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Research Article

SELECTION OF A SUITABLE MEDIUM FOR THE MASS PRODUCTION OF SOME SELECTED ENTAMOPATHOGENIC FUNGUS

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ABSTRACT

Various grains such as polished rice, brown rice, wheat, maize, ragi, sorghum, barley and bajra were evaluated for mass production of three entomopathogenic fungi such as *Beauveria bassiana*, *Metarhizium anisopilae* and *Lecanicillium lacanii*. Among the various grains, maize grains supported maximum good growth and sporulation for *B. bassiana*. Similarly wheat supported good growth and sporulation of *M. anisopilae* and for *L.lecanii* observed maximum growth support, sporulation in brown rice.

INTRODUCTION

A great many chemical pesticides (e.g. organochloride insecticides, methyl bromide) cause human health risks, environmental pollution, and effects on non-target organisms of the development of pest resistance. Use of biological control agents such as entomopathogenic fungi (EPF) can be used as a component of integrated pest management (IPM) of many pests. Several fungal species such as *Beauveria bassiana*, *Metarhizium anisopliae* and *Lecanicillium lecani* are being used as biocontrol agent for a number of crops, livestock and human nuisance pests.

Biopesticides based on bacteria, viruses, entomopathogenic fungi and nematodes are often considerable scope as plant protection agents against several insects (Noris *et al*., 2002). Use of entomopathogenic fungi as biological control agents for insect species has increased the global attention during the last few decades. The mycoinsecticide based on *Beauveria bassiana* (Balsamo) Vaillemin (Babu *et al*., 2001; Sharma, 2004) and *Lecanicillium lecanii* (Zimm.) Viegas (Butt *et al*., 2001) have been used to control various insect pests

Entomogenus fungi are potentially versatile biological control agents, because they cause a regular and tremendous mortality of many pests in different parts of the world. They have wide host range and infect at different ages and stages of their hosts and often cause natural epizootics.

Entomopathgens are cheap to mass produce, easy to store and effective over a wide range of temperature and humidity levels.

The present study was undertaken to evaluate grains such as brown rice, polished rice, wheat, ragi, sorghum, bajra, barley and maize such as for the mass production of *B. bassiana, M. anisopliae* and *L. lecanii*.

MATERIALS AND METHODS

Entomopathogenic fungal culture

Beauveria bassiana, Metarhizium anisopilae and *Lecanicillium lecanii* were isolated from the diseased caterpillar of weevils, plant hoppers, caterpillars, bugs, grubs and sucking pests collected from fields of Telangana in India. The infected larvae showed white colour for *B. bassiana, L. lecanii* shows white mycelial growth on the edges of infected insects and a green muscardine growth observed for *M. anisopilae* fungus. The infected insects were collected for each entomopathogenic fungus (EPF) separately in screw cap vials (18 x 4 mm) and brought to the laboratory for further studies. The infected insects were surface sterilized with 0.1% mercuric chloride for few seconds and then thoroughly washed with sterilized double distilled water. The excess water was removed by keeping the infected insects on Whatman filter paper No. 1. The infected insects were then cut into small pieces with the help of sterile blade and the bits were aseptically transferred on to the sabourand maltose agar enriched with 1% yeast extract

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(SMYA) slants with the help of sterile inoculation needle. The slants were kept at 25 ± 1°C. Infected insects were also kept on moist filter paper in Petri dish for mycelial growth and sporulation. The fungi were identified based on the morphological character as per Humber (1997). All the cultures were maintained on SMYA and PDA slants.

Whole grain media

Eight whole grains viz polished rice, brown rice, wheat, ragi, sorghum, bajra, barley and maize were used for checking the fastest growth of *B. bassiana*, *M. anisopilae* and *L. lecanii* at 28°C. After washing the grains, 100 g of each grain were packed in individual 500 gm capacity polypropylene bags for three entomopathogenic fungi separately. Add equal amount of water to these bags. Three replications were maintained for each grain. Place 2 inches pvc pipe inside the center of the cover at the top and were plugged with cotton wool and auto calved at 15 psi for 1 h. After cooling, 1-2 bits of fungal pathogen was inoculated into each bag, separately. All these procedures were done under laminar air flow chamber. They were incubated in BOD incubator at 27 ± 1°C separately for 10 days. Once the sporulation initiated to avoid clumping, polypropylene bags were shaken vigorously to separate the grain and to break the mycelial mat. After 10 days of incubation, grains of each replicate were transferred from polypropylene bags to plastic tubs for shade drying. After drying, the grains were grinded to yield powder of three entomopathogenic fungi mass multiplied in different grain powder.

