Geophysical Research Abstracts
Vol. 20, EGU2018-2372, 2018
EGU General Assembly 2018

Efficiency of Plant Growth Promoting Bacteria to improve soil water storage capacity and physiological status of tomato plants under different water regimes

Elfahl Mustafa (1), Sara Borin (2), Francesca Mapelli (2), Valentina Riva (2), giovanna dragonetti (1), and Nicola Lamaddalena (1)

(1) CIHEAM IAMBari, Land and Water Division, valenzano, Italy (dragonetti@iamb.it), (2) Department of Food, Enviromental and Nutritional Sciences DEFENS, University of Milan

Various management strategies have been proposed to overcome drought stress. Plant Growth Promoting Bacteria (PGPB) could play a significant role in mitigating drought effects in plants by positively influencing physiological parameters, soil water storage and crop yield. In this study, we tested whether PGPB can enhance water stress tolerance in tomato plants and improve crop yield. Greenhouse tomato plants were inoculated with 5 different PGPB isolates added to the soil surrounding 7-days potted plantlets. The strains were belonging to different taxa and were previously isolated from plants growing in dry lands and tested both in vitro and in vivo in short-term experiments. Three water regimes (WR) were applied: full irrigation based on evapotraspiration demand (100%), and two deficit water regimes corresponding to the 75% and 50% of full irrigation. Time Domain Reflectometry (TDR) technique was used to monitor the changes of soil water stored and the physiological data were collected at different stages of the plant life cycle using LI-6400 instrument, as well as plant and fruit biomass measurements were recorded at the end of the trial.

All the strains showed to induce a significant improvement in one or more parameters under one or more WRs when compared with not bacterized tests. At 50% WR the strain 2-50 induced increase of root length and dry weight. Strain M1 showed to positively influence root length and dry weight at 75% WR. Three strains, 2-T30, 2-50 and SR7-77 showed to significantly affect soil water storage capacity, the first two at all the WRs and the last only in conditions of water deficit. Further leaf Water Use Efficiency (lWUE) was significantly improved by RP26, 2-T30 and 2-50 strains and which values increased with increasing water deficit. On the contrary, the term water productivity (WP) was significant for 4 out of the 5 tested strains. Only M1 showed a significant influence at all water regimes. RP26, and 2-50 have a positive effect on WP at 100% and 50% WR, but SR7-77 has at 50% irrigation regime.

Overall, the results showed that selected PGPB are a promising tool able to improve plant growth and yield in drought conditions, by exerting strain-specific mechanisms that still remain to be elucidated.