Geophysical Research Abstracts
Vol. 20, EGU2018-1390, 2018
EGU General Assembly 2018

A more sustainable and efficient definition of Regulated Deficit Irrigation phases in olive (Olea europaea L.)

Sara González-Mora (1), David Pérez-López (2,3), Hava F. Rapoport (4), Ana Centeno (2,3), Alejandro Galindo (5), Mireilla Corell (6), Ignacio Giron (7), María José Martín-Palomo (6), Carmen Moreno (1), Arturo Torrecillas (8), Alfonso Moriana (6), and Marta María Moreno (1)

(1) Universidad de Castilla-La Mancha, Escuela Técnica Superior de Ingenieros Agrónomos, Dept. de Producción Vegetal y Tecnología Agraria, Ciudad Real, Spain (martamaria.moreno@uclm.es), (2) Dept. de Producción Agraria, ETSIAAB, Universidad Politécnica de Madrid, 28040, Madrid, Spain, (3) 3CEIGRAM, Centro de Estudios e Investigación para la Gestión de Riesgos Agrarios & Medioambientales, 28040 Madrid, Spain, (4) Instituto de Agricultura Sostenible, IAS-CSIC, Alameda del Obispo S/N, 14004 Córdoba, Spain, (5) 5Dept. of Water Engineering & Management, Faculty of Engineering Technology, University of Twente, P.O. Box, 217, AE Enschede, The Netherlands, (6) Dept.de Ciencias Agroforestales, Universidad de Sevilla, Carretera de Utrera km. 1, 41013 Sevilla, Spain, (7) Instituto de Recursos Naturales y Agrobiología (CSIC), P.O. Box 1052, E-41080 Sevilla, Spain, (8) Dept. Riego, Centro de Edafología y Biología Aplicada del Segura (CSIC), P.O. Box 164, E-30100 Espinardo, Murcia, Spain

Water is a limited but highly essential resource, with large quantities required for agriculture. Regulated Deficit Irrigation (RDI) is an agricultural technique with great relevance for water savings worldwide, in which water stress is imposed by irrigation withholding based on fruit growth phases. The objective of this method is to identify phases where water stress has little or no effect on yield. RDI in olive has been demonstrated as an efficient tool to save water without negatively affecting yield. In olive trees, the mid-summer "pit hardening" is recognized as the most drought-resistant phenological stage, and has been used successfully for RDI water savings even though neither the description, boundaries, nor length of the period have been cleared reported. Many studies merely utilize a constant reference date for pit hardening, providing no explanation regarding how it was estimated or measured, while a few cases report the resistant to a knife-cut as the proper method to identify hardening, but leave unclear whether it represents its onset or completion. Recent studies have addressed these uncertainties, better showing the nature and duration of olive pit hardening, to which RDI can now be fitted. The objective of this current work was to determine if a RDI strategy more precisely fitted to pit hardening influences yield. In Ciudad Real (Spain) in 2016 and 2017, four irrigation treatments were applied in an 'Arbequina' olive orchard planted at 7 x 4.75 m in 1999. Treatment T1 consisted in water stress during pit hardening, aiming to maintain stem water potential (SWP) of -2 MPa during this phase. Treatment T2 was severely water stressed, aimed at maintaining -3 MPa during the same phase. In the rest of the season, before and after pit hardening, both treatments were irrigated to prevent water stress. Additionally, a highly deficit treatment was established (T3), irrigated only after pit hardening was completed. A control treatment (T0), irrigated following FAO methodology, was established to determine potential yield. Irrigation water savings with respect to T0 were approximately 45%, 57%, and 77% for T1, T2, and T3, respectively. There were no significant yield differences among treatments, although 2017 was nearly significant ($P = 0.06$), as when both years were considered together, due to the low yield of T3. Average yields from the two years were 25, 24, 23 and 21 kg tree-1 in T0, T1, T2 and T3, respectively. In conclusion, basing RDI on a new, more precise definition of the pit hardening phase produces similar yields with higher water savings, with the consequent environmental, economic and energetic benefits.