RINGKASAN

Jagung (*Zea mays* L.) adalah salah satu jenis tanaman pangan yang paling banyak dibudidayakan dan dikembangkan. Pada tahun 2022 terjadi penurunan produksi jagung pipilan di Indonesia dengan persentase 10,61% (1,75 ton) dari total produksi sebesar 16,53 juta ton menjadi 14,77 juta ton di tahun 2023. Keberadaan ulat grayak (*Spodoptera frugiperda*) pada pertanaman jagung di Indonesia mampu mengakibatkan kerusakan mencapai 80%. Berbagai tindakan pengendalian *S. frugiperda* telah banyak dilakukan, salah satunya secara kimia. Penggunaan pestisida kimia sintetis mengakibatkan resistensi hama dan gangguan kesehatan manusia. Jamur entomopatogen sebagai agensia hayati efektif mengendalikan hama target. Jamur *Fusarium oxysporum* mampu mengakibatkan kematian larva serangga mencapai 100%. Metabolit sekunder yang dihasilkan jamur entomopatogen menjadi alternatif untuk mengatasi kelemahan penggunaan jamur. Penelitian ini bertujuan untuk mengetahui konsentrasi efektif dan kemampuan metabolit sekunder jamur entomopatogen *F. oxysporum* dalam mematikan dan menghambat perkembangan *S. frugiperda*.

Penelitian ini dilakukan di Laboratorium Perlindungan Tanaman, Universitas Jenderal Soedirman, Purwokerto. Penelitian ini berlangsung pada bulan September 2024 sampai Maret 2025. Penelitian ini menggunakan Rancangan Acak Kelompok (RAK) dengan kombinasi K dan P yang terdiri atas 10 perlakuan. Setiap perlakuan diulang sebanyak 3 kali sehingga terdapat 30 unit percobaan menggunakan larva instar II. Perlakuan yang diujikan yaitu K0: kontrol, K1: metabolit sekunder konsentrasi 10%, K2: metabolit sekunder konsentrasi 20%, K3: metabolit sekunder konsentrasi 30%, K4: metabolit sekunder konsentrasi 40%, P1: penyemprotan larva, dan P2: pencelupan pakan. Variabel yang diamati meliputi mortalitas, daya makan, lama stadia hidup, fekunditas, fertilitas, terbentuknya pupa normal, dan terbentuknya imago normal. Data yang diperoleh dari hasil penelitian dianalisis dengan menggunakan analisis sidik ragam (*Analysis of Variance*). Ketika menunjukkan adanya pengaruh nyata, maka dilakukan uji lanjut *Duncan Multiple Range Test* (DMRT) taraf nyata 5%.

Hasil penelitian menunjukkan bahwa metabolit sekunder jamur entomopatogen *F. oxysporum* menyebabkan kematian larva *S. frugiperda* sampai 46,67% pada perlakuan metabolit sekunder 40% dengan metode aplikasi semprot larva (efek letal). Perlakuan metabolit sekunder konsentrasi 40% juga efektif dalam menurunkan aktivitas makan sebesar 36,22% dan menghambat perkembangan stadia biologis *S. frugiperda*, yakni stadia larva sebesar 20,06% (celup pakan), stadia pupa sebesar 33,68% (semprot larva), dan stadia imago sebesar 16,89% (celup pakan). Selain itu, perlakuan ini menghambat pembentukan pupa normal sebesar 46,67% dan imago normal sebesar 66,67% serta menurunkan tingkat fekunditas dan fertilitas individu dewasa (efek subletal).

SUMMARY

Corn (Zea mays L.) is one of the most widely cultivated and developed types of food crops. In 2022, there was a decrease in the production of shelled corn in Indonesia, with a percentage of 10.61% (1.75 tons) from a total production of 16.53 million tons to 14.77 million tons in 2023. The presence of the fall armyworm (S. frugiperda) in corn crops in Indonesia can cause up to 80% damage. Various control measures for S. frugiperda have been widely implemented, including chemical control. The use of synthetic chemical pesticides leads to pest resistance and human health problems. Entomopathogenic fungi as a biological agent effectively control target pests. The fungus Fusarium oxysporum can cause insect larvae mortality of up to 100%. Secondary metabolites produced by entomopathogenic fungi are an alternative to overcome the weaknesses of using fungi. This research aims to determine the effective concentration and ability of the entomopathogenic fungus F. oxysporum's secondary metabolites to kill and inhibit the development of S. frugiperda.

This research was conducted at the Plant Protection Laboratory, Jenderal Soedirman University, Purwokerto. The research lasted on September 2024 until March 2025. This research used a Randomized Block Design (RBD) with a combination of K and P consisting of 10 treatments. Each treatment was replicated 3 times, resulting in 30 experimental units using instar II larvae. The treatments tested were K0: control, K1: secondary metabolite concentration 10%, K2: secondary metabolite concentration 20%, K3: secondary metabolite concentration 30%, K4: secondary metabolite concentration 40%, P1: larval spraying, and P2: feed dipping. The observed variables include mortality, feeding ability, life stage duration, fecundity, fertility, normal pupa formation, and normal imago formation. The data obtained from the research results were analyzed using Analysis of Variance. When a significant effect is shown, Duncan's Multiple Range Test (DMRT) at a significance level of 5% is performed for further analysis.

The research results show that the secondary metabolites of the entomopathogenic fungus F. oxysporum caused the death of S. frugiperda larvae up to 46.67% in the 40% secondary metabolite treatment with the larval spray application method (lethal effect). The 40% concentration secondary metabolite treatment was also effective in reducing feeding activity by 36.22% and inhibiting the development of S. frugiperda biological stages, namely the larval stage by 20.06% (feed dipping), the pupal stage by 33.68% (larval spray), and the adult stage by 16.89% (feed dipping). In addition, this treatment inhibited the formation of normal pupae by 46.67% and normal adults by 66.67%, and reduced the fecundity and fertility rates of adult individuals (sublethal effect).