

Grapevine recovery after fire



Fire damage to grapevines

Fire may damage grapevines to different degrees depending on the intensity and time of exposure to fire or radiant heat. It is important to understand the impacts of the damage on the long-term viability of vines in order to make decisions about how they should be managed after fire exposure.

The major cause of long-term vine decline or death after fire exposure is damage to the vascular system, the structures which transport water and nutrients between the roots and leaves, in the permanent structures including the cordon, trunk and roots. Understanding the extent to which these structures are damaged can help growers adopt the best management strategies to maximise long-term recovery of the vines.

Irrigation

If there is a chance that the vines can be saved or if damage is variable and there are vines which are unaffected by fire, the first priority is to re-instate irrigation to the vines, especially if ongoing dry conditions are forecast. If irrigation infrastructure such as driplines has been damaged, getting it working is paramount. Temporary irrigation systems such as movable sprinklers or furrow irrigation may be useful as an interim solution to ensure vines receive water.



Figure 1. A fire-damaged grapevine trunk showing browning of the vascular tissue (left) and healthy grapevine vascular tissue (right).

Assessing vine damage and promoting recovery

Damaged tissue of vine shoots, leaves and inflorescences/bunches grown in the current season will not recover. Vines with a small proportion of damaged shoots, leaves and bunches may continue to grow and produce a successful crop; however, vines with a high proportion of damage will not. In cases where the damage is moderate, the removal of remaining bunches should be considered to promote the recovery of the vines during the remainder of the season.




To assess the damage to the vascular tissue in the permanent structures of the vine, make a shallow cut into through the bark and cambium layer (Figure 1). Vascular tissue that is white or green is healthy; tissue that is yellow or light brown is damaged and deteriorating; and tissue that is darker brown is dead (Figure 1). Different levels of damage may occur irregularly around the trunk depending on the duration and location of the fire exposure.

Damage to the vascular tissues is permanent and depending on the degree of damage may reduce long-term grapevine viability. Because there are no non-destructive measures to assess the damage to the vascular system, visual assessment of vine damage may provide a useful guide to the potential for long-term recovery. Other useful indicators of the severity of fire damage include observations of the dripper line. Sagging tube – hot; melted tube – hotter; burnt tube – hottest.

Visual assessment of fire-damaged vines

Assessing individual blocks and mapping the damage to vines, irrigation, trellis and fencing helps to visualise the damage, to quantify losses and to identify priority areas for attention and redevelopment. It is useful to categorise the severity of vine damage into groups based on visual assessment of the vines and to relate this to the management approach to be taken (Table 1). It is important to remember that vines will continue to decline during the weeks after the fire and early assessment may not reflect the final status or survival of the vines.

Table 1. Example categories for visual assessment of fire-damaged vines and potential remedial actions

Category		Description	Action
Severe		Leaves, shoots and trunks are damaged (including split trunks). The vascular system is likely to be severely damaged.	Consider trunk and cordon redevelopment.
Moderate		Vines have a high proportion of damaged leaves. Trunk damage may be visible. High potential for damage to the vascular system. Vines may recover with reduced capacity.	Consider trunk and cordon redevelopment.
Minor		Vines have a low proportion of damaged leaves and are otherwise unaffected. Vines are expected to recover next season.	Continue usual irrigation and pest and disease control. Consider bunch removal to promote vine recovery.

Undamaged



Vines have not been exposed directly to flames or radiant heat from fires and show no signs of injury.

Continue usual irrigation and pest and disease control.

Factors that influence vine damage

Slope and aspect – depending on the direction of the fire, the topography of the vineyard will influence the severity of damage.

Proximity to vegetation and fuel – the fuel load adjacent to the vineyard will significantly influence the potential heat of the fire and embers.

Fuel load in the vineyard – practices such as midrow and undervine cover cropping and undervine mulch which are implemented to promote biodiversity, enhance soil health and conserve soil moisture, also increase fuel load and potential for fire damage to vines.

Burnt dripper tube – Plastic dripper tube which catches fire burns with intense heat and, when adjacent to vine trunks, the likelihood of severe damage to the vines increases.

Soil moisture status – Soils with higher soil moisture content prior to a fire have a greater ability to buffer the impacts of fire on the vine root system.

Vine recovery and vineyard redevelopment after fire

Buds and shoots may start to appear within weeks after fire damage. These shoots are produced from stored reserves in the permanent woody structures of the vines. It is essential that this growth is promoted with an adequate supply of water and fertiliser, and protected from pests and diseases.

In some cases, especially after hot and dry conditions, new shoots may collapse and dry out. This is caused by damage to the vascular system preventing the flow of water within the xylem to the shoots and leaves. Significant damage to the phloem will have a girdling effect, whereby carbohydrates generated by the leaves are prevented from reaching and replenishing the root system. These vines may start to decline and die over the coming weeks, months and years.

Recovery of vines after fire is variable and it can take several months for the full extent of the damage to become apparent. In some cases, where the damage to vines is severe, if the block

has a history of poor performance or if a new variety, clone or rootstock is desired, the best action may be to completely remove the vines and replant the block.

In an own-rooted vineyard, if the vines are to be retained, it is recommended to confirm that they are viable by waiting for new growth to appear below the fire-damaged tissue. Vines with healthy tissue at the base of the trunk or below the ground may start to produce new shoots from the base within a few weeks after the fire (Figure 2). This new growth should be allowed to grow and lignify. In winter, the damaged trunk and cordon can be removed and a strong shoot from the base retained to form a new trunk.

If there is sufficient time left in the growing season to develop a new trunk (at least 12 weeks), it may be desirable to immediately remove the damaged trunk and cordon. Before deciding which action to take, growers should consider the length of time left in the season for regrowth and retraining to occur and the availability of funds and labour to adequately complete the job. The advantages and disadvantages of taking immediate action compared to waiting for signs of recovery are listed in Table 2.



Figure 2. A new shoot growing from the base of a fire-damaged vine trunk, four weeks after the fire

Table 2. Advantages and disadvantages of immediate action after fire damage compared to waiting for signs of vine recovery

Action	Advantages	Disadvantages
Wait for signs of vine recovery	No immediate expenditure required Improved accuracy of damage assessment Avoiding expenditure on vines that do not survive	Re-growth may occur at varied heights Damaged trunks may be susceptible to trunk diseases
Immediate removal of damaged trunks	Trunk removal may be quicker without new growth at the base If sufficient time remains in the growing season, trunks may be re-established in the same season	Wasted expenditure if vines do not regrow

Vines growing on rootstocks pose a challenge for reworking after fire damage. If the rootstock regrows, this may be left to redevelop a new trunk and a scion can be grafted onto this in the following year. Alternatively, if there is sufficient rootstock remaining after the damaged tissue is removed, a new scion can be grafted close to the ground level.

Other things to consider after fire damage to vineyards

Stay safe

Smoke and ash can be toxic. It is important to follow the advice of government agencies before re-entering an area damaged by fire and wear appropriate protective equipment, especially when dealing with burnt CCA-treated posts.

Written records

Accurate record-keeping is recommended for insurance and other purposes. Maintain a detailed record of any damage incurred, significant dates and the remedial actions taken. Records may include photographs and the time taken on recovery activities.

Rubbish removal

Fire-damaged vineyard posts, wire and driplines should be separated and stockpiled. The local Environmental Protection Agency can provide advice on disposal.

Risks of erosion

Burnt vineyards may be at a greater risk of soil erosion. Temporary control of water run-off may be achieved using contours or hay bales.

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Further reading

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