

**VARIASI GEN *Ace-1* PADA NYAMUK *Aedes aegypti* (Diptera: Culicidae)
YANG RESISTEN TERHADAP ORGANOFOSFAT
DI DUSUN PLOSOKUNING V, KABUPATEN SLEMAN**

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INTISARI

Latar Belakang: Nyamuk *Aedes aegypti* merupakan vektor penyakit demam berdarah, yang masih bersifat endemis di Dusun Plosokuning V. Sebagai upaya pengendalian vektor, malation yang termasuk insektisida golongan organofosfat telah lama digunakan di Dusun Plosokuning V. Penggunaan insektisida malation dalam waktu lama di daerah tersebut dapat menyebabkan timbulnya resistensi nyamuk *Ae. aegypti* terhadap malation. Resistensi nyamuk terhadap insektisida organofosfat dapat terjadi melalui 2 mekanisme yaitu detoksifikasi metabolik dan mutasi daerah target yaitu terjadinya peningkatan aktivitas enzim esterase non spesifik dan adanya variasi gen *Ace-1*. Tujuan penelitian ini adalah untuk mendeteksi status resistensi nyamuk *Ae. aegypti* di Dusun Plosokuning V terhadap insektisida malation serta mengetahui mekanisme resistensi nyamuk secara biokimia dan molekuler.

Metode: Penelitian ini merupakan penelitian deskriptif dengan rancangan penelitian *cross sectional*. Nyamuk *Ae. aegypti* diperoleh dengan mengkolleksi larva dari tiap rumah di Dusun Plosokuning V. Status resistensi diuji dengan metode *CDC bottle bioassay*. Deteksi aktivitas enzim esterase non spesifik menggunakan *microplate assay*. Deteksi variasi gen *Ace-1* menggunakan PCR dengan primer *Ace-1 Forward* dan *Ace-1 Reverse*, elektroforesis, dan sekuensing.

Hasil: Nyamuk *Ae. aegypti* dari ke-6 RT Dusun Plosokuning V tergolong resisten terhadap malation dengan rata-rata mortalitas 17,33%. Pada uji biokimia didapatkan adanya peningkatan aktivitas enzim esterase non spesifik pada larva *Ae. aegypti* dari ke-6 RT Dusun Plosokuning V. Hasil sekuensing menunjukkan adanya variasi gen *Ace-1* yaitu T506T pada 12 sampel (66,6%).

Kesimpulan: Nyamuk *Ae. aegypti* di Dusun Plosokuning V tergolong resisten terhadap malation. Mekanisme resistensi yang terjadi yaitu adanya peningkatan aktivitas enzim esterase non spesifik dan variasi gen *Ace-1*.

Kata Kunci: *Aedes aegypti*, organofosfat, esterase non spesifik, gen *Ace-1*

***Ace-1* GENE VARIATION IN ORGANOPHOSPHATE-RESISTANT *Aedes aegypti* (Diptera: Culicidae) MOSQUITOES IN PLOSOKUNING V HAMLET, SLEMAN REGENCY**

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ABSTRACT

Background: *Aedes aegypti* is the vector of dengue fever, which is still endemic in Plosokuning V hamlet. As a vector-control tool, malathion, which is an organophosphate insecticide, has been used for a long time in Plosokuning V Hamlet. Long term usage of malathion in that area can lead to *Ae. aegypti* resistance to malathion. The resistance mechanisms are metabolic detoxification and target site mutation (enhanced activity of esterase non-specific enzyme and *Ace-1* gene variation). This study aimed to determine the status of *Ae. aegypti* resistance in Plosokuning V hamlet and detect the resistance mechanism by biochemistry and molecular testing.

Methods: This was a descriptive study with a cross-sectional study design. *Aedes aegypti*'s larva were collected from each house in Plosokuning V Hamlet. Resistance status was tested by the CDC bottle bioassay method. Detection the activity of esterase non-specific enzyme using microplate assay. Detection *Ace-1* gene variation using PCR (primer *Ace-1 Forward* and *Ace-1 Reverse*), electrophoresis, and sequencing.

Results: *Aedes aegypti* mosquitoes from Plosokuning V Hamlet were categorized resistant to malathion (17,33% average mortality). There were enhancing activities of esterase non-specific enzyme from *Ae. aegypti* larvae in Plosokuning V Hamlet on biochemical test. Sequencing results showed variations of *Ace-1* gene, namely T506T in 12 samples (66,6%).

Conclusion: *Aedes aegypti* mosquitoes in Plosokuning V Hamlet were resistant to malathion. The resistance mechanisms were enhancing activity of esterase non-specific enzyme and *Ace-1* gene variation.

Keywords: *Aedes aegypti*, organophosphate, esterase non specific, *Ace-1* gene