Expression of Interest: Botrytis Decision Support Model

Scenario
Cap fall has finished and your protective sprays for botrytis and mildews have been applied. Would you like to know if you are going to be in for a ‘bad year’ for botrytis? If you knew this in advance, then what would you do to prevent significant losses? Read on…..

Predicting a ‘bad year’ for botrytis
The Botrytis Decision Support Model (BDSM) has two component models to assess the risk of a botrytis outbreak.

The early-season model uses weather data and vineyard management actions against botrytis (e.g., fungicides and leaf removal) between flowering and veraison to assess the risk of major botrytis damage leading up to harvest. The model accepts inputs of actual dates for management actions and also for possible future actions anytime between flowering and veraison and it shows the effects these would have on botrytis risk.

The late-season weather-based model is used when the first sign of botrytis bunch rot appears in a grape block (usually after veraison). Botrytis severity is measured according to an assessment protocol and the severity readings and dates are entered into the model, which provides a graph (Figure 1) of how future botrytis severity will increase (or not). Grape sugar development (°Brix) is also monitored and a separate model predicts the date that a target °Brix for the grape block will be reached. This allows botrytis severity at harvest to be predicted and shows it allows the effect that harvesting at different dates would have on botrytis severity to be seen.

Figure 1. Late-season output showing three disease observations, three °Brix observations as well and weather data up to the date of the second observation. All observations of actual disease in the vineyard are also shown for comparison. Data courtesy Dr Rob Beresford, Plant & Food Research, New Zealand.

What will the Botrytis Decision Support Model (BDSM) do for you?
- A rating of ‘high’ botrytis risk after flowering will aid decisions about the extent of mid to late season botrytis management.
  - Decisions might include continuing with a full-season fungicide program, leaf removal (if appropriate) or other control measures.
- The late-season prediction of botrytis and °Brix development will aid decisions about harvest date
• Retrospective analysis of model outputs will aid identification of the key factors contributing to botrytis risk. What can we do better next time? Do we really need to keep applying a full fungicide program at a consistently ‘low risk’ site?
• The model allows collection of standardised data to make comparisons from one site to another. How well are you managing botrytis in relation to others in the region?

How well developed is the BDSM?
The BDSM is currently a prototype model that operates via an (Excel) spreadsheet. This prototype needs to be developed into web-based software that will access a weather database. The ideal scenario is for a service provider to maintain a network of suitably located weather stations that dumps weather data to a central location that can be accessed by web-based software.

What equipment and data are needed to run and test the prototype BDSM?
1. Specific instructions for setting up a calibrated, standardised and well-maintained weather station that records temperature, rainfall and the duration of surface wetness (leaf wetness sensor). The weather station should be located on a vineyard headland away from buildings and trees and at a site that is representative of the weather in the vineyard block being assessed.
2. The following vine phenological stages need to be recorded: 5% cap fall (between E-L 19 and 20), pre-bunch closure (between E-L 31 and 32), veraison (E-L 34) and the expected harvest date (when it is known).
3. A rating of botrytis severity last season: minor (< 3% severity) or major (≥ 3% severity)
4. A rating of current crop load: low, medium (normal for this site), high
5. A rating of current canopy vigour: low, medium (normal for this site), high
6. The dates of all fungicide applications for botrytis control
7. The date/s of leaf removal (plucking), if any, to achieve about 70% fruit exposure.
8. Assessment of berry sugar levels (°Brix) at 10-14 day intervals from just before veraison to harvest.
9. Assessment of botrytis severity in the block when symptoms first appear, and then coinciding with the Brix assessments at, 10-14 day intervals.
10. A computer to access the weather data and run Excel software.

Who owns the BDSM?
The New Zealand Institute of Plant and Food Research Limited (P&FR) own the model algorithms, which have been calibrated using data from vineyards in southern Tasmania and the Yarra Valley of Victoria (GWRDC project UT0601). Dr Kathy Evans, Tasmanian Institute of Agricultural Research (TIAR) managed the Australian contribution to model development and is the key Australian contact for facilitating further development of the BDSM in consultation with P&FR.

What needs to happen in order for the BDSM to be used by growers?
• Establishment of suitable ‘on site’ weather stations, or preferably, a regional network of weather stations that is managed by a service provider
  o A separate project may be required to ensure appropriate weather-station infrastructure is identified, established (at the right sites) and ‘ground truthed’.
• Generate data for the model at sites that were not used for developing the model
  o use new data to check the accuracy of the model
  o obtain feedback from users about the user interface and practical application
  o fine tune botrytis assessment methods for late-season botrytis prediction
• Develop web-based software with a user-interface tailored for use in Australian vineyards.
  o P&FR is planning on developing web-based software for NZ growers, so some modification will be needed to make it relevant to Australian growers.
How can we make this happen?
Apart from the work that is continuing in New Zealand, there is currently no project to bring the BDSM to Australian growers. We believe it will be up to individual grape growing regions, or even individual wine or service companies, to take the prototype (Excel spreadsheet) model and develop it for use in their own regions or vineyards. Demonstration that the model can be implemented in one region will provide impetus for scaling up the delivery of the BDSM across all botrytis-prone regions.

Any new project to test and implement the BDSM will require an ‘on ground’ technician and/or skilled vineyard staff to obtain the vineyard ‘input’ data, including weather data. This data can then be sent to Kathy Evans (TIAR) for running the Excel spreadsheet to provide model output. K. Evans will also provide instruction on all aspects of data collection. Concurrently, the ‘on ground’ technician will relay any practical issues and ideas for the software user interface. Funding will be required to cover the cost of project staff, travel to field sites and weather station set up.

The advantage of being involved in implementing the BDSM is that having a ‘first look’ at the model will raise your awareness of the key factors driving the disease and hence botrytis management.

Who can you contact to get involved in implementing the BDSM?
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