



## Host Defence Induction and Growth Promotion of Chilli Using Eight Bacterial Antagonists

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### Abstract

Plant defence induction and growth promotion are two main indirect mechanisms of microbial involvement in plant disease biocontrol. As the first approach, induction of the expression of three defence related enzymes Phenylalanine ammonia lyase (PAL), Peroxidase (PO) and Polyphenoloxidase (PPO) by an antagonistic *Bacillus* sp. was assessed in the *Capsicum annum*- *Colletotrichum truncatum* patho-system. Four hundred chilli seeds, pre-treated with the antagonist were placed in a sterilized potting medium, and 200 of them were inoculated with *C. Truncatum* after 15 days, while the rest were not inoculated. In another separate set of chilli seeds, 200 were inoculated only with the pathogen and another 200 seeds were maintained as the control without any treatment. Chilli seedlings were sampled after 1,3,5,7 and 10 days of inoculation and tested for activity of PAL, PO and PPO. The second approach was to evaluate phosphate solubilisation, Indole Acetic Acid (IAA) production, siderophore production, exopoly saccharide production, swimming and swarming abilities of eight selected antagonists of *C. truncatum* as plant growth promoting traits. IAA production was assessed both qualitatively and quantitatively while other traits were assessed through qualitative plate assays. According to the results, the PAL, PO and PPO activities in all three treatments showed a significant enhancement ( $p < 0.05$ ) compared to the control. This implies that both antagonist and the pathogen are capable of inducing latent host defence mechanisms in chilli seedlings. A significantly higher induction of PAL and PO enzymes ( $p < 0.05$ ) was observed only in the seedlings, which were emerged from seeds pre-treated with the antagonist and challenge inoculated by the pathogen. An enhancement of the enzyme expression with significant differences among treatments, could be observed since the 7<sup>th</sup> day of inoculation. Results of the growth promoting traits revealed that, *Burkholderia arboris*, *Burkholderia rinojensis* and *Stenotrophomonas maltophilia* could solubilize phosphates. All eight antagonists of *Burkholderia* sp., *Bacillus* sp., *Pseudomonas* sp. and *Stenotrophomonas* sp. produced significant amounts of IAA. The two antagonists, *Pseudomonas aeruginosa* and *B. rinojensis* also produced iron chelating siderophores. None of the antagonists produced exopolysaccharides while



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all the antagonists showed various degrees of swimming and swarming abilities. It can be concluded that bacterial antagonists used for this study have an ability to induce host plant defence with respect to *Colletotrichum truncatum* infection while promoting the growth of *Capsicum anuum* under the tested conditions.

**Key words:** *Bacillus sp.*, *Capsicum anuum*, *C. truncatum*, Defense induction, Growth promotion

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