

ABSTRAK

Penggunaan antibiotik kimia dalam dosis yang berlebihan menyebabkan terjadinya resistensi bakteri, sehingga eksplorasi agen antibakteri baru dari sumber-sumber alami sangat dibutuhkan. Agen antibakteri alami dapat dengan mudah ditemukan pada organisme laut, seperti rumput laut, khususnya *Gracilaria* sp. Pantai Karapyak dan Sayang Heulang merupakan salah satu habitat rumput laut *Gracilaria* sp. Penelitian mengenai identifikasi molekuler dan senyawa bioaktif *Gracilaria* sp. di Pantai Karapyak dan Sayang Heulang masih sangat terbatas. Penelitian ini bertujuan untuk mengidentifikasi secara molekuler, mengetahui potensi antibakteri dan senyawa bioaktif dari *Gracilaria* sp. Identifikasi molekuler dilakukan melalui tahapan isolasi DNA, amplifikasi, elektroforesis, sekuensing, analisis BLAST, dan filogenetik. Metode maserasi bertingkat dan MAE (*Microwave Assisted Extraction*) diterapkan untuk ekstraksi senyawa bioaktif. Analisis metabolomik dilakukan dengan LC-HRMS (*Liquid Chromatography High Resolution Mass Spectrometry*), GNPS, dan divisualisasikan dengan cytoscape. *Gracilaria* sp. dari dua lokasi pantai berbeda teridentifikasi memiliki kemiripan masing-masing 99,68% dan 100% dengan spesies *Gracilaria edulis*. *G. edulis* memiliki aktivitas antibakteri terhadap bakteri patogen *Bacillus megaterium* DSM32, *Micrococcus luteus* ATCC4698, *Escherichia coli* K12 dengan kategori lemah dan bersifat bakterisidal. Senyawa bioaktif *G. edulis* yang terderekuplikasi dengan potensi antibakteri, yaitu cholesta-4,6-dien-3-ol, neomycin sulfate, sarmentoside B, avobenzone, dan sulfoquinovosyl-diacylglycerol (SQDG).

Kata kunci : *Gracilaria*, identifikasi molekuler, analisis metabolomik, antibakteri, bakteri patogen.

ABSTRACT

The use of chemical antibiotics in excessive doses causes bacterial resistance, so the exploration of new antibacterial agents from natural sources is urgently needed. Natural antibacterial agents can be easily found in marine organisms, such as seaweed, especially *Gracilaria* sp. Karapyak and Sayang Heulang Beach are one of the habitats of *Gracilaria* sp. Research on molecular identification and bioactive compounds of *Gracilaria* sp. in Karapyak and Sayang Heulang Beach is still very limited. This study aims to identify molecularly, determine the antibacterial potential and bioactive compounds of *Gracilaria* sp. Molecular identification was carried out through the stages of DNA isolation, amplification, electrophoresis, sequencing, BLAST analysis, and phylogenetics. Multistage maceration and MAE (Microwave Assisted Extraction) methods were applied for extraction of bioactive compounds. Metabolomic analysis utilized by LC-HRMS (Liquid Chromatography High Resolution Mass Spectrometry), GNPS, and visualized by cytoscape. *Gracilaria* sp. from two different coastal locations were identified as having 99,68% and 100% similarity with *Gracilaria edulis* species, respectively. *G. edulis* has antibacterial activity against pathogenic bacteria *Bacillus megaterium* DSM32, *Micrococcus luteus* ATCC4698, *Escherichia coli* K12 with a weak category and tends to be bactericidal. The replicated bioactive compounds of *G. edulis* with antibacterial potential were cholesta-4,6-dien-3-ol, neomycin sulfate, sarmentoside B, avobenzene, and sulfoquinovosyl-diacylglycerol (SQDG).

Keywords : *Gracilaria*, molecular identification, metabolomic analysis, antibacterial, pathogenic bacteria.

