FORECASTING LATE BLIGHT OF POTATO IN THE MONTREAL AREA IN 1960

Thomas Simard[1]

Abstract

According to the results obtained at five different localities in the Montreal district, Hyre's rainfall-temperature method of forecasting late blight of potato reflected quite well the situation during the 1960 growing season. Blight was not forecast for Ste. Clotilde and it was not reported from this locality nor was it found in unsprayed potato plots. Blight was reported at Lennoxville and Duvernay, the only localities where it was likely to occur according to the method of forecasting used. At Ste. Clotilde, Hyre's method of forecasting was supplemented by the 90% relative humidity-temperature method developed by Wallin.

Introduction

Late blight of potato is not endemic in the Montreal region. Its occurrence and severity vary from year to year, as does the date on which it is first reported. It appears as an epidemic in approximately one year out of five.

The proper timing of fungicide applications is difficult under these conditions. Better and more economical control could be obtained if the annual occurrence of late blight was correctly forecast and the information relayed to the growers through a Spray Warning Service.

With this in mind, a study of methods of forecasting late blight was initiated in 1960. This paper is a preliminary report on this work.

Methods and Procedure

The principal method employed in this study was the moving-graph or rainfall-temperature method devised by Hyre (1). For comparison, the 90% relative humidity-temperature method developed by Wallin (2) was also used at one station. These methods can be briefly described as follows(3):

"By the rainfall-temperature method the initial occurrence of blight is forecast after 10 consecutive days when both rainfall and temperature are favorable, and the current weather forecast is for continued blight-favorable weather, Rainfall is considered favorable when the 10-day total is 1.20 inches or more. Temperature is considered favorable when the 5-day average is less than 78°F. Any day is considered unfavorable, however, if the minimum temperature is less than 45°F. An unfavorable day due to low temperature is not allowed to interrupt the count of consecutive favorable days. That day is simply omitted from the count. The disease is expected 1 or 2 weeks after it is forecast. Once blight is established, 10 favorable days are no longer required for it to spread, A degree of flexibility is desirable in applying these criteria."

---

[1] Plant Pathologist, Information & Research Service, Plant Protection Branch, Quebec Department of Agriculture, Montreal, P.Q.

The relative humidity-temperature method used was developed by Dr. Jack Wallin. Hygrothermographs are located 12 to 15 inches above ground in shelters placed near the field. Blight severity values are calculated as follows:

"The relation of the hours duration of given average temperature coincident with relative humidities above 90% to the estimated severity of secondary infection of Phytophthora infestans."

Average Temp. range, °F.	Hours that produce indicated infection severity[a]			
	1	2	3	4
54 - 59	16 - 18	19 - 21	22 - 24	25 +
60 - 80	13 - 15	16 - 18	19 - 21	22 +
	10 - 12	13 - 15	16 - 18	19 +

[a] 1=0 to trace secondary infection; 2=trace to slight; 3=slight to moderate; 4=moderate to heavy.

A tentative interpretation of severity values is as follows: If the hygrothermograph is activated at the time of emergence of the potatoes, late blight symptoms are not expected before a cumulated severity value of about 20 is reached. After this "zero" time a severity value 1 per week keeps the fungus alive, 3 or more during a 7-day period calls for fungicide treatment, and the pathogen is considered dead if there are no severity values for 3 or more consecutive weeks".

A part of this study was conducted at the Ste. Clotilde Sub-Station for organic soils in co-operation with Dr. Russell A. Hyre. The required meteorological data and hygrothermograph charts from Ste. Clotilde were forwarded weekly to Dr. Hyre who made the forecasts. These were included in the cooperative study made by Dr. Hyre at several localities of northeastern United States and the province of New Brunswick.

In order to investigate the effect of location on the occurrence of late blight, one more station south of Montreal, at Lennoxville, and three north of Montreal, at Duvernay, St. Thomas and Lavaltrie, were observed in addition to Ste. Clotilde. Forecasts for these stations were made by the author.

Finally, potato plots to be sprayed according to the forecasts were established in the Ste. Clotilde district.

Results

At Ste. Clotilde, as estimated by the rainfall-temperature criteria, there were only 8 consecutive faborable days in the second half of June, the remainder of the season being unusually dry. The cumulative severity values as determined by Wallin's method were only 10 for the season. By following either of the two methods, no late blight was forecast and no blight was found. Neither was any blight detected in the potato plots left unsprayed all season.

At the other stations, only the rainfall-temperature method was used. According to this method, the first occurrence of late blight is predicted 7 to 14 days after 10 consecutive favorable days. Positive forecasts were made for the four stations, but blight was reported only from two.

If we keep in mind that first blight infections are very hard to detect and, also, that continued favorable weather is necessary for blight to establish itself, spread, and be easily detected, the above results reflect quite well the situation prevailing in 1960. At Lennoxville, the first infection was forecast to occur at the beginning of July. Its spread was favored by a spell of 19 nearly consecutive unfavorable days, after which blight was reported on August 15. Unfavorable weather prevented further spread during August.

The first blight infection was predicted to occur at Duvernay at the beginning of August. Three weeks of dry weather at that time slowed, but did not apparently prevent, its development, since the disease was found in the district during September, following a period of several favorable days during the latter part of August,

At both St. Thomas and Lavaltrie, localities only a few miles apart, the first appearance of blight was forecast for the beginning of July. However, it seems that its establishment was prevented there by the unusually dry summer of 1960.

Acknowledgements

I wish to thank Dr. Russell A. Hyre, Plant Pathologist, U.S. Department of Agriculture, University of Delaware, Newark, Del., for his kind collaboration; also the personnel of the following organizations: the Sub-Station 'for organic soil at Ste. Clotilde, particularly Mr. Jacques Jasmin, Director; the-Experimental Farms at Lennoxville and L'Assomption (Lavaltrie); the Provincial Plant Protection Stations at Duvernay and St. Thomas.

Literature Cited

1. HYRE, R.A. 1954. Progress in forecasting late blight of potato and tomato. Plant Dis. Reptr. 38: 245-253.
2. WALLIN, Jack. 1957. U.S. Dept. Agr. Plant Disease Situation Report 28.
3. HYRE, Russell A. 1960. U.S. Dept. Agr. Plant Disease Situation Report 13.

PLANT PROTECTION BRANCH,
QUEBEC DEPARTMENT OF AGRICULTURE,
MONTREAL, P.QUE.