GRAPE AND WINE RESEARCH AND DEVELOPMENT CORPORATION

FLOODED VINEYARD CASE STUDIES

Fundamental management of flooded vineyards

Flooding across large areas of New South Wales and Victoria during March 2012 has resulted in flooded vineyards in several of the states' winegrape-growing regions. These case studies aim to inform growers of some immediate issues to consider and issues for next season based on others observations'.

Flooding may be caused by from heavy localised rains, flood waters slowly flowing across the landscape or a combination of both. Whatever the cause, the duration and timing of flooding are important to consider. Flooding of well-drained soil types, where water disappears in one or two days, usually has little impact on vine growth. Where flood water is slow to recede, either due to soil type or the volume of water, some issues may arise.

When soil becomes waterlogged, it becomes anaerobic as air is forced out from pores in the soil. Roots need air to function, and waterlogged roots will die over a period of time. However, flood events from 2011 have shown vines are resilient, and can return to production in the following season without significant side-effects. To minimise the impact of flood on vineyards, water should be encouraged to drain away, or pumped from the vineyard **as soon as possible.**

Observations from vineyards flooded in 2011 include:

- for the best outcome, drain or pump all surface water as soon as possible
- increased vigour noted in the following season
- some reduced yield observed in the following season (variety-dependent)
- increased disease pressure in the following season (associated with higher rainfall and disease pressure in year of flood)
- possible leaching of nutrients.

The duration and timing of a flood are important considerations for growers. Photo G. Moulds

Considerations for the growing season following a flood:

- areas with poor soil drainage (impervious sub-soil) are most likely to have dead vines
- cold, wet soil may result in unthrifty vines early in the season (restricted spring growth)
- sudden vine collapse, resulting in vine defoliation, may occur in poorly drained areas
- high disease pressure during the flood may result in increased spore load and disease pressure in the following season. Improved spray programs, particularly around flowering, are important to minimise crop loss to disease
- more water shoots may grow on some varieties
- flower and berry set may be influenced resulting in lower yield
- increased soil water content may result in more vigorous vine growth later in the season, thereby reducing airflow in the canopy
- increased weed seed distribution and weed growth is common
- waterlogging and leaching may decrease soil nutrition; consider soil testing and nutrient applications.

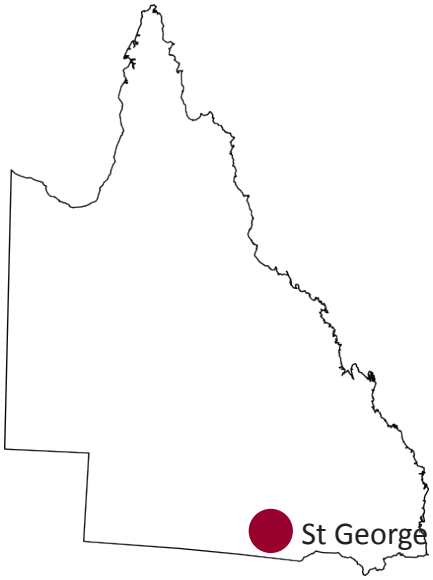
Additional information prepared by DPI Victoria on managing grapevines and crop during a flood, and management following a flood, is available online:

Managing crop recovery after flooding - grapevines
www.dpi.vic.gov.au/agriculture/horticulture/wine-and-grapes/after-flooding-grapevines

Checklist for flood recovery - grapevines
www.dpi.vic.gov.au/agriculture/horticulture/wine-and-grapes/checklist-for-flood-recovery-grapevines

ST GEORGE, QUEENSLAND

St. George, located in south-east Queensland, has a Mediterranean climate with hot, dry summers, cold winters and an annual rainfall of 531mm. Over the past three years, the St. George region was flooded three times: March 2010 (13.4m record), January 2011 (13.2m record) and February 2012 (14m record). The strong La Niña event in the last three years resulted in widespread flooding across many parts of Queensland and many rainfall records were broken in St. George.



Case Study One: St. George, Queensland

The St. George vineyard grows both tablegrapes and winegrapes, with harvest occurring between December and February. In the 2011 flood, huge volumes of water travelled downstream to St. George from heavy falls in other parts of Queensland. Some blocks were entirely submerged by 2.5m of water, which took around four weeks to recede, and resulted in total crop loss. Vines were covered in mud and debris, but two weeks later, healthy green growth was obvious. Only a few vines died after being totally submerged. On higher unharvested blocks, vines were in only 1m of water and grapes were sound and successfully hand harvested. In 2012, the yield was substantially lower, primarily due to wet weather at flowering. Based on the observations by the grower between completely submerged and unsubmerged vine rows, a reduction in yield, directly due to flooding was not seen.

