SCREENING OF POTATO FUNGICIDES IN 1973'

L.C. Callbeck [2]

Introduction

In Prince Edward Island weather conditions during July 1973 were generally favorable to the potato late bliqht fungus Phytophthora infestans (Mont.) de Bary, and at the end of that month a few cases of field infections were observed in the province. At mid-August the weather became much less conducive to the development and spread of the disease and growers were able to contain the epidemic.

This paper describes the procedures used and presents the results obtained in the 1973 screening of nine fungicidal mixtures for their relative efficacies in controllinq late bliqht disease.

Materials and methods

In the list of fungicides given below, the description of each is arranged in order of trade name or code number, guaranteed active ingredient (except for three products that must be treated confidentially), source, and dosage rate per acre in terms of formulated product.

1. Bravo 7.2F. 7.2 lb/Imp. gal. tetrachloroisophthalonitrile. Diamond Shamrock Canada Ltd., Willowdale, Ontario, Canada. (a) 0.4 pints first three sprays, 0.75 pints remaining four sprays; (b) 0.75 pints at each spray.
2. CGF 2660. Confidential formulation. Ciba-Geigy Canada Ltd., Etohicoke, Ontario, Canada. 1.5 lb.
3. Dithane M-45 80W. 80% zinc coordinated maneb. Rohm and Haas Company of Canada Limited, West Hill, Ontario, Canada. 1.5 lb.
4. DPX 740. Confidential formulation. E. I. DuPont de Nemours and Company (Inc.), Wilmington, Delaware, U. S. A. 6.0 oz.
5. Du-Ter 20 WP. 20% triphenyltin hydroxide. Ciba-Geigy Canada Limited, Etobicoke, Ontario, Canada. 1.5 lb.
6. Liro-Matin 45.5 WP. 34% maneb, 11.5% triphenyltin acetate. Ciba-Geigy Canada Limited, Etobicoke, Ontario, Canada. 1.8 lb.
7. Polyram 80W. Zinc activated polyethylene thiuram disulfide. Niaqara Brand Chemicals (now Agricultural Chemicals Division, FMC of Canada Ltd.), Burlinqton, Ontario, Canada. 1.5 lb.
8. RHC-365. Confidential formulation. Rohm and Haas Company of Canada Limited, West Hill, Ontario, Canada. 48 fl. oz.

Table 1. Percent defoliation causedbylate blight

Treatment	Aug. 23	Aug. 30	Sept. 4	Sept. 13
Bravo 7.2F 0.4 - 0.75 pt	8	18	20	29
Bravo 7.2F 0.75 pt	3	10	12	22
CGF 2660	2	4	5	8
Dithane M-45	1	4	5	9
DPX 740	15	25	28	33
Du-Ter	6	12	16	26
Liro Matin	2	5	8	14
Polyram	3	6	8	16
RHC-365	2	4	5	6
Check	47	63	70	97
LSD 0.05	2.0	3.2	3.2	5.0
LSD 0.01	2.7	4.3	4.3	6.7

The plots were set out on land that had been in potatoes in 1972, manured in the autumn, and given a broadcast application of 10-20-20 fertilizer at the rate of 1,000 lb/acre before planting. Each plot was 4 rows wide by 50 ft lonq and exactly 50 seed pieces of the cultivar Green Mountain were dropped in each row. Single rows of the same cultivar were planted as buffers between plots and along each lateral side of the block. The 10 treatments were randomized and replicated in five consecutive ranges, separated from one another by 20-ft driveways. All data were taken from the two center rows of the plots.

The entire experiment was sprayed with endosulfan when it was necessary to control insect pests.

The fungicides were applied on July 16, 26; August 7, 15, 23, 30; and September 5, the mean interval being 8.5 days.

'Contribution No. 296, Research Station, Research Branch, Canada Department of Agriculture, Charlottetown, Prince Edward Island.

[2] Plant Pathologist.

Table 2. Effects of treatments on yield and rot

Treatment	Total (bu/acre)	Rot (bu/acre)	No. 1 (bu/acre)
Bravo 7.2F 0.4 - 0.75 pt	432.5	0.7	298.3
Bravo 7.2F 0.75 pt	454.7	0.4	323.6
CGF 2660	466.0	1.8	335.7
Dithane M-45	470.4	0.7	335.5
DPX 740	398.0	2.9	257.8
Du-Ter	460.0	2.4	339.2
Liro-Matin	477.0	0.9	344.5
Polyram	452.7	0.4	321.4
RHC-365	478.0	0.4	360.8
Check	341.9	0.9	207.7
LSD 0.05	37.7		43.6
LSD 0.01	50.6		58.5

The unsprayed buffer and border rows were inoculated by sprinkling a few plants in each of them with a water suspension of late blight spores during a light mist in the late afternooon of July 19. A second inoculation was performed when the dew was fallinq in the evening of July 26. The first lesions in these rows were observed on July 24.

After the disease had become well established in the untreated check plots and had bequn to appear in the treated plots, defoliation estimates, based on the British Mycological Society's late blight key, were made at regular intervals. The estimates for four dates are shown in Table 1.

The test was terminated by spraying the plants with a top killer (diquat) on September 14, which was 105 days after planting. The plots were harvested on October 2 and 3. Yield data are given in Table 2.

Results and discussion

Under the conditions of late blight activity that existed in the 1973 season, the new test products of RHC-365 and CGF 2660 and the standard product Dithane M-45 gave the best control of the disease on the foliaqe. Another new entrant, DPX 740, gave poor control and, consequently, the plots sprayed with it gave the lowest yield among the nine fungicidal mixtures.

Du-Ter 20WP did not produce any visible deleterious effects on the foliage of potato plants in 1973. In some previous years in which the test sample contained 50 percent triphenyltin hydroxide, phytotoxicity was expressed as bronze leaf spots and as a brittleness of the leaves, the latter condition resulting in the detachment of leaves during high winds and heavy rains. These symptoms were likely to occur even when the dosage rate had been set as low as 10 oz per acre per application.

Bravo 7.2 F gave only mediocre control at the dosage rates at which it was tested in 1973. In 1971 and 1972 (1, 2) the dosages per acre per application of the active ingredient had been 0.9375 lb and 0.75 lb, respectively. In these two years Bravo flowable had been a leadinq fungicide in the screening tests. In 1973 the 0.4 and 0.75 pints of Bravo 7.2 F provided active ingredient dosages of 0.36 lb and 0.675 lb, respectively. In the treatment in which it was used at 0.4 pints per acre for the first three applications and at 0.75 pints per acre for the remaining four applications it ranked eighth among the nine treatments in controlling late blight in the foliage. The product ranked sixth when it was used at 0.75 pints per acre for all seven applications.

Conclusions

Previous experience and current results suggest that further testing of Du-Ter is required to determine if this fungicide is likely to be phytotoxic under certain meteorological conditions or when applied at more than the recommended rate. Similarly, it is suggested that further studies on dosage rates for Bravo 7.2 F should be made.

Literature cited

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

2. Callbeck, L. C. 1972. Screening of potato fungicides in 1972. Can. Plant Dis. Surv. 52:151-152.