Uji Aktivitas Antibakteri dan Uji Emulsi Senyawa Ester Asam Lemak-Sukrosa Hasil Esterifikasi Enzimatik Asam Stearat dan Asam Linoleat = Antibacterial Activity and Emulsion Evaluation of Sucrose-Fatty Acid Ester Derived from Enzymatic Esterification of Stearic and Linoleic Acid

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Abstrak

Ester asam lemak-gula banyak menarik perhatian karena aplikasinya yang luas di berbagai bidang. Ester asam lemak-gula diketahui memiliki aktivitas antimikroba, aktivitas antitumor, dan kemampuan sebagai pengemulsi. Penelitian ini mempelajari pengaruh penggunaan asam lemak yang berbeda terhadap aktivitas antibakteri dan kemampuan zat pengemulsi senyawa. Asam lemak yang digunakan adalah asam lemak jenuh asam stearat dan asam lemak tak jenuh asam linoleat, dengan gula berupa sukrosa. Perbandingan mol antara asam lemak dengan sukrosa adalah 1:6. Reaksi esterifikasi dilakukan secara enzimatik menggunakan enzim lipase Novozym Eversa Transform 2.0 sejumlah 20% dari total massa substrat selama +48 jam pada suhu 40oC dengan pelarut n-heksana. Sintesis produk ester asam lemak-gula berhasil dilakukan dibuktikan dengan adanya pergeseran puncak serapan gugus C=O ester dari kisaran panjang gelombang 1700—1715 cm-1 ke panjang gelombang 1730-1750 cm-1 pada karakterisasi dengan spektrometer FT-IR. Uji aktivitas antibakteri dilakukan terhadap bakteri . Staphylococcus aureus dan Escherichia coli. Aktivitas antibakteri ester asam linoleat-sukrosa lebih baik dibandingkan dengan ester asam stearat-sukrosa dan kedua produk ester memiliki aktivitas yang lebih baik terhadap bakteri gram positif S. aureus. Hal ini menunjukkan perbedaan tingkat kejenuhan asam lemak mempengaruhi aktivitas antibakteri. Akan tetapi, perbedaan asam lemak yang digunakan tidak memiliki pengaruh yang signifikan terhadap tipe dan stabilitas emulsi ester asam lemak-sukrosa.

.....Fatty acid-sugar esters have attracted a lot of attention due to its wide application in various fields. Fatty acid-sugar esters are known to have antimicrobial activity, antitumor activity, and ability as emulsifiers. This research studied the effect of using different fatty acids on antibacterial activity and its ability as an emulsifier. The fatty acids used were stearic acid as saturated fatty acid and linoleic acid as unsaturated fatty acid, with sucrose as sugar. The mole ratio between fatty acid and sucrose is 1:6. The esterification reaction was carried out enzymatically using Novozym Eversa Transform 2.0 lipase around 20% of the total substrate mass for +48 hours at 40oC. N-hexane was utilized as solvent. The synthesis of fatty acid-sugar ester products was successfully carried out as evidenced by characterization with an FT-IR spectrometer that shows a shift in the absorption peak of the C=O ester group from the wave number 1700-1710 cm-1 to 1730-1750 cm-1. The antibacterial activity was tested toward Staphylococcus aureus and Escherichia coli. Results shows that linoleic acid-sucrose ester was shown to have better antibaterial activity than that of stearic acid-sucrose ester and both of the sugar fatty acid esters shows better activity toward the Gram positive bacteria S. aureus. This indicates that different levels of fatty acid saturation affect the antibacterial activity of fatty acid-sucrose esters. However, results shows that the difference fatty acid does not cause significant difference in emulsion type and stability