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"Resilience of agricultural systems against crises"

Characterisation of Plant Growth Promoting Rhizobacteria and their Potential as Bioprotectant Against Tomato Bacterial Wilt Caused by *Ralstonia solanacearum*

Henok Kurabachew[1], Kerstin Wydra[2]

[1] *Leibniz Universität Hannover, Institute of Plant Diseases and Plant Protection, Germany*
[2] *Georg-August-Universität Göttingen, CBL - Tropical and Subtropical Agriculture and Forestry, Germany*

Abstract

Bacterial wilt caused by *Ralstonia solanacearum* is one of the most destructive bacterial diseases of tomato and several other economically important crops. To develop a biological control strategy against the pathogen, 150 strains of rhizobacteria were isolated from tomato and potato fields in Ethiopia and screened for *in vitro* antibiosis. Thirteen strains inhibited the growth of *R. solanacearum*. They were identified as *Pseudomonas putida*, *P. veronii* and *Pseudomonas* spp, *Serratia marcescens* and *Bacillus cereus*. These strains were further characterised for their plant growth promoting traits: 11 strains produced siderophores, 9 strains solubilised inorganic phosphate, all strains produced indole acetic acid and only 1 strain produced HCN. Only strain *P. putida* PP3WT produced the quorum sensing molecule and showed quorum sensing inhibition which was depicted by the lack of pigment production by the indicator culture in the vicinity of the test strain (PP3WT). Based on the *in vitro* screening, five strains BC1AW, BC2BA, BC3AW, BC4SS and PP3WT (*B. cereus* and *P. putida*, respectively) were selected for ad planta tests. Strains BC1AW and PP3WT significantly reduced bacterial wilt incidence in tomato genotypes King Kong 2 (moderately resistant) by 46.8, 44.7 % and L390 (susceptible) by 33.6, 30 %, respectively in pot experiments, while in split root experiments they reduced by 48.7, 43.2 % and 25.7 %, 20.1 % in King Kong 2 and L390, respectively. Shoot dry weight increased in plants treated with BC1AW and PP3WT and reduced the number of *R. solanacearum* in midstems of both tomato genotypes. Hence, BC1AW and PP3WT were selected as promising strains whose effectiveness under field conditions and their mode of action at molecular level should be investigated.

Keywords: Hydrogen cyanide, induced resistance, quorum sensing, *R. solanacearum*, rhizobacteria, siderophore, tomato bacterial wilt

Contact Address: Kerstin Wydra, Georg-August-Universität Göttingen, CBL - Tropical and Subtropical Agriculture and Forestry, Büsgenweg 1, 37077 Göttingen, Germany, e-mail: kwydra@gwdg.de