Summary 11

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Title: **"Cluster thinning effects on three deficit-irrigated *Vitis vinifera* cultivars"**

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Because evidence of a strict relationship between yield and quality is limited, this article's objective is to study the effect of timing of crop thinning on the ripening and final fruit composition of several cultivars. The authors hope to be able to test whether the following hypothesis is correct: "Cluster thinning, especially early thinning, would accelerate ripening and improve fruit composition". To do that, they follow-up the trial for 5 consecutive years (1997-2001)

The study takes place in Yakima Valley (WA). The authors compare an early thinning (30 days after bloom) and a late thinning (at veraison) in Cabernet sauvignon, Riesling, and Chenin blanc.

- "Thinning" consisted of the removal of clusters from non-count shoots, as well as small clusters on weak count shoots. Target yields were the industry standards for each variety at the time (Cabernet sauvignon 6.7 tons/ha, Riesling 9 tons/ha, Chenin blanc 11.2 tons/ha). To calculate how much crop to drop, yield estimations took into consideration clusters/vine, berry count/cluster, and historical berry weight data at harvest.

- For each of these treatment variables (year, variety, time of thinning), the authors measured the following parameters: weather data, soil moisture; leaf area, and yield components. Additionally, they measured juice Brix, TA and pH, as well as wine color. After a thorough statistical analysis, they were able to see if any of the measured parameters was particularly influenced by, or correlated with, year, variety, or time of thinning.

- The authors make a distinction among three similar ways of expressing yield, which are worth emphasizing here. These terms are **crop level** (kg of fruit per vine), **crop load** (fruit to pruning weight ratio), and **yield** (tons per hectare). As we will see, not all change at the same time.

- Before presenting the results, the authors review a few parameters that characterize a well-balanced canopy: **leaf area:fruit weight** =0.8-1.2 m^2/kg, **fruit to pruning weight ratio**=5-10, and **shoot density**= 15/meter (4.5 shoots/foot).

- **Vegetative growth**. Cluster thinning did not affect vegetative growth (for example leaf area, shoot length) for any of the varieties. Pruning weights, a measure of vine size, were, in contrast, proportional to crop level and yield. In other words, larger vines had the capacity to support a heavier crop.

- **Yield and crop load**. Cluster thinning decreased, as intended, both crop level and crop load in all three cultivars (36% crop level reduction in Cabernet sauvignon, 17% Riesling, and 20% Chenin blanc). The magnitude of the decrease was similar for the early and the late thinnings. Thinning also reduced cluster numbers by 1/3 in Cabernet sauvignon and Chenin blanc, and by 1/4 in Riesling.

- **Yield components**. Even though early-thinning tended to produce larger berries than those of the control, by harvest the differences had disappeared. Early thinning did increase berry weight only in 1999, which was the coolest year. However, late thinning did not affect final berry weight in any of the years studied.

- **Ripening rate.** The harvest target Brix was 21.5 B for whites and 23 B for reds. All treatments within each variety (early thinning, late thinning, and control) were harvested on the same day. Crop thinning had a small effect on harvest Brix. Over the 5 years, early-thinned fruit was, on average, only 0.5 B higher than the control (despite the 36% fruit drop). Late thinned fruit was only 0.25 higher than the control. In general, Brix differences progressively declined over the course of the ripening period.

- **Fruit composition**. Besides the small impact on Brix, crop thinning did not have an effect on final TA or pH. Anthocyanin levels in Cabernet were strongly influenced by the weather conditions of each particular year, but they were not affected by thinning.

- The authors mention a couple of exceptions to the above trends. Year 1998 was an outlier year in that the crop was extremely heavy for all three cultivars (mean daily temperatures were also higher this year). The authors note that this was the only year in which there was a negative correlation between crop level and Brix. (Still, even then, it was only true for Riesling and Chenin blanc, not Cabernet sauvignon). Another outlier that the authors discuss is Chenin blanc. This variety was particularly sensitive to high crop levels (or shoot densities higher than 50 shoots per canopy meter), which caused an important increase in juice TA and a decrease in pH.

As we can see, the data failed to prove the hypothesis that "thinning accelerates ripening and improves fruit composition". This means that, just because we thin the crop, it doesn't follow that the Brix will necessarily be higher, the harvest be advanced, or final color improved. And this applies regardless of the timing of the thinning. As the authors point out, seasonal differences (such as temperature or soil moisture) have far more impact than thinning. The authors conclude that, under the conditions of the study (deficit-irrigated winegrapes in the arid Yakima Valley) thinning was unnecessary. And they leave us with another author's quote: "Each region should investigate for each cultivar and each training system which is the optimum yield to produce both quality and an economic crop". Still, the authors recommend cluster thinning when both high yield potential and a cool growing season coexist in any given year.

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