ABSTRAK

BIOTRANSFORMASI KULIT UDANG MENJADI *CHITOOLIGOSACCHARIDE* (COS) OLEH FUNGI LAUT DAN UJI BIOAKTIVITAS SEBAGAI ANTIMIKROBA

Oleh:

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Crustasea merupakan sumber kitin yang sangat melimpah. Melalui proses fermentasi, kitin diubah menjadi produk turunannya, yaitu *Chitooligosaccharide* (COS), yang memanfaatkan bahan baku dari limbah kulit udang dan mikroorganisme dekomposer seperti fungi.

Penelitian ini bertujuan untuk mengisolasi dan mengkarakterisasi produk biodegradasi kitin dari kulit udang melalui proses fermentasi padat menggunakan fungi. Isolasi COS dilakukan menggunakan isolat fungi (18A12RF, 19A15RF, 20BA0502RF, 20CD01RF, 21RSM02 dan 22PLP1F1) yang diperoleh dari deposit Unit Pelaksanaan Teknis Laboratorium Terpadu Sentra Inovasi dan Teknologi (UPT LTSIT) sebagai agen pendegradasi melalui proses kultivasi secara *Solid State fermentation* (SSF) selama 4 hari. Produk biodegradasi oligomer diekstraksi menggunakan air panas, dan diisolasi melalui beberapa tahap kromatografi serta dianalisis menggunakan FTIR dan LC-MS/MS. Produk biodegradasi ini diuji bioaktivitas terhadap bakteri patogen resisten seperti *Staphylococcus aureus*, dan *Pseudomonas aeruginosa*, dan fungi *Malassezia globosa*.

Hasil penelitian menunjukkan bahwa isolat fungi efektif sebagai agen pendegradasi kulit udang. Isolat fungi 18A12RF terbukti menjadi isolat unggul dalam mendegradasi kulit udang menjadi COS pada hari ke-4, dibuktikan dengan uji KLT. Analisis morfologi menunjukan isolat 18A12RF merupakan fungi *Aspergillus* sp. COS yang dihasilkan dari degradasi oleh isolat 18A12RF mampu menghambat pertumbuhan mikroba patogen pada dosis 2 mg/mL. Karakterisasi produk hasil degradasi menggunakan FTIR dan LC-MS/MS mengindikasikan bahwa COS memiliki derajat polimerisasi (DP) sebesar 7.

Kata kunci: antimikroba, *chitooligosaccharide*, enzim kitinase, isolat fungi, kulit udang

ABSTRACT

BIOTRANSFORMATION OF SHRIMP SHELL INTO *CHITOOLIGOSACCHARIDE* (COS) BY MARINE FUNGI AND BIOACTIVITY ASSAY AS ANTIMICROBIAL

By

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Crustaceans are a highly abundant source of chitin. Through the fermentation process, chitin is converted into its derivative product, Chitooligosaccharide (COS), utilizing raw materials from shrimp shell waste and decomposer microorganisms such as fungi.

This study aims to isolate and characterize the biodegradation products of chitin from shrimp shells through Solid State Fermentation using fungi. COS isolation was carried out using fungal isolates (18A12RF, 19A15RF, 20BA0502RF, 20CD01RF, 22RSM02 and 22PLP1F1) obtained from the Integrated Laboratory Technical Implementation Unit Center for Innovation and Technology (UPT LTSIT) as degrading agents through Solid State Fermentation (SSF) cultivation for 4 days. The oligomer biodegradation products were extracted using hot water, isolated through several stages of chromatography, and analyzed using FTIR and LC-MS/MS. The biodegradation products were tested for bioactivity against resistant pathogenic bacteria such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and the fungus *Malassezia globosa.*

The results showed that the fungal isolates were effective as shrimp shell degrading agents. The fungal isolate 18A12RF proved to be the superior isolate in degrading shrimp shells into COS on the 4 days, as evidenced by the TLC test. Morphological analysis indicated that the 18A12RF isolate is the fungus *Aspergillus* sp. The COS produced from the degradation by the 18A12RF isolate was able to inhibit the growth of pathogenic microbes at a dose of 2 mg/mL. Characterization of the degradation products using FTIR and LC-MS/MS indicated that COS has a degree of polymerization (DP) of 7.

Keywords: antimicrobial, chitooligosaccharide, chitinase enzyme, fungal isolates, shrimp shells.