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Biochemical Characterisation and Resistance Induction by Bacterial Antagonists against Bacterial Wilt Caused by *Ralstonia solanacearum*

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Abstract

A total of 150 rhizosphere bacterial strains were isolated from tomato and potato rhizosphere soil and roots from Ethiopia. The strains were screened *in vitro* for their antagonistic effect against the pathogen *R. solanacearum* on NGA agar medium using the dual assay test. Of all the tested isolates fifteen were found to inhibit the pathogen; among these four were selected for an ad planta experiment with two tomato varieties: King Kong–2 and L390, moderately resistant and susceptible, respectively. The antagonistic strains were characterised phenotypically and physiologically using the standard microbiological methods such as colony morphology, oxidase test, catalase test, gram-reaction, gelatine liquidification, growth at different salt concentrations. Further characterisation of isolates, metabolic fingerprinting by C-source utilisation using the Biolog microplates and fatty acid profiling was done. Thus selected, promising strains suppressed wilt severity and incidence both in split root and pot experiments and improved growth of the plant under glass house conditions, indicating the potential for resistance induction and for growth promotion, respectively. Bacterial numbers of *R. solanacearum* in midstems of genotype King Kong–2 were found to be lower than in the susceptible tomato genotype L390 in antagonist treated plant. The strains were further characterised for plant growth promoting activity such as siderophore, indole acetic acid and hydrogen cyanide production and phosphate solubilisation capacity. The alteration of the cell wall structure after infection and inoculation of the plant with antagonistic bacteria was investigated by immuno-fluorescent microscopy. To confirm the rhizobacteria-induced systemic resistance, enzymatic assays and quantitative real time PCR are being performed to quantify the level of expression of target enzymes involved in resistance signaling pathways in the plant.

Keywords: Indole acetic acid, induced resistance, *Ralstonia solanacearum*, rhizosphere bacteria, siderophore, split-root test

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