Mycelial dry weight

After 10 days of incubation, grains of each replicate were transferred from polypropylene bags to plastic tubs for shade drying. After drying, the grains were grinded to yield different grain powder of mass multiplied three EPFs. Three replications of respective grain media dry weight was calculated for each EPF by using the following formula.

Dry weight = Wt. of filter paper along with Biomass – Wt. of filter paper

RESULT AND DISCUSSION

From this study it was clear that all the tested fungi were able to grow on a wide variety of cereal grains. Humber stated that the growth characteristic of the vast majority of EPFs is clearly affected by the supply of nutrients. Our finding showed that almost all isolates grew on all grain substrates, even though no nutrient supplements were added. Among the different grains, brown rice gave the highest growth rate with highest fungal biomass (94 gms) and wheat showed the lowest growth rate and fungal biomass (74 gms) for *L. lecanii*. Maize, bajra and barley recorded moderate growth of *L. lecanii*. While, the *M. anisopilae* showed highest growth and fungal biomass (83 gms) in wheat and lowest growth in rice with biomass (68 gms), therefore moderate growth was observed in maize, sorghum and barley. *B. bassiana* recorded more growth and fungal biomass (87 gms) in maize, less growth and biomass (63 gms) were seen in barley, whereas moderate growth and fungal biomass recorded in ragi, bajra and brown rice.

Latifian *et al* (2013) evaluated most appropriate medium for the production of *Beauveria bassiana* in liquid media includes potatoes, wheat flour, rice flour, corn flour and sugar cane molasses and solid phases includes sugar cane, corn, barley, rice, millet and sorghum. Among different media, sugar cane molasses extract and rice showed maximum growth of *Beauveria bassiana*

Different solid substrates *i.e* such as grains, vegetable wastes, maize, bran, cotton seed, rice husk, wheat and liquid media such as coconut water were evaluated at variable moisture content and yeast extract concentration for mass production of two entomopathogenic fungi: *Beauveria bassiana* (Bals.) Vuellemin and *Metarhizium anisopliae*. Rice as a best solid substrate for spore production and their viability. (Seema *et al* 2013).

Sahayaraj *et al* (2008) reported that, wheat supported maximum spore production for *B. bassiana* while sorghum recorded maximum spore production in *V. lecanii* among different grains. Sivakalai *et al* (2014) utilized various naturally available products such as vegetables (bitter gourd, drumstick, green banana, potato), oil-cakes (coconut oil cakes, coconut cakes, groundnut cakes, sunflower cakes) and agro-industrial wastes such as rice grain, boiled bran, raw bran, rice husk, rice powder and whey for mass production of two entomopathogenic fungi such as *Beauveria bassiana* and *Metarhizium anisopilae.* Results showed that rice grain supporting maximum spore production for both entomopathogenic fungi.

Prasad, *et al* (2014) revealed that highest cost of spore production was recorded in sugarcane bagasse (Rs. 1.14, 2.18 and 1.92) followed by pressmud for *B. bassiana*, *M. anisopliae* and *V. lecanii.*

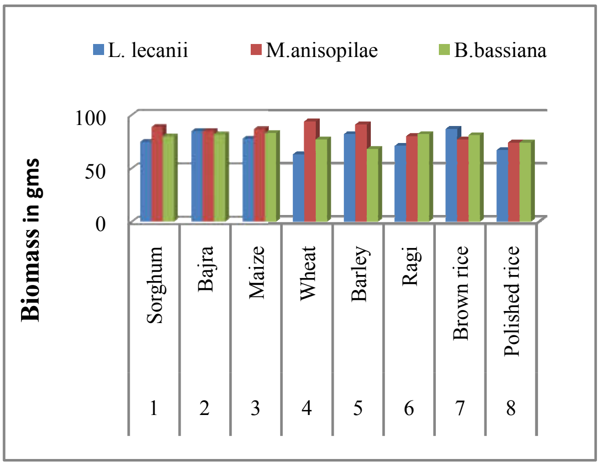

Fig 1 Biomass of three entomopathogenic fungus grown in different grains

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