

## **ABSTRACT**

### **EFