“Personalized” late blight management.

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During the past several years, we have been developing and evaluating a Decision Support System (DSS) to aid late blight management (Figure 1). It is highly personalized because the data are specific to a given farm. The system provides information that is useful during the season. The components include:

- observed weather (from a weather station on-farm or nearby)
- very local forecast weather (from the national weather service on a 4km grid)
- late blight disease forecast using the observed and forecast weather
- predictions of the effect of previously applied fungicide
- predictions of the effect of future fungicide applications
- knowledge of the levels of resistance in different potato varieties
- alerts (and predictions of risk) concerning local reports of late blight
- predictions (using a simulation model) of future late blight development

The outputs of the system are meant to aid decisions made by the grower or the consultant. The system is not intended to replace grower or consultant decisions. The front page of the system is pictured in Figure 1.

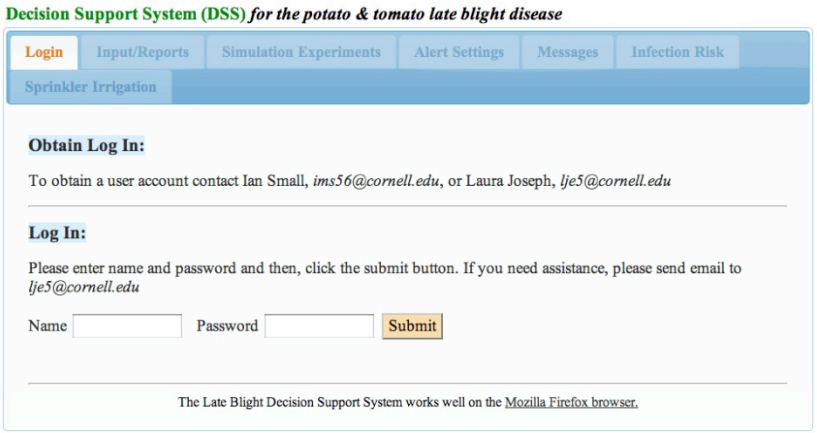

Figure 1. Front page of the DSS

The observed weather and weather forecast are presented in a series of graphs. Observed weather is presented in green, and forecast weather is presented in red (Figure 2).

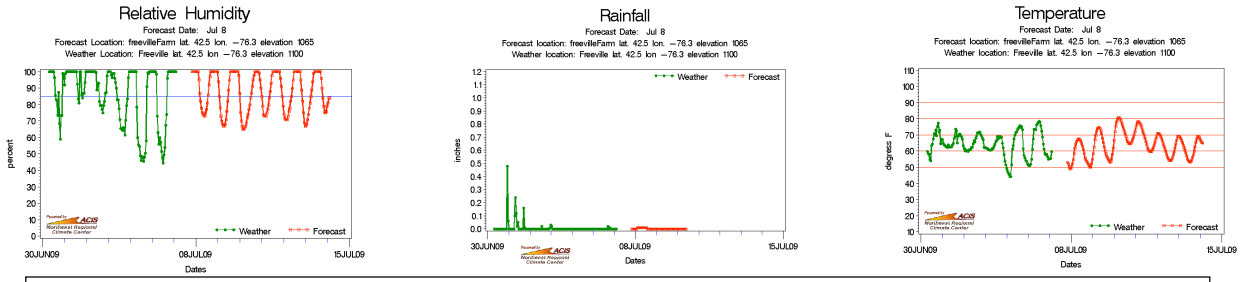

Figure 2. Weather data available in the DSS.

