VALIDATION AND ADAPTATION OF THE "BLITECAST" MODEL FOR PREDICTION OF POTATO LATE BLIGHT DEVELOPMENT IN OREGON

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Introduction

Prior to the 1995 growing season, potato late blight (Phytophthora infestans) was not a management concern in the Treasure Valley. During the 1995 season, late blight spread rapidly throughout the valley from initial outbreaks in low lying humid areas. Growers needed to make three to six fungicide applications in 1995. Lack of adequate late blight control in 1995 resulted in a loss of yield and a loss of some of the crop during storage. The ability to predict when the disease is most likely to commence and when conditions are conducive to rapid spread would aid in decisions of necessity and timing of fungicide applications. Late blight development predictions could thus save growers money and could improve the efficiency of control measures. Accurate late blight predictions are now needed for areas where the disease has not been a problem in the past.

We are applying Blitecast to regions with hotter and/or drier summer weather patterns than Wisconsin and Pennsylvania. Some additional factors may be needed to adapt the model to PNW conditions.

Dr. Dennis Johnson of Washington State University and Dr. Phil Hamm of OSU are building a different potato late blight prediction model specific for the Columbia Basin.

Objectives

1. Validate the accuracy of the computer model "Blitecast" in predicting the development of potato late blight in the Pacific Northwest.

2. Automate the "Blitecast" calculations from additional weather stations in growers' fields and additional AgriMet stations.

3. Adapt the "Blitecast" model to the relatively arid areas not originally envisioned in the development of the model where potatoes are now suffering economic losses from late blight.

Procedures

"Blitecast" is a program module that is part of the "Wisdom" software for potato crop and pest management from the University of Wisconsin, Madison. Weather data from eight weather stations (four AgriMet stations, and four remote stations in growers' fields) were collected at the Malheur Experiment Station and entered into the "Blitecast" computer model to make daily predictions of late blight development. The model uses the duration of high relative humidity along with the corresponding range of temperatures to calculate the extent to which the daily environment has been favorable for disease development and sporulation. The Blitecast program calls these accumulated favorable environmental conditions for late blight "severity values". When "severity values" reach 18, late blight is predicted and fungicide control measures are indicated. The Blitecast model also accumulates the risk of early blight as "P-Days". These predictions were compared to the actual onset and development of the disease in fields located in close proximity to each of the weather stations.

The predictions and control recommendations from the model were updated daily and made available as a recorded message on a telephone line. Access to the predictions included calls to a 1-(800) number, information distribution by regular FAX service, and access to the Malheur Experiment Station home page, http://ww.primenet.com/~mesosu/ where late blight risks and treatment information were posted regularly.

Results

In 1996 we successfully collected data from four weather stations in growers' fields and four AgriMet weather stations. Examples of the accumulated late blight "severity values" are presented in the graphs that follow (Figures 1 and 2). The weather data was collected from the AgriMet weather stations at Glenn's Ferry (Idaho), Dry Lake at Nampa (Idaho), the Malheur Experiment Station at Ontario (Oregon), and the Parma Experiment Station (Idaho) in 1996. None of the weather data from the AgriMet stations predicted the occurrence of late blight, even though the critical level of relative humidity for calculating severity values was reduced from 90 to 80 percent (Figure 1).

The weather stations in the potato canopies developed a range of risk estimates (Figure 2). The late blight "severity value" threshold of 18 was reached on July 2 at Morton Island, Ontario, Oregon and later in the season at the other locations. Clearly late blight could have developed fairly early at Morton Island, Ontario if the disease organism had been present there and protective fungicide measures had not been exercised. Once late blight sporulates at any susceptible location, the risk would be spread throughout the region.

Late blight was first detected locally at Parma, Idaho near the Idaho-Oregon border on August 21, 1996. By the time late blight was detected, many fields had been harvested. Many more fields were nearing harvest.

