Radiation-associated effects on regulated deficit irrigation management in grapevine cv. Cabernet Sauvignon

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Abstract

The main challenge of regulated deficit irrigation (RDI) research is to isolate the factors that come with RDI, the direct effect of plant water status from the indirect ones like increased radiation and temperature changes on the cluster zone. This study aims to isolate the effects of vine water status from the effects of increased radiation on the phenolic composition of grapes subjected to RDI.

A three-year study on an RDI experiment where radiation was controlled was implemented in a commercial vineyard of Cabernet Sauvignon in Chile. Four RDI treatments based on partial evapotranspiration (ET) irrigation were established. Irrigation treatments were 100% ET, 70% ET, 50-100% ET (50% ET before veraison and 100% ET afterward), and 35-100% ET (35% ET before veraison and 100% ET afterward). Radiation in the cluster zone was measured on a weekly basis and shading nets were installed in part of the trial to reduce radiation as soon as the RDI treatment started to increase it. Also, leaf removal was applied to the control treatment to increase radiation at the same levels as RDI treatments. Anthocyanins, Flavan-3-ols, and Flavonols were measured at harvest.

Findings reveal that increased radiation on the control due to leaf removal does not reduce the concentration of flavan-3-ols and the water deficit effect is maintained in shaded vines. Regarding flavonols all of them increased due to radiation in the leaf removal control, some of them maintained the effect RDI in shaded vines like myricetin but others lost their effect like quercetin.

Keywords: deficit irrigation, radiation, phenolics.