

ABSTRAK

Fairushafa Khairunnisa Sasmita

GEN *VOLTAGE-GATED SODIUM CHANNEL* (VGSC) SEBAGAI PENANDA RESISTENSI NYAMUK *Aedes aegypti* TERHADAP INSEKTISIDA PERMETRIN METODE DETEKSI *REAL-TIME* PCR

xv + 57 halaman + 5 Tabel + 10 Lampiran

Demam berdarah dengue (DBD) termasuk penyakit menular vektor *Aedes aegypti* yang diakibatkan infeksi virus dengue. Kejadian DBD di Indonesia masih tergolong tinggi, pemerintah mengadakan program pengendalian dengan penyemprotan insektisida seperti permetrin. Penggunaan suatu insektisida terus menerus dalam periode lama berpotensi menimbulkan resistensi. Maka, deteksi *Voltage-Gated Sodium Channel* (VGSC) sebagai gen target insektisida nyamuk *Aedes aegypti* yang telah resisten akan insektisida permetrin perlu dilakukan.

Penelitian ini bertujuan mengetahui hasil deteksi gen VGSC sebagai indikator resistensi *Aedes aegypti* terhadap permetrin dengan metode *Real-Time* PCR. Desain penelitian ini deskriptif kuantitatif dengan pengambilan data langsung dari pengujian resistensi nyamuk metode *CDC Bottle Bioassay* dan deteksi gen VGSC. Penelitian ini berlangsung dari bulan November 2024 hingga Mei 2025 di BBLKM dan Laboratorium Biologi Molekuler Poltekkes Kemenkes Surabaya. Sampel nyamuk *Aedes aegypti* terbagi dalam 5 kelompok yaitu 1 untuk kontrol dan 4 untuk pengujian terhadap permetrin. Nyamuk yang resisten dibuat suspensi untuk ekstraksi DNA. Setelah DNA nyamuk didapatkan, maka dilakukan uji kemurnian dan konsentrasi kemudian amplifikasi dan deteksi gen VGSC. Hasil akhir deteksi gen VGSC secara *Real-Time* PCR berupa nilai Ct.

Hasil uji resistensi menunjukkan *Aedes aegypti* resisten terhadap permetrin. Uji molekuler menghasilkan nilai Ct sampel 1 adalah 4,78, sampel 2 tidak muncul nilai Ct, sampel 3 adalah 4,45, dan sampel 4 adalah 4,02. Disimpulkan bahwa terdapat 3 sampel terdeteksi gen VGSC dan 1 sampel tidak terdeteksi gen VGSC.

Kata Kunci: Gen VGSC, *Aedes aegypti*, Permetrin, *Real-Time* PCR

Daftar Bacaan: 19 Buku (2017-2024)

ABSTRACT

Fairushafa Khairunnisa Sasmita

VOLTAGE-GATED SODIUM CHANNEL (VGSC) GENE AS A MARKER OF RESISTANCE OF AEADES AEGYPTI MOSQUITOES TO PERMETHRIN INSECTICIDE REAL-TIME PCR DETECTION METHOD

xv + 57 Pages + 5 Tables + 10 Appendices

Dengue haemorrhagic fever (DHF) is a vector-borne disease transmitted by Aedes aegypti mosquitoes and caused by dengue virus infection. The incidence of DBD in Indonesia remains high, prompting the government to implement control programmes involving the spraying of insecticides such as permethrin. The prolonged and continuous use of insecticides over an extended period has the potential to induce resistance. Therefore, the detection of Voltage-Gated Sodium Channels (VGSC) as target genes for insecticides in Aedes aegypti mosquitoes that have developed resistance to permethrin is necessary.

This study aims to determine the results of VGSC gene detection as an indicator of Aedes aegypti resistance to permethrin using the Real-Time PCR method. The study design is quantitative descriptive, with data collected directly from mosquito resistance testing using the CDC Bottle Bioassay method and VGSC gene detection. The study was conducted from November 2024 to May 2025 at the BBLKM and the Molecular Biology Laboratory of the Surabaya Public Health Polytechnic. Aedes aegypti mosquito samples were divided into five groups: one for control and four for testing against permethrin. Resistant mosquitoes were suspended for DNA extraction. After mosquito DNA was obtained, purity and concentration tests were conducted, followed by amplification and detection of the VGSC gene. The final result of VGSC gene detection via Real-Time PCR was the Ct value.

The resistance test results showed that Aedes aegypti was resistant to permethrin. The molecular test produced a Ct value of 4.78 for sample 1, no Ct value for sample 2, 4.45 for sample 3, and 4.02 for sample 4. It was concluded that three samples detected the VGSC gene and one sample did not detect the VGSC gene.

Keywords: VGSC Gene, Aedes aegypti, Permethrin, Real-Time PCR

References: 19 Books (2017-2024)