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VII SIMPÓSIO NACIONAL DE OLIVICULTURA DE LA ASSOCIAÇÃO PORTUGUESA DE HORTICULTURA (APH)
Badajoz-Elvas, 13, 14 e 15 de abril de 2016

Evaluation of water use, yield and water productivity of a high-density orchard (cv. Cobrançosa) subjected to different irrigation regimes – An account of four years

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The impact of different irrigation scheduling regimes on the water use, yield and water productivity from a high-density olive grove cv. Cobrançosa in southern Portugal was assessed during the irrigation seasons of 2011, 2012, 2013 and 2014. The experiments were conducted in a commercial olive orchard at the Herdade Álamo de Cima, near Évora (38o 29' 49.44'' N, 7o 45' 8.83'' W; alt. 75 m) in southern Alentejo, Portugal. The orchard was established with 10-year old Cobrançosa trees in grids of 8.0 x 4.2 m (300 trees ha^{-1}) in the E-W direction, and experiments conducted on a shallow sandy loam Regosoil Haplic soil. From mid-May to the end of September the orchard was irrigated and three plots were subjected to one of two irrigation treatments: a control treatment A, irrigated to replace 100% ETc, a moderate deficit irrigation treatment B irrigated to 70% of ETc, and a more severe deficit irrigation treatment C that provided for approximately 50% of ETc. Daily tree transpiration rates were obtained by continuously monitoring of sap flow in representative trees per treatment. Among the irrigated treatments, water use efficiency (WUE, ratio of water used to irrigation- water applied) of treatment C was the highest, with a value of 0.89, being treatment B slightly lower,

with a WUE of 0.76. Olive harvest for 2012 was an exceptional “on year”. Bearing yields showed contrasting differences within years where an “on year” was followed by an “off year”. In 2011 and 2012 treatment B yields were 41 and 50% higher than treatment C, respectively. In 2013 treatment B yield was 45% higher than yield of the fully irrigated treatment A, and treatment C showed practically the same yield than treatment A. In the “on year” of 2014 treatment B averaged 48% higher yield than treatment C. Treatment B farm irrigation water productivity (WPI-Farm, ratio of yield to water applied) was the highest among all treatments. Treatment A showed the lowest conversion efficiency of all treatments, indicating treatment B as the adequate deficit irrigation treatment for our Cobrançosa orchard

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Key-words: olive irrigation; farm irrigation water productivity; Cobrançosa; olive

transpiration; olive deficit irrigation.

Acknowledgments: This work is supported by FCT – Foundation for Science and Technology through the SFRH/BSAB/113589/2015 programme from which the authors