

## **ISOLASI DAN KARAKTERISASI SENYAWA ANTIBAKTERI DARI KULIT BATANG *Xylocarpus granatum* J. Koenig**

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### **INTISARI**

*Xylocarpus granatum* merupakan tanaman mangrove sejati yang memiliki bioaktivitas sebagai antibakteri. Bioaktivitas antibakteri yang dimiliki berasal dari senyawa kimia (terpenoid, saponin, flavonoid, alkaloid, dan tanin) yang dihasilkan karena lingkungan hidup mangrove yang ekstrim. Tujuan dari penelitian ini adalah melakukan isolasi dan penentuan struktur senyawa yang berperan sebagai antibakteri dari ekstrak kulit batang *X. granatum* menggunakan metode *bioassay guided fractionation*, serta menguji aktivitas antibakteri tersebut kepada bakteri Gram positif maupun Gram negatif. Sampel diambil dari Pulau Setoko, Kota Batam, Kepulauan Riau. Sampel diekstraksi dengan metode maserasi bertingkat (*n*-heksan, etil asetat, kemudian etanol). Masing-masing ekstrak diuji aktivitas antibakteri terhadap bakteri Gram positif dan Gram negatif dengan metode difusi agar lapis ganda. Ekstrak yang paling aktif selanjutnya difraksinasi dengan metode kromatografi kolom dan diperoleh isolat aktif. Isolat aktif dikarakterisasi dengan *Gas Chromatography – Mass Spectrometry* (GC – MS) untuk mengetahui senyawa yang terkandung dan aktivitas antibakterinya diuji *Minimum Inhibitory Concentration* (MIC) dan *Minimum Bactericidal Concentration* (MBC) menggunakan metode mikrodilusi. Hasil ekstraksi yang memiliki aktivitas antibakteri terbaik adalah ekstrak etanol kulit batang *X. granatum*. Senyawa-senyawa yang terbaca pada basis data WILEY 09 Library, dengan *similarity index* dan persen area dominan adalah *1,2-Benzenediol (Catechol)* dan *1,3,5-Benzenetriol (Phloroglucinol)*. Isolat aktif diujikan pada bakteri Gram positif (*Mycobacterium* sp. dan *Staphylococcus aureus*) dan bakteri Gram negatif (*Aeromonas hydrophila* dan *Vibrio* sp.). Aktivitas antibakteri *X. granatum* terhadap bakteri *Mycobacterium* sp., *S. aureus*, *Aeromonas hydrophila* dan *Vibrio* sp. menunjukkan nilai MIC berturut-turut sebesar 25 µg/ml, 50 µg/ml, 200 µg/ml, dan >400 µg/ml. Nilai MBC terhadap *Mycobacterium* sp., *S. aureus*, *A. hydrophila* dan *Vibrio* sp. yaitu sebesar 50 µg/ml, 200 µg/ml, >400 µg/ml, dan >400 µg/ml. Aktivitas antibakteri isolat aktif kulit batang *X. granatum* terhadap bakteri Gram negatif lebih rendah dibandingkan dengan bakteri Gram positif. Penelitian ini menambah informasi mengenai potensi kulit batang *X. granatum* dari Kepulauan Setoko, Kota Batam, Kepulauan Riau sebagai agen antibakteri *Mycobacterium* sp. yang selama ini belum pernah dilaporkan.

**Kata kunci:** antibakteri, ekstrak etanol, fraksinasi, isolat aktif, *Xylocarpus granatum*.

## ISOLATION AND CHARACTERIZATION OF ANTIBACTERIAL COMPOUND FROM THE STEM BARK OF

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### ABSTRACT

*Xylocarpus granatum* is a true mangrove plant that shows bioactivity as antibacterial. Its antibacterial bioactivity derived from chemical compounds (terpenoids, saponins, flavonoids, alkaloids, and tannins) which are produced due to the extreme environment of mangroves. The aims of this study were to isolate and determine the structure of the compounds that act as antibacterial from the *X. granatum* stem bark extract using the bioassay guided fractionation method, and to test the antibacterial activity on Gram-positive and negative bacteria. Sample was taken from Setoko Island, Batam City, Riau Islands. Sample was extracted by multilevel maceration extraction method (*n*-hexane, ethyl acetate, then ethanol). Each extract was then tested for its antibacterial activity against Gram-positive and negative bacteria by using the double layer agar diffusion method. The most potent extract was then fractionated by column chromatography method and the active isolate was obtained. Active isolate was further isolated and purified by column chromatography method. The result of purification was characterized by Gas Chromatography-Mass Spectrometry (GC-MS) to determine the compounds present in the extract of *X. granatum* stem bark and their antibacterial activity were assayed for Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) using the microdilution method. The result of extraction which showed antibacterial activity was ethanol extract. The compounds read in the WILEY 09 Library database, with a similarity index and percent of the dominant area, were identified as 1,2-Benzenediol (Catechol) and 1,3,5-Benzenetriol (Phloroglucinol). Active isolates were tested against Gram-positive bacteria (*Mycobacterium* sp. and *Staphylococcus aureus*) and Gram-negative bacteria (*Aeromonas hydrophila* and *Vibrio* sp.). Antibacterial activity of *X. granatum* against *Mycobacterium* sp., *S. aureus*, *Aeromonas hydrophila* and *Vibrio* sp. exhibited MIC values of 25 µg/ml, 50 µg/ml, 200 µg/ml, and >400 µg/ml, respectively. MBC values against *Mycobacterium* sp., *S. aureus*, *A. hydrophila* and *Vibrio* sp. were 50 µg/ml, 200 µg/ml, >400 µg/ml, and >400 µg/ml, respectively. The antibacterial activity of the active isolate of *X. granatum* stem bark against Gram-negative bacteria was lower than that of Gram-positive bacteria. This study provides information about the potential of *X. granatum* stem bark from the Setoko Islands, Batam City, Riau Islands as an antibacterial agent for *Mycobacterium* sp. which has never been reported to date.

**Key words:** active isolate, antibacterial, ethanol extract, fractionation, *Xylocarpus granatum*