Technical notes

Addressing knowledge gaps in smoke taint – the AWRI's new collaborative Rural R&D for Profit project

Introduction

Across the world's winemaking countries, wildfires and associated smoke have caused damage to grapes and wines via the phenomenon known as 'smoke taint' – the development of undesirable sensory attributes in wines made from smoke-exposed grapes. In Australia, major smoke events have occurred in six vintages since 2003 in a number of states, resulting in over $400M worth of grapes and wine being lost or downgraded due to smoke taint. Also, more frequent fire and smoke events near vineyards can be expected, given that the frequency of days with very high and extreme Forest Fire Danger Index (FFDI) is predicted to increase by 4–25% by 2020 and 15–70% by 2050 under various climate change scenarios. In addition to wildfires, controlled burn activities by public land management agencies will continue. Thus, it is important that the Australian wine industry manages the risk of smoke taint and develops effective remediation tools for smoke-affected grapes and wine.

A new collaborative project on smoke taint has recently been funded by the Australian Government Department of Agriculture and Water Resources (DAWR) as part of its Rural R&D for Profit program, in conjunction with Wine Australia. This project, to be carried out by the AWRI, Agriculture Victoria and La Trobe University, will address a range of gaps in the current knowledge about smoke taint and pursue some novel industry solutions. Key aspects of the project are listed below.

- **Development of an improved early warning system for smoke exposure in vineyards:** This part of the project is managed by Agriculture Victoria/La Trobe University and aims to evaluate a range of atmospheric monitoring tools designed to monitor both particulate matter and smoke chemical composition. Efforts will also be made to understand the relationship between smoke composition and potential risk of uptake of smoke compounds by grapes.
- **Investigation of practical options to prevent or limit smoke taint compounds getting into grapes in the vineyard:** This part of the project is a collaborative effort between Agriculture Victoria and the AWRI that aims to examine a range of possible products which could be sprayed onto grapevines prior to smoke exposure to limit the uptake and/or concentration of smoke taint compounds in grapes.
- **Improved methods of assessing the risk of smoke taint in both grapes and wine:** This is being approached through increasing the AWRI's database of background levels

of smoke taint compounds in fruit that has not been exposed to smoke. It also aims to improve statistical techniques for separating affected from unaffected samples and seeks to determine sensory thresholds for smoke taint in a range of different wine varieties and styles.

- **Evaluation of remediation strategies for managing smoke-affected fruit and wines in the winery:** Research here is focused on examining processing options and fining materials to remediate smoke-affected wines. The AWRI leads this part of the project and will consider a range of practical options that may offer more selectivity than the current carbon fining options.

Progress

The AWRI project team is currently actively working on the desktop evaluation of products that could be used as sprays in the vineyard mitigation experiments. Work is also underway to extend the background database in vintage 2017 to increase the number of varieties from five (Pinot Noir, Cabernet Sauvignon, Shiraz, Chardonnay and Riesling) to 12 (to also include Sauvignon Blanc, Pinot Gris, Semillon, Merlot, Grenache, Mataro and Sangiovese). This is critical information which aids in determining which grapes have been affected or unaffected following a smoke event.

The Agriculture Victoria/La Trobe University project team has established a remote nephelometer network across North East Victoria and the Yarra Valley and is monitoring smoke daily in relation to on-ground controlled burn activities being conducted by the Victorian Department of Environment Land Water and Planning (DELWP). Additionally, a controlled smoke system is being used to evaluate protectant products for the vineyard and field data of smoke composition collected during the 2016 season is being analysed to determine the impact of age of smoke, distance from the smoke source, wind direction and temperature on smoke taint risk.

Need for smoke-affected samples

The project team is seeking smoke-affected grapes and wines from the Australian wine industry from vintage 2017 for use in winery mitigation experiments. Please contact Mark Krstic (mark.krstic@awri.com.au; 0437 325 438) or Julie Culbert (julie.culbert@awri.com.au; 08 8313 6600) if you think you have had a smoke event in or near your vineyard. The focus varieties for the project are Chardonnay, Pinot Noir and Shiraz, but fruit from other varieties is also of interest. If you have experienced a smoke event, or if you have some smoke-affected wine in storage, please get in touch.

Acknowledgements

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Further reading

Krstic, M.P., Johnson, D.L., Herderich, M.J. (2015) Review of smoke taint in wine: smoke-derived volatile phenols and their glycosidic metabolites in grapes and vines as biomarkers for smoke exposure and their role in the sensory perception of smoke taint. Australian Journal of Grape and Wine Research 21(1): 537–553.

Wine Australia media release: https://www.wineaustralia.com/news/media-releases/$3-million-to-safeguard-winegrapes-from-smoke

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