

# Pengaruh Toksisitas *in vitro* ?-Asaron dan Ekstrak Rimpang Jeringau (Acorus Calamus L.) terhadap Larva Aedes Aegypti: Mortalitas, Enzim Detoksifikasi, dan Histopatologi Midgut = Toxicity Effect of $\beta$ -Asarone and Sweet Flag (Acorus calamus L.) Rhizome Extract against Aedes aegypti Larvae *in vitro*: Mortality, Detoxification Enzymes Activity, and Midgut Histopathological Changes

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## Abstrak

Rimpang jeringau / dringo (Acorus calamus L.) dengan kandungan senyawa fitokimia aktif - asaron diketahui memiliki aktivitas neuroproteksi dan antioksidan sehingga banyak digunakan sebagai obat tradisional. Selain itu, kandungan fitokimia dalam ekstrak tanaman juga berpotensi dimanfaatkan sebagai larvisida alternatif untuk pemberantasan Ae. aegypti sebagai vektor penyakit DBD. Penelitian ini bertujuan untuk mengevaluasi aktivitas larvisidal dari -asaron dan ekstrak rimpang jeringau terhadap larva Ae. aegypti dengan mekanisme perubahan aktivitas enzim detoksifikasi dan histopatologi midgut. Larva Ae. aegypti instar III-IV dipajankan dengan -asaron dan ekstrak rimpang jeringau dengan konsentrasi 0,25; 1,25; 6,25; dan 24,25 ppm. Pengamatan mortalitas dilakukan sesuai panduan WHO pada jam ke-24, 48, dan 72. Aktivitas asetilkolinesterase (AChE), glutathione-S-transferase (GST), dan oksidase dianalisis dengan metode biokimia sesuai protokol CDC. Histopatologi midgut dievaluasi dengan metode pemeriksaan rutin menggunakan pewarnaan H&E. Penelitian ini membuktikan -asaron dan ekstrak rimpang jeringau bersifat toksik dan mampu membunuh >50% larva Ae. aegypti pada konsentrasi rendah sekalipun (24,25 ppm). -asaron memperlihatkan aktivitas larvisida yang lebih tinggi dibanding ekstrak rimpang jeringau dengan mekanisme menghambat enzim AChE dan oksidase serta mengakibatkan kerusakan masif pada midgut larva Ae. aegypti.

.....Sweet flag or jeringau rhizome, with -asarone as its main phytochemical content, is known to have neuroprotective and antioxidant properties in traditional medication. In addition, phytochemical agents from plant extract are also known to have larvicidal potential. This study evaluates larvicidal activity of -asarone and sweet flag rhizome extract against Ae. aegypti larvae with its mechanism in alternating detoxification enzymes activities and midgut histopathology. Ae. aegypti larvae instar III-IV were exposed to two different treatments, -asarone and sweet flag rhizome extract, with concentrations of 0.25, 1.25, 6.25, and 24.25 ppm. Larval mortality was observed 24 h, 48 h, and 72 h post-treatment using WHO guideline.

Acetylcholinesterase (AChE), glutathione-S-transferase (GST), dan oxidase enzyme activities were analyzed with biochemistry method using CDC guideline. Midgut histopathological changes were evaluated using H&E staining and light microscope. This study proved that both -asarone and sweet flag rhizome extract were toxic towards Ae. aegypti larvae and were able to cause >50% larval mortality even with low concentration (24.25 ppm). -asarone exhibited higher toxicity than sweet flag rhizome extract with mechanism of inhibiting AChE & oxidase enzymes along with causing massive injuries on larval midgut.