: Two-row, tractor-mounted, Niagara duster with 3 nozzles pe row.

Rate of dust application: 20 pounds per acre for each of the first applications and 40 pounds per acre for each of the last 3 treat ments.

Dates of spray and dust applications: July 12 and 24, August 2, 12, an 24, and September 3. In order to minimize the amount of drift the materials were only applied when there was none or a sligh breeze.

First killing frost: September 29.

Dates harvested: October 12 and 13.

[1]Commercial cooperators included the Agricultural Supply Company, Grand Forks, N Dak., Tennessee Copper Company, Rohm and Haas Company, Carbide and Carbor Chemicals Corporation, Allied Chemical and Dye Corporation and E. I. DuPont de Nemours and Company.
[2]Associate Plant Pathologist, North Dakota Agricultural Experiment Station and State Seed Department.
[3]Soil classification determined by Mr. Gordon Brackett, Soil Conservation Service Grafton, N. Dak.

Experimental Results

Among the 7 dusted plots shown in table 1, the one receiving Parzate yielded 314.6 bushels per acre followed by Zerlate and Z-78. Each of these dusts contained zinc. The copper-containing dusts, Cuprocide and Tri-Basic Copper Sulphate, yielded 289.9 and 286.8 bushels respectively. Plot 2D had 4 treatments of 5 per cent DDT and 2 applications of the zinc-containing spray Dithane D-14. It yielded 13.2 bushels more than the check plot.

Plots sprayed with the zinc-containing fungicides Dithane D-14, Parzate, Zinc Nitrodithioacetate, Tri-Basic-Nu-Z and Copper-Zinc Chromate all yielded considerably more than the check plot or the plot sprayed with the copper-containing fungicide Tri-Basic Copper Sulphate.

Zinc Sulphate was applied to plots 8S, 9S and 10S to determine if this chemical would increase the yield in the absence of a fungicide. Treatments were made on plot 8S the last 3 applications, on plot 9S the first 3 applications and on plot 10S the entire season.

Table 1. Total Yields of Potatoes Dusted and Sprayed With Various Copper- and Zinc-Containing Materials

Plots	Materials	Yields in bushels per acre
	CHECK	
1D	5% DDT	275.7
	DUST TREATMENTS	
2D	5% DDT until Aug. 24 then Dithane D-14, Zinc Sulphate and DDT spray. 2 qts. 1-1-100	288.9
3D	10% Zerlate and 5% DDT	295.7*
4D	8% Z-78 and 5% DDT	295.1*
5D	8% Parzate and 5% DDT	314.6**
6D	5.5% Cuprocide and 5% DDT	289.9
7D	7% Tri-Basic Copper Sulphate and 5% DDT	286.8
	SPRAY TREATMENTS	
8S	Zinc Sulphate the last 3 applications and DDT. 1-1-100[1]	300.1**
9S	Zinc Sulphate the first 3 applications and DDT. 1-1-100	305.9**
10S	Zinc Sulphate 6 applications and DDT. 1-1-100	304.8**
11S	Dithane D-14, Zinc Sulphate and DDT. 2 qts. 1-1-100	314.3**
12S	Parzate and DDT. 2-1-100	314.6**
13S	Zinc Nitrodithioacetate, Filmfast and DDT. 4-½-1-100	307.9**
14S	Tri-Basic-Nu-Z and DDT. 6-1-100	312.2**
15S	Copper-Zinc Chromate and DDT. 2-1-100	303.9**
16S	Tri-Basic Copper Sulphate and DDT. 4-1-100	281.3

Least significant difference at 5 per cent level equals 17.5 bushels, and 23.2 bushels at the 1 per cent level.

*Denotes significant difference at the 5 per cent level.

**Denotes significant difference at the 1 per cent level.

[1]All spray materials are expressed in standard units of weight or liquid measure sufficient to make 100 gallons of spray mixture. For example, Zinc Sulphate and DDT 1-1-100 means 1 pound of Zinc Sulphate and 1 pound of actual DDT with sufficient water to make 100 gallons of spray mixture.

The yields were approximately the same as some of the other high yielding sprayed plots and indicated the time of application wa immaterial.

A comparison of the yields obtained from plots 14S and 16 indicated the influence of zinc in increasing the yield. Plot 14S re ceived a copper-zinc mixture containing Tennessee Tri-Basic Cop per Sulphate and Tenn-Nu-Z furnishing 2.58 pounds of metalli copper and 0.60 pounds of metallic zinc per 100 gallons of water Plot 16S was treated with Tennessee Tri-Basic Copper Sulphate a the rate of 2.12 pounds of metallic copper in the same quantity o water. The zinc-containing fungicide yielded 30.9 bushels mor per acre than the plot receiving only copper.

During the latter part of August, the vines on plots treated wit zinc-containing materials were first observed to be greener thar those on untreated rows, the check plot or plots treated with copper-containing fungicides. As the season advanced this difference wa quite noticeable and especially just previous to the killing frost o September 29. An examination of the zinc-treated plots revealed the presence of new vine growth. There was a difference, however among the various plots receiving zinc-containing sprays and dust with respect to the amount of new foliage.

Summary

1. The potato-fungicide experiments for 1948 were conducted with the Cobbler variety at Northwood, North Dakota on soil classified as Bearden very fine sandy loam.

2. Sixteen different treatments were applied to determine which were the most effective for controlling *Alternaria solani* and *Phytophthora infestans*, the fungi causing early and late blights respectively, and their effect on yields.

3. Only a trace of late blight was present and early-blight infection was too slight to compare the effectiveness of the various fungicides. The high yields obtained from plots treated with zinc-containing materials are attributed to the effect of zinc.

4. Among the 7 plots receiving dusts, those treated with the zinc-containing fungicides Parzate, Zerlate and Z-78 had the highest yields.

5. Plots sprayed with the zinc-containing fungicides Dithane D-14, Parzate, Zinc Nitrodithioacetate, Tri-Basic-Nu-Z and Copper-Zinc Chromate had considerably higher yields than the check plot or the plot sprayed with Tri-Basic Copper Sulphate.

6. The yields obtained from plots sprayed with Zinc Sulphate were comparable to some of the high-yielding plots treated with zinc-containing fungicides.

7. Plot 14S was sprayed with a copper-zinc mixture, Tri-Basic-Nu-Z, and plot 16S with the copper-containing fungicide Tri-Basic

Copper Sulphate. A difference of 30.9 bushels per acre existed between these 2 plots in favor of the one treated with the zinc-containing fungicide.

8. Vines sprayed or dusted with zinc-containing materials had more foliage and remained green longer than vines on untreated rows, on the check plot or on plots treated with copper-containing fungicides.

9. The results of this investigation have shown that zinc-containing sprays and dusts increased the yield of Cobbler potatoes grown at Northwood, North Dakota in 1948.

"Price Differentials for Slaughter Hogs" is the title of Iowa Agricultural Experiment Station Bulletin P93 recently published under the authorship of the North Central Livestock Marketing Research Committee. Copy of this bulletin for North Dakota inquirers may be obtained by addressing the Information Department, State College Station, Fargo, North Dakota. Do not write to the Iowa Station. Mr. Perry V. Hemphill, Associate Agricultural Economist of the North Dakota Agricultural Experiment Station, is the North Dakota representative on the research committee.