Summary 12

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Title: **"Timing of shoot thinning in *Vitis vinifera*: impacts on yields and fruit composition variables"**

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Most shoot thinning studies have addressed the optimal shoot density, but not the optimal **timing** –or phenological stage- for this operation. These authors hypothesize that, to achieve an effective vigor reduction and prevent stimulation of the remaining shoots, the optimal timing for shoot thinning would be late in the season, after fruit set. This, they believe, would lead to enhanced fruit exposure and better fruit composition. The goal of this paper is to test whether this hypothesis is correct.

- The authors compared 5 thinning dates, spaced about 1 week apart, and happening at the following phenological stages: stages 9-12 (3-5 expanded leaves), stage 15 (visible flower clusters), stages 19-21 (full bloom), stages 25-27 (berry set), and stages 29-31 (berry cell division). (The numbers correspond to the grape development nomenclature proposed by Eichhorn and Lorenz in 1977). Thinning consisted of removal of all secondary and tertiary shoots on "count" positions, as well as all shoots on "non count" positions.

- The authors applied the thinnings in two varieties, which had been pruned to canes in the Ontario area (Pinot noir and Cabernet franc), and carried the trial for two growing seasons (2001 and 2002). Additionally, they included a "double-prune" treatment for Cabernet franc in both years. This treatment consisted of retaining a third and a fourth cane ("kicker canes") that were removed one week after stage 29-31. Finally, an un-thinned control was included.

- The authors measured how each of these 7 treatments affected **yield** (total yield, clusters/vine, cluster weight, berries/vine, berry weight, shoot density, length of periderm formation), **canopy** (leaf layer number, % exposed leaves, % exposed clusters, main shoot and lateral leaf areas, photosynthetic photon flux density, vine size), **juice composition** (Brix, TA, pH, hue, color intensity, phenols, anthocyanins), **wine composition** (TA, pH, hue, color intensity, phenols, anthocyanins), and **wine sensory** characteristics (descriptive analysis using 16 different attributes). The authors actually broke down juice composition parameters into "berry composition parameters" and "must composition parameters", a distinction that we will overlook here for the sake of simplicity.

- **Yield components.** Shoot thinning tended to reduce total yields, mainly due to a reduction in cluster numbers, but the effect was small. Later shoot thinnings reduced yields more than earlier thinnings. Interestingly, there was some tendency for the mid-range thinnings (stages 15 and 19-21) to increase yield above the control, but this was only observed for Pinot noir, and only in 2002. Double-pruning also decreased yield compared to the control.

- **Canopy architecture.** Shoot thinning reduced the number of leaf layers, and increased the percentage of exposed clusters and exposed leaves. These positive effects were more significant when the thinning was performed late (fruit set, and berry growth stage I). Photosynthetic photon flux density –light usable for photosynthesis- increased slightly with the late thinning, but only in Cabernet franc and in year 2002. Interestingly, early thinning tended to increase leaf area when compared to the control in Pinot noir, but a similar effect was not observed in Cabernet franc.

- **Juice composition.** There were very few clear and consistent trends. Soluble solids – or Brix – tended to increase with shoot thinning, particularly in the earlier stages, but only in Pinot noir and in 2001. Total acidity tended to decrease for both varieties, but only in 2002. The authors suggest this may be related to a decrease in malic acid due to increased cluster exposure in the shoot thinning treatments. As for pH, it was unaffected or had a slight increase in both seasons. Other authors have reported increased pH values with reduced shoot densities. Double pruning (leaving a "kicker" cane) clearly decreased total acidity.

- **Wine composition.** Pinot noir showed little or no response to shoot thinning in both years. In contrast, Cabernet franc showed a trend for increased color, increased phenols and increased anthocyanins with shoot thinning, but only in 2001. This effect happened with both early and late thinnings. Double pruning clearly had a beneficial effect on phenolic compounds, as it increased spectrophotometric color, total phenols and anthocyanins in both 2001 and 2002.

- In summary, consistent changes in the magnitude of an effect with increasing delays in shoot thinning could not be found. Instead, differences among thinning timings were small and mixed. Thus, the authors were unable to prove their hypothesis that delaying shoot thinning until after fruit set would help reduce vigor and lead to improved fruit exposure and composition. They conclude that, even though delaying shoot thinning until after bloom had an overall positive impact in canopy microclimate, the effects are likely not large enough to influence wine quality.

I think this paper reiterates how agronomic data rarely give us the linear responses we would be happy to see. It also points out that two years is probably an insufficient amount of time to draw conclusions about any given viticultural practice with any confidence.

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