



Pre-fermentation skin contact

Since 2016 the AWRI has made a series of wines from single batches of grapes, changing one variable in each fermentation, with the resulting wines being presented to winemakers in workshops around Australia. In this column, the AWRI's Peter Godden covers key questions on pre-fermentation skin contact in white winemaking - one of the treatments included in the 2019 trial.

Background

The amount of contact allowed between white juice and skins and seeds before fermentation has a marked effect on the properties of finished wine. For sparkling wines and Riesling, for instance, winemaking with hand-harvested intact whole bunches coupled with modern winemaking equipment or traditional presses used in Champagne, can result in the virtual avoidance of any skin contact. At the other end of the spectrum, 'amber' wines are essentially white wines made in the same way as red wines, with skin contact periods of up to several months.

The widespread introduction of machine harvesting in the early-1980s represented a huge change in winemaking practice regarding skin contact. When hand-harvested fruit is delivered to wineries as whole bunches, the winemaker has a clear choice whether to press the whole bunches, crush the fruit and press as quickly as possible, or to crush and allow a period of skin contact before pressing. With machine-harvested fruit, however, musts receive a degree of skin contact during harvesting and transport, and when transported over long distances the amount of skin contact can be substantial. When machine harvesting was first introduced, it was generally

regarded as largely negative for wine quality. However, the ability to machine harvest at cooler night temperatures, improved dosing of SO₂, and gentler grape handling practices throughout the winemaking process have largely negated the deleterious effects.

What are the potential benefits of pre-fermentation skin contact?

Numerous studies have shown that skin contact increases wine flavour and viscosity or 'body', due to extraction of the many flavour and phenolic compounds that are found in grape skin. Skin contact has been shown to increase concentrations of varietal thiols, terpenes and norisoprenoids, and in a study with Sauvignon Blanc, skin contact at cold temperatures led to large increases in several important varietal-linked aroma compounds (Olejar *et al.* 2015).

Does pre-fermentation skin contact cause other changes in juice and wine composition?

Additional changes in must and wine composition are consistently seen following skin contact. In a study of Chardonnay wines, these included increases in must pH, potassium, and total nitrogen (particularly ammonia), and decreases in titratable acidity and tartaric acid. The decrease in tartaric

acid was probably due to the precipitation of potassium bitartrate, which would also lead to an increase or a decrease in pH depending on the initial pH of the must. In the resulting wines, both flavonoid and non-flavonoid phenolics and malic acid increased proportionally to the length of skin contact over periods of 6, 12 and 24 hours. However, during sensory evaluation when the wines were six months old, only small differences in wine flavour were detected, and only in the 12- and 24-hour treatments when compared to a non-skin contact control. Small differences were also seen between the 12- and 24-hour treatments, but not between the 6-hour treatment and the control (Test *et al.* 1986).

What practical considerations should be taken into account?

Skin contact may be conducted with and without the addition of pectinase and/or glucosidase enzymes, and it is recommended that it is performed under inert gas cover. Enclosed presses are ideal vessels but may not be available for the length of time required at the height of vintage. If not available, an important consideration is how to move the must to the press after a period of skin contact, without excessive aeration or additional mechanical maceration. Overhead tanks from which must can be

dropped directly into a press are the next best alternative to enclosed presses.

Temperature has a major influence on the rate and nature of extraction, with higher temperatures resulting in wines with increased phenolics, increased colour, a propensity to mature faster and a 'coarser' more astringent sensory character. However, at higher temperatures the concentrations of volatile compounds do not appear to increase. Therefore, the best results are likely to be obtained between 15 and 20°C, which may require the must to be cooled between the crusher and the skin contact holding tank and may also require the must to be warmed prior to yeast inoculation.

Are there any risks to consider?

If Botrytis is present on fruit when conducting pre-fermentation skin contact, it can lead to rapid oxidation due to the laccase enzyme. Even in dry conditions, Botrytis may be present on the inside of tightly filled bunches. Close inspection is therefore recommended.

It is also important that grapes are fully ripe, because skin contact coupled with subsequent pressing leads to an increase in C6 compounds responsible for herbaceous characters in white wines (Ferreira *et al.* 1995).

Over-extraction of phenolic compounds is also a risk if the skin contact period is too long, especially at an elevated temperature, or if the fruit is not otherwise treated gently during harvesting, transport, de-stemming, crushing and pressing. While every batch of grapes is different, a degree of standardisation of extraction can be achieved between batches and between vintages, by use of spectrophotometric measurements of phenolics.

High pH following skin contact is also a potential risk if the initial juice potassium is high and the pH is above approximately 3.56, because under these conditions the precipitation of potassium bitartrate will result in the pH increasing further.

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

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