The 1996 data provided growers with regular predictions of the risk of late blight using "Blitecast". In 1996, growers accessed predictions via approximately 3,980 phone calls to the 1-(800) 790-7264 number, information distribution by regular FAX service, and 2,140 hits on the Malheur Experiment Station home page, http://ww.primenet.com/~mesosu/ where late blight risks and treatment information was posted.

Access to late blight predictions and low cost recommendations in 1996 allowed growers in the Treasure Valley of Oregon and Idaho to reduce fungicide costs and control late blight.

Future Plans

In 1997 we will expand the late blight prediction service to more of Oregon and adapt the "Blitecast" model for Oregon environments.

Adaptation of "Blitecast" to Oregon conditions will allow accurate prediction of potato late blight outbreaks. The late blight forecasts help assure high potato yields of excellent quality tubers with minimum fungicide applications. Yields are assured because the disease is anticipated and controlled. Fungicide applications are decreased because only sprays that have benefit controlling the disease are recommended.

Figure 1. Accumulated risk of late blight "severity values" at four AgriMet stations during 1996. Data graphed is accumulated severity units from potato emergence on May 6 through August 28 using 80 percent relative humidity at Glenn's Ferry, Idaho, Nampa, Idaho, the Malheur Experiment Station at Ontario, Oregon, and Parma, Idaho. The late blight threshold of 18 "severity values" was not reached.

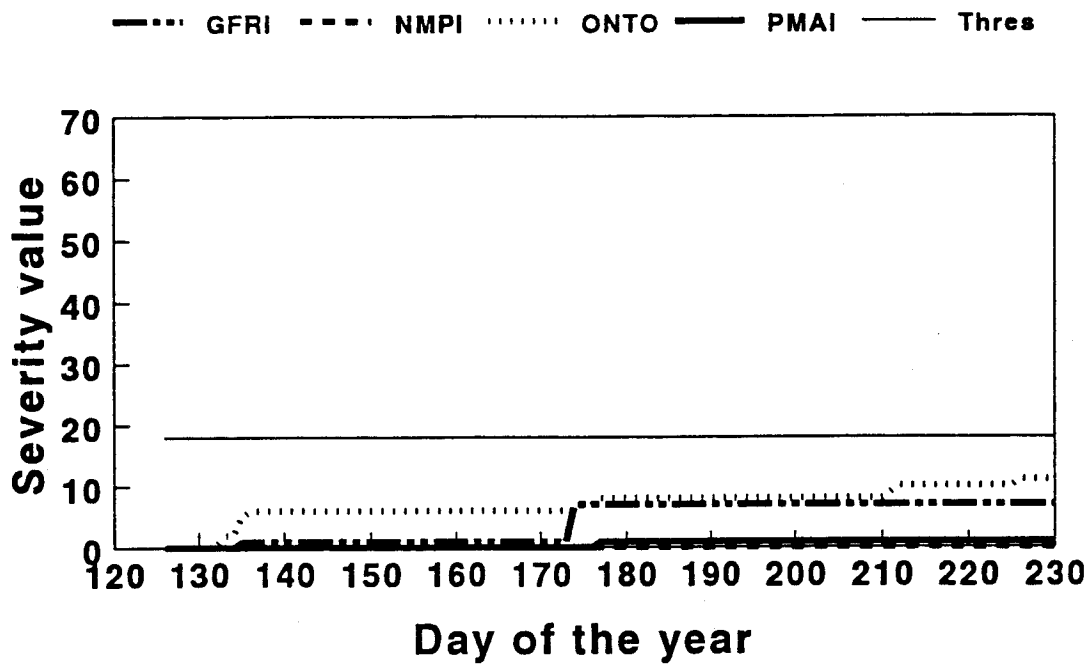

Figure 2. Accumulated risk of late blight "severity values" at four weather stations in the potato canopies during 1996. Data graphed is accumulated severity units from potato emergence on May 6 through August 28 using 90 percent relative humidity at Arena Valley, Idaho, Dry Lake at Nampa, Idaho, Morton Island near Ontario, Oregon, and Owyhee Junction near Adrian, Oregon. The late blight threshold of 18 "severity values" was exceeded starting July 2 at Morton Island.