ABSTRAK

BIOAKTIVITAS EKSTRAK METANOL DAN ETIL ASETAT *Gracilaria* sp. TERHADAP STRUKTUR MORFOLOGI DAN HISTOPATOLOGI LARVA *Anopheles* sp. ANALISIS MENGGUNAKAN *SCANNING ELECTRON MICROSCOPE* (SEM)

Oleh

NABILA MUHARRANI FAHDA

Malaria merupakan penyakit yang disebabkan oleh parasit *Plasmodium* dan ditularkan melalui gigitan nyamuk *Anopheles* sp. Penggunaan insektisida sintetis secara terus-menerus berdampak negatif terhadap lingkungan dan menimbulkan resistensi vektor, sehingga diperlukan alternatif larvasida nabati yang lebih aman. Penelitian ini bertujuan untuk mengetahui perbedaan tingkat mortalitas, menentukan nilai LC_{50}, serta mendeskripsikan perubahan morfologi dan histopatologi larva *Anopheles* sp. instar III setelah paparan ekstrak metanol dan etil asetat *Gracilaria* sp. Penelitian ini merupakan penelitian eksperimental menggunakan Rancangan Acak Lengkap (RAL) dengan dua faktor, yaitu jenis ekstrak dan konsentrasi (0,5%; 0,75%; 1%; 1,2%; serta kontrol akuades) dengan masing-masing lima ulangan. Data mortalitas dianalisis menggunakan metode Probit untuk menentukan LC_{50} serta diuji menggunakan *Analysis of Variance* (ANOVA) dan uji lanjut *Tukey Honestly Significant Difference* (HSD) pada taraf 5%. Hasil penelitian menunjukkan bahwa peningkatan konsentrasi ekstrak berbanding lurus dengan peningkatan mortalitas larva. Mortalitas tertinggi diperoleh pada konsentrasi 1,2%, yaitu sebesar 94,4% pada ekstrak metanol dan 85,6% pada ekstrak etil asetat *Gracilaria* sp. Nilai LC_{50} ekstrak metanol sebesar 0,870%, sedangkan ekstrak etil asetat sebesar 0,973%, yang menunjukkan bahwa ekstrak metanol memiliki aktivitas larvasida dan tingkat toksisitas yang lebih tinggi dibandingkan ekstrak etil asetat. Pengamatan menggunakan *Scanning Electron Microscope* (SEM) menunjukkan adanya kerusakan kutikula dan deformasi struktur tubuh larva pada bagian kepala, toraks, abdomen, dan papila anal. Sementara itu, pengamatan histopatologi menunjukkan disorganisasi epitel, degenerasi sel, serta perubahan lumen pada usus tengah larva.

Kata kunci : *Gracilaria* sp., *Anopheles* sp., larvasida nabati, SEM, histopatologi

ABSTRACT

Bioactivity of Methanol and Ethyl Acetate Extracts of *Gracilaria* sp. on The Morphological And Histopathological Structures of *Anopheles* sp. Larvae: An Analysis Using Scanning Electron Microscope (SEM)

By

NABILA MUHARRANI FAHDA

Malaria is a disease caused by *Plasmodium* parasites and transmitted through the bites of *Anopheles* mosquitoes. The continuous use of synthetic insecticides has negative impacts on the environment and contributes to the development of vector resistance, highlighting the need for safer plant-based larvicidal alternatives. This study aimed to evaluate differences in larval mortality, determine the LC_{50} values, and describe the morphological and histopathological changes in third-instar *Anopheles* sp. larvae following exposure to methanol and ethyl acetate extracts of *Gracilaria* sp. This experimental study employed a Completely Randomized Design (CRD) with two factors, namely extract type and concentration (0.5%, 0.75%, 1.0%, 1.2%, and a distilled water control), with five replicates per treatment. Mortality data were analyzed using Probit analysis to determine LC_{50} values and were further subjected to Analysis of Variance (ANOVA), followed by Tukey's Honestly Significant Difference (HSD) test at a 5% significance level. The results showed that increasing extract concentrations were directly associated with increased larval mortality. The highest mortality was observed at the 1.2% concentration, reaching 94.4% for the methanol extract and 85.6% for the ethyl acetate extract of *Gracilaria* sp. The LC_{50} value of the methanol extract was 0.870%, whereas that of the ethyl acetate extract was 0.973%, indicating that the methanol extract exhibited greater larvicidal activity and toxicity than the ethyl acetate extract. Observations using a Scanning Electron Microscope (SEM) revealed cuticular damage and structural deformities in the larval head, thorax, abdomen, and anal papillae. Furthermore, histopathological examination demonstrated epithelial disorganization, cellular degeneration, and alterations in the lumen of the larval midgut.

Keywords : *Gracilaria* sp., *Anopheles* sp., botanical larvicide, SEM, histopathology