

## Improved Water Productivity by Deficit Irrigation: Implications for Water Saving in Orange, Olive and Vineyard Orchards in Arid Conditions of Tunisia

**Authors :** K. Nagaz, F. El Mokh, M. Masmoudi, N. Ben Mechlia, M. O. Baba Sy, G. Ghiglieri

**Abstract :** Field experiments on deficit irrigation (DI) were performed in Médenine, Tunisia on drip-irrigated olive, orange and grapevine orchards during 2013 and 2014. Four irrigation treatments were compared: full irrigation (FI), which was irrigated at 100% of ET<sub>c</sub> for the whole season; two deficit irrigation (DI) strategies -DI75 and DI50- which received, respectively, 25 and 50% less water than FI; and traditional farming management (FM) - with water input much less than actually needed. The traditional farming (FM) applied 11, 18, 30 and 33% less water than the FI treatment, respectively, in orange, grapevine and table and oil olive orchards, indicating that the farmers practices represent a form of unintended deficit irrigation. Yield was reduced when deficit irrigation was applied and there were significant differences between DI75, DI50 and FM treatments. Significant differences were not observed between DI50 and FM treatments even though numerically smaller yield was observed in the former (DI50) as compared to the latter (FM). The irrigation water productivity (IWP) was significantly affected by irrigation treatments. The smallest IWP was recorded under the FI treatment, while the largest IWP was obtained under the deficit irrigation treatment (DI50). The DI50 and FM treatments reduced the economic return compared to the full treatment (FI), while the DI75 treatment resulted in a better economic return in respect to DI50 and FM. Full irrigation (FI) could be recommended for olive, orange and grapevine irrigation under the arid climate of Tunisia. Nevertheless, the treatment DI75 can be applied as a strategy under water scarcity conditions in commercial olive, orange and grapevine orchards allowing water savings up to 25% but with some reduction in yield and net return. The results would be helpful in adopting deficit irrigation in ways that enhance net financial returns.

**Keywords :** water productivity, deficit irrigation, drip irrigation, orchards

**Conference Title :** ICWRM 2017 : International Conference on Water Recycle and Management

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** July 27-28, 2017