Sintesis Senyawa Fenolipid Turunan Asam Risinoleat, Asam Risinoleat Teroksidasi, dan Asam Oleat Teroksidasi dengan Asam Galat serta Uji Toksisitas dan Antibakteri = Synthesis of Phenolipid Compounds Derivative of Ricinoleic Acid, Oxidized Ricinoleic acid, and Oxidized Oleic Acid with Gallic Acid as well as Toxicity and Antibacterial Test

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Abstrak

Penyakit akibat infeksi bakteri masih menjadi masalah di masyarakat. Salah satu cara untuk mengatasi infeksi tersebut dengan menggunakan antibiotika. Namun, beberapa penelitian melaporkan banyak bakteri telah resisten terhadap antibiotika tertentu. Penelitian ini dilakukan untuk memodifikasi asam risinoleat dan mereaksikannya dengan asam galat untuk menghasilkan produk yang memiliki aktivitas antibakteri. Esterifikasi dilakukan dengan mereaksikan asam risinoleat dan oleat dengan metanol serta adanya penambahan katalis asam sulfat. Metil ester yang terbentuk selanjutnya dioksidasi menggunakan H2O2 30%. Tahap berikutnya adalah reaksi esterifikasi Steglich dengan asam galat. Tahapan reaksi dipantau menggunakan KLT. Produk hasil reaksi dikarakterisasi menggunakan FTIR, NMR dan UV, setelah dilakukan pemurnian dengan kromatografi kolom. Dari tahapan sintesis fenolipid didapatkan produk berupa fenolipid metil risinoleat, fenolipid oksida risinoleat, dan fenolipid oksida metil oleat. Hasil karakterisasi FTIR produk fenolipid didapatkan peningkatan intensitas pita serapan gugus -OH pada rentang bilangan gelombang 3500 cm-1 sampai 3200 cm-1 yang menunjukkan adanya pertambahan gugus -OH. Ciri khas serapan lainnya terdapat serapan -C-O ester aromatik pada bilangan gelombang 1300 cm-1 sampai 1000 cm-1. Selain itu, terdeteksi serapan infra merah gugus C=C aromatik pada bilangan gelombang 1625 cm-1 samapai 1500 cm-1. Produk fenolipid yang diperoleh diuji tosisitasnya terhadap Daphnia magna. Hasil uji menunjukkan bahwa senyawa fenolipid memiliki toksisitas yang sangat tinggi dengan nilai LC50 <100 ppm. Produk hasil sintesis jugdiuji aktivitas antibakterinya terhadap Escherichia coli dan Staphylococcus aureus. Hasil uji tersebut menunjukkan bahwa produk fenolipid mengalami sedikit peningkatan aktivitas dibandingkan senyawa prekursor yang ditunjukkan pada nilai zona inhibisin namun masih tergolong memiliki aktivitas lemah

.....Diseases caused by bacterial infections are still a problem in society. One way to treat the infection is to use antibiotics. However, some studies report that many bacteria have become resistant to certain antibiotics. This research was conducted to modify ricinoleic acid and react with gallic acid to produce a product that has antibacterial activity. Esterification was carried out by reacting ricinoleic and oleic acids with methanol with the addition of sulfuric acid as a catalyst. The methyl ester formed was then oxidized using 30% H2O2. The Steglich esterification reaction with gallic acid. The reaction steps were monitored using TLC. The reaction products were characterized using FTIR, NMR, and UV after purification by column chromatography. From the phenolipid synthesis stage, the products obtained were phenolipid methyl ricinoleate, phenolipid ricinoleic oxide, and phenolipid oxide methyl oleate. The results of FTIR characterization of phenolipid products showed an increase in the intensity of the absorption band of the-OH group in the range of wave numbers from 3500 cm-1 to 3200 cm-1, which indicated an increase in the-OH group. Another characteristic of absorption is the absorption of-C-O aromatic esters at wave numbers of

1300 cm-1 to 1000 cm-1. In addition, infrared absorption of the aromatic C=C group was detected at wave numbers from 1625 cm1 to 1500 cm-1. The phenolipid products obtained weres examined for their toxicity against Daphnia magna. The results showed that all phenolipid compounds were categorized as very strong toxicity with an LC50 value of <100 ppm. The synthesized products were also tested for their antibacterial activity against Escherichia coli and Staphylococcus aureus. The test results showed that the phenolipid product experienced a slight increase in activity compared to the precursor compound, indicated by the inhibitory zone value, but was still classified as having weak activity.