

Effect of combined application of *Trichoderma harzianum* and *Bacillus subtilis* against wilt disease complex of chickpea caused by *Fusarium oxysporum* and *Rhizoctonia solani*

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ABSTRACT

In this study, antagonistic effects of *Bacillus subtilis* and *Trichoderma harzianum* isolated from *Rhizosphere* of chickpea were evaluated against *Fusarium oxysporum* as potential biocontrol agents *in vitro* and *in vivo*. Fungal inhibition tests were performed using plate assay. Isolates were selected according to their high antagonistic efficiency in *in vitro* which was shown as inhibition zones in the dual-culture assay. *Bacillus subtilis* was isolated in cyst form and is transferred to inert carriers like peat, lignite ore or can be transferred to liquid medium. In lab conditions (controlled) seeds of chickpea are 20 treated directly with *Bacillus* sp. culture and dried for a while and treated with cultures (generally spores) of *Trichoderma* sp. These treated seeds are sown in earthen pots containing black soil having few spores of *Fusarium oxysporum* (MTCC, Chandigarh). Observations are made after every 2-4 days. Combined application of *Bacillus subtilis* and *Trichoderma harzianum* has synergistic effect on the growth of *Fusarium oxysporum* in *in-vitro* environment. Our results indicate that PGPR improve growth parameters in this plant and can help in the biocontrol of pathogen.

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