

Abstract

French bean is a major plant of Royal Project Foundation for the growers of organic vegetable system. The problem of French bean plantation is bean fly, *Ophiomyia phaseoli* Tryon (Agromyzidae: Diptera). Severe damage is indicated by wilting and dying of seedlings. The attack disrupts nutrient transportation, causing the tap root to die. The plant attempts to recover by forming adventitious roots above the damaged area. Young seedlings under stress wilt and die within a short time. Older and more vigorous plants may tolerate the damage but become stunted and will have reduced yield. Integrated pest management strategies have been suggested for controlling various insect pests. Entomopathogenic fungi and repellent such as essential oil have promise considerable potential as major components in sustainable management. Potential for the use of entomopathogenic fungi to control bean fly has been recently reported. Out of 9 isolates of entomopathogenic fungi tested, 2 isolates were found pathogenic against bean fly. Repellent properties of essential oils from Eucalyptus and pill of pomelo are also well documented. These presented high repellency against bean fly. Therefore, the present study aimed to formulated entomopathogenic fungi and essentials oil to improved efficiency to control bean fly. Because of the high volatility of essential oils, direct application onto leaves has often been found to have limited benefits. An improved application method is to incorporate the oils into formulation to protect the bioactivity of the active compounds, obtain a better distribution, and maintain high concentrations of active compounds on the surface of the leaves for longer period. Screening of surfactant and emulsifier effect to entomopathogenic fungi was the first step towards the development of mycoinsecticides. The results showed that surfactants and emulsifier i.e. Sodium lauryl ether sulfate sorbitan esters lecithin gum acacia gelatin methyl cellulose glycerol and sodium alginate at a concentration of 1 3 and 10 % had negative effect to germination of *Beauveria bassiana* and *Metarhizium anisopliae*. Sodium lauryl sulfate at a concentration of 1 % decrease germination of *B. bassiana*. No conidia viability was found after exposure 1% of Cetyl trimethyl ammonium bromide. The results effect of surfactant and emulsifier to colony growth showed the same tendency as spore germination, except 10 % of sorbitan esters and glycerol affected to colony growth.

The results of potential to surfactant found that surfactant properties was different depend on type and concentration of surfactant and emulsifier, lecithin and sodium alginate displayed superior one. For long- term storage of mycoinsecticide contained of sodium alginate lecithin and entomopathogenic fungi at ratio 1:10:10 found that spore still geminate after 6 month under cold condition at temperature 10 ± 2 °C. However, myco insecticide loss germination by month 4 under room temperature between 24-39 °C. Production cost of mycoinsecticide was 116 Bath/ Kilogram and application for once time was 9.28 Bath/Rai at application rate 80 lite/rai.

Different formulations of eucalyptus and pill of pomelo have been evaluated in this study. Two Liquid formulations, 10 cream formulations and 5 solids formulation were prepared. Cream formulations was very promising for topical use, espectively, formular 6. Formular 6 will selected to use in field. Production cost was 158.29 Bath/ kilogram of eucalyptus essential oil. Formulation of mycoinsecticide with 10% essential oil inhibited germination of conidia. No repellent activity was found when decrease concentration of essential oil.

The experiments under greenhouses conditions indicated that myco insecticide base on *Beauveria bassiana* was efficient, it can decrease percent damage of French bean by bean fly. No significant different of percentage damage were found among mycoinsecticide and imidacoplid.