Wine Industry Smoke Detection (WISD) system for early warning of smoke taint risk in wine

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Background:

Smoke taint is the greatest risk to wine production in many regions of the world, particularly as climate change worsens. In Australia in 2020, smoke taint from the catastrophic bushfires caused grape and wine losses worth over A$500M across 4 states. Any smoke from bushfires and controlled burns that occurs before harvest causes major concern for growers due to the inability to know how much smoke is too much. Although grape testing has improved dramatically over the last decade, there is still a lot of uncertainty in predicting whether wines will be tainted and their suitability for harvest. Consequently, the world's first real time smoke taint predictive system using smoke dose has been developed and is now being implemented into vineyards in Australia. Networked smoke detectors at vineyards can now provide a prediction of smoke taint risk.

Fig 1. Catastrophic bushfire, Vic. 2020 (DELWP)

Fig 2. Wines (91) made and evaluated from different smoke levels from bushfires in 2020

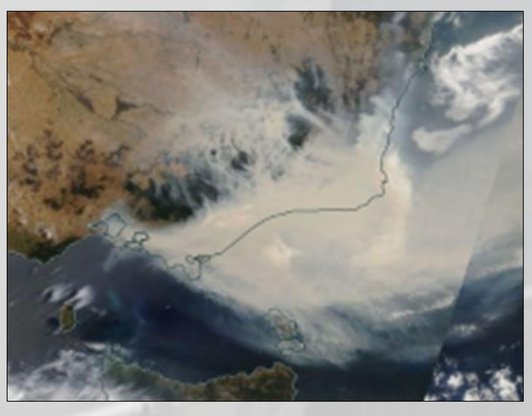


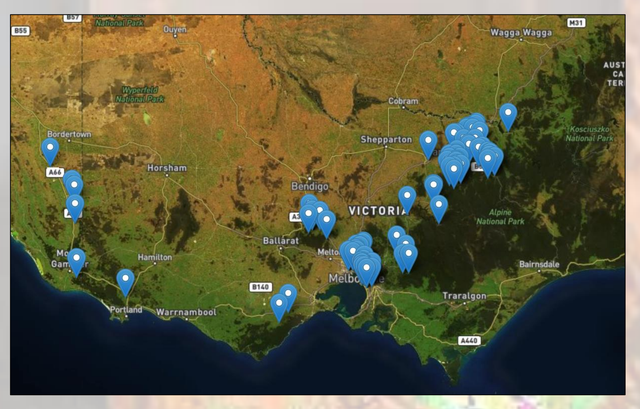
Fig 3. Satellite Image of Vic 2/1/2020 (NASA)

Research:

Research at over 400 sites across 65 planned controlled burns and 8 major bushfires in Australia in the last decade has shown that cumulative dose of fresh smoke is highly correlated with smoke taint compounds in grapes and wine, and sensory ratings of wines. However a large number of factors which influence this relationship need to be accounted for to enable accurate linking to smoke taint and these include the age, volume and timing of smoke, distance from the burn, wind direction, the grape variety and the wine making method.

The WISD Smoke Taint Risk System:

This information has now been consolidated into an early warning real time predictive risk tool for smoke taint in wine. As part of the system a new WISD (Wizard) smoke detector has been developed for industry and over 130 already networked throughout Victoria and South Australia to minimize losses in future smoke events by providing an accurate prediction of smoke taint. Growers will also be able to access information in real time on a website and phone app.



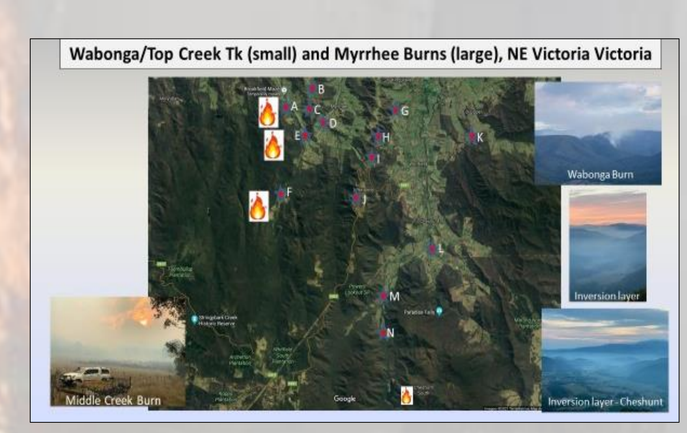


Fig 4 (a). Current sensor location of sensors (PM2.5, PM10) in SE Australia, (b) Networking smoke levels around a number of prescribed burns in NE Victoria in 2021

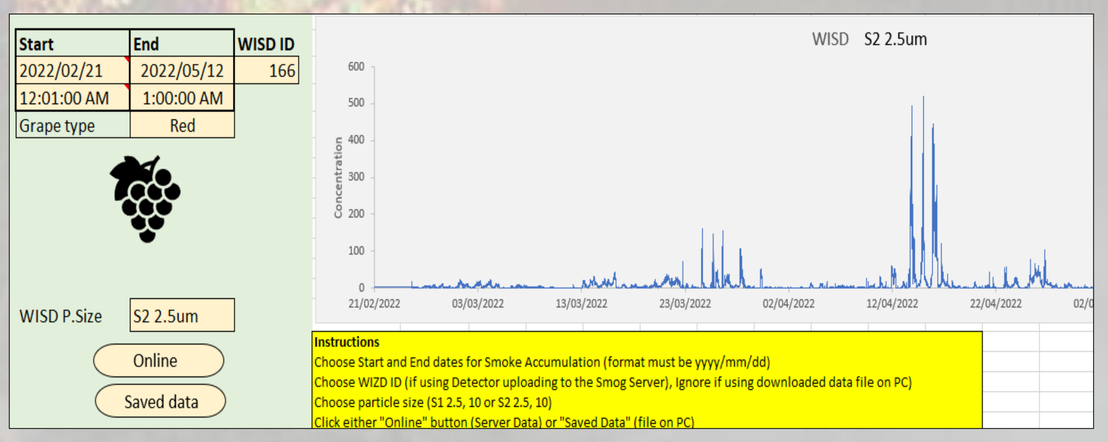


Fig 5. Networked smoke taint risk assessment tool

Fig 6. A Wine Industry Smoke Detector, WISD (WIZARD)

Industry Benefit:

Since 2018, a large number of vineyards have been accurately advised of the likely outcome of smoke events from bushfires and controlled burns and the risk of smoke taint in Victoria, Tasmania, South Australia and NSW. Grapes can tolerate considerable smoke exposure before taint becomes a problem, providing that the burn event is not within the immediate proximity of the vines. Linking smoke dose with accurate concentrations of free and bound phenols in grapes and wine, and repeat sensory sessions on wines, has been the key to the development of the program.

The current research is supported by funding from the Victorian Government's Bushfire Recovery Grants Program (DJPR), La Trobe University, DELWP, Wines of the King Valley Wines and Wine Australia