Summary 215

VITICULTURE & ENOLOGY
UNIVERSITY OF CALIFORNIA DAVIS

Variation in Shiraz berry size originates before fruitset but harvest is a point of resynchronization for berry development after flowering

By: J. Gray and B. Coombe

In: Australian Journal of Grape and Wine Research. 15:156-165. 2009

• Large variation in berry size within a cluster is sometimes referred to as '*hen and chicken*', also known by the French word 'millerandage'. The problem is frequent in susceptible varieties (such as Chardonnay) growing in cool regions. A separate problem related to berry size is the presence of *'shot' berries*. Shot berries are undeveloped ovaries that remain attached to the cluster, caused by incomplete fertilization. The goal of this study was to determine when variation in berry size begins.

· The authors used an interesting approach to answer this question. They sampled Syrah clusters at 7 developmental stages: berry set, pea-size, softening, colored, pre-harvest, harvest, and post-harvest (corresponding to *Eichhorn-Lorenz* stages 27, 31, 34, 36, 37, 38, 39), and measured a number of berry parameters at each stage (weight, volume, surface, deformability, seed number, seed weight). Then, they quantified the variability of the data by calculating the coefficient of variation (CV) at each stage. (The coefficient of variation is a unitless measure defined as the variation of a group of data relative to its sample mean.) **By comparing CVs across sequential stages, the authors were able to narrow down when the variation for a given parameter started to occur**, based on the following 3 potential outcomes:

If	$CV_A < CV_B$	**then**	**sample variation increased between stages A and B**
If	$CV_A > CV_B$	**then**	**sample variation decreased between stages A and B**
If	$CV_A = CV_B$	**then**	**there was no change in sample variation bet. A and B**

• **Results. Variation in berry weight, volume and surface area**. 1) All of these parameters followed a double-sigmoidal pattern during development. Berry size increased particularly rapidly between the 'softening' and 'colored' stages, and then declined in the last three stages (pre-harvest, harvest, and post-harvest). 2) Variation in berry weight, volume and surface area were already very high at the 'setting' stage, declining significantly at the 'pea-size'and 'harvest'stages. This indicated to the authors that **variation in berry size originates very early, and then a resynchronization takes place as the berries approach harvest**.

• **Variation in berry deformability.** By harvest, berries had softened so much that their ease of deformation exceeded the range of sensitivity of the researchers' instrument (calliper gauge). As a result, deformability was only recorded until 'pre-harvest'. 1) There was a sharp increase in berry deformability at the 'softening' stage, as the name indicates. But there was also an unexpected decrease in deformability

at the ‘pea-size’ stage. 2) The authors found a significant decrease in variation at the ‘colored’ stage, which they interpreted as a resynchronization of development taking place around veraison.

• **Variation in berry combined seed weight.** 1) Seed weight increased slightly between ‘pea-size’ and ‘softening’, and then decreased significantly ‘pre-harvest’. This means that the seeds had begun to dehydrate with the onset of ripening. 2) The variation in “combined seed weight” was high at every stage, partly due to important variations in seed number.

• **Berry weight versus seed weight.** The authors studied the relationship between berry weight and combined seed weight. As *combined seed weight* (weight of all seeds present) increased, berry weight increased, but the slope of the relationship curve (the amount of increase) went up as the berry developed. Similarly, as seed number per berry increased, berry weight also increased, but this relationship, once again, changed with each developmental stage. Basically, what this means is that *berry growth* and *seed growth* became uncoupled in the early stages of development (post-bloom); that is, seeds achieved maximum size at ‘softening’, while berries continued growing.

• You may want to take a look at the authors’ curves for the various parameters measured, as it is very interesting to notice when each reached a maximum value. For instance, berry surface area, berry fresh weight and berry volume all reached a maximum at the ‘colored’ stage [*not harvest, so berries do always ‘shrink’ to some extent!*]. Combined seed weight reached its maximum at ‘softening’. Finally, a maximum value for deformability was recorded at ‘pre-harvest’, even if this parameter was likely to have continued increasing (instruments couldn’t measure any further).

• In conclusion, the authors showed that berry size variation starts prior to set, and harvest is a point of resynchronization. Therefore, both ‘floral differentiation’ and ‘timing of harvest’ are crucial stages to achieve a harvest of homogeneous berry size.

However, and on a completely different note, the authors are unsure how important the role of homogeneous berries is in determining wine quality. Even though berry size variation is presumed to have a negative impact on juice composition and wine quality, they also remind us that this presumption is still scientifically unproven.

Author: Bibiana Guerra, Editors: Kay Bogart, Matthew Fidelibus. This summary series funded by J. Lohr Vineyards & Wines.