ABSTRAK

Selulosa pada dinding sel tanaman sulit untuk didegradasi, sehingga diperlukan enzim selulase untuk mempercepat hidrolisis selulosa menjadi glukosa. Enzim selulase dapat dihasilkan dari bakteri endofit yang memiliki potensi besar, karena pertumbuhan bakteri berlangsung cepat. Isolat bakteri endofit berhasil diisolasi dari kulit dan daun waru yang dilakukan oleh penelitian terdahulu. Penelitian ini bertujuan untuk memperoleh ekstrak kasar enzim selulase, serta karakteristik enzim selulase yang meliputi aktivitas dan aktivitas spesifik pada kondisi suhu, pH, dan waktu inkubasi optimum. Tanapan penelitian ini meliputi pembuatan kurva pertumbuhan bakteri, skrining enzim selulase, produksi enzim selulase, uji aktivitas enzim selulase dengan menggunakan reagen DNS (asam 3,5-dinitrosalisilat), karakterisasi pengaruh suhu, pH, dan waktu inkubasi optimum terhadap aktivitas enzim selulase, serta uji aktivitas spesifik enzim selulase dengan metode Lowry. Penelitian ini berhasil memperoleh ekstrak kasar enzim selulase dari seluruh bakteri uji. Karakterisasi pengaruh suhu, pH, dan waktu inkubasi optimum terhadap aktivitas enzim selulase menghasilkan kondisi optimum yang berbeda pada masing-masing bakteri. Pada bakteri *Acinetobacter junii* Z3 dan *Delftia lacustris* Z8 optimum pada suhu 37°C, pH 6,5, dan waktu inkubasi 15 menit; *Acinetobacter ursingii* Z10 optimum pada suhu 37°C, pH 6, dan waktu inkubasi 45 menit; *Pseudomonas hibiscicola* WK optimum pada suhu 37°C, pH 6,5, dan waktu inkubasi 30 menit; serta *Staphylococcus warneri* WR optimum pada suhu 30°C, pH 6,5, dan waktu inkubasi 15 menit. Bakteri endofit *Staphylococcus warneri* WR diketahui menghasilkan aktivitas dan aktivitas spesifik tertinggi, dengan nilai aktivitas enzim 70,082 U/mL dan nilai aktivitas spesifik enzim 0,350 U/mg.

Kata kunci : Enzim selulase, bakteri endofit, tanaman waru

ABSTRACT

The cellulose in plant cell walls is difficult to degrade, requiring the enzyme cellulase to accelerate the hydrolysis of cellulose into glucose. Cellulase enzymes can be produced by endophytic bacteria, which have great potential due to their rapid growth. Endophytic bacterial isolates were successfully isolated from the bark and leaves of *Hibiscus tiliaceus* in previous research. This study aims to obtain crude extracts of cellulase enzymes and to characterize the cellulase enzymes, including their activity and specific activity under optimal temperature, pH, and incubation time conditions. The stages of this research include the development of bacterial growth curves, cellulase enzyme screening, cellulase enzyme production, enzyme activity testing using DNS (3,5-dinitrosalicylic acid) reagent, characterization of the effects of optimal temperature, pH, and incubation time on cellulase enzyme activity, and specific enzyme activity was tested using the Lowry method. The study successfully obtained crude extracts of cellulase enzymes from all tested bacteria. Characterization of the effects of optimal temperature, pH, and incubation time on cellulase enzyme activity produced different optimal conditions for each bacterium. For *Acinetobacter junii* Z3 and *Delftia lacustris* Z8 the optimum conditions were 37°C, pH 6.5, and 15 minutes of incubation time; for *Acinetobacter ursingii* Z10 the optimum conditions were 37°C, pH 6.0, and 45 minutes of incubation time; for *Pseudomonas hibiscicola* WK the optimum conditions were 37°C, pH 6.5, and 30 minutes of incubation time; and for *Staphylococcus warneri* WR, the optimum conditions were 30°C, pH 6.5, and 15 minutes of incubation time. The endophytic bacterium *Staphylococcus warneri* WR was found to produce the highest activity and specific activity, with an enzyme activity value of 70.082 U/mL and a specific enzyme activity value of 0.350 U/mg.

Keywords: Cellulase enzyme, endophytic bacteria, hibiscus plant