

Characterization and Formulation of Entomopathogenic Fungi for the Production of Mycoinsecticides

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In light of the environmental threats posed by chemical pesticides to humans, animals, and soil microbes, this study addresses the urgent global concern of the fall armyworm (*Spodoptera frugiperda*), a major maize crop pest in Sri Lanka. The research explores the use of entomopathogenic fungi as a sustainable alternative for mycoinsecticide production, emphasizing their varied effectiveness across different biological stages of insect pests, particularly in the laboratory evaluation of controlling *S. frugiperda* larvae. Insect cadavers were collected, and single-spore isolation was conducted on PDA media. Macroscopic and microscopic morphological characteristics, including white mycelium and spores ranging from light green to dark green, were observed in the native entomopathogenic fungi (RU-EPF004 and RU-EPF007), serving as positive indicators of *Metarhizium* characteristics and a 14-day-old *Metarhizium* standardized culture, harvested from Tween-20, sodium carbonate as a stabilizer, Triton X-100 as a nonanoic surfactant, and silica as an antifoaming agent, was utilized in this study. The compatibility of olive, coconut, and castor oils were compared as components in formulation. Three oil formulations using coconut oil, olive oil, and castor oil were prepared with *Metarhizium* strains, and applied to five *S. frugiperda* larvae each. The bioassays, conducted in perforated plastic containers at room temperature, involved spraying 1% oil formulation onto fresh cone leaves provided as feed daily. Larvae mortality data, collected after 48 hours, showed significant mortality rates for all three formulations compared to unformulated oils, indicating potential for the development of an indigenous *Metarhizium*-based bio-insecticide against *S. frugiperda*.

Keywords: *Oil formulation; Metarhizium; Armyworm; Spodoptera frugiperda; Maize plant*