EFEK KONSENTRASI SUBSTRAT SERBUK JERAMI PADI (*Oryza sativa* L.) TERHADAP PRODUKSI GULA HIDROLISAT OLEH BAKTERI SELULOTIK AIR LINDI

SKRIPSI

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Sarjana Sains
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ABSTRAK

Gula hidrolisat telah luas diaplikasikan dalam berbagai industri, termasuk peralihan bahan bakar fosil ke bioetanol. Di Indonesia, limbah jerami (*Oryza sativa* L.) yang menumpuk merupakan sumber selulosa yang dapat diolah menjadi gula hidrolisat. Jerami padi memiliki kandungan selulosa yang tinggi. Secara biologis proses tersebut memanfaatkan mikroorganisme dari alam. Air Lindi (*Leachate*) kurang diperhatikan akan potensi sebagai sumber isolasi bakteri selulolitik. Produksi gula hidrolisat serbuk jerami padi oleh bakteri selulolitik penting untuk dilakukan. Melalui uji CMC, didapatkan bakteri yang diisolasi dari TPS Gegerkalong dengan Indeks Selulolitik tinggi (IS>3). Identifikasi morfologi, pewarnaan, dan biokimia menduga bakteri dengan kode BG8 tersebut mendekati karakter dalam genus *Neisseria*. Praperlakuan jerami padi dilakukan sebelum tahap hidrolisis dengan memperkecil ukuran partikel serta delignifikasi menggunakan kombinasi NaOH 1% dengan rasio 1:20 (m/v) dan suhu 45 ^{o}C dalam *ultrasound water bath*. Perlakuan substrat awal (5 dan 10% b/v) digunakan sebagai komposisi medium fermentasi pada 37 ^{o}C dan pH7 selama 24 jam. Parameter berupa jumlah sel bakteri dan konsentrasi gula hidrolisat diukur dengan spektrofotometer *UV-visible* dengan interval 3 jam. Didapatkan bahwa jumlah sel bakteri dan gula hidrolisat maksimal adalah 1.3×10^{11} (CFU/ml) dan 33.7 (%) pada perlakuan substrat awal 10%. Penelitian ini, menunjukkan bahwa konsentrasi terbaik untuk hidrolisis serbuk jerami padi oleh bakteri selulolitik yang diduga *Neisseria* pada 37 ^{o}C, pH7 adalah 10%. Produksi gula hidrolisat dalam penelitian ini membuka peluang untuk penelitian lebih lanjut terkait produksi bioetanol.

Kata kunci: bakteri selulolitik, air lindi, jerami padi, selulosa, gula hidrolisat, bioetanol

EFFECT OF RICE STRAW POWDER SUBSTRATE CONCENTRATION (Oryza sativa L.) AGAINST THE PRODUCTION OF SUGAR HYDROLYSATE BY LEACHATE CELLULOTIC BACTERIA

ABSTARCT

Sugar hydrolysates have been widely used in industry, including the switch from fossil fuels to bioethanol. In Indonesia, accumulated straw (*Oryza sativa* L.) waste is a source of cellulose that can be processed into sugar hydrolysate. Rice straw has a high cellulose content. Biologically, the process uses naturally occuring microorganisms. Less attention has been paid to its potential as a source for isolation of cellulolytic bacteria. Production of sugar hydrolysate from rice straw powder by cellulolytic bacteria is important carried out Through the CMC test, the bacteria isolated from the Gegerkalong TPS with high cellulolytic index (IS>3). Morphological identification, staining and biochemistry show that the bacteria with code BG8 are close to the characters in the genus *Neisseria*. The praperlakuan of rice straw before the hydrolysis stage was carried out by particle size reduction and delignification using a combination of 1% NaOH at a ratio of 1:20 (m/v) and a temperature of 45 °C in an ultrasonic water bath. The initial substrate treatment (5 and 10% w/v) was used as the composition of the SmF medium.at 37 ºC and pH 7 for 24 hours. Parameters such as bacterial cell count and hydrolyzed sugar concentration were measured by UV-visible spectrophotometer at 3-hour intervals. It was found that that the highest bacterial cell count and sugar hydrolysate concentrations were $1.3x10^{11}$ (CFU/ml) and 33.7 (%) in the 10% initial substrate treatment. This study showed that the best concentration for hydrolysis of rice straw powder by cellulolytic by cellulolytic bacteria, suspected to be *Neisseria* at 37 ºC, pH7 was 10%. The production of sugar hydrolysate in this study opens opportunities for further research related to bioethanol production.

