SCREENING OF POTATO FUNGICIDES IN 1972[1]

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Introduction

Weather conditions in Prince Edward Island were generally unfavorable to the development and spread of the potato late blight fungus, Phytophthora infestans (Mont.) de Bary, during the growing season of 1972. Consequently, growers experienced no difficulty in protecting their plantings from attack and experimental work with the disease was hampered.

Materials and methods

In the following list of the fungicides selected for screening in 1972, the description of each is arranged in order of trade name or code number, guaranteed active ingredient, source, and dosage rate per acre in terms of formulated products.

1. Bravo 6F. 6.0 lb/U.S. gal. tetrachloroisophthalonitrile. Diamond Shamrock Canada Ltd., Willowdale, Ontario. 1.0 U.S. pint/acre.
2. Dithane M-45 80W. 80% zinc coordinted maneb. Rohm and Haas Company of Canada Limited, West Hill, Ontario. 1.5 lb/acre.
3. Bravo 6F + Dithane M-45. 0.5 U.S. pint + 1.0 lb/acre.
4. Bravo 6F + Dithane M-45. 1.0 U.S. pint + 1.0 lb/acre.
5. CGF 2630. Confidential mixture and dosage. Ciba-Geigy Canada Ltd., Montreal, Quebec.
6. Difolatan 4.8F. 4.8 lb/Imp. gal. N-(1,1,2,2,-tetrachloroethylsulfenyl)-cis-Δ-cyclohexene-1,2-dicarboximide. Chevron Chemical (Canada) Limited, Oakville, Ontario, Canada. 1.0 Imp. qt/acre.
7. Du-Ter 50WP. 50% fentin hydroxide. Philips-Duphar, Amsterdam, Holland. 10.0 oz/acre.
8. Kocide 101 WP. 83% cupric hydroxide. Kennecott: Copper Corporation, Houston, Texas, U.S.A. 1.0 and 2.0 lb/acre.
9. Liro-Martin 45.51. 34% maneb, 11.5% fentin acetate. Ciba-Geigy Canada Ltd., Montreal, Quebec. 1.8 lb/acre.
10. Manzate 200 80W. 80% zinc coordinated maneb. DuPont of Canada Limited, Montreal, Quebec. 1.5 lb/acre.
11. Polyram 80W. 80% zinc activated polyethylene thiuram disulfide. Niagara Brand Chemicals, Burlington, Ontario, Canada. 1.5 lb/acre.

The plots were planted on June 6 on land that had received a dressing of manure in the fall and a broadcast application of 1,400 pounds per acre of 6-12-12 + 1.2 Mg fertilizer on May 31. Each plot was 4 rows wide by 50 feet long and 50 seed pieces of the variety Green Mountain were planted in each row. Single rows of the same variety were planted as borders and as buffers between plots. The 13 treatments were randomized and replicated in five ranges.

The plants in all rows were sprayed at times appropriate for insect control with endosulfan.

A tractor-sprayer unit, the 4-row boom of which carried four nozzles per potato row,

Table 1. Percentage defoliation

Treatment	Sept. 7	Sept. 15	Sept. 18	Sept. 22
Bravo 6F(1 pt)			Tr*	Tr
Bravo 6F(0.5 pt) + Dithane M-45(1.0 lb)				Tr
Bravo 6F(1.0 pt) + Dithane M-45(1.0 lb)				Tr
CGF 2630	1.5	2.5	5	15
Difolatan 4.8F			Tr	0.5
Dithane M-45				Tr
Du-Ter			Tr	1
Kocide 101(1.0 lb)	2	3	6	11
Kocide 101(2.0 lb)	0.5	1.5	3	6
Liro-Matin				Tr
Manzate 200			Tr	Tr
Polyram			0.5	2
Check	20	35	80	98

* Tr = trace.

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two being above the plants and two on drop pipes, was used to apply the fungicidal mixtures. The applications were made on July 13 and 24, August 1, 9, 18, 29, September 7 and 15, the mean interval being 9.3 days.

Late blight disease was introduced by sprinkling a few plants in each of the border and buffer rows with a water suspension of spores of the race complex 1, 2, 3, 4, 5, 6, 7, 8, 9 in the evening of July 28. A light mist wetted the foliage immediately after the inoculation. Early in the following morning, the foliage being damp, a similar dissemination of spores was made. Both inoculations were successful, lesions being found on August 1.

Because the weather was commonly unfavorable for the fungus, the disease progressed very slowly. The unsprayed check plots were only 20% defoliated on September 7 (Table 1), at which time most of the treated plots were still free of disease. On September 22, when the experiment was terminated by the application of diquat top killer, the check plots showed a mean defoliation of 98% but the means of the treated plots were in the low range of traces to 15%.

Defoliation readings, recorded by means of the British Mycological Society Key (1), were taken at regular intervals and the mean readings for four dates, expressed as percentages, are shown in Table 1.

The plots were harvested and the tubers graded and examined for late blight rot on October 18 and 19. The data are given in Table 2.

Results and discussion

Under the conditions of low disease activity, six spray treatments allowed only trace amounts of late blight to develop. These were Bravo 6F, Dithane M-45, and two mixtures containing both these fungicides, Liro-Matin, and Manzate 200. Mean defoliations allowed by Difolatan 4.8F, Du-Ter, and Polyram were 0.5%, 1.0%, and 2.0%, respectively. The relatively greater defoliations shown in Table 1 for Kocide 101 and the confidential fungicide CGF 2630 suggest that these products would be inadequate under blight epidemic conditions.

Phytotoxic reactions were observed in plots sprayed with Du–Ter and with Kocide 101 after the area was subjected to a storm with very strong winds early in September. The plants in the plots that had been sprayed with either of these fungicides showed a scorching of leaf tips and margins, the extent of which injury made subsequent late blight defoliations difficult to estimate. The same type of injury in plots sprayed with Du–Ter has been reported previously (2).

Literature cited

1. British Mycological Society. 1947. The measurement of potato blight. Brit. Mycol. Soc. Trans. 31:140–141.

2. Callbeck, L. C. 1972. Screening of potato fungicides in 1971. Can. Plant Dis. Surv. 52:30–31.

Table 2. Effects of treatments on yield and rot

Treatment	Total (bu/acre)	Small (bu/acre)	Rot (bu/acre)	NO. 1 (bu/acre)	Rot (%)
Bravo 6F(1 pt)	591.4	45.8	0.0	545.6	0.0
Bravo 6F(0.5 pt) + Dithane M-45(1.0 lb)	597.7	45.3	0.4	552.0	Trace
Bravo 6F(1 pt) + Dithane M-45(1.0 lb)	619.5	44.4	0.0	575.1	0.0
CGF 2630	546.9	43.6	10.3	493.0	1.9
Difolatan 4.8F	582.5	43.3	0.0	539.2	0.0
Dithane M-45	582.8	50.1	1.5	531.2	0.2
Du-Ter	570.9	47.3	0.2	523.4	Trace
Kocide 101(1.0 lb)	538.1	48.6	7.0	482.5	1.3
Kocide 101(2.0 lb)	549.1	46.2	3.3	499.6	0.6
Liro-Matin	548.4	48.8	0.2	499.4	Trace
Manzate 200	591.8	49.7	1.1	541.0	0.2
Polyram	564.3	40.5	1.7	522.0	0.3
Check	521.2	44.7	17.4	459.1	3.3
LSD 0.05	33.1			35.2	
LSD 0.01	44.1			46.9	