EXPERIMENTAL TIMING OF FUNGICIDE APPLICATIONS ACCORDING TO TWO METHODS OF FORECASTING LATE BLIGHT OF POTATO

Thomas Simard and Jacques Simard[1]

Abstract

The results obtained show that late blight was as effectively controlled by 3 sprays applied according to Wallin's method as by 6 sprays applied according to the usual practice. In plots sprayed twice according to Hyre's criteria, the yield of marketable sound potatoes did not differ from that of the unsprayed plots. These results suggest that Wallin's method would be more accurate for a proper timing of fungicide applications on potatoes grown on muck soil.

Introduction

In 1961, an experiment was undertaken in order to study the possibility of using two different methods of forecasting late blight of potato for a proper timing of fungicide applications and, possibly, a more economical control of the disease. The first year's results showed the usefulness of forecasting methods in spray timing (4) and the advantage of continuing the study.

Methods and Procedures

The experiment was carried out on muck soil at the Canada Agriculture Substation at Ste-Clotilde, south of Montreal. It included 16 plots of the late susceptible variety Green Mountain, randomized in a Latin Square. The plots, consisting of 8 rows, 18 inches apart, were 50 feet long and were bordered by 2 unsprayed rows.

The two methods of late blight forecasting used in this experiment were those developed by Hyre and Wallin (2). The recording of the data for the two methods started on potato emergence. However, possible "favourable periods" occurring before the last week of June were to be ignored for the forecasting of the first appearance of blight. Previous results suggested that such early favourable periods were more valid for forecasting blight on summer than on late varieties (4, 2). The treatments were as follows:

A- Spraying according to Hyre's method of forecasting.
B- Spraying according to Wallin's method of forecasting.
C- Spraying according to normal farm practice.
D- Unsprayed.

---

[1]Plant pathologists, Information and Research Service, Quebec Department of Agriculture and Colonization, Montreal, Que.

The fungicide used was maneb 50-W, at the rate of 2 lb per acre, The sprays were applied with a high power potato sprayer, except for the treatment on August 8 which, due to soil conditions, had to be made with a hand spray gun, The tops were rotobeaten and then chemically killed on September 19. The tubers were harvested on October 4, graded, and the rotten tubers sorted on October 10. Yield records and other data were taken in the 4 center rows of each plot,

A summary of blight forecasts and development and fungicide applications is given in Figure 1.

