

Growing *Beauveria bassiana* for Cuticle Degrading Activities and its Bioefficacy Against Greater Wax Moth, *Galleria melonella*

RAMANDEEP KAUR, V. K. GUPTA*, VIKAS JINDAL, BLOSSOM AND
V. K. DILAWARI

Insect Molecular Biology Laboratory, Department of Entomology
Punjab Agricultural University, Ludhiana- 141004, India

Biopestic. Int. 6(2): 96-104 (2010)

ABSTRACT *Beauveria bassiana* owes its entomopathogenic activity to secretion of two cuticle degrading enzymes- protease and chitinase. Therefore, biosynthesis of these enzymes by an Indian strain of *B. bassiana* was studied during growth under different fermentation conditions. Under liquid cultures, the slow growth of fungus resulted in accumulation of only low levels of extracellular chitinase and protease enzymes. However, yields of both of the enzymes as well as conidia increased many fold when the fungus was grown under SSF condition using deoiled rice bran (DRB) or wheat bran (WB) as base substrate. While, DRB supported higher activities of chitinase (3.6 U/ml) and protease (22.5 U/ml) than WB (2.8 and 14.3 U/ml, respectively), supplementation of DRB with inducers of chitinase (cockroach wings, colloidal chitin, N-acetyl D-glucosamine, NAGA) and/or protease (casein) resulted in manifold improvement in production of extracellular chitinase (30.7 U/ml) and protease (47.0 U/ml) enzymes. The conidia yields varied directly with the levels of these two cuticle degrading enzymes, being maximum in case of DRB supplemented with cockroach wings (21.2×10^9 /ml) or chitin + casein (19.9×10^9 /ml), which supported maximum yields of the two cuticle degrading enzymes. Bioassay of *B. bassiana* against wax moth, *Galleria melonella* (Linnaeus) larvae with different conidia concentrations (10^3 – 10^8 /ml) depicted a dose related mortality, which increased from 43.33 to 86.67% after 144 h post treatment. The study suggested that optimized medium and culturing conditions, which induce optimal levels of the cuticle degrading enzymes coupled with sporulation, could form a criterion for development of low cost mass production technology for *B. bassiana* based biopesticides.

KEY WORDS : *Beauveria bassiana*, chitinase, protease, bioassay, semi-solid fermentation

INTRODUCTION

Beauveria bassiana Vuill (Deuteromycotina: Hyphomycetes) is an established broad host range entomopathogenic fungus (Charnley, 2003). As a prominent insect biological control agent, *B. bassiana* has been reported as a suppressive agent for several insect species worldwide, such as *Helicoverpa armigera* (Hübner), *Alphitobius diaperinus* (Panzer), *Plutella xylostella* (Linnaeus),

Laniifera cyclades, *Prostephanus truncatus* (Horn), *Polyphagotarsonemus latus* (Banks) and *Bemisia tabaci* (Gennadius) (Dhuyo and Selman, 2007; Nugroho and Ibrahim, 2007; Ozano-Gutiérrez and Spaña-Luna, 2008). *B. bassiana* has been extensively exploited for the field control of coffee berry borer, *Hypothenamus hampei* (Ferrari) (Coleoptera: Scolytidae) in many countries around the world (Neves and Hirose, 2005). Establishment

* Corresponding author: E-mail: virashkgupta@gmail.com