

## ABSTRAK

### PENGARUH DAN KARAKTERISASI FORMULASI BIOPESTISIDA DENGAN PENAMBAHAN EKSTRAK PUPA MAGGOT BSF (*Hermetia illucens*) TERHADAP *Phytophthora* PADA TANAMAN TOMAT

Oleh

Lyra Carisca Tresya  
2217061048

*Phytophthora* merupakan patogen penting yang menyebabkan kerusakan serius pada tanaman tomat dan menurunkan hasil panen secara signifikan. Penggunaan fungisida kimia secara berlebihan menimbulkan dampak negatif terhadap lingkungan dan mendorong resistensi patogen. Biopestisida berbasis mikroorganisme telah digunakan sebagai alternatif ramah lingkungan, namun efektivitasnya masih perlu ditingkatkan. Pupa maggot BSF (*Hermetia illucens*) diketahui mengandung senyawa bioaktif yang berpotensi sebagai agen antimikroba. Penelitian ini bertujuan untuk mengkarakterisasi formulasi biopestisida dengan penambahan ekstrak pupa maggot melalui uji senyawa bioaktif serta mengevaluasi efektivitasnya dalam formulasi biopestisida dan konsentrasi yang paling efektif dalam menghambat pertumbuhan *Phytophthora* secara *in vitro* dan *in vivo*. Perlakuan terdiri dari enam perlakuan dengan biopestisida 10% tanpa ekstrak dan konsentrasi ekstrak (2,5%, 5%, 7,5%, 10%, dan 12,5%) dalam biopestisida 10% pada masing-masing perlakuan. Uji *in vitro* dilakukan dengan mengukur diameter koloni jamur pada media PDA, sementara uji *in vivo* dilakukan pada tanaman tomat untuk mengamati kejadian dan keparahan penyakit. Data dianalisis menggunakan uji homogenitas dan dilanjutkan dengan uji ANOVA satu arah, jika terdapat perbedaan dilanjutkan dengan uji dengan uji BNJ dengan taraf kepercayaan 5%. Hasil penelitian menunjukkan bahwa penambahan ekstrak pupa maggot BSF berpengaruh nyata terhadap penghambatan pertumbuhan *Phytophthora*. Konsentrasi 7,5% memberikan penghambatan diameter koloni dan penurunan keparahan penyakit paling optimal, sedangkan konsentrasi 12,5% paling baik dalam menekan kejadian penyakit. Dengan demikian, ekstrak pupa maggot BSF berpotensi dikembangkan sebagai bahan tambahan dalam formulasi biopestisida yang efektif dan ramah lingkungan untuk pengendalian *Phytophthora* pada tanaman tomat.

**Kata Kunci:** *Phytophthora* spp., Pupa maggot (*Hermetia illucens*.), Biopestisida, *In vitro*, *In vivo*, Senyawa bioaktif.

## ABSTRACT

### THE EFFECT AND CHARACTERIZATION OF BIOPESTICIDE FORMULATION WITH THE ADDITION OF BSF MAGGOT PUPA EXTRACT (*Hermetia illucens*) ON *Phytophthora* IN TOMATO PLANTS

By  
Lyra Carisca Tresya  
2217061048

*Phytophthora* is an important pathogen that causes serious damage to tomato plants and significantly reduces crop yields. Excessive use of chemical fungicides has a negative impact on the environment and encourages pathogen resistance. Microorganism-based biopesticides have been used as an environmentally friendly alternative, but their effectiveness still needs to be improved. Maggot pupae BSF (*Hermetia illucens*) are known to contain bioactive compounds that have the potential as antimicrobial agents. This study aims to characterize the biopesticide formulation with the addition of maggot pupa extract through bioactive compound testing and to evaluate its effectiveness in the biopesticide formulation and the most effective concentration in inhibiting the growth of *Phytophthora* in vitro and in vivo. The treatments consisted of six treatments with biopesticide 10% without extract and extract concentrations (2.5%, 5%, 7.5%, 10%, and 12.5%) in biopesticide 10% in each treatment. In vitro testing was conducted by measuring the diameter of fungal colonies on PDA media, while in vivo testing was conducted on tomato plants to observe disease incidence and severity. Data were analyzed using a homogeneity test followed by a one-way ANOVA. Any differences were further analyzed using the HSD test at a 5% confidence level. The results showed that the addition of BSF maggot pupa extract significantly inhibited *Phytophthora* growth. A concentration of 7.5% provided the most optimal inhibition of colony diameter and reduction in disease severity, while a concentration of 12.5% was the best in suppressing disease incidence. Thus, BSF maggot pupa extract has the potential to be developed as an additive in an effective and environmentally friendly biopesticide formulation for controlling *Phytophthora* in tomato plants.

**Keywords:** *Phytophthora* spp., Pupa maggot BSF (*Hermetia illucens*.), Biopesticide, *In vitro*, *In vivo*, Bioactive compounds.