

## AKTIVITAS ANTIBAKTERI EKSTRAK KALUS DARI EKSPAN BIJI DAN DAUN JERUK PURUT (*Citrus hystrix* DC.) SERTA PROFIL SENYAWA BIOAKTIF

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### INTISARI

Penggunaan obat-obatan antibiotik seringkali menimbulkan efek samping dan resistensi. Jeruk purut (*Citrus hystrix* DC.) merupakan salah satu sumber alternatif senyawa antibakteri yang potensial dan relatif aman karena mengandung komponen bioaktif. Namun, kandungan senyawa aktif didalamnya juga dapat berubah-ubah karena faktor lingkungan. Kultur kalus merupakan salah satu strategi untuk mengatasi hal tersebut. Penelitian ini bertujuan untuk menganalisis aktivitas antibakteri melalui uji MIC (*Minimum Inhibitory Concentration*) dan diameter zona hambat ekstrak daun dan kalus dari eksplan biji serta profil senyawa bioaktif daun jeruk purut. Ekstraksi daun dengan metode maserose menggunakan metanol, etil asetat dan kloroform. Uji aktivitas antibakteri berupa MIC dan zona hambat dilakukan pada *Staphylococcus aureus* (bakteri gram positif) dan *Escherichia coli* (bakteri gram negatif). Kandungan senyawa aktif dari ekstrak pelarut terbaik di analisis dengan *Gas Chromatography- Mass Spectrometry* (GC-MS). Ekstrak etil asetat dianalisis di Laboratorium Kimia Organik, FMIPA UGM dengan kolom AGILENT yang mengandung 5% diphenyl polysiloxane – 95% dimethyl polysiloxane sedangkan ekstrak kloroform dianalisis di Laboratorium Kimia Terpadu UIN Sunan Kalijaga. Hasil uji aktivitas antibakteri ekstrak daun dijadikan dasar untuk uji ekstrak kalus. Hasil menunjukkan bahwa nilai MIC ekstrak metanol, etil asetat dan kloroform daun serta ekstrak etil asetat dan kloroform kalus terhadap *E. coli* dan *S. aureus* adalah 0-0,5 mg/mL. Daya hambat ekstrak daun terhadap *E. coli* paling besar adalah ekstrak etil asetat, diikuti oleh ekstrak kloroform dan metanol sedangkan daya hambat ekstrak daun terhadap *S. aureus* paling kuat dihasilkan dari ekstrak kloroform, diikuti ekstrak etil asetat dan metanol. Kalus dengan medium induksi perbanyakan biasa memiliki penghambatan yang lebih rendah dibandingkan dengan daun baik di *E. coli* maupun *S. aureus* namun potensial untuk dikembangkan lebih lanjut. Dalam ekstrak etil asetat daun terdeteksi 21 jenis komponen senyawa bioaktif yang diketahui memiliki aktivitas antibakteri. Sedangkan dalam ekstrak kloroform daun terdapat 12 jenis. Komponen senyawa bioaktif didominasi oleh metabolit sekunder golongan terpen, kemudian diikuti oleh asam lemak. Berdasarkan hasil tersebut dapat disimpulkan bahwa ekstrak daun dan kalus jeruk purut memiliki daya antibakteri. Kalus potensial dikembangkan untuk produksi senyawa antibakteri.

Kata kunci : daun, kalus, jeruk purut, antibakteri, senyawa bioaktif

## ANTIBACTERIAL ACTIVITY OF CALLUS DERIVED SEED AND LEAVES OF KAFFIR LIME (*Citrus hystrix* DC.) AND BIOACTIVE COMPOUNDS PROFILES

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### ABSTRACT

The use of antibiotics for long time exposure can cause side effects and resistances of bacteria. Kaffir lime (*Citrus hystrix* DC.) is potential candidate for antibacterial agent because of its bioactive compounds. However quantity and type of bioactive compounds in plants can be fluctuated because it is influenced by environmental factors. Callus culture is a promising strategy to solve this problem. Objective of this study was to determine antibacterial activity lime leaves and callus by analyzed MIC (*Minimum Inhibitory Concentration*) and measure diameter of inhibition zone, also detected leaves bioactive compounds using *Gas Chromatography-Mass Spectrometry* (GC-MS). Extraction was done by maceration method with methanol, ethyl acetate and chloroform. *Staphylococcus aureus* (gram positive bacteria) and *Escherichia coli* (gram negative bacteria) were used for MIC and inhibition zone assay. MIC test and diameter of inhibition zone were done to determine efficacy of antibacterial activity among solvent which produce the widest zone of inhibition against tested bacteria. Bioactive compounds of the best extract solvent was analyzed using GC-MS. Ethyl acetate extract was analyzed at Laboratorium Kimia Organik, FMIPA UGM using AGILENT column which is composed by 5% diphenyl polysiloxane – 95% dimethyl polysiloxane while chloroform extract was analyzed at Laboratorium Kimia Terpadu, UIN Sunan Kalijaga using AGILENT column which is composed by 5% phenyl methyl siloxane. Antibacterial test of callus extract is done according to the result of antibacterial test of leaves' extract. Results showed that MIC's methanolic, ethyl acetate and chloroform leaves extracts for *E. coli* and *S. aureus* is 0-0,5 mg/mL. Callus extracts was also showed the same results. Ethyl acetate was best solvent of leaves' solvent extract for *E. coli* while chloroform was best solvent for *S. aureus*. Inhibition effects of callus was less than leaves extracts for each tested bacteria but callus is potential to be develop for producing antibacterial compounds. 21 kinds of antibacterial bioactive compounds were detected in leaves' ethyl acetate extract while 12 kinds are detected in leaves' chloroform extract. Antibacterial bioactive compounds was dominated by terpenes and followed by fatty acids. According to that result, can be concluded that leaves' and callus' extract have antibacterial activity. Callus is potential to be developed for producing antibacterial compounds.

Key words : leaves, callus, kaffir lime, antibacterial, bioactive compounds