

Research Paper :

Preparation and Shelf-life Study of *Pseudomonas* and *Bacillus* Bioformulations Against Phytopathogenic *Pythium* and *Fusarium* species

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SUMMARY

Four *Pseudomonas* and three *Bacillus* isolates from rhizosphere of healthy tomato and cotton plants with potent antifungal activity against phytopathogenic *Fusarium* and *Pythium* species were used to prepare bioformulations. Talc and dried fecal pellets (DFP) of sheep and goats were used as carrier materials, along with carboxymethylcellulose (CMC) as a sticking agent. The formulations were stored at room temperature (30°C) and cold conditions (4°C) and tested for viability, after each month. The bioformulations of *Bacillus* species were relatively more durable than *Pseudomonas* species. Storage of bioformulations at 4°C was found significant than at room temperature. The DFP based formulations of *Pseudomonas* as well as *Bacillus* species were more durable than their talc based formulations. DFP was found to be the best carrier material for formulation of bacterial biocontrol agents.

Key words :

Biocontrol formulation, *Pseudomonas*, *Bacillus*, Shelf-life, Phytopathogenic fungi

India is an agro-based country and more than half of the total population either directly or indirectly depends on agriculture. The Indian farmers have to suffer great economic losses per year due to weather irregularities and crop diseases caused by phytopathogens such as pests, herbs, insects and microorganisms including-bacteria, fungi, algae, viruses etc. The soil-borne fungal pathogens of crops are most risky and cause substantial economic losses (Agrios, 2005). Control of crop diseases using chemicals available in the market with different trade names has become a regular practice since last half century. However, indiscriminate use of chemical agents to control the plant diseases since last few years has created great harm to human beings, animals, vegetation and the complete environment. Hence, a relatively safe and eco-friendly mean of disease control has become necessary. Biological control is the best solution.

The biocontrol products are prepared in the form of powder, pellets or wet formulations, applicable for seed coating, soil amendment and foliar spray. Preparation of biocontrol formulations involves primary screening of antagonists from disease suppressive soils against phytopathogens, by *in vitro* tests. Highly potent species of antagonists are selected in secondary screening and used to produce large biomass. A suitable carrier material such as dried fecal pellets (DFP) of

sheep and goats, farmyard manure, gram shell and other agricultural wastes are used to prepare bioformulations using the biomass (Gaur *et al.*, 2005; Bohra and Mathur 2005). The objective of the present work was to isolate *Pseudomonas* and *Bacillus* species with potent antagonistic activity against phytopathogenic fungi, particularly *Pythium* and *Fusarium* species, prepare biocontrol formulations, study their shelf-life and biocontrol efficiency.

MATERIALS AND METHODS

Isolation of phytopathogenic fungi and antifungal bacterial species:

According to the Koch's postulate-'the pathogen must be isolated and brought into pure culture and studied for its specific characters' (Rangaswami and Mahadevan, 2005). phytopathogenic *Pythium* and *Fusarium* species were isolated from infected tomato and cotton plants by tissue segment method (Agrios, 2005). *Bacillus* and *Pseudomonas* species were isolated from rhizosphere of healthy tomato and cotton plants using Nutrient agar (NA) and Kings B (KB) agar, respectively. Antifungal cultures were selected among the isolates by dual culture/ co-culture method (Krishnamurthy and Gnanamanickam 1998; Saikia *et al.*, 2004). Potent antifungal isolates were identified on the basis of microscopic, cultural and biochemical characters as well as

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