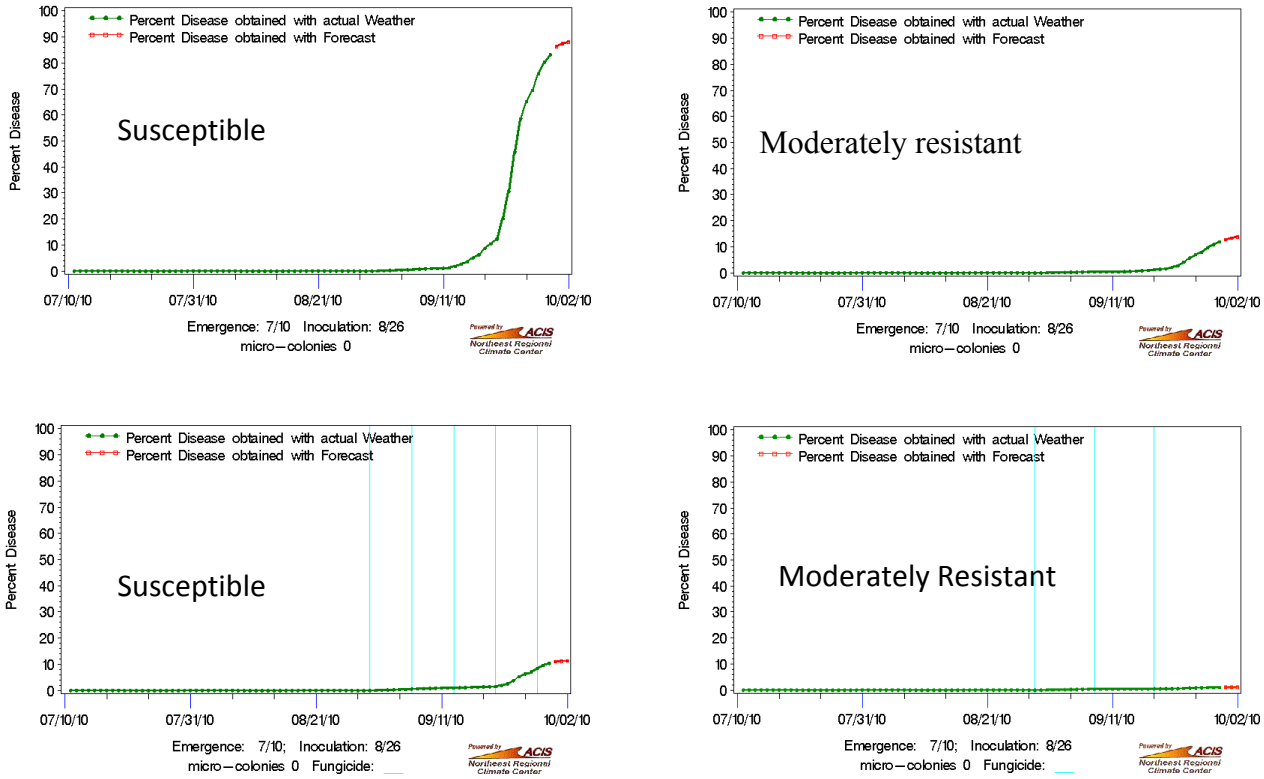

Figure 3. The effect of host

Evaluation of the DSS. We used Simcast (one of the late blight disease forecasts in the DSS) to guide fungicide applications in research plots. This experiment involved Katahdin as the susceptible variety and Kennebec as the moderately resistant variety. Late blight was known to be present about 0.5 miles away. Chlorothalonil was the fungicide. Treatments consisted of i) weekly applications, ii) applications according to the DSS, or iii) no fungicide. At the end of the season there was essentially no late blight in any plot receiving fungicide, but different treatments had received different amounts of fungicide. Plots sprayed weekly had received 8 applications. Katahdin plots sprayed according to the DSS had received 6 applications, and Kennebec plots sprayed according to the DSS had received 5 applications. Late blight was certainly a threat because by the end of the season the untreated Kathahdin plots were severely affected by late blight (60% defoliated), and the untreated Kennebec plots were about 10% defoliated. Use of Simcast in the DSS enabled the savings of three fungicide applications for Kennebec and two fungicide applications for Katahdin. These savings were made possible by taking into account the effect of weather and host resistance.

Future Directions. There are a variety of improvements planned for the next version of the DSS. These include: i) incorporating the effects of diverse fungicides of diverse modes of action and diverse efficacies ii) providing various types of alerts via email or text messages (the alerts include recommendations from a disease forecast, information about late blight detections in your region); iii) modifying disease forecasts to include the diverse effects of diverse pathogen genotypes.