

Reduced Fungicide Use for Hop Downy Mildew Management

The overall goal of this proposed research and extension project is to improve hop grower profitability and sustainability with reduced-risk pest management tactics that will protect hop plants against downy mildew and conserve environmental quality. Various disease forecast systems for hop downy mildew were tested in Oregon. Two growing degree-day models developed in Washington State by Johnson (1991) were evaluated in Oregon fields for prediction of the first emergence of hop shoots systemically infected with the hop downy mildew pathogen (i.e., primary spikes). The growing degree day model based on air temperature predicted the appearance of primary spikes within 1 to 3 days of actual emergence during 2005 in an experimental site of cv. 'Nugget' and two commercial yards of cv. 'Glacier' in Oregon. However, during 2006 spike emergence occurred more than a week earlier than predicted.

A downy mildew forecast model developed in England predicts infection events in response to rainfall, hours of high relative humidity, and temperature. Hop growers in England following this model often eliminated one fungicide application per season as compared to calendar-based applications, and disease control was improved significantly. This forecasting model was validated in experimental plots of 'Nugget' and treatments were applied preventatively (grower standard) or timed according to the infection risk forecast. Fungicide applications applied according to the downy mildew risk index provided disease suppression similar to that of the standard grower spray program, but with three fewer applications during 2005 and four fewer applications than the grower standard in 2006. Potted hop plants were also used to evaluate infection events and weather parameters. In total, 34 sets of potted plants were placed for 24 h periods from mid-May to mid-September in an experimental hop field with natural infections. Concentration of downy mildew spores in the air was measured with an air sampler and weather variables were monitored. Preliminary analysis of the 2005 data suggests that of the weather variables investigated, duration of morning leaf wetness was the most accurate predictor of major infection events.