Bunch rots—understanding the winemaker's dilemma

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Introduction
Australasian winemakers are generally a happy and optimistic group of people. There is nothing quite like bunch-rot to quell that optimism. For many grapegrowers the nightmare generally ends the moment the fruit leaves the vineyard, whereas for winemakers, it can continue well into the following year and have consequences well beyond that. This paper aims to present the winemakers' perspective.

The term 'bunch rot' is used to cover a multitude of different infections that can occur in vineyards. It is most commonly associated with 'grey rot' caused by the fungus Botrytis cinerea. As well as grey rot there is the more insidious slip-skin Botrytis infection, where the fruit looks fine on the vine but disintegrates to a slimy pulp when the winemaker attempts to crush it. However, it should be noted that even in situations where there appears to be a 'clean' Botrytis infection, there are likely to be high populations of other microflora present, that can in themselves have damaging effects on the wine. Of particular significance are the bacteria Acetobacter and Gluconobacter, both of which are capable of producing acetic acid, or vinegar, during winemaking. In addition, Aspergillus and Penicillium species are also commonly present, and may be responsible for the 'dusty' or 'stale ashytray' type taints that are commonly associated with wines made from mouldy fruit. Add to this a higher than usual population of wild yeast, especially if birds or insects have started to attack the fruit and spread the infection, and the winemaker has a wide variety of micro-organisms to deal with.

The problems of dealing with rotten fruit fall into three main categories:

• the loss of wine quality—and the necessary change in winemaking methods which inevitably result in a change of wine style
• logistical problems—in what will already be a hectic winery environment
• the associated costs—both tangible and intangible, which can be significant

These will form the major themes of this paper.

Loss of wine quality and change of wine style
Notwithstanding the fact that small amounts of Botrytis may add complexity to some white wines, or assist in rapid colour extraction in reds, Pascal Ribéreau-Gayon expresses the view that 'a good red wine can never be made from grapes that are even slightly mouldy' (Ribéreau-Gayon et al. 1980). For many wine consumers one of the most enticing qualities of wine is its variation due to site and climate, which is not seen to the same extent in other beverages or food products. However, many consumers do not want variety, and would prefer to buy the same product they purchased last week, or last month, or last year. One of Australia's great advantages has been that our climate has allowed us to make reliable products, which in turn have allowed the building of brands, which are so important to the industry. Ergo, when the weather is unknown, we can have a big problem.

Making wine from rotten fruit inevitably results in the winemaker making compromises in the winemaking in order to minimise the damage to the wine, and producing a product of consistent quality becomes difficult, if not impossible. It is simply not possible to recreate the previous vintage's dark coloured, 14% alcohol Shiraz with concentrated berry aromas, worthy of ageing in new oak, from the following year's fruit that had to be harvested at 12° Baume because it already had 10% Botrytis infection.

There are three common problems associated with making wine from mouldy fruit. The agent in Botrytis that is responsible for much of the quality loss in wine is the enzyme laccase, which is strongly oxidative towards the polyphenols that are found in wine. Wines containing laccase turn orange/brown in the glass, and if left to stand for a few hours, a characteristic oily film will form on top of the wine. While it is not possible to deactivate laccase under the conditions found in wine, with the correct fermentation management laccase activity can be reduced, and the addition of bentonite and tannin may help to remove some of the enzyme. In addition, laccase can only work oxidatively when oxygen is present, so excluding oxygen is important when managing mouldy fruit. This sounds simple, but presents problems when crushing, fermenting and pressing grapes.

A nother major problem when making wine from mouldy fruit is mouldy taint. When making white wines, it may be possible to remove some of the taint by pressing whole bunches; by discarding the first fraction of juice; or by fining the juice with polyvinyl polyalcohol (PVPP), casein and bentonite. When making red wine, mouldy taints may be a bigger problem, as the winemaker is forced to leave the skins present with the juice during fermentation. In addition, by overworking the skins during fermentation the winemaker also runs the risk of accentuating a macerated mouldy-skins character in the wine.

A third common problem with mouldy fruit is that there is often a less than desirable concentration of sugar in the grapes, due to the fact that the grapes have to be harvested earlier than had been planned due to the presence of rot. Fundamentally, insufficient sugar leads to insufficient alcohol, which is required for the body and length of flavour of the wine, and for the extraction of colour and tannin during fermentation. Invariably, low sugar concentrations will also be associated with under-ripe flavours and 'hard' tannins. The winemaker may add some grape juice concentrate, and some tannin, which may also be helpful in removing some laccase as well as adding some structure to the wine.
However, no matter how judiciously grape juice concentrate and tannins are added, it is simply not possible to make a silk purse from a sow's ear.

In addition to the three general problems that are discussed above, winemakers are often forced to make many other changes and compromises to their winemaking when dealing with mouldy fruit, that will ultimately affect the quality and style of the wine.

Logistical problems
Dealing with mouldy fruit can cause significant logistical problems for the winemaker, and force additional winemaking compromises. The planning of a vintage, especially in a large wineyard, can take on the appearance of a military campaign, and in 1999 especially, the industry was at the limit of its fermentation and storage capacity. Under these conditions, it is critical that the intake of fruit is carefully matched with the physical and human resources available to deal with it. In many wineries, all the fermenters will be full all of the time during the heart of the vintage, and the time allocated for each fermentation may only be five or six days. All the planning is thrown into chaos when the fruit starts to rot, and in reality there is little option but to pick at the same time as planned, and to try and take the worst affected fruit first. However, this can mean leaving unaffected fruit on the vine for longer, which in turn deteriorates.

A 53 ASVO PROCEEDINGS • MANAGING BUNCH ROTS
to this figure, the total difference in wine value and processing costs between the mouldy and unaffected fruit is $998 per tonne. Therefore, if the full $370 per tonne price penalty had been applied, it would equate to only 37% of this total. It should also be noted that when the wine made from the unaffected fruit is bottled under the winery’s brand, the value of the wine would increase by at least $10 per litre. And in the words of the winemaker concerned, the wine made from the affected fruit that was retained by the winery ‘is still a liability’.

Whilst the figures presented in this case study are considered representative, it would be desirable for other such studies to be undertaken and published, so that informed decisions on appropriate penalty rates can be made.

Conclusion
It is the quality, consistency and price of the final wine product in the bottle that will determine the future of the Australian wine industry—the future of growers and winemakers alike. The potential quality will always be determined in the vineyard, and the high incidence of bunch rots experienced over much of Australia during the last two years is worrying. This serves to emphasise the importance of research into, and implementation of, best vineyard practice to minimise the losses caused, and to ensure that Australian winemakers have the fruit to continue to produce the consistent high quality products that are the basis of the current success of the industry.

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References