

**ISOLASI DAN IDENTIFIKASI BAKTERI SELULOLITIK JERAMI PADI
(*Oryza sativa* L.) DAN KAJIAN TEORITIS OPTIMASI PRODUKSI
ENZIM SELULASE**

SKRIPSI

diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Sains
Program Studi Biologi Departemen Pendidikan Biologi



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UNIVERSITAS PENDIDIKAN INDONESIA**

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Sains pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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Juli 2020

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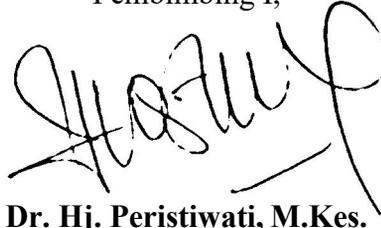
LEMBAR PENGESAHAN

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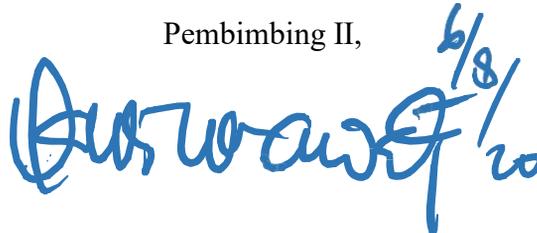
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PERNYATAAN

Dengan ini saya menyatakan bahwa skripsi dengan judul “Isolasi dan Identifikasi Bakteri Selulolitik Jerami Padi (Oryza sativa L.) dan Kajian Teoritis Optimasi Produksi Enzim Selulase” beserta seluruh isinya adalah benar-benar karya saya sendiri, dan saya tidak melakukan penjiplakan atau pengutipan dengan cara yang tidak sesuai dengan etika keilmuan yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung resiko atau sanksi yang dijatuhkan kepada saya apabila ditemukan adanya pelanggaran terhadap etika keilmuan dalam karya saya ini, atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

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Yang membuat pernyataan

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KATA PENGANTAR

Puji syukur kehadirat Allah SWT atas segenap limpahan rahmat, anugerah dan karunia-Nya sehingga penulis dapat menyelesaikan skripsi yang berjudul **“ISOLASI DAN IDENTIFIKASI BAKTERI SELULOLITIK JERAMI PADI (*Oryza sativa* L.) DAN KAJIAN TEORITIS OPTIMASI PRODUKSI ENZIM SELULASE”**. Skripsi ini diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Sains pada Program Studi Biologi Strata Satu (S1), Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam, Universitas Pendidikan Indonesia.

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Bandung, Juli 2020

Penulis

Zahra Ramadhani Tayubi

ISOLASI DAN IDENTIFIKASI BAKTERI SELULOLITIK JERAMI PADI (*Oryza sativa* L.) DAN KAJIAN TEORITIS OPTIMASI PRODUKSI ENZIM SELULASE

ABSTRAK

Enzim selulase merupakan enzim komersial yang banyak digunakan dalam bidang industri dengan jumlah banyak sehingga mengakibatkan kebutuhan akan enzim selulase terus meningkat dengan rata-rata 5-7% per tahun. Pembuatan enzim selulase diperlukan substrat yang mengandung bahan selulosa, salah satunya berasal dari limbah jerami padi. Selain itu, mikroorganisme yang mampu memproduksi enzim selulase disebut bakteri selulolitik. Bakteri selulolitik ini dapat ditemukan pada jerami padi, karena mendukung lingkungan tempat hidup dan nutrisi bagi bakteri, sementara bakteri dalam mencerna selulosa dengan menghasilkan enzim selulase. Bakteri yang ditemukan pada jerami padi yaitu *Bacillus* sp. dan *Pseudomonas* sp. Pada penelitian ini telah dilakukan identifikasi dan karakterisasi bakteri selulolitik yang berhasil diisolasi dari jerami padi (*Oryza sativa* L.). Seleksi bakteri selulolitik dilakukan dengan menggunakan medium selektif *carboxymethyl cellulose* (CMC) dengan indikasi keberadaan zona bening di sekitar koloni pada bakteri selulolitik. Hasil penelitian diperoleh 4 isolat bakteri selulolitik yaitu isolat J-1, J-2, J-4, dan J-5 yang merupakan bakteri *Pseudomonas* sp. Produksi enzim selulase maksimum akan sangat bergantung pada pH dan suhu optimum bakteri selulolitik *Bacillus* sp. dan *Pseudomonas* sp. Tujuan penelitian studi literatur ini adalah untuk mengetahui pH dan suhu optimum yang dapat menghasilkan enzim selulase tertinggi oleh bakteri selulolitik. Berdasarkan hasil studi literatur, pH optimum bakteri selulolitik *Bacillus* sp. yaitu 6.5 dan suhu optimum 60°C yang menghasilkan aktivitas enzim selulase tertinggi 0.85 U/mL, sedangkan pH optimum bakteri selulolitik *Pseudomonas* sp. adalah 5 dan suhu optimum 37°C yang menghasilkan aktivitas enzim selulase (CMCase) maksimum berkisar 0,48 U/mL.

Kata Kunci: Enzim selulase, jerami padi, lignoselulosa, bakteri selulolitik, aktivitas selulolitik

**ISOLATION AND IDENTIFICATION OF CELLULOLYTIC BACTERIA
IN RICE STRAW (*Oryza sativa* L.) AND THEORY OF OPTIMIZATION
CELLULASE ENZYME PRODUCTION**

ABSTRACT

Cellulase enzymes are commercial enzymes that are widely used in industrial fields with large quantities resulting in the need for cellulase enzymes to continue to increase by an average of 5-7% per year. Cellulase enzyme making is needed substrate containing cellulose material, one of which is derived from rice straw waste. In addition, microorganisms that are able to produce cellulase enzymes are called cellulolytic bacteria. Cellulolytic bacteria can be found in rice straw, because it supports a living environment and nutrients for bacteria, while bacteria digest cellulose by producing cellulase enzymes. Bacteria found in rice straw are *Bacillus* sp. and *Pseudomonas* sp. In this study identification and characterization of cellulolytic bacteria have been isolated from rice straw (*Oryza sativa* L.). Cellulolytic bacterial selection is carried out using a selective *carboxymethyl cellulose* (CMC) medium with an indication of the presence of clear zones around the colony in cellulolytic bacteria. The results obtained by 4 isolates of cellulolytic bacteria namely isolates J-1, J-2, J-4, and J-5 which are *Pseudomonas* sp. Maximum cellulase enzyme production will depend on the optimum pH and temperature of the cellulolytic bacteria *Bacillus* sp. and *Pseudomonas* sp. The purpose of this literature study was to determine the optimum pH and temperature that can produce the highest cellulase enzymes by cellulolytic bacteria. Based on the results of literature studies, the optimum pH and temperature of cellulolytic bacteria *Bacillus* sp. were 6.5 and 60°C which produces the highest cellulase enzyme activity 0.85 U/mL, while the optimum pH of cellulolytic bacteria *Pseudomonas* sp. was 5 and the optimum temperature was 37°C which produces maximum cellulase (CMCase) enzyme activity ranging from 0.48 U/mL.

Key Words: Cellulase enzyme, rice straw, cellulolytic bacteria, *pretreatment*, CMCase

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