



Effect of irrigation amount and preharvest irrigation cutoff date on vine water status and productivity of Danlas grapevines

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- Twelve-year old Danlas (*V. vinifera*)/110R table grapes in a commercial vineyard close to Rabat, Morocco, were head-trained and pruned to 4 canes that were trellised to a vertically-divided double “T” (Pergollete). During 2000 and 2001, 4 irrigation treatments were conducted: 1) no irrigation, 2) early cut-off (berry set), 3) late cut-off (veraison), and 4) no cutoff or traditional irrigation. For each irrigation treatment above, 2 different irrigation volumes were imposed by using either 2 L/h or 4 L/h emitters. The experiment was a split-plot design replicated 4 times (6 vines per replication).
- To evaluate each irrigation strategy, the authors measured: 1) soil water content, 2) mid-day leaf water potential, 3) canopy temperature, 4) shoot length, 5) yield and yield components, and 6) pruning weights.
- **Results.** 1) **Water potential** reached the most negative values (most stressed value) in the “early cutoff” (-1.6 MPa, or -16Bars, on average), compared to “no cutoff” (-1.0 MPa, -10Bars). Other treatments were in between. Midday water potential correlated well with soil water content. 2) **Canopy temperatures** for the “early cutoff” vines ranged between 22°-33°C, in comparison with the lower temperatures of the “no cutoff” (15-26°C). Reading canopy temperature is important because previous reports have correlated plant transpiration with the difference between the temperature of the canopy and the temperature of the surrounding air.
- 3) **Shoot length** was shorter in the “early cutoff” and the “no irrigation” treatments, compared to the “no cutoff”. The rate of applied water (2 or 4 L/hr) had a small effect. 4) Somewhat in agreement, “no cutoff” and “late cutoff” showed the highest **pruning weights**, whereas “no irrigation” had the lowest (“early cutoff” was intermediate). 5) “Late cutoff” and “no cutoff” vines had the highest **yields**; and “no irrigation” had the lowest. Doubling the amount of applied water had no significant effect on yield. Yield differences were mainly due to cluster weight, not to cluster number. **Withholding water at berry set (“early cutoff”) significantly reduced berry size. In contrast, withholding water at veraison (“late cutoff”) had no significant effect.** As a result, the lowest berry weights were those of the no irrigation, followed by the “early cutoff”.
- In contrast, the highest berry weights were those of the “no cutoff” treatment. 5) “No irrigation” caused lower **soluble solids** than the remaining treatments. There were no significant differences in TA or pH.

The authors were able to make the following recommendations:

- _ in general, the commercial grapevines at this particularly location were under-irrigated with regard to estimated vineyard ET.
- _ a value of $T_C - T_A$ (canopy temperature – air temperature) higher than -2.5°C –that is, less negative, indicating canopy temperature getting closer to ambient temperature- could be considered a value indicating initial water stress.
- _ a value of mid-day ψ_L (leaf water potential) of -1.0 MPa could also be considered a threshold for vines to start experiencing water stress. Either $T_C - T_A$ or ψ_L could be used to determine when to initiate irrigations early in the growing season.
- _ under limited water reserves (as is the case in Morocco), an irrigation cutoff at veraison would be an adequate strategy to conserve water and, at the same time, minimize yield reduction. Additionally, this treatment may also favor sugar accumulation and prompt an earlier harvest.

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