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Screening of Indigenous Rhizobacteria for Growth Promoting and Antagonistic Activity against Fusarium Oxysporoum in Tomato

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Abstract : Plant growth-promoting rhizobacteria (PGPR) are known to enhance plant growth and/or reduce plant damage due to soil-borne pathogens. Tomato is the highest consumable vegetable world-wide including Jordan. Fusarium oxysporum is a pathogen that causes well-known damages and losses to many vegetable crops including tomato. In this study, purification of 112 isolates of PGPR strains from rhizosphere environment of different regions in Jordan was accomplished. All bacterial isolates were In-vitro screened for antagonistic effects against F. oxysporum. The eleven most effective isolates that caused 30%-50% in-vitro growth reduction of F. oxysporum were selected. 8 out of 11 of these isolates were collected from Al-Halabat (arid-land). 7 isolates of Al-Halabat exerted 40-54% In-vitro growth reduction of F. oxysporum. Four-week-old seedlings of tomato cultivar (Anjara, the most susceptible indigenous cultivar to F. oxysporum) treated with PGPR5 (Bacillus amyloliquefaciens), and exposed to F. oxysporum, showed no disease symptoms and no significant changes in biomasses or chlorophyll contents indicating a non-direct mechanism of action of PGPR on tomato plants. However PGPR3 (Bacillus sp.), PGPR4 (Bacillus cereus), and PGPR38 (Paenibacillus sp.) treated plants or PGPR treated and exposed to F. oxysporum showed a significant increasing growth of shoot and root biomasses as well as chlorophyll contents of leaves compared to control untreated plants or plants exposed to the fungus without PGPR treatment. A significant increase in number of flowers per plant was also recorded in all PGPR treated plants. The characterization of rhizobacterial strains were accomplished using 16S rRNA gene sequence analysis in addition to microscopic characterization. Further research is necessary to explore the potentiality of other collected PGPR isolates on tomato plants in addition to investigate the efficacy of the identified isolates on other plant pathogens and then finding a proper and effective methods of formulation and application of the successful isolates on selected crops.

Keywords : antagonism, arid land, growth promoting, rhizobacteria, tomato
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