

Screening of free-living and endophytic Rhizobacteria with potential antagonistic activity against *F. oxysporum* f. sp. *Lycopersici* for Their Potential as Plant Growth Promoters

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Abstract

Plants can benefit from soil microbes in many ways. Certain microbes stimulate plant growth, enrich soils, degrade pollutants, or protect plants against pathogens. Plant growth-promoting rhizobacteria (PGPR) are free-living, soil-borne bacteria, which, when applied to seeds or crops, enhance the growth of the plant or reduce the damage from soil-borne plant pathogens.

In the present work a total of one hundred and nine bacterial strains have been isolated from the rhizosphere, surfaces root (rhizoplane) and the inner roots tissues (endophytic bacteria) of tomato plant cultivated in different locations of semi-arides zones in west of Algeria. Out of these, 53% of the total isolates exhibited a variable antagonistic activity against tomato wilt agent (*F. oxysporum* f. sp. *lycopersici*). The endophytic strain ERL3 has exhibited the maximal inhibition rate equivalent to 78%. Effective antagonist isolates have been further screened for their plant growth promoting (PGP) activity viz., production of plant growth regulators (IAA), siderophores, HCN, inorganic phosphate solubilization, Ammonia and catalase production.

Indole acetic acid has been detected in 72%, 66% and 61% epiphytic, endophytic and rhizospheric strains respectively. 47.45% among antagonist strains are of solubilisation inorganic phosphates capacity. A maximal solubilization index (SI) of 2.48 has been obtained after 14 days of incubation with RMSK43 and RPMK26. Evaluation of Seven strains, each with multiple plant growth promoting activities, to enhance tomato plant growth was carried out in pots experiments under greenhouse conditions. All the isolates have significantly ($P < 0.01$) increased shoot length, root length, shoot dry weight, root dry weight of the inoculated plant. The percentage increase of root weight was up 141.56% with RPMK2 and shoots weight up to 57.98% with RSBK10 over uninoculated control.