

Bunches with ripe and unripe berries

Q. My Cabernet Sauvignon grapes were going through veraison at the time of the heatwave in mid-January 2014. Since that time, I have noticed that bunches comprise a mixture of small unripe berries and larger riper berries. It looks a bit like 'hen and chicken' but I didn't notice any bunches with this problem prior to veraison. Can you explain what is going on?

The fact that your bunches were developing normally prior to veraison without any signs of 'hen and chicken' suggests that what you are observing is a ripening disorder termed 'sweet and sour' in 2000 by the late Dr Bryan Coombe.

Bryan was tracking the development of single bunches of several grape varieties in his backyard during the 1999/2000 growing season (as he was inclined to do as one of the world's leading authorities on grape berry ripening).

For most bunches in that season, seed and berry development had proceeded normally (with moderate air temperatures) up to the stage when veraison had just started.

Then followed an 11-day spell of very hot days and nights beginning on 8 January. Subsequently it became apparent that only the early berries on those bunches were expanding and colouring normally, apparently unaffected by the heat.

The remaining berries remained green. During the ensuing week or two when temperatures moderated, the green berries commenced ripening—but bunches had, by that stage, become much more variable in terms of berry ripening.

By the end of February, the Cabernet Franc bunch (Figure 11.12a, Coombe and Iland 2004) had 85 per cent of berries coloured but many were deficient in sugar having been derived from those that were green one month before.

At that stage, the sugar content of juice from all berries was measured and showed the following: 60 per cent of berries were 13° to 20°Brix and coloured purple, 18 per cent were 9° to 13°Brix and coloured pink, and 15 per cent were 4° to 9°Brix and still green.

Nearly all berries were seeded. Bryan speculated that high temperature had damaged phloem tissue in the bunch stems thereby disrupting translocation into the berries. This damage would have been subject to a variable degree of repair.

In your case you could confirm that it is not 'hen and chicken' by dissecting some of the small berries. You should



Possible example of 'sweet and sour' disorder in Cabernet Sauvignon bunches, 10 February 2014

find that they have seeds whereas true 'chicken' berries are either seedless or have seed traces.

Diagnosis of this disorder in this 2013/14 season may be problematical because there appears to have been a high incidence of millerandage* in some regions, particularly for varieties such as Cabernet Sauvignon, as a consequence of low temperatures during flowering and fruit set in spring of 2013.

On 10 February, some bunches were collected from Cabernet Sauvignon vines that would have experienced the same heatwave as your vines at a similar growth stage (Figure 1).

The sugar content of juice from 20 individual berries per colour class was measured. The large black berries averaged 21.1°Brix, the medium to large pink berries 16.5°Brix and the small to medium green berries 11.0°Brix.

Furthermore, every single berry on both bunches had at least one seed (a sample of dissected pink and green berries is shown in Figure 1). Therefore, it is reasonable to conclude that these bunches also have the 'sweet and sour' disorder. Asynchronous ripening occurs in every season to some degree—but it is possible that a heatwave at the start of veraison can cause even greater variability within a bunch.

What are the implications of the 'sweet and sour' disorder for fruit composition and sampling? Unlike 'hen and chicken' for which the chicken berries ripen just as well as hen berries (and thus have comparable sugar, acid and pH), there will be much greater variability of composition in the case of the 'sweet and sour' disorder and thus bunches that appear to be ripe as a whole, based on colour at harvest time, may contain a high proportion of under-ripe berries. You should sample whole bunches rather than just berries for pre-harvest compositional analysis and also ensure that all berries are crushed. **GW**

Further reading:

Coombe, B.G. (2000) Letter to the Editor. *Aust. N. Z. Wine Ind. J.* 15(2): 13.

Coombe, B.G. and Iland, P.G. 2004. *Grape Berry Development and Winegrape Quality*. Dry, P.R. and Coombe, B.G. (eds.) *Viticulture Volume 1 – Resources*. 2nd edition. Adelaide: Winetitles: 210-248.

Iland, P., Dry, P., Proffitt, T. and Tyerman, S. 2011. *The Grapevine – from the science to the practice of growing vines for wine*. Adelaide: Patrick Iland Wine Promotions.

* Hen and chicken is often used as a descriptor of poor fruit set when the term 'millerandage' is preferable. Millerandage refers to the condition when there is an excessively high proportion of seedless berries and live green ovaries relative to seeded berries. It is, along with coulure (excessive shedding of flowers and young berries resulting in relatively few berries), a symptom of poor fruit set.