



Optimization of irrigation water in stone fruit and table grapes

Jose M^a de la Rosa, Cristina Castillo, Abdel Temnani , and Alejandro Pérez-Pastor

Technical University of Cartagena, Higher Technical School of Agricultural Engineering, Plant production, Cartagena, Spain
(alex.perez-pastor@upct.es)

In water scarcity areas, it must be highlighted that the maximum productions of the crops do not necessarily imply maximum profitability. Therefore, during the last years a special interest in the development of deficit irrigation strategies based on significant reductions of the seasonal ET without affecting production or quality has been observed. The strategies of regulated deficit irrigation (RDI) are based on the reduction of water supply during non critical periods, the covering of water needs during critical periods and maximizing, at the same time, the production by unit of applied water. The main objective of this experiment was to implement, demonstrate and disseminate a sustainable irrigation strategy based on deficit irrigation to promote its large scale acceptance and use in woody crops in Mediterranean agroecosystems, characterized by water scarcity, without affecting the quality standards demanded by exportation markets.

Five demonstration plots were established in representative crops of the irrigating community of Campotejar (Murcia, Spain): i) Peach trees, cv. catherina in the "Periquitos" farm; ii) Apricot trees, cv. "Red Carlet" in "La Hoya del Fenazar" farm; iii) Nectarine trees, cv. Viowhite in "Agrícola Don Fernando" farm; iv) Table grape, cv "Crimson Seedless" in "La Hornera" farm; and v) Paraguayan cv. carioca in "The Hornera" farm. In each demonstration plot, at least two irrigation treatments were established: i) Control (CTL), irrigated to ensure non-limiting water conditions (120% of crop evapotranspiration) and ii) Regulated deficit irrigation (RDI) irrigated as CTL during critical periods and decreasing irrigation in non-critical periods.

The plant water status indicators evaluated were midday stem water potential and Trunk Diameter Fluctuation derived indices: maximum daily shrinkage (MDS) and trunk daily growth rate (TGR); vegetative growth of the different crops from trunk diameter and pruning dry weight, fruit growth and fruit fresh weight, yield and quality of the harvest were also measured.

The irrigation applied in CTL during the 2015-16 was 6770, 7691, 6673, 6774 and 7020 m³ ha⁻¹ year⁻¹ while the decrease in irrigation in RDIs was 28, 40, 12, 34 and 25% for nectarine, peach, apricot, paraguayan and table grapes, respectively. The plant water status indicators used were sensitive to water deficit and showed moderate water stress in RDI. The water deficit affected, to a greater or lesser extent, the vegetative growth of the crop. On the other hand, the yield and fruit quality parameters (size, firmness, total soluble solids, acidity and maturity index) at harvest were not affected by the deficit irrigation. In this way, the water use efficiency increased significantly in RDI treatments.

From the information obtained in the demonstration plots irrigation recommendations were made to the farmers of the irrigation community through the project web page. Farmers in the irrigation community are using this information to manage irrigation on their farms, thus improving the profitability of their crops.

Acknowledgements

This work has been funded by the European Union LIFE+ project IRRIMAN (LIFE13 ENV/ES/000539).