



Partial rootzone drying: effects on growth and fruit quality of field-grown grapevines (*Vitis vinifera*)

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These authors compared four irrigation approaches: Deficit Irrigation (DI), Partial Rootzone Drying (PRD), Full irrigation (FI), and No irrigation (NI). They considered the results insufficient to encourage growers to switch from DI to PRD.

- In DI, as we know, a percentage of ET is applied throughout the season. In PRD, the rootzone is simultaneously exposed to wet -half of the roots- and drying soils -the other half- in the belief that the watered side would maintain the water status of the plant, while the drying side would control vegetative growth and stomatal conductance. PRD is controversial because it has not been clearly concluded whether its effects are truly different from those of DI.
- In this study, PRD and DI were compared using the same water deficit (50% ET). Full Irrigation had 100% ET, and No irrigation was rain-fed. The trial took place for two consecutive seasons (2000-2001) in Southern Portugal. This part of Portugal normally receives 550 mm (34") of rain, 400 mm (24") of which fall during the dormant period. The soil was mostly sandy with a clay area at 3 feet of depth. Irrigation took place 2X per week from fruit set to one week before harvest. The PRD cycle was 15 days. There were 4 replications consisting of 15-20 vines each per treatment.
- **Water status.** Fully irrigated vines exhibited high water potentials throughout the season (> -0.2 MPa, or -2 bars). Non irrigated vines declined, as expected, as the season progressed (attaining -0.7 MPa, or -7 bars by the end of August). Both PRD and DI vines presented intermediate values.
- **Vegetative growth.** 1) There were no differences in shoot number. However, shoot weight was lower in PRD and NI (no irrigation) than in FI (full irrigation) and DI. 2) Total leaf area of PRD was similar to that of NI vines. 3) NI had the narrowest canopy; PDR was intermediate; and DI an FI had the widest. 4) Leaf layer number was lower in NI and PRD, compared to DI and FI. This means that PRD controlled vegetative growth better than RD, allowing higher light interception in the fruit zone.
- **Yield and fruit composition.** 1) Full irrigation had the highest yield, PRD and DI had intermediate values, and the non irrigated treatment had the lowest yield. Yield differences were mostly due to cluster weights. 2) Water use efficiency was almost double in PRD and DI compared to FI. 3) Irrigation treatment had no effect on Brix in both seasons and varieties, but it did increase TA in Castelao. 4) Irrigation (be it PDR, DI or FI) had a negative effect on skin anthocyanins and phenols of Castelao. Still, PDR presented the highest anthocyanin levels of the three.

In conclusion, both Partial Rootzone Drying and Deficit Irrigation caused a marked reduction in vigor, slightly reduced yields, a slight increase in fruit quality, and a marked improvement of water use efficiency, compared to Full irrigation. The main difference between PRD and DI was a better control of vegetative growth in PRD. Even though the authors admit that, in certain years, PRD could provide better fruit quality than DI, they are unsure whether the differences observed are large enough to justify encouraging growers to switch from DI to PRD.

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