

Research Paper :

Eco-friendly management of aflatoxin B₁ at preharvest level in groundnut (*Arachis hypogaea* L.)

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SUMMARY

Biocontrol agents like *Trichoderma viride*, *Trichoderma harzianum*, *Trichoderma hamatum*, *Bacillus subtilis*, and *Pseudomonas fluorescens* were studied singly and in combination for the management of aflatoxin B₁ in groundnut. Experiments were conducted for continuous three years i.e. Kharif 2006 to Kharif 2008. Observations were recorded on *A. flavus* population, initial plant population, aflaroot, assessment of kernel infection and aflatoxin B₁ content. Application of these five biocontrol agents in combination resulted in significant reduction in *A. flavus* population and aflatoxin B₁ content in groundnut cultivar GG-20. The combination of *T. viride*, *B. subtilis* and *P. fluorescens* was most effective in reducing *A. flavus* rhizospheric population, percentage incidence of aflaroot, infection and colonization of kernels and aflatoxin B₁ content. On the basis of the findings, a package can be formulated by combining these three biocontrol agents and could be recommend to use in farmers field on large scale for pre-harvest management of aflatoxin B₁ in groundnut.

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Groundnut,
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Biocontrol agents possess differing modes of action and all strains of biocontrol agents may not possess all the modes of actions. Efforts were made for different combinations of biocontrol agents to get the desirable results. The detection of biocontrol agents (Gowdu and Balasubramaniam, 1991) helps in assessing the natural load of the biocontrol agent, and thus to plan a strategy to enrich the conditions for the multiplication of these mycoparasites.

Aflatoxin contamination is a major problem in the nutritional and confectionery quality of groundnut, which can occur both before- and after- harvest, and during storage. The components of resistance are also complex - pre- and post- harvest resistance, dry seed resistance, and resistance to aflatoxin production. Aflatoxins are colourless, crystalline substances with molecular weight ranging from 312 to 333 and melting point ranging from 237 to 299°C. Among the several aflatoxins, four fractions namely, B₁, B₂, G₁ and G₂, so labelled because of their blue (B) and green (G) fluorescence under ultra violet

light, are commonly found in groundnut and its extractions. Aflatoxins M₁ and M₂, products of metabolic hydroxylation of B₁ and B₂, are generally found in milk. Aflatoxins are generally resistant to heat, but decompose at very high temperature and in the presence of moisture.

Aflatoxins are a family of closely related heterocyclic compounds produced by *A. flavus* and *A. parasiticus*. Aflatoxins are highly toxic and teratogenic compounds, contaminate legumes, cereals and oilseeds when stored improperly. Among these aflatoxins B₁, a secondary metabolites, is the most potent of all mycotoxins and known to be carcinogenic, hepatotoxic and teratogenic in nature (Groopman and Donshu, 1988). *Aspergillus* spp. moulds are present in the soil and air, gain entry into several crops at different stages. Pseudomonads are known to be inhibitory to large number of fungal, soil-borne plant pathogens, and in this lies their importance organisms for biological control and management of these pathogens (Howell and Stipanovick, 1979; Lynch, 1978;

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