

Isolation and Screening of Antagonistic Bacteria against Wheat Pathogenic Fungus *Tilletia indica*

Authors : Sugandha Asthana, Geetika Vajpayee, Pratibha Kumari, Shanthi Sundaram

Abstract : An economically important disease of wheat in North Western region of India is Karnal Bunt caused by smut fungus *Tilletia indica*. This fungal pathogen spreads by air, soil and seed borne sporidia at the time of flowering, which ultimately leads to partial bunting of wheat kernels with fishy odor and taste to wheat flour. It has very serious effects due to quarantine measures which have to be applied for grain exports. Chemical fungicides such as mercurial compounds and Propiconazole applied to the control of Karnal bunt have been only partially successful. Considering the harmful effects of chemical fungicides on man as well as environment, many countries are developing biological control as the superior substitute to chemical control. Repeated use of fungicides can be responsible for the development of resistance in fungal pathogens against certain chemical compounds. The present investigation is based on the isolation and evaluation of antifungal properties of some isolated (from natural manure) and commercial bacterial strains against *Tilletia indica*. Total 23 bacterial isolates were obtained and antagonistic activity of all isolates and commercial bacterial strains (*Bacillus subtilis* MTCC8601, *Bacillus pumilus* MTCC 8743, *Pseudomonas aeruginosa*) were tested against *T. indica* by dual culture plate assay (pour plate and streak plate). Test for the production of antifungal volatile organic compounds (VOCs) by antagonistic bacteria was done by sealed plate method. Amongst all s1, s3, s5, and *B. subtilis* showed more than 80% inhibition. Production of extracellular hydrolytic enzymes such as protease, beta 1, 4 glucanase, HCN and ammonia was studied for confirmation of antifungal activity. s1, s3, s5 and *B. subtilis* were found to be the best for protease activity and s5 and *B. subtilis* for beta 1, 4 glucanase activity. *Bacillus subtilis* was significantly effective for HCN whereas s3, s5 and *Bacillus subtilis* for ammonia production. Isolates were identified as *Pseudomonas aeruginosa* (s1) and *B. licheniformis* (s3, s5) by various biochemical assays and confirmed by 16S rRNA sequencing. Use of microorganisms or their secretions as biocontrol agents to avoid plant diseases is ecologically safe and may offer long term of protection to crop. The above study reports the promising effects of these strains in better pathogen free crop production and quality maintenance as well as prevention of the excessive use of synthetic fungicides.

Keywords : antagonistic, antifungal, biocontrol, Karnal bunt

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