**Late blight prediction in Washington State**

By David Linnard Wheeler

Late blight forecasts in Washington state were motivated by several factors. First was the occurrence of late blight outbreaks. The first reported outbreak of late blight in Washington occurred in 1947 (Anonymous, 1947). Thereafter epidemics occurred in the late 1970’s and the early 1980’s (Johnson *et al.* 1996). It was not until 1990 that yearly epidemics were consistently observed year after year (Johnson *et al.* 1996). In addition to the outbreaks, which appeared to increase in frequency and magnitude over time, weather data were available to use as inputs for forecasting models. These weather data were collected and informally related to late blight by Easton (1982). To build forecasting models, however, information on late blight epidemics had to be formally related to weather data. This was done by Dr. Dennis Johnson and colleagues from Washington State University in the early 1990s (Johnson *et al.* 1996).

Anticipating the need for late blight forecasts, Johnson and colleagues developed the first forecasts with weather data collected from the WSU’s Irrigated Research and Extension Center in Prosser, Washington (Johnson *et al.* 1996). These first models were described in Johnson et al. (1996). They predicted the annual occurrence of late blight in the Columbia Basin from 26 years of in season rainfall data and late blight occurrence data from the previous year. In 1998, these models were expanded to include rainfall data from Hanford and Othello, WA. as well as from Hermiston, OR (Johnson *et al.* 1998). Finally in 2009, the predictive performance of these models were enhanced by incorporating information from three new variables: solar irradiance, the number of cloudy days without rain, and the number of days since the first occurrence of late blight (Johnson et al. 2009).

From these forecasts, probabilities that late blight will occur within a given year are generated. Management recommendations are then produced as the product of five risk factors. In short, the following risk factors were used to calculate a risk index: (i) crop phenology (ii), the presence of *P. infestans* in nearby fields, (iii) the probability of late blight occurrence, (iv) the calendar date, and (v) the number of rainy days over the next 7 days. This index, in turn, guides the management recommendations. Finally, these recommendations are issued weekly by Dr. Carrie Wohleb via WSU’s Potato Pest Alerts.

Since Dr. Johnson retired in 2018, colleagues at WSU, including Rachel Bomberger and Drs. Gary Grove, Carrie Wohleb, and David Linnard Wheeler, have carried the torch. For both 2019 and 2020, forecasts and recommendations were generated by the processes described above. The same processes will be used for 2021. Thereafter, the authors plan to develop a comprehensive forecasting system for the PNW.

**Literature Cited:**

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