

## Biological Control of Karnal Bunt by *Pseudomonas fluorescens*

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**Abstract :** *Pseudomonas* species possess a variety of promising properties of antifungal and growth promoting activities in the wheat plant. In the present study, *Pseudomonas fluorescens* MTCC-9768 is tested against plant pathogenic fungus *Tilletia indica*, causing Karnal bunt, a quarantine disease of wheat (*Triticum aestivum*) affecting kernels of wheat. It is one of the 1/A1 harmful diseases of wheat worldwide under EU legislation. This disease develops in the growth phase by the spreading of microscopically small spores of the fungus (teliospores) being dispersed by the wind. The present chemical fungicidal treatments were reported to reduce teliospores germination, but its effect is questionable since *T. indica* can survive up to four years in the soil. The fungal growth inhibition tests were performed using Dual Culture Technique, and the results showed inhibition by 82.5%. The interaction of antagonist bacteria-fungus causes changes in the morphology of hyphae, which was observed using Lactophenol cotton blue staining and Scanning Electron Microscopy (SEM). The rounded and swollen ends, called 'theca' were observed in interacted fungus as compared to control fungus (without bacterial interaction). This bacterium was tested for its antagonistic activity like protease, cellulose, HCN production, Chitinase, etc. The growth promoting activities showed increase production of IAA in bacteria. The bacterial secondary metabolites were extracted in different solvents for testing its growth inhibiting properties. The characterization and purification of the antifungal compound were done by Thin Layer Chromatography, and Rf value was calculated (Rf value = 0.54) and compared to the standard antifungal compound, 2, 4 DAPG (Rf value = 0.54). Further, the in vivo experiments showed a significant decrease in the severity of disease in the wheat plant due to direct injection method and seed treatment. Our results indicate that the extracted and purified compound from the antagonist bacteria, *P. fluorescens* MTCC-9768 may be used as a potential biocontrol agent against *T. indica*. This also concludes that the PGPR properties of the bacteria may be utilized by incorporating it into bio-fertilizers.

**Keywords :** antagonism, Karnal bunt, PGPR, *Pseudomonas fluorescens*

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