Research Paper :

Survival and effect of *Pseudomonas fluorescens* formulation developed with various carrier materials in the management of late leaf spot of groundnut

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SUMMARY

The effect of various carrier materials *viz*., gypsum, lignite, talc, vermiculite and their combinations in supporting the growth of *Pseudomonas fluorescens* was assessed. The population of *P. fluorescens* at different days after storage was estimated. Among the various formulations tested, talc based and talc + gypsum based formulations supported better survival of *P. fluorescens*. Talc based powder formulation of *P. fluorescens* Pf1 isolate was highly effective in reducing the late leaf spot disease intensity.

Key words : *Pseudomonas fluorescens,* Formulation, Carrier, Groundnut, Late leaf spot

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Late leaf spot caused by *Cercosporidium personatum* is the destructive foliar disease in groundnut. The most obvious effect of this disease is the loss of photosynthetic tissue, which leads to premature defoliation (Kaur *et al*., 1992). Fluorescent pseudomonads have emerged as the largest and potentially most promising group of plant growth promoting rhizobacteria (PGPR) for biocontrol of plant diseases (Liu *et al.,* 1995). Several fluorescent Pseudomonads were known to control soil borne fungal pathogens like *Pythium*, *Fusarium*, *Rhizoctonia* in a wide range of crops (Vidhyasekaran *et al*., 1997a and b). Earlier workers have used bacterial cell suspension for seed treatment, soil application or foliar spray for the control of foliar diseases. Injection or other methods of application of bacterial suspension is impracticable for large scale application to control foliar diseases in field (Capper and Higgins, 1993). Bacterial cell suspension cannot be used for large-scale field use due to difficulty in storage, transport and handling. A powder formulation with a long shelf-life would be beneficial.

The present study was undertaken to develop *P. fluorescens* as a commercial formulation with suitable carrier and to test the efficacy of the developed formulation as seed treatment and foliar spray for the management of diseases under greenhouse condition.

MATERIALS AND METHODS

P. fluorescens was isolated using King's B (KB) medium (King *et al.,* 1954). King's B broth was inoculated with *P. fluorescens* isolate Pf1 and bacterium was grown with constant shaking at 150 rpm for 48 h at room temperature (28±2^{0}C). Centrifugation was done at 6000 g for 10 minutes and the cells were resuspended in 0.01M phosphate buffer, pH 7.0, concentration was adjusted to give 10^9 colony forming units (cfu) per ml (OD_{595}=0.3).

Efficacy of various carrier materials to support the growth of *P. fluorescens* in storage was assessed. Talc, vermiculite, lignite, gypsum and their combinations were used as carrier materials and pH was adjusted to neutral by adding calcium carbonate at the rate of 15 g kg^{-1} substrate. These substrates were taken at the rate of 100 g per polypropylene bag along with 1 g of CMC, sealed and autoclaved at 1.4 kg cm^{-2} for one hour on two successive days. To this, 40 ml of 48 h old bacterial inoculum as described above was added, mixed under aseptic condition and stored at room temperature (28±2^{0}C). At 15 days interval, one gram sample was drawn from each bag and serially diluted in sterile distilled water up to 10^{-8} level and 1 ml aliquot from 10^8 dilution was pipetted out, poured in sterile Petri dishes to which King'B medium was poured, gently rotated and incubated at room temperature (28±2^{0}C). The number of colonies were counted after 24 h.

Groundnut plants (45 days old) were sprayed with Pf1 formulation at the rate of 1 kg ha^{-1} and after two days, the plants were inoculated with conidial suspension of *C. personatum* (5x10^4 spores ml^{-1}). Disease