

Sustainable Agriculture Practices Using Bacterial-mediated Alleviation of Salinity Stress in Crop Plants

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Abstract : Massive utilizations of chemical fertilizer and chemical pesticides in agriculture sector to improve the farming productivity have created increasing environmental damages. Then, agriculture must become sustainable, focusing on production systems that respect the environment and help to reduce climate change. Isolation and microbial identification of new bacterial strains from naturally saline habitats and compost extracts could be a prominent way in pest management and crop production under saline conditions. In this study, potential mechanisms involved in plant growth promotion and suppressive activity against fungal diseases of a compost extract produced from poultry manure/olive husk compost and halotolerant and halophilic bacterial strains under saline stress were investigated. On the basis of the antimicrobial tests, different strains isolated from Sfax solar saltern (Tunisia) and from compost extracts were selected and tested for their plant growth promoting traits, such as siderophores production, nitrogen fixation, phosphate solubilization and the production of extracellular hydrolytic enzymes (protease and lipase) under in-vitro conditions. Among 450 isolated bacterial strains, 16 isolates showed potent antifungal activity against the tested plant pathogenic fungi. Their identification based on 16S rRNA gene sequence revealed they belonged to different species. Some of these strains were also characterized for their plant growth promoting capacities. Obtained results showed the ability of four strains belonging to *Bacillus* genus to ameliorate germination rate and root elongation compared to the untreated positive controls. Combinatorial capacity of halotolerant bacteria with antimicrobial activity and plant growth promoting traits could be promising sources of interesting bioactive substances under saline stress.

Keywords : abiotic stress, biofertilizer, biotic stress, compost extract, halobacteria, plant growth promoting (PGP), soil fertility

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