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WATER STRESS RESPONSE EVALUATION IN OLEA EUROPAEA L . CULTIVARS: A MULTIDISCIPLINARY APPROACH

SALIMONTI A.*, LUCCHESE P. G.*, BENINCASA C.*, DESANDO M.*, NICOLETTI R.*, SANTILLI E.*, LODOLINI E. M.**, MERCATI F.***, SUNSERI F.****, CARBONE F.*

*) Research Centre for Olive, Citrus and Tree Fruit, Council for Agricultural Research and Economics (CREA), Rende, Italy
**) Research Centre for Olive, Citrus and Tree Fruit, Council for Agricultural Research and Economics (CREA), 00134 Roma, Italy
***) Institute of Biosciences and BioResources (IBBR), National Research Council of Italy (CNR), 90129 Palermo, Italy
****) Department of Agriculture, University Mediterranea of Reggio Calabria, 89124 Reggio Calabria, Italy

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The current climate change is affecting the whole agricultural sector. A greater demand for irrigation is occurring for many crops and even a xerophilous species, such as the olive tree, needs an adequate water supply to guarantee a quality production. Although, over the years, some olive cultivars with a greater tolerance to water stress have already been selected, given the complex physiological response to the condition of such stress, there is still little information relating to genes and metabolic pathways directly involved in the tolerance mechanism. A study is underway in genotypes with different responses to water stress, in order to identify genes with key roles in the regulation of metabolic pathways potentially involved in these processes, useful to support and integrate future olive tree breeding programs. An initial screening was launched for six dual-purpose olives, raised under controlled conditions: 'Arbequina', 'Coratina', 'Frantoio', 'Itrana', 'Leccino', 'Moraiolo'. Part of the plant material was inoculated with commercial mycorrhizae, their role in improving the resilience of crops against water deficit is reported in the literature. After a period of post-repotting acclimatization, half of the set of plants, for each cultivar, was placed in conditions of progressive water deficit for a period of five weeks, while the other half was

irrigated regularly. During the experimental test in vessel, numerous physiological parameters were measured, and the levels of target molecules known to be linked to the response to the water deficit of the plant as proline, total sugars and abscisic acid were analyzed. At the same time, in the same samples, the levels of gene transcripts of some water stress markers coding for aquaporins, channel proteins localized at the level of cell membranes, were monitored. This integrated approach made it possible to identify, among the six genotypes studied, the two cultivars having the most contrasting response to the stress condition. The effect of mycorrhizae in improving the response of olive cultivars to the condition of water deficit was also confirmed. Finally, for the two genotypes identified, a comparative analysis of gene expression profiles on a large scale was started through Next Generation Sequencing (RNASeq), in order to identify consortia of genes that play key roles in the response to water stress.

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