AWRI Australian Wine Research Institute

Fact Sheet
VITICULTURE

Stubble burning – a possible source of smoke taint in grapes

What is smoke taint?

When vineyards and grapes are exposed to smoke it can result in wines with undesirable aromas and flavours, described as ‘smoky’, ‘burnt’, ‘ashy’ or ‘medicinal’. Wines affected by these characters are commonly known as ‘smoke-tainted’.

The compounds in smoke primarily responsible for the taint are free volatile phenols, which are generated when the lignin present in plants such as trees and grasses is burnt.

Why is smoke taint a problem for grapegrowers?

Consumers have been shown to respond negatively to smoke-affected wines. There are no effective ways to remove smoke compounds from grapes or wines. Grapes that are affected thus have no commercial value and are not likely to be harvested. This has significant financial impact for the grapegrower, as no harvest means no income. There is also a reputational risk, not only for the grapegrower but for the region and Australia as a whole, if smoke-affected grapes are harvested and made into wine that is sold domestically or exported.

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When are grapevines susceptible to smoke?

The effects of smoke vary depending on the stage of grapevine development when smoke exposure occurs. In the past it was believed that early-season smoke exposure posed a lower risk than exposure close to harvest; however, data from Australian smoke events in 2019/20 showed that there is a significant risk of perceptible smoke characters in wine, even when smoke exposure occurs early in grape berry development. The high-risk period therefore typically extends from November/December until April/May, depending on the region, variety and seasonal conditions.

Can burning stubble generate the compounds that cause smoke taint?

Given that wheat, rice, rye, flax, corn, rice, oats and barley straws can contain between 6 and 34% lignin, the burning of stubble from such cereal crops would be expected to generate volatile phenols capable of tainting grapes. Indeed, early smoke taint research showed that grapes could produce smoke-tainted wines following exposure to smoke generated by burning barley straw.

Why are grapegrowers concerned about stubble burn?

Based on a survey of farmers in southern NSW, the months in which the burning of stubble was most likely to be conducted were March, April and May. Grapegrowers who have varieties that might be harvested late in the season may still have grapes on the vines until well into May, which overlaps with the time that grain farmers might want to burn stubble. As such, growers are concerned that stubble burning may occur before the grape harvest, potentially causing taints.

What is the risk of stubble burning affecting grapes?

Given grapes are susceptible to smoke when stubble burning typically occurs, there is a risk that grapes could become tainted from exposure to smoke from stubble burning. The degree of risk will depend on many factors, such as the amount of stubble/ha, the temperature of the burn, wind speed and direction and other environmental conditions, smoke density, the concentration of the volatile phenol compounds, duration of exposure and proximity of the vineyard. The risk is likely to be less than that associated with a bushfire, because stubble fires are less likely to result in longer-term smoke exposure; however, there is still a risk. Shi et al. (2023) suggest that generally the risk of smoke taint from stubble burning is low except where vineyards are immediately downwind of stubble burns and/or prolonged or repeated smoke exposure occurs. Stubble moisture content and prevailing weather conditions affect smoke density and dispersion, and therefore affect the potential for smoke contamination of grapes.

How can the risks of smoke taint from stubble burns be reduced?

Burning stubble near vineyards represents a risk of smoke taint if fruit is still present on vines. If possible, it is therefore preferable to postpone any stubble burning until after grapes have been harvested. Communication between district councils, cereal farmers and grapegrowers about the timing of harvest and the timing of proposed stubble burns will be important in avoiding risks of smoke taint from stubble burns.

Reference

Shi, T., Ristic, R., Wilkinson, K.L., Tian, B. 2023. Impact of smoke from wheat, oat, and clover stubble burning on Cabernet Sauvignon grapes and wine. *Aust. J. Grape Wine Res.* 2023: 6693220.

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