Keywords: cellulolytic bacteria, leachate water, rice straw, cellulose, sugar hydrolysate, bioethanol

DAFTAR ISI

LEMBAR PENGESAHAN ... i

LEMBAR PERNYATAAN ... ii

KATA PENGANTAR ... iii

UCAPAN TERIMA KASIH ... iv

ABSTRAK ... v

ABSTARCT ... vii

DAFTAR ISI ... viii

DAFTAR TABEL ... xi

DAFTAR GAMBAR ... xii

DAFTAR LAMPIRAN ... xiii

BAB I PENDAHULUAN ... 1

1.1 Latar Belakang ... 1

1.2 Rumusan masalah ... 5

1.3 Pertanyaan Penelitian ... 5

1.4 Tujuan Penelitian ... 5

1.5 Batasan Penelitian ... 6

1.6 Manfaat Penelitian ... 6

BAB II PRODUKSI GULA HIDROLISAT DARI SERBUK JERAMI PADI OLEH BAKTERI SELULOLITIK ASAL AIR LINDI ... 9

2.1. Gula hidrolisat ... 9

2.2. Jerami Padi ... 10

2.3. Lignoselulosa ... 12

2.3.1. Lignin ... 12

2.3.1.1. Delignifikasi ... 13

2.3.2. Selulosa ... 14

2.4. Bakteri selulolitik 15
2.5. Air Lindi (*Lechate*) 16
2.6. Fermentasi SmF 18
2.7. Faktor yang Mempengaruhi Keberhasilan Produksi Gula Hidrolisat 18
BAB II METODE PENELITIAN 22
3.1. Jenis Penelitian 22
3.2. Desain Penelitian 22
3.3. Populasi dan Sampel 22
3.4. Waktu dan Lokasi Penelitian 22
3.5. Prosedur Kerja 22
3.5.1. Persiapan Alat dan Bahan 23
3.5.2. Sampling dan Isolasi 23
3.5.3. Pembiakan isolat bakteri 24
3.5.4. Seleksi Bakteri Selulotik 24
3.5.5. Identifikasi bakteri Selulotik 25
3.5.6. Pembuatan Kurva Tumbuh 28
3.5.7. Pembuatan Kurva Standar Jumlah Sel 29
3.5.8. Praperlakuan Jerami 29
3.5.9. Pembuatan Larutan Standar Glukosa 30
3.5.10. Pembuatan Kurva Standar Glukosa 30
3.5.11. Produksi Gula Hidrolisat dari Penguraian Enzim yang Dihasilkan secara *Submerged Fermentation* (SmF) 30
3.5.12. Pengukuran Parameter 31
3.6. Analisis Data 31
3.7. Alur Penelitian 31
BAB IV HASIL DAN PEMBAHASAN 33

4.1. Isolat Bakteri Asal Air Lindi 33
4.2. Seleksi CMC 34
4.3. Karakteristik Morfologi, Pewarnaan, dan Biokimia Bakteri Selulolitik. 36
4.4. Pengukuran Kurva Pertumbuhan Bakteri Selulolitik 41
4.5. Jumlah Sel Bakteri Selulolitik selama Hidrolisis pada Medium SmF 42
4.6. Kadar Gula Hidrolisat dari Jerami oleh Bakteri Selulolitik 47
BAB V KESIMPULAN, IMPLIKASI, DAN SARAN 53
5.1. Kesimpulan 53
5.2. Implikasi 53
5.3. Saran dan Rekomendasi 53
DAFTAR PUSTAKA 55
LAMPIRAN 66

DAFTAR TABEL

Tabel 4.1 Indeks Selulolitik (cm) dari Isolat Bakteri Selulolitik 35

Tabel 4.2 Karakteristik Biokimia Bakteri Selulolitik BG8 dan BG7 asal Lindi....37

Tabel 4.3 Uji Statistik Jumlah Sel Bakteri Selulolitik selama Hidrolisis 44

Tabel 4.4 Uji Statistik Gula Hidrolisat Hasil Produksi dari Serbuk Jerami Padi oleh Bakteri Selulolitik..48

DAFTAR GAMBAR

Gambar 2.1 Jerami Padi 11
Gambar 2.1 Komposisi Lignoselulosa 12
Gambar 2.2 Mekanisme Tiga Enzim Selulase Memecah Rantai Selulosa 20
Gambar 3.1 Alur Penelitian...32
Gambar 3.2 Langkah Kerja Produksi Gula Hidrolisat dari Serbuk jerami padi (*Oryza sativa* L.) oleh Bakteri Selulolitik asal Air Lindi....................32
Gambar 4.1 Zona Bening Bakteri Selulolitik Asal Lindi pada Medium CMC......34
Gambar 4.2 Kurva Pertumbuhan Bakteri BG8 pada *Nutrient Broth*, pH 7, suhu 37 °C...41
Gambar 4.3 Grafik Jumlah Sel Bakteri BG8 selama Hidrolisis Substrat Serbuk Jerami Padi pada 37 ^{o}C, pH 7 43
Gambar 4.4 Grafik Konsentrasi Gula Hidrolisat (%) Dua Perlakuan Substrat Awal Hasil Hidrolisis Serbuk Jerami Padi oleh Bakteri Selulolitik BG8 pada 37 ^{o}C, pH 7 47

DAFTAR LAMPIRAN

Lampiran 1. Alat dan Bahan Penelitian…………………………………………………...66

Lampiran 2. Dokumentasi Tumbuhan Padi 68

Lampiran 3. Dokumentasi Praperlakuan...69

Lampiran 4. Isolasi Bakteri dengan Cawan tuang 70

Lampiran 5. Karakterisasi Morfologi, Pewarnaan, dan Uji Biokimia Bakteri selulolitik BG7 dan BG8...71

Lampiran 6. Kurva jumlah sel standar bakteri 80

Lampiran 7. Kurva glukosa standar 81

Lampiran 8. Jumlah sel dan Gula hidrolisat 82

Lampiran 9. Analisis statistik menggunakan IBM SPSS Statistik 22 *For Windows*……….…………………………………………………………..…84

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