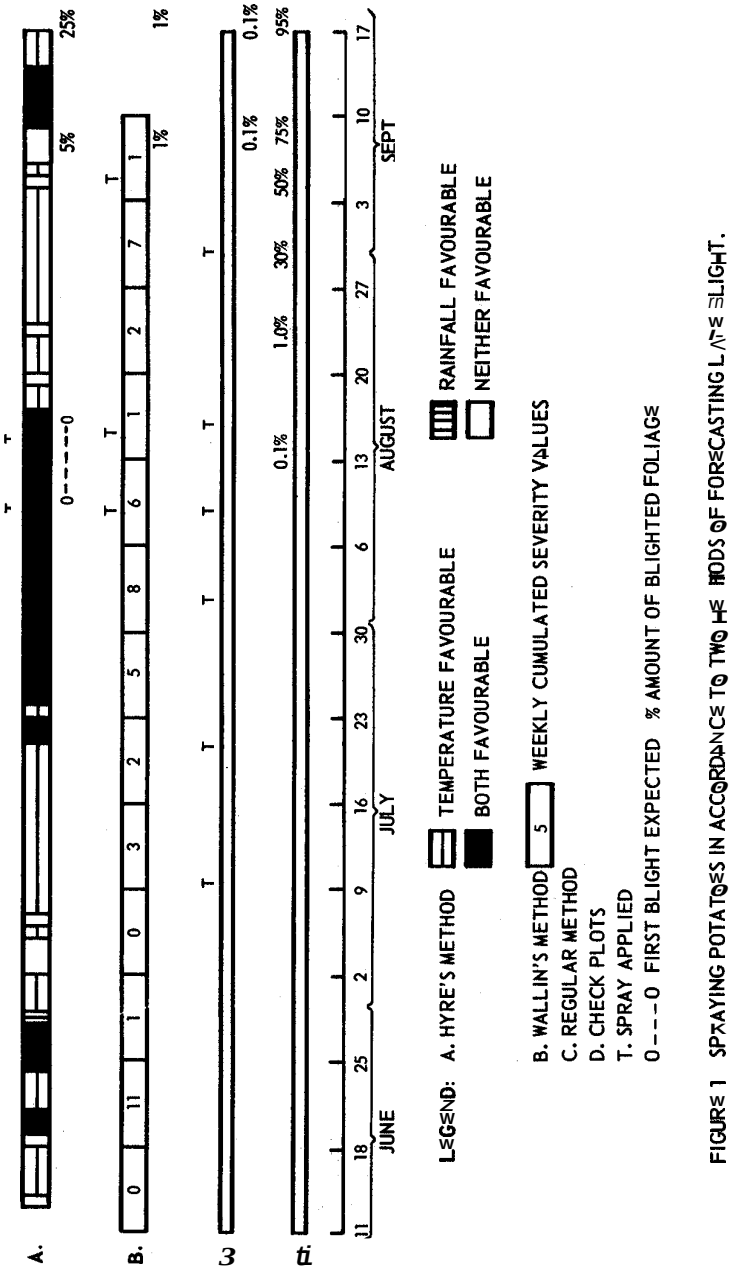

FIGURE 1 SPRAYING POTATOES IN ACCORDANCE TO TWO METHODS OF FORECASTING LATE BLIGHT.

Results

Figure 1 shows that 2 treatments were applied according to Hyre's method, 3 according to that of Wallin and 6 according to normal farm practice, It also shows that the sprays applied before August 8 were of no use and that the two forecasting methods were in close agreement in predicting the time of the blight outbreak and the timing of the first two sprays, However, a further infection period was detected only by Wallin's method, and a third spray was accordingly made on September 4 in plot B, On September 17, there was about 25% of foliage blight in plot A, only a trace in plots B and C, and 95% in check plots,

These results show that Wallin's method was more accurate than Hyre's method for the correct timing of fungicide applications. In the muck soil district, low rainfall and high relative humidity frequently prevail late in the season, Under those conditions in 1962, Figure 1 shows that Wallin's method detected an infection period at the end of August which was overlooked by Hyre's method, This is in agreement with the results obtained this year in the comparative study of the two forecasting methods at several stations (3).

The total and marketable yields as well as the amount of blighted tubers are shown in Table I.

Table 1. Total and marketable yields in pounds and amount of blighted tubers at harvest

Treatments	Yield in pounds Mean of 4 plots		Blighted tubers	
	Total	Marketable	Mean of 4 plots	Percentage
A- Hyre's method (2 sprays)	448.1	389.6	58.5	13.0
B- Wallin's method (3 sprays)	446.3	424.2	22.1	4.9
C- Farm practice (6 sprays)	447.9	426.9	21.0	4.7
D- Check	397.9	371.5	26.4	6.6
L.S.D. (5%)	35. 7	29.7		

As shown in Table 1, there was no significant difference in total yield between plots which received respectively 2, 3 and 6 sprays. However, if we consider the yield of sound, marketable potatoes, there was no difference between plots which were sprayed 3 and 6 times, but the yield of plots which received only 2 sprays did not differ from that of the unsprayed plots.

These results suggest that the decrease in yield of marketable potatoes in plot A was due to the high number of tubers which became infected late in the season. The apparently lower percentage of tuber rot in the unsprayed plots was probably due to the fact that the tubers infected earlier in the season completely decayed in the soil and were not harvested,

The high percentage of tuber rot observed this year probably resulted from the high level of soil moisture which prevailed from the middle of July until harvest. Rainfall was 7.65 inches from July 16 to August 15, and 1.71 inches in the first half of September. The well known association of tuber rot with high soil moisture was recently confirmed by Zan (5).

