P448. Evaluation of olive beneficial rhizobacteria as protectants against drought and salt stresses: examining the potential involvement of bacterial 1-aminocyclopropane-1-carboxylate deaminase activity

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Stress caused by drought and high salinity can affect growth and productivity of olive (Olea europaea L.) trees. The phytohormone ethylene plays essential roles in plants but high levels in response to (a)biotic stresses may cause negative effects. Some rhizobacteria have been investigated for its potential to ease these effects due to the enzyme 1-aminocyclopropane-1-carboxylic acid (ACC) deaminase (ACD). ACD degrades ACC, the immediate ethylene biosynthetic precursor. The aim of this work was to examine whether indigenous olive rhizobacteria showing ACD activity may alleviate salt and drought stress in young olive plants. A collection of 32 previously-isolated olive rhizobacteria was in vitro screened for the presence/absence of ACD activity. The well-characterized beneficial olive root endophyte Pseudomonas simiae (fluorescens) PICF7 showed as defective in ACD activity, although genes phylogenetically related to ACD and putatively coding for a D-cysteine desulphhydrase and an unidentified deaminase are present in its genome. Pseudomonas sp. PICF6 displayed this activity and sequencing of its genome revealed the presence of a true ACD gene. By confocal laser scanning microscope analysis using fluorescently-labelled derivatives of both strains similar olive root colonization patterns were visualized, including evidence of the endophytic behaviour of strain PICF6. Greenhouse experiments were performed in which olive 'Picual' plants inoculated either with strain PICF6 or PICF7, or with a combination of both strains, were subjected to drought or salt stress. Different physiological and biochemical parameters (chlorophyll and flavonoids contents, stomatal conductance and spectral plant index) were measured along time and compared to the situation in non-stressed and/or non-bacterized plants. Proline content and stem water potential was also scored in plants subjected to salt and drought stress, respectively. Results showed that neither PICF6 (ACD-positive) nor PICF7 (ACD-negative) were able to lessen the negative effects caused by the abiotic stresses tested, although some of the parameters examined (e.g. stomatal conductance or flavonoid content) showed differences in some cases. In summary, inoculation with strain PICF6 does not help olive plants to cope with salt/drought stress, suggesting that ACD activity does not seem to play any protective role under experimental conditions tested.

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