SCREENING OF POTATO FUNGICIDES IN 1963[1]

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The relative efficiencies in the control of potato late blight, Phytophthora infestans (Mont.) de Bary, of the several fungicides listed below were studied in a Screening Test at Charlottetown in 1963.

1. Bayer 47531 50W - N -(dichlorofluoromethylthio)-N, N-dimethyl-N-phenylsulphamide. 1.3 pounds/80 Imperial gallons. Chemagro Corporation, Latham, New York, U.S.A.

2. Bordeaux mixture - 8-4-80 formula. Included annually as a standard fungicide.

3. Carbane - Polyethylene bis-thiuram sulphide (12%) + copper oxy-chloride (36%). 2.5 lb./80 gal. Procida, Neuilly sur Seine, France.

4. Dithane M-22 - Manganese ethylene bisdithiocarbamate. (maneb). 1.0 lb./80 gal. Rohm and Haas Company of Canada Limited, West Hill, Ontario.

5. Dithane M-45 - Zinc ion and maneb. Mn, 16%; Zn, 2%. 1.0 lb./80 gal. Rohm and Haas Company of Canada Limited.

6. Difolatan 80W - N-(1, 1, 2, 2, -tetrachloroethylsulphenyl)-cis-Δ^4-cyclohexene-1, 2-dicarboximide. 1.0 lb./80 gal. Ortho Agricultural Chemicals Limited, Oakville, Ontario.

7. DuTer - Triphenyl tin hydroxide (20%). 0.75 lb./80 gal. Philips-Duphar, Amsterdam, Holland.

8. F-100 - Confidential product. 1.0 lb./80 gal. Green Cross Products, Montreal.

9. Hortocritt - Ethylene thiuram monosulphide. 2.5 lb./80 gal. S.I.A.P.A., Rome, Italy.

10. Miller 658 - Copper-zinc-chromate. 2.0 lb./80 gal. Miller Chemical and Fertilizer Corporation, Baltimore, U.S.A.

11. Polyram 80W - Zinc activated polyethylene thirame disulphide. 1.5 lb./80 gal. Two forms of this product were used: (a) the current form on the market and (b) a milled form. Both forms were submitted by Niagara Brand Chemicals, Burlington, Ontario.

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12. TC-90 - 48% copper salts of fatty and rosin acids. 1.7 qt./80 gal. Tennessee Corporation, Atlanta, Georgia, U.S.A.

13. Trimanoc - Confidential product. 1.25 lb./80 gal. Fabrick van Chemische Producten, Holland, and supplied by Green Cross Products of Montreal.

The plots were planted on June 4, exactly 45 seed pieces of the Green Mountain variety being dropped in each 45-foot row. Each plot was 4 rows wide x 45 feet long and 15 plots, or one for each treatment, were set out in each of 4 ranges. Single rows of potatoes were planted as borders and buffers. These rows were not sprayed, their purpose being to equalize the epidemic over the area. They were inoculated with the late blight fungus by sprinkling them with a water suspension of spores on the evening of August 8. Lesions were observed in all border and buffer rows on August 13.

The fungicides were applied on July 19, 30, August 8, 20, 28, September 2, 12; the mean interval being 9.2 days. The machine employed was a tractor-sprayer unit which delivered approximately 120 gallons per acre at a pressure of 375 pounds per square inch. The boom carried 4 nozzles per potato row; 2 being directly over the plants and 2 being on drop pipes. Insects were controlled by spraying all rows with endosulfan, three applications being made during the season.

The weather in 1963 was favorable for the development and spread of late blight. Rain was recorded in each week of the July-September period, the total precipitation being 14.56 inches or approximately 4.0 inches above normal. There were also several periods of extremely high relative humidity which favored sporulation of the fungus. Three of these periods of abundant sporulation were accompanied by heavy rains which, in turn, caused heavy losses by washing spores into the soil where they established infection on many tubers. In the period of very high humidity and rapid sporulation of August 20-25, rain fell every day, the total for the six days being 2.24 inches. Of this amount, 1.18 inches fell on August 24. In a similar period, August 29-31, 1.44 inches of rain were recorded. A third period of very active sporulation occurred in the first week of September and inoculation of additional tubers was assured by a heavy rain of 1.89 inches on September 6.

Because of the weather conditions described above, losses caused by the rotting of tubers were very high. Losses in the treated plots ranged from 3.9 to 29.0 per cent. In the unsprayed check plots 34.6 per cent of the crop was spoiled by rot.

Under the influence of the high relative humidity and frequent rains, the disease spread out rapidly from the inoculated buffer rows. The unsprayed check plots were 50 per cent defoliated by September 3 and from a trace to 10 per cent defoliation had occurred in the treated plots. Beginning on that date defoliation readings were taken at regular intervals, and mean defoliations, expressed as percentages, are given for selected dates in Table 1.

Table 1. Percentage of defoliation

Treatment	Sept. 6	Sept. 12	Sept. 16
Dithane M-45	3	10	15
Polyram (milled)	3	11	15
Hortocritt	3	14	18
Bordeaux	5	14	22
Bayer	7	16	22
Difolatan	3	14	22
F-100	4	16	22
Dithane M-22	5	18	24
DuTer	4	17	25
Trimanoc	7	20	27
Polyram (current)	8	23	30
Carbane	5	25	35
Miller 658	17	70	85
TC-90	23	72	87
Check	70	100	100

Table 2. Effect of treatments on yield* and rot

Treatment	Total bu/ac	Smalls bu/ac	Rot bu/ac	No. 1 bu/ac	Tuber % Rot
Difolatan	460.3	55.2	18.0	387.1	3.9
DuTer	474.5	52.8	36.0	385.7	7.6
Bayer	466.8	48.2	39.6	378.0	8.5
Dithane M-45	475.7	49.7	55.9	369.6	10.8
F-100	484.1	55.2	64.8	364.1	13.4
Dithane M-22	449.5	47.3	48.7	353.5	10.8
Bordeaux	437.5	51.6	34.8	351.1	8.0
Trimanoc	444.5	50.4	46.8	347.3	10.5
Polyram (milled)	462.5	45.1	78.5	338.9	17.0
Carbane	433.2	51.6	54.5	327.1	12.6
Hortocritt	418.8	51.1	49.7	318.0	11.9
Polyram (current)	417.1	49.2	72.7	295.2	17.4
Miller 658	400.8	37.7	91.9	271.2	22.9
TC-90	393.6	49.2	114.0	230.4	29.0
Check	334.8	56.9	115.9	162.0	34.6
S.D. 5%	42.6			66.4	10.5
S.D. 1%	57.0			88.9	14.0

*Arranged in descending order of No. 1 tuber yields.

The test was terminated on September 18, 106 days after planting and 6 days after the last fungicide treatment, by spraying the plants with Reglone. The tubers were dug, graded, examined for blight rot, and weighed on October 3. The data are given in Table 2.

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