



Regione Puglia



IRRIMED 2015

International Conference on
**“Modern technologies, strategies and tools
for sustainable irrigation management
and governance in Mediterranean agriculture”
(IrriMed 2015)**

Valenzano (Bari, Italy), 23-25 September 2015

Proceedings - Book of Abstracts

Editors:

F. F. Montesano, A. Parente, N. Lamaddalena, M. Todorovic, L. Trotta



European Territorial Cooperation Programmes (ETCP)
GREECE-ITALY 2007-2013

Co-funded by the European Union (ERDF)
and by National Funds of Greece & Italy



Efficient Irrigation Management Tools for Agricultural
Cultivations and Urban Landscape

ROOT SIGNALING AND TREE PHYSIOLOGY IN RELATION TO IRRIGATION METHODS

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Abstract

Irrigation methods differ in the amount of soil surface and wetting volume. Soil moisture is among the most dominant variable affecting plant water relations, however there are still some physiological issues not fully explored especially for abundants of hormones at root scale. Soil moisture is also involved in the CO₂ soil emission processes, however information on the impact of various irrigation systems on these emissions are limited. Therefore this study compared the influence of micro-jet (MJ) and drip irrigation methods (D) on levels of ABA and indole acetic acid (IAA) in roots and on soil CO₂ emission. Two plots were identified at a peach orchard (1666 p ha⁻¹) located in Southern Italy, and irrigated by MJ (35 L h⁻¹) and D (16 L h⁻¹). Irrigation volumes were calculated according to ET₀ released by local weather station. Plant water status (pre-dawn leaf water potential) was kept optimal in both plots. In mid summer, roots were sampled along the row and inter-row position for ABA and IAA determinations (ELISA), similarly CO₂ soil emissions were measured. Results reveal that ABA is increased in inter-row roots at the D plot being 1.84-fold higher than those of MJ, despite both plots had similar water status. The CO₂ soil emissions were substantially 31.8% lower in D plot compared to the MJ one. Based on the physiological effect of ABA and carbon gain and the overall low CO₂ soil emissions observed in D plot, the ecological significance of the irrigation method is discussed.

Keywords: *water use efficiency, hormonal interaction, abscisic acid, indole-acetic acid, drought stress*