Figure 2 shows that the progress curve of foliage blight in 1962 was drawn over a rather long period. As reported by Cox and Large (1), tuber rot is more threatening with this type of curve than with a steeper one such as occurred in 1961. The blight progress curve in 1962 also shows that the 75% stage of foliage blight occurred late, that is, about 12 days before the tops were killed. This also indicates that tuber rot rather than premature defoliation was responsible for the decreased yield (about 2 tons per acre) in the check plots.

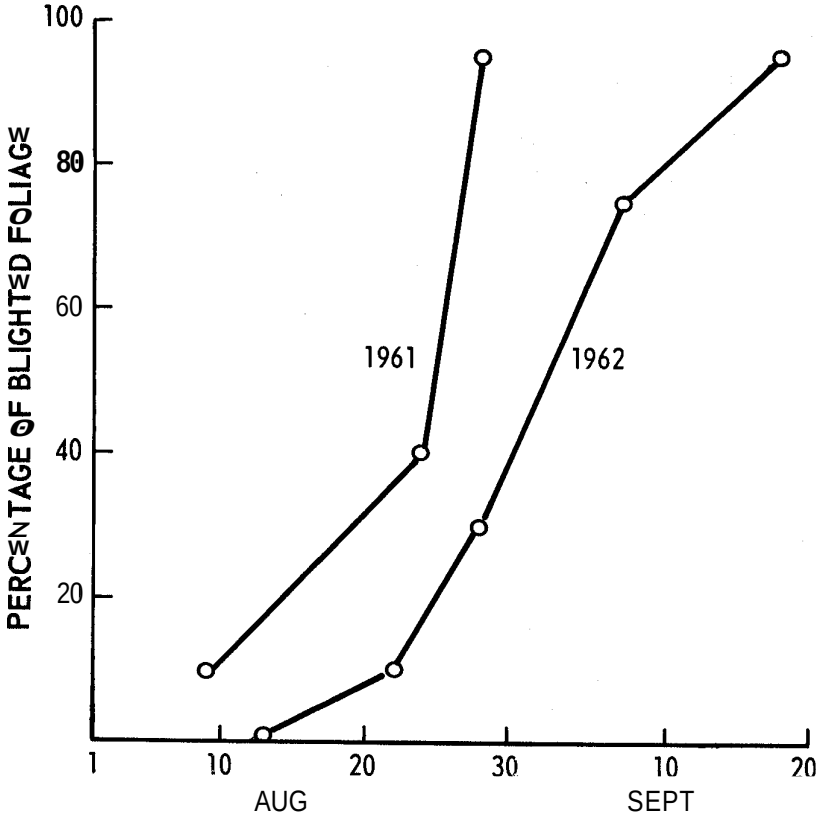

FIGURE 2. PROGRESS CURVE OF POTATO BLIGHT IN 1961 AND 1962

Acknowledgements

We wish to thank for their cooperation the head and personnel of the Canada Agriculture Substation, Ste-Clotilde, the Quebec Information and Research Service and Muck Crops Protection Station, Ste-Clotilde,

Literature cited

1. COX, A.E. and E.C. LARGE, 1960, Potato blight epidemics throughout the world, U.S.D.A. Agr, Handbook 174, p. 30,
2, SIMARD, Thomas, 1961, Forecasting late blight in the Montreal area in 1961. Can. Plant Dis. Survey 41: 310-313.
3, SIMARD, Thomas. 1962. Comparing two methods of forecasting late blight of potato in the Montreal. area in 1962. Can, Plant Dis, Survey 42 (In press),
4, SIMARD, Thomas and Jacques SIMARD. 1961. Spraying potatoes according to two methods of forecasting late blight, Can. Plant Dis, Survey 41: 314-316,
5, ZAN, Kaung, 1962, Activity of Phytophora infestans in soil in relation to tuber infection. Trans, Mycol, Soc. 45: 205-221.

INFORMATION AND RESEARCH SERVICE,
QUEBEC DEPARTMENT OF AGRICULTURE,
306 CRAIG ST., E., MONTREAL, Que.