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Mass Production of *Beauveria bassiana* (NCIM No.1300) Fungal Spores on Cereal Grains and Agro-Industrial Residues.

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ABSTRACT

Entomopathogenic fungi *Beauveria bassiana* has the potential to infect a large number of arthropods. In this experiment, conidia production of insect pathogenic fungi *B.bassiana* (NCIM-1300) grown on four different substrates viz Spent Mushroom Substrate (SMS), Barley, Rice and Jatropha Press Cake was evaluated. In grains, highest conidial yield was on rice which was followed by barley. Among the agro-industrial residue, SMS show more spore production than Jatropha press cake. It was for the first time that Jatropha press cake and SMS were used as a substrate/support for the growth of *B.bassiana*. Both show good results and can be used in future for the commercial production of mycopesticide.

Keywords: Entomopathogenic fungi, Mycopesticide, *Beauveria bassiana,* Jatropa press cake, Spent mushroom substrate

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INTRODUCTION

Entomopathogens have been suggested as controlling agents of insect pests, and belong to species of fungi, viruses, bacteria, and protozoa. Entomopathogenic fungi such as *Beauveria bassiana, Verticillium lecanii, Metarhizium anisopliae, Beauveria brongniartii, Metarhizium flavoviride, Paecilomyces fumosoroseu* and *Lagenidium giganteum* have been developed or being developed for the biological control of pests [1]. *B.bassiana* (Balsamo) has wide host range which includes Lepidoptera, Coleoptera and Hemiptera [2]. Diverse raw materials have been tested such as grains, vegetable wastes, seeds, sorghum, chopped carrot, tapioca, neem cake, cotton seed cake, sugarcane press mud rice husk, sawdust, Refused potatoes, coffee husks and sugar-cane bagasse, Molasses and liquid media such as coconut water, rice and wheat washed water and rice cooked water, spent wash for the production of *B.bassiana* [3,4,5]. The present study was undertaken to evaluate barley, rice, spent mushroom substrate and Jatropha press cake for the mass production of *Beauveria bassiana* through solid submerged fermentation.

MATERIALS AND METHODS

Fungus

Beauveria bassiana NCIM No.1300 used in this study was kindly supplied by National Collection of Industrial Microorganism, Pune, India.

Inoculum

B. bassiana spores were produced in Erlenmeyer flasks (250 mL) containing 50 mL of Potato Dextrose Agar, incubated at 26º C for 10 days under static condition. The spore suspension was prepared by the addition of 40 mL sterile distilled water, 15 g of glass beads and Tween 80 (0.1%) and stirred for 30 minutes on a magnetic stirrer. The spores were counted in Neubauer chamber [6]

Raw Materials

Barley and rice were obtained from departmental store; SMS was gently donated by Plant Pathology Deptt, Chandra Shekhar Azad Agricultural University, Kanpur and Jatropha press cake (deoiled) was obtained from Chemical Engg. Deptt, HBTI, Kanpur. Barley, SMS and Jatropha press cake were dried at 55^{o}C for 48 hours and finely grounded whereas rice was used as a whole grain for the sporulation of *B.bassiana.*

Production Medium for comparison of conidia yield of entomopathogenic fungi grown on different substrates

In this experiment, conidia production of insect pathogenic fungi grown on four different substrates was evaluated. This experiment was conducted with milled substrate incorporated into agar in Erlenmeyer flask so that variation in physical characteristic of the different substrate in solid culture was not a factor in conidia yields. Fine grounded flour of different substrates (Rice, Barley, SMS and Jatropha press cake) was mixed at 3 % w/w with water, 1.5% agar added, autoclaved for 20 minutes at 15 psi, 121^{o}C and poured into Erlenmeyer flasks [7].

Method for conidia (spore) count:

Conidia production was monitored by placing beads and premeasured volume of distilled water containing 0.1% Tween 80 in Erlenmeyer flask containing uniform surface of fungus. The Erlenmeyer flasks were then placed on magnetic stirrer for 30 minutes, to disperse the conidia as conidia are hydrophobic in nature. The suspension containing conidia were passed through muslin cloth to obtain the suspension of spores only. Conidia in the suspension were diluted as appropriate and were counted in a hemocytometer at 400X magnification in phase contrast microscope [6].

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RESULT AND DISCUSSION

In this experiment, conidia production of insect pathogenic fungi *B.bassiana* grown on four different substrates viz SMS, Barley, Rice and Jatropha Press Cake was evaluated. Results are expressed as number of conidia per gram of dry substrate and are summarized in Figure 1. In grains, highest conidial yield was on rice which was followed by barley. Among the agricultural waste product tested SMS show more spore production than jatropha press cake. It was for the first time that Jatropha press cake and SMS were used as a substrate/support for the growth of *B.bassiana*. Both show good results and these agricultural waste products can be used in future for the commercial production of mycopesticide.

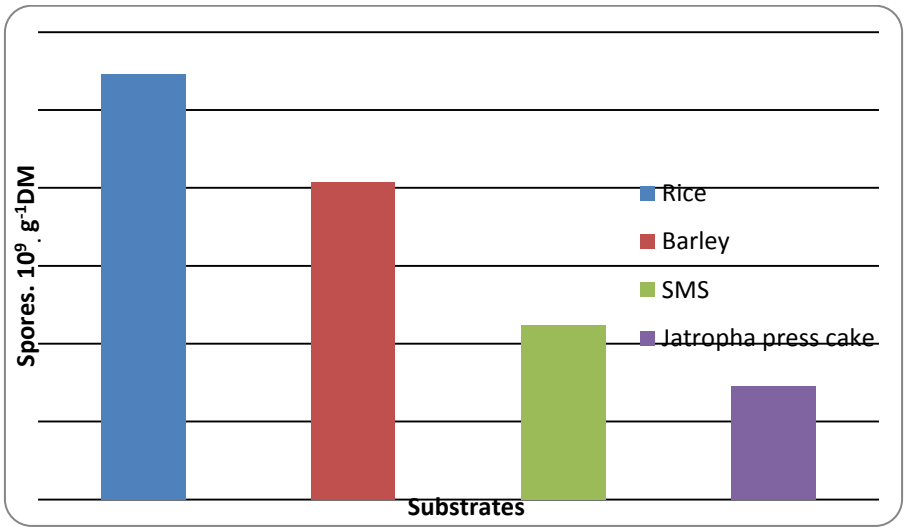

Figure 1: Conidia yield of entomopathogenic fungi grown on different substrates.

CONCLUSION

Various substrates were tested for the production of *B.bassiana* and spore yield was taken as the major parameter for presentation of result. In our study, rice gave the highest conidial yield which was followed by barley, SMS and jatropha press cake. To the best of our knowledge it was for the first time that SMS and Jatropha press cake were used for the production of our fungus and results show that these agricultural waste products can be used in future for the commercial production of mycopesticide economically.

Not only commercialization but also crude production by solid state process with least cost can be developed for the farmers. SMS after production of mushroom can be utilized for the production of *B.bassiana* and sporulated SMS in crude form can be applied to the field. In this way solid waste management and biological pest management can be applied simultaneously. Similarly jatropha press cake which is a waste and cannot be used as animal feed can be treated with *B.bassiana* and can be further analyzed for its detoxification & utilization as animal feed.

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