

Smoke taint risk and management in vineyards



Information sheet 2 of a series of 5

Implementation of the 2009 Victorian Bushfire Royal Commission recommendations has led to a tripling in the area of prescribed burning to reduce fuel loads so that bushfires are not as extensive and destructive. Smoke from prescribed burns and bushfires can have an adverse impact on grape quality resulting in undesirable tainting in wine. This factsheet describes the risks of smoke taint in wine and the current management options to reduce the loss to growers and winemakers.

Phenolic compounds in smoke are absorbed directly through the skins of berries and leaves. These smoke taint compounds exist in the berries as free volatile compounds or are bound to sugars and do not move through the plant. During the process of winemaking, the smoke taint compounds are released from the berry skins and end up in the wine.

KEY RISK FACTORS OF SMOKE

- Grape varieties are at higher risk of absorbing smoke taint compounds at different times during the growing season. Research by the Department of Agriculture and Food WA has shown that Merlot grapes are at highest risk from one-week post-veraison to harvest (Figure 1). However, other studies in conjunction with DEDJTR have shown that Cabernet Sauvignon, Sauvignon Blanc and Chardonnay are at highest risk at pea size, but also uptake compounds through till harvest. In general, it appears that grapes can take up smoke taint compounds from pea size onwards.

Grapevine growth stage	Potential for smoke uptake
Shoots 10 cm long	Low
Flowering	Low
Pea-size berries	Variable (low to medium)
Beginning of bunch closure	Variable (low to medium)
Onset of veraison to three days post-veraison	Variable (low to medium)
From seven days post-veraison to Harvest	High

Figure 1. Susceptibility of Merlot grapes to uptake of smoke taint compounds (courtesy of: Department of Food and Agriculture WA).

- Smoke taint compounds can be absorbed by both the leaves and the berries. Fortunately, smoke taint compounds do not move from the leaves into the berries; however, it is important to minimize leaves coming into contact with berries during harvesting and fermentation.
- The absorption of smoke taint compounds into berries increases with younger, denser smoke and longer smoke exposure. Absorption can occur from exposure to dense smoke over a few hours and from exposure to low smoke density over a number of days.
- Smoke taint compounds can continue to accumulate in berries from repeated exposure to smoke. Repeated

exposure during the season will be more susceptible to reach threshold limits due to the cumulative effect.

- Smoke taint compounds are relatively unstable in the air and they are affected by photo-oxidation, moisture, temperature and wind direction. Thus, smoke taint compounds are worse in fresh smoke directly downwind of a fire and may no longer be present in smoke that is a number of days old.
- Observation of smoke haze does not necessarily mean it contains smoke taint compounds or that they are at a level that will cause smoke taint absorption into berries.
- Prescribed burns are usually short in duration, which lowers risk, but as smoke is likely to be high in smoke taint compounds, a burn in close proximity to a vineyard increases risk. For more information on prescribed burns go to www.delwp.vic.gov.au
- Bushfires are usually high intensity for longer duration and are unpredictable. This increases the likelihood smoke taint compounds are continually produced and increases risk that grapes can absorb smoke taint compounds. The closer you are to a bushfire, or a controlled burn, the greater the risk especially if you are receiving fresh smoke downwind of the fire.

WORKING WITH FIRE MANAGERS TO MINIMISE SMOKE TAINT RISK

- Advise local and regional DELWP fire management staff of your location, your enterprise, varieties (early and late ripening), anticipated harvest dates, size and contact details. This can be done as an individual or as a regional industry group.
- Use the Planned Burn Notification System (PBNS) on the DELWP website (see <http://delwp.vic.gov.au/fire-and-emergencies/planned-burning-notifications-system>) to determine when burns are planned and if necessary to set up automatic notification about timing of specific burns.
- Conduct a twice-yearly meeting to discuss the current Fire Operations Plan (FOP) for your region (see <http://delwp.vic.gov.au/fire-and-emergencies/managing-bushfire-risk/fire-operations-planning/approved-fire-operations-plan>). FOPs are released in August and cover the next 3 years of burns to take place. Information can be given to fire managers at this time to allow planning to take into account any burns near your location.
- Update local and regional DELWP fire management staff prior to and during harvest to give fire managers the opportunity to burn in other areas or to undertake extra burns in your area due to an early harvest.

CURRENT MANAGEMENT OPTIONS FOR SMOKE AFFECTED GRAPES

- Measure smoke density, timing, duration and composition to determine the risk of berries absorbing smoke taint compounds (see fact sheet No.3: "Measuring smoke density and smoke composition in vineyards").
- Test grapes for smoke taint compounds at an accredited laboratory, e.g. the Australian Wine Research Institute. Visit www.awri.com.au for guidelines for assessing vineyards and grapes for smoke taint.
- Minimise the risk during the winemaking process of contamination with smoke taint compounds in leaf and woody tissue by reducing MOG and hand harvesting.
- Minimise skin contact and implement early press cutoff to reduce the extraction of smoke compounds from skins.
- Conduct a mini bench top ferment of smoke affected grapes to produce a small-scale wine if concerned. Send a wine sample to an accredited laboratory (e.g. the Australian Wine Research Institute) for analysis and interpretation.
- Monitor smoke taint compounds in wine during storage. There is evidence that wine made from berries considered free of taint may slowly develop taint during storage due to the changes in complexity of the wine.

ACCESSIBILITY

For more information, please contact the Project Leader, DEDJTR Victoria – Centre for Expertise in Smoke Taint Research, Agriculture Research Branch on 136186.

This document is also available in PDF format at www.victoriagovernmentdepartment.vic.gov.au

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