Research Paper :

Mass multiplication and shelf-life of *Metarhizium anisopliae* and *Beauveria bassiana* in solid and liquid formulations

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SUMMARY

In present investigation, *Metarhizium anisopliae* and *Beauveria bassiana* were produced in bulk quantity by using liquid fermentation technology where in Sabouraud dextrose yeast broth was used as medium. The maximum fermentation biomass of *M. anisopliae* was obtained after 96 hours of fermentation. The maximum fermentation biomass of *M. anisopliae* was obtained after 72 hours of fermentation. Soya lecithin, and neem oil were used for liquid formulation. Formulated final products were stored at 30^{0}C to study shelf-life of these products. Soya lecithin and neem oil formulations retained shelf-life for 300 days, while vermicompost, de-oiled castor cake and farmyard manure formulations retained shelf-life for 200,190 and 160 days, respectively as compared to gypsum and talc powder where the cfu/g declined by 110 days after storage. The results of present research indicate that solid formulation in vermicompost and liquid formulation in soya lecithin and neem oil supported the growth of both the biocontrol agents during storage thus increasing the count over storage, which is a major advantage for the marketing of these biocontrol agents.

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Economically important agricultural, horticultural and ornamental crop plants are attacked by various insects and pests, resulting in billions of dollars in cumulative crop losses. Currently, the most widely used control measure for suppressing these pests is the use of pesticides. The indiscriminate use of chemicals created serious problems by causing health hazards. Blindness, asthma, cancer, skin disorders, enlargement of liver, neural malfunction and to some extent even psychological problems. Widespread knowledge of groundwater contamination, together with the fact that pesticides are among the most exclusively used synthetic chemicals in agriculture worldwide (Peterson and Highley, 1993). However, problems encountered, such as development of pest resistance to chemicals. The chemical method developed to control too has its own limitations such as high capital investment, non-remunerative, poor availability, selectivity, temporary effect, efficacy affected by physico-chemicals and biological factors, pollution of food and feeds, health hazards, environmental pollution, etc. Considering these limitations biological control is an important approach in this direction. Pest biologic control is being considered as an important part of integrated pest management (IPM), which is a more ecological friendly strategy than conventional chemical pest control (Naylor and Erhich, 1997). The mycoinsecticides based on deuteromycetous fungi such as *M. anisopliae* (Agarwal, 1990), *B. bassiana* (Sandhu *et al.*, 2001), *N. rileyi* (Tang *et al.*, 1999) have been reported to be useful to control insect pests. Mass production of biocontrol agents using low cost technology is the logic requirement for successful exploitation of biocontrol agents. Similarly, the production process must result in biomass with excellent shelf-life even under adverse storage conditions. The combination of formulation, application and the selection of the strain is one of the key steps for field trials. Use of different oil based formulations for mycoinsecticides has been extensively studied (Lomer and Lomer, 2001). It has been suggested that oil formulation can prevent