**Title** Effect of irrigation water reduction strategies on quality at harvest and during storage of in-shell almonds

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**Abstract**

Field-grown almond trees (*Prunus amygdalus* L. cv. Marta) were subjected to the following 4 irrigation treatments: I) full irrigation at 110% of ETc since 1999 (FI) II) partial rootzone drying at 50% of ETc, periodically supplied to only one side of the root system, since 2003 (PRD); III) regulated deficit irrigation at 100% of ETc until June and at 30% of ETc from June until the end of August, since 2003 (RDI); IV) rain fed since 2006 (NI). In August 2007, almonds were harvested, dried in the orchard and stored in shell at room temperature for 9 months. Yield average (per ha) was recorded. Initially and after 2, 5 and 9 months of storage the following determinations were carried out: peel color, rupture force, sensorial analysis and oil content (on the kernels), acidity, peroxide value and tocopherols content (on the mechanically extracted oil), and antioxidant activity, total phenols and sugar composition (on the defatted powder). Average yield for NI trees resulted significantly lower than yield for FI trees, while yield for RDI and PRD trees showed intermediate values, not significantly different from the other two treatments. Oil content was not affected neither by water regime or storage time. Differences on kernels and oil quality were more marked during storage, than at harvest. After 2 months of storage, NI kernels showed a different peel color from all the other treatments, while no differences were observed after 5 and 9 months. Rupture force decreased during storage with the same pattern for all the irrigation treatments. The absence of irrigation resulted in a higher total sugar content, and in particular in sucrose content, with no difference among other treatments. FI, PRD and RDI samples did not show differences in antioxidant activity and phenols content during storage, while NI samples showed the lowest values in these parameters after 5 months and also received the lowest sensorial evaluation for appearance, and, after 5 months, also for crispness attributes. As for oil quality, acidity and peroxide values increased during storage, regardless to water supply. Oil from NI samples had an higher α-tocopherol content than RDI and FI, after 2 and 5 months of storage, while PRD showed an intermediate value. In conclusion, both irrigation water reduction strategies (PRD and RDI) did not significantly affected the yield/ha and produced almonds similar in quality to that obtained by full irrigation but with a reduced use of water.