

ADINDA ROHMAH JULIVIA. NIM 20.03.111.00118. Efektivitas Media Perbanyakkan *Bacillus thuringiensis* Menggunakan Tepung Kacang Hijau dan Kedelai sebagai Bioinsektisida Formula Cair Terhadap Ulat Grayak (*Spodoptera frugiperda*)

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ABSTRAK

Ulat grayak (*Spodoptera frugiperda*) merupakan hama tanaman jagung yang mampu menurunkan hasil panen hingga 80%. Diperlukan pengendalian secara terpadu tanpa merusak ekosistem salah satunya melalui bioinsektisida berbahan aktif bakteri *Bacillus thuringiensis*. Mahalnya bahan pembuatan bioinsektisida terutama pada media tumbuh bakteri menjadi salah satu kendala bagi petani dan masyarakat, dibutuhkan alternatif menggunakan bahan lokal seperti kacang hijau dan kedelai yang mengandung nutrisi karbohidrat, protein, asam amino esensial dan non-esensial yang sesuai dengan syarat tumbuh bakteri yakni pH 6,5-7,5 serta suhu 40-70°C. Penelitian dilakukan melalui beberapa tahapan yaitu peremajaan bakteri, kultur bakteri, perancangan formula, serta pengujian yang meliputi uji daya tumbuh bakteri, karakterisasi dan viabilitas formula serta toksisitas formula. Bioinsektisida dibuat dalam bentuk cair menggunakan bahan berupa isolat *Bacillus thuringiensis*, media *Nutrient Broth* (NB), agar, TiO₂, Natrium nitrat (NaNO₃) 1%, Asam sitrat (C₆H₈O₇) 0,1%, Gliserol 20%, tepung kacang hijau, tepung kedelai, dan aquades. Hasil penelitian diperoleh bahwa terjadi perbedaan waktu daya tumbuh bakteri pada media NB, kacang hijau, dan kedelai selama 24 jam. Media NB dan kedelai terjadi peningkatan koloni hingga pengujian jam ke-12 sedangkan pada kacang hijau terjadi hingga jam ke-16. Jumlah koloni tertinggi pada media NB yaitu 155×10^7 cfu/ml. Formula bioinsektisida kacang hijau mempunyai karakterisasi paling baik dibandingkan formula kedelai. Formula bioinsektisida kacang hijau mempunyai viabilitas paling sesuai terhadap pertumbuhan *Bacillus thuringiensis* dibandingkan formula kedelai dengan nilai terbesar pada masa penyimpanan 8 minggu yaitu 214×10^8 cfu/ml. Berdasarkan nilai mortalitas, *lethal concentration* (LC), dan *lethal time* (LT) diketahui bahwa formula bioinsektisida kacang hijau konsentrasi 15% paling efektif dalam membunuh larva *Spodoptera frugiperda* dibandingkan dengan konsentrasi 5% dan 10% serta pada formula kedelai disemua konsentrasi, dengan nilai mortalitas 60% serta mampu membunuh 50% larva uji dengan LC₅₀ sebesar 10,5% dan LT₅₀ 70,2 jam.

Kata kunci: *Bacillus thuringiensis*, Bioinsektisida, Kacang hijau, Kedelai, *Spodoptera frugiperda*

ADINDA ROHMAH JULIVIA. NIM 20.03.111.00118. Effectiveness of *Bacillus thuringiensis* Propagation Media Using Mung Bean and Soy bean Flour as a Liquid Formula Bioinsecticide against Armyworms (*Spodoptera frugiperda*)
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ABSTRACT

Armyworm (*Spodoptera frugiperda*) is a corn pest that can reduce crop yields by up to 80%. Integrated control is needed without damaging the ecosystem, one of which is through bioinsecticides made from the active ingredient *Bacillus thuringiensis* bacteria. The high cost of materials for making bioinsecticides, especially bacterial growth media, is one of the obstacles for farmers and the community. Alternatives are needed using local materials such as green beans and soybeans which contain carbohydrate, protein, essential and non-essential amino acids which are in accordance with the requirements for bacterial growth, namely pH. 6.5-7.5 and a temperature of 40-70°C. The research was carried out through several stages, namely bacterial rejuvenation, bacterial culture, formula design, and testing which included testing the growth capacity of bacteria, characterization and viability of the formula and toxicity of the formula. Bioinsecticide is made in liquid form using ingredients in the form of *Bacillus thuringiensis* isolate, Nutrient Broth (NB) media, agar, TiO₂, Sodium nitrate (NaNO₃) 1%, Citric acid (C₆H₈O₇) 0.1%, Glycerol 20%, green bean flour, flour soybeans, and distilled water. The research results showed that there was a difference in the growth time of bacteria on NB, green beans and soybean media for 24 hours. NB media and soybeans showed an increase in colonies until the 12 hours of testing, whereas in green beans it occurred until the 16 hours. The highest number of colonies on NB media was 155 x 10⁷ cfu/ml. The green bean bioinsecticide formula has the best characteristics compared to the soybean formula. The green bean bioinsecticide formula had the most suitable viability for the growth of *Bacillus thuringiensis* compared to the soybean formula with the largest value during the 8 week storage period, namely 214 x 10⁸ cfu/ml. Based on the mortality, lethal concentration (LC) and lethal time (LT) values, it is known that the green bean bioinsecticide formula with a concentration of 15% is the most effective in killing *Spodoptera frugiperda* larvae compared to the 5% and 10% concentrations and the soybean formula at all concentrations, with mortality values 60% and was able to kill 50% of the test larvae with an LC₅₀ of 10.5% and a LT₅₀ of 70.2 hours.

Key words: *Bacillus thuringiensis*, Bioinsecticide, Mung beans, Soybeans, *Spodoptera frugiperda*