

ABSTRAK

PRODUKSI BIOSURFAKTAN DARI BAKTERI ISOLAT LOKAL BSPPP-4 ASAL SEDIMEN PERAIRAN PELABUHAN PANJANG DAN UJI POTENSI ANTIBAKTERI

Oleh

WIWIN INDRIANTI

Biosurfaktan adalah produk metabolit sekunder yang dihasilkan oleh mikroba. Biosurfaktan banyak diaplikasikan dalam berbagai bidang, salah satunya dalam bidang medis yang biasa digunakan sebagai antibakteri, antifungi, dan antivirus. Penelitian ini bertujuan untuk mendapatkan biosurfaktan dari bakteri isolat lokal BSPP-4 asal sedimen perairan Pelabuhan Panjang, serta menguji potensinya sebagai antibakteri. Isolat lokal BSPP-4 diremajakan menggunakan nutrient agar. Metode uji yang dilakukan meliputi uji biosurfaktan (hemolisis, IE_{24} , *Oil Spread=OS*, dan *Drop Collapse=DC*), karakterisasi biokimia bakteri isolat BSPP-4, pembuatan kurva pertumbuhan, optimasi produksi biosurfaktan, produksi biosurfaktan, karakterisasi biosurfaktan menggunakan FT-IR, serta uji potensi biosurfaktan sebagai antibakteri. Hasil uji biosurfaktan diketahui bahwa isolat BSPP-4 memiliki aktivitas β -hemolisis, dengan nilai IE_{24} 33%, uji OS 2 mm, dan uji DC positif. Karakterisasi biokimia menunjukkan bahwa isolat BSPP-4 merupakan jenis bakteri *Bacillus*. Optimasi produksi menunjukkan kondisi optimum untuk produksi biosurfaktan pada waktu inkubasi 96 jam, sumber karbon gliserol 2%, sumber nitrogen $NaNO_3$ 0,3%, dan konsentrasi inokulum 7,5%. Produksi biosurfaktan dari bakteri isolat BSPP-4 memiliki ciri-ciri fisik biosurfaktan berwarna kuning tua sebanyak 0,9674 g/L. Hasil Analisis data FT-IR memperlihatkan adanya serapan dari gugus fungsi, seperti pada daerah 3272 cm^{-1} (N-H *Stretching*), 1535 cm^{-1} (deformasi ikatan N-H), 2937 cm^{-1} (C-H *stretching*), 1625 cm^{-1} (CO-N *stretching*), pada daerah 1103 cm^{-1} dan 1185 cm^{-1} (C-O *Stretching*), daerah 2937 cm^{-1} , dan 1625 cm^{-1} (rantai alifatik C-H) yang merupakan ciri-ciri surfaktan lipopeptida. Uji antibakteri ekstrak biosurfaktan menunjukkan adanya zona bening sebesar 1,72 cm pada bakteri Gram negatif *Escherichia coli*, sedangkan pada bakteri Gram positif *Staphylococcus aureus* sebesar 1,16 cm. Berdasarkan hasil penelitian ini, dapat disimpulkan bahwa isolat BSPP-4 diduga menghasilkan biosurfaktan jenis lipopeptida dan memiliki kemampuan sebagai antibakteri.

Kata Kunci : Biosurfaktan, lipopeptida, antibakteri, FT-IR, Indeks Emulsi.

ABSTRACT

PRODUCTION OF BIOSURFACTANTS FROM LOCAL BSPP-4 BACTERIA ISOLATES OF SEDIMENTS IN PANJANG PORT WATERS AND TESTING POTENTIAL ANTIBACTERIALS

By

WIWIN INDRIANTI

Biosurfactants are secondary metabolite products from microbes. Biosurfactants are widely applied in various fields, one of which is in the medical field which is commonly used as antibacterial, antifungal, and antiviral. This study aims to obtain biosurfactants from local isolates of bacteria BSPP-4 from the sediments of Panjang Port waters, and to test their potential as antibacterial. Local isolates of BSPP-4 bacteria were maintained in nutrient agar medium. The analysis includes biosurfactant tests (hemolysis, IE₂₄, Oil Spread=OS, and Drop Collapse=DC), biochemical characterization of BSPP-4 isolate bacteria, growth curve creation, optimization of biosurfactant production, production of biosurfactant, characterization of biosurfactants using FT-IR, as well as testing the potential of biosurfactants as antibacterial. The biosurfactant test showed that the BSPP-4 isolate had β -hemolysis, with an IE₂₄ value of 33%, 2 mm OS test, and a positive DC test. Biochemical characterization showed that BSPP-4 isolate was a type of *Bacillus* bacteria. The optimum conditions for biosurfactant production was at an incubation time of 96 hours, 2% glycerol carbon source, 0.3% NaNO₃ nitrogen source, and 7.5% inoculum concentration. The production of biosurfactant of bacterial isolate BSPP-4 has the physical characteristics of a dark yellow biosurfactant as much as 0.9674 g/L. The FT-IR analysis data showed that there was absorption from functional groups, such as in the area of 3272 cm⁻¹ (NH Stretching), 1535 cm⁻¹ (NH bond deformation), 2937 cm⁻¹ (CH stretching), 1625 cm⁻¹ (CO-N stretching), on the area 1103 cm⁻¹ and 1185 cm⁻¹ (CO Stretching), 2937 cm⁻¹ area and 1625 cm⁻¹ (CH aliphatic chain) which are characteristics of lipopeptide surfactants. Antibacterial test of biosurfactant extract showed a clear zone of 1.72 cm on Gram negative bacteria *Escherichia coli*, while in Gram positive bacteria *Staphylococcus aureus* of 1.16 cm. Based on the results of this study, it can be concluded that BSPP-4 isolate can produce lipopeptide biosurfactant and has the ability as an antibacterial.

Keywords: Biosurfactant, lipopeptide, antibacterial, FT-IR, Emulsification indeks