



Understanding whole-bunch fermentation



During the 2016 and 2017 vintages, the AWRI made small-lot Pinot Noir and Shiraz wines from single batches of fruit, demonstrating the effects of changing one winemaking variable at a time. During tastings of those wines presented across Australia, many winemakers asked why there are such large sensory differences between wines made with 100% pure carbonic maceration and those made with the more common whole-bunch fermentation treatment. A previous 'Ask the AWRI' discussed carbonic maceration, and this one examines whole-bunch fermentation.

What is whole-bunch fermentation and how is it different from carbonic maceration?

As the name suggests, whole-bunch fermentation describes a red winemaking technique where intact bunches of grapes are placed in the fermenter, rather than grapes that have been removed from the stems. Destemmed and/or crushed berries are then generally placed on top of them, and as the fermentation progresses, the intact bunches are often partially or wholly crushed by plunging, or traditionally by foot-treading. Carbonic maceration, on the other hand, involves placing 100% intact whole bunches of grapes, with absolutely no free grape juice, in a closed fermentation vessel filled with carbon dioxide, for around a week, prior to destemming, crushing and fermenting with yeast under normal winemaking conditions.

What sensory changes should I expect from using whole bunches?

The major sensory differences between whole-bunch fermented and conventional wines made from de-stemmed fruit relate to the phenolic profiles and the aroma. During the period that intact berries remain attached to the stems, it is possible that similar enzymatic reactions occur as with carbonic maceration, and thus the wines may contain some of the same 'fruity' or 'spicy' aromas. The inclusion of stems can result in higher concentrations of compounds which confer 'cut-grass' and 'herbal' aromas, as well as potentially 'fruity' and 'floral' aromas, and there is some evidence that it can also result in higher pH and decreased acidity. There is also strong evidence of increased tannin concentrations, which if overdone, can lead to excess astringency and a perception of 'greenness' in the wines. The effect on wine colour is unclear, with the consensus of winemaker observations being that colour is generally reduced, but data in some publications indicating an increase in colour density.

What are the risks associated with using whole bunches in my fermentation?

The biggest risk associated with the use of whole bunches is the potential for 'green', 'grassy' and 'herbal' aromas and flavours, and overly astringent tannins in the wine. The best results are achieved when bunches with a high degree of lignification are selected (i.e. stems that are 'woody' rather than green), and the most well-lignified bunches are likely to be found in relatively low-vigour sections of the vineyard. Lignification is likely to be lower in cool climates, and in cooler years, and is known to commence at the cessation of shoot growth. Consequently, lignification tends to be lower in wet years, especially when there is mid to late-season rainfall which stimulates vine growth, and in high-vigour vineyards. It is advisable to take a cautious approach when trialling whole-bunch fermentation, by only using a small percentage of whole bunches at first (10 to 15%), and assessing the results

over time, and by only making a small amount of whole-bunch fermented wine, which can then be blended into other wines to the point where the desired sensory effects are achieved.

With which varieties is the technique most commonly used, and how many whole bunches should I use?

The technique is most commonly applied to Pinot Noir and Shiraz, with the proportion of whole bunches used in Pinot Noir being as high as 100%, but with 15 to 20% being more common, especially with Shiraz. Use of the technique is uncommon with Cabernet Sauvignon and related varieties, because of the high methoxypyrazine concentration in the grape stems, which can result in 'cut grass' and 'herbal' characters in the wine.

Is whole bunch fermentation becoming more popular, and if so, why?

The popularity of whole bunch fermentation is growing in Australia according to a range of anecdotal sources. As a possible explanation of this trend, Jamie Goode (2012, re-published 2016), says that "..... very few young winemakers worldwide are looking to produce bigger wines – certainly not at the high end. They tend to prize elegance, freshness and definition above all else", and maintains that whole-bunch fermentation can result in wines displaying those characteristics. He notes that "People in the past used stems by default, and the results weren't always good. Now the choice to use stems is an active one, so the people doing it are doing a better job of it".

For further information about whole-bunch fermentation or other technical questions, contact the AWRI helpdesk on (08) 8313 6600 or helpdesk@awri.com.au

Reference

Goode, J. 2012 and 2016. Stemming the tide. *World of Fine Wine*. 37: 90–97 and <http://www.worldoffinewine.com/news/stemming-the-tide-4869650>