ABSTRAK

Indonesia memiliki iklim tropis dan subtropis yang mana iklim tersebut mendukung untuk perkembangbiakan nyamuk terutama nyamuk *Aedes aegypti*. Penyakit yang ditularkan oleh nyamuk *Aedes aegypti* adalah DBD. Data dari Kemenkes tahun 2023 melaporkan bahwa untuk kasus DBD mencapai 143.266 kasus hingga minggu ke 33 untuk kematian akibat DBD mencapai 422. Maka perlu dikembangkan strategi pengendalian yang tepat, salah satunya yaitu deteksi berbasis molekuler. Deteksi gen *Ace-1* mampu menjadi alternatif penanda penting mengenai adanya resistensi nyamuk *Aedes aegypti* melawan insektisida golongan karbamat. Tujuan penelitian ini untuk mengetahui hasil deteksi nyamuk *Aedes aegypti* melawan insektisida karbaril metode *Real-Time* PCR (*Polymerase Chain Reaction*), menghitung presentase kematian nyamuk *Aedes aegypti* terhadap insektisida karbaril. Penelitian ini menggunakan desain penelitian deskriptif kuantitatif yang menganalisis data observasi dari resistensi nyamuk yang dilakukan di Laboratorium Entomologi Dinas Kesehatan Provinsi Jawa Timur dan Laboratorium Biologi Molekuler Jurusan Teknologi Laboratorium Medis Poltekkes Surabaya sebagai tempat deteksi gen *Ace-1* menggunakan metode Real-Time PCR. Dalam penelitian tersebut mencakup 5 kelompok perlakuan (satu botol kontrol dan empat botol uji). Nyamuk dilakukan pengujian resistensi dan sampel nyamuk yang hidup dijadikan suspensi untuk digunakan ekstraksi DNA. Nyamuk yang telah diekstraksi dilakukan uji kemurnian beserta konsentrasi DNA. Gen *Ace-1* dideteksi menggunakan *Real-Time* PCR. Hasil deteksi menggunakan *Real-time* PCR berupa nilai CT (*Cycle thresold*). Hasil deteksi 4 sampel negatif atau tidak terdeteksi adanya gen *Ace-1*. Tidak terdeteksinya Gen *Ace-1* kemungkinan terjadi karena mutasi gen dan mekanisme resistensi lain yaitu metabolisme detoksifikasi yang melibatkan enzim esterase yang merupakan mekanisme primer golongan insektida karbamat pada resistensi populasi vektor nyamuk.

Kata kunci : Nyamuk *Aedes aegypti*, gen *Ace-1*, RT-PCR, karbaril

ABSTRACT

Indonesia has tropical and subtropical climate which is favorable for mosquito breeding, especially Aedes aegypti. Disease transmitted by Aedes aegypti is DHF. Data from Ministry of Health in 2023 reported that dengue cases reached 143,266 until week 33 for deaths due to dengue reached 422. Is necessary to develop appropriate control strategies, for example is molecular-based detection. Ace-1 gene detection can be an important alternative marker regarding resistance of Aedes aegypti to carbamate insecticides. Purpose of this study to determine detection results of Aedes aegypti against carbamate insecticides using Real-Time PCR (Polymerase Chain Reaction) method, calculate the percentage mortality of Aedes aegypti against carbamate insecticides. This study used a quantitative descriptive research design that analyzed observational data from mosquito resistance conducted at the Entomology Laboratory of the East Java Provincial Health Office and Molecular Biology Laboratory of Medical Laboratory Technology Department of Surabaya Polytechnic, which used Real-Time PCR method to detect Ace-1 gene. The study included 5 treatment groups (one control bottle and four test bottles). Mosquitoes were tested for resistance and live mosquito samples were made into suspension for DNA extraction. The extracted mosquitoes were tested for purity and DNA concentration. Ace-1 gene was detected using Real-Time PCR and detection results was a CT (Cycle thresold) values. Detection results of 4 samples were negative or no Ace-1 gene was detected. Non-detection of Ace-1 gene due to gene mutation and other resistance mechanisms, namely detoxification metabolism involving esterase enzymes, which is primary mechanism for carbamate class resistance in mosquito vectors.

Key words: *Aedes aegypti* mosquito, Ace-1 gene, RT-PCR, carbaryl.