

ABSTRAK

STUDI OPTIMASI PERTUMBUHAN DAN AKTIVITAS ENZIM BAKTERI PENGHASIL FUKOIDANASE *Cytobacillus kochii* GSD DENGAN VARIASI SALINITAS

Oleh

ALIFIA ADIBILA NURHALISA

Fukoidan merupakan polisakarida sulfat yang memiliki berbagai manfaat, namun pemanfaatannya kurang optimal apabila memiliki berat molekul tinggi sehingga diperlukan proses hidrolisis enzimatis menggunakan bakteri penghasil enzim fukoidanase, seperti *Cytobacillus kochii* GSD, untuk menghasilkan fukoidan dengan berat molekul rendah. Pertumbuhan dan aktivitas enzim fukoidanase dari bakteri *C. kochii* GSD dapat ditingkatkan melalui optimasi kondisi kultur, salah satunya dengan variasi salinitas. Penelitian ini bertujuan untuk menentukan salinitas optimal bagi pertumbuhan *C. kochii* GSD serta mengevaluasi aktivitas enzimatisnya. Penelitian dilaksanakan di Laboratorium Produktivitas Perairan dan Laboratorium M, Jurusan Perikanan dan Kelautan, Fakultas Pertanian, Universitas Lampung. Optimasi dilakukan pada perlakuan salinitas 3,5 ppt, 5ppt, 17,5 ppt, 30 ppt dan 38,5 ppt dengan mengukur kepadatan bakteri menggunakan metode *total plate count* (TPC) dan turbidimetri dilanjutkan dengan uji aktivitas enzimatis pada salinitas optimal. Uji aktivitas enzimatis meliputi ekstraksi fukoidan, uji FT-IR dan uji aktivitas menggunakan metode CPC. Hasil penelitian menunjukkan bahwa salinitas 30 ppt memberikan perbedaan nyata terhadap pertumbuhan bakteri dibandingkan variasi salinitas lainnya, dengan kepadatan tertinggi sebesar ($4,84 \times 10^8$) CFU/mL serta fase pertumbuhan yang paling stabil dan konsisten. Aktivitas enzim fukoidanase tertinggi tercatat pada jam ke-72 dengan zona aktivitas sebesar 20,97 mm menjadikan salinitas 30 ppt merupakan kondisi optimal untuk pertumbuhan dan aktivitas enzim fukoidanase secara maksimal.

Kata kunci: Aktivitas Enzim, *Cytobacillus kochii* GSD, Fukoidan, Hidrolisis Enzimatis, Salinitas.

ABSTRACT

STUDY OF THE GROWTH OPTIMIZATION AND ACTIVITY OF THE FUCOIDANASE PRODUCING BACTERIA *Cytobacillus kochii* GSD UNDER VARIATIONS OF SALINITY

By

ALIFIA ADIBILA NURHALISA

Fucoidan is a sulfated polysaccharide, offers a variety of benefits; however, its utilization is less than optimal in cases where it possesses a high molecular weight. To address this, an enzymatic hydrolysis process is necessary, employing fucoidanase-producing bacteria, such as *Cytobacillus kochii* GSD, to produce low-molecular-weight fucoidan. The growth and activity of fucoidanase enzyme from *C. kochii* GSD bacteria can be enhanced through the optimization of culture conditions, including salinity variation. The objective of this study is to ascertain the optimal salinity for the cultivation of *C. kochii* GSD and to assess its enzymatic activity. The research was conducted at the Aquatic Productivity Laboratory and Laboratory M, Department of Fisheries and Marine Sciences, Faculty of Agriculture, University of Lampung. Optimization was carried out on salinity treatments of 3.5 parts per thousand (ppt), 5 ppt, 17.5 ppt, 30 ppt, and 38.5 ppt. Bacterial density was measured using total plate count (TPC) and turbidimetric methods. Enzymatic activity tests were then conducted at optimal salinity. The enzymatic activity test is a multifaceted procedure that encompasses fucoidan extraction, FT-IR testing, and activity assessment employing the CPC method. The findings indicated that a salinity level of 30 ppt resulted in a substantial impact on bacterial proliferation, as compared to variations in salinity. This condition exhibited the highest bacterial density of 4.84×10^8 CFU/mL and demonstrated the most stable and consistent growth phase. The maximum fucoidanase enzyme activity was documented at 72 hours, exhibiting an enzyme activity zone measuring 20.97 millimeters.

Keywords: Enzyme Activity, *Cytobacillus kochii* GSD, Fucoidan, Enzymatic Hydrolysis, Salinity.