This St. George vineyard was covered in mud and debris once flood waters of 2.5m had receded (left), but healthy green growth ensued just a fortnight later (right). Photos D. Blacket

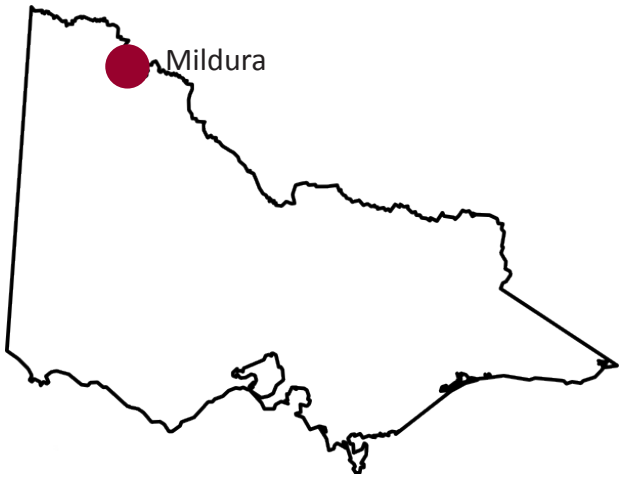
All young vines, planted only five months earlier, drowned after being completely submerged for four weeks and required replanting. In 2012, the flood submerged the replanted young vines for one week and around 70% of the vines recovered and re-shot.

To assist recovery after each flood, the grower made several fungicide and foliar fertiliser applications to prevent disease on new foliage and maintain leaf condition prior to senescence. Soil testing was also undertaken to assess nutrient loss, and necessary fertiliser applications were made.

These young vines planted in the St George vineyard were submerged by flood waters for one week (left) and once water receded, recovered and re-shot soon after (right). Photos D. Blacket

MURRAY DARLING, VICTORIA

Mildura, the main centre of the Murray Darling wine region in Victoria, has an average annual rainfall of 276mm. In 2010–11, a strong La Niña event resulted in cooler temperatures and significantly higher than average rainfall. In early February 2011, with soil already significantly wet from earlier rains, 185mm of rain was recorded in 24 hours in Mildura and up to 240mm in surrounding areas. The rainfall was the highest ever recorded for the region and resulted in widespread flooding. Following the floods, many blocks were unpicked, due to bunch rot and poor harvester access.



Following the high incidence of downy mildew, botrytis and other rots in 2010–11, growers again observed high disease pressure in 2011–12. Wet soil and a higher spore load saw disease unexpectedly occur in many cases, even when conditions were considered unsuitable. Growers who remained vigilant and stepped up their fungicide programs, particularly around flowering, had fewer problems than those who relied on their usual spray program.

Case Study Two: Red Cliffs, Victoria

The affected vineyard, planted with Sultana, remained unharvested in 2011 because of significant berry split and bunch rot caused by rain. The flood water was 300–600mm deep through the vineyard and remained on the surface for at least six weeks. Further rain resulted in downy mildew infection, which was followed by defoliation of susceptible leaves.

In the 2011–12 season, several vines did not arise after winter dormancy. Pruning and budburst on other vines progressed as normal with strong shoot growth early in the season. As the season progressed, some vines suddenly collapsed, resulting in complete defoliation. In most cases, this was due to an impervious sub-soil which led to poor soil drainage and vine root death. Poor berry set and lower yields were also observed in this block, as was reported on many varieties across the region, most likely due to cool weather during flowering, rather than the flood.

Flood waters in this Red Cliffs vineyard remained on the surface for more than six weeks and new growth was later affected by downy mildew (left). The following season, some vines grew poorly or died with growth in the majority of the vineyard unaffected. Photos G. Moulds

Case Study Three: Irymple, Victoria

Following the rain, this vineyard was up to 1m under water. The vines, Merlot (D3V14) planted on Schwarzmann rootstock, were not harvested in 2011 due to excessive bunch rot. After two weeks, the flood water naturally receded from the vineyard. However, cool and wet conditions continued, resulting in late-season downy mildew and poor cane lignification.

In the 2011–12 season, shoot growth was strong, resulting in reduced canopy airflow and higher disease pressure. Increased watershoot production was also observed. Due to cooler conditions, the flowering period was longer than usual and produced an inconsistent set, resulting in yield at 10t/ha, down by around 50% on average yield. Veraison and harvest were about two weeks earlier, due to lower yields.

In 2011, this Irymple vineyard was submerged in 1m of flood water (left), leading to increased shoot growth, disease pressure and water shoot production in 2012 (right). Photos L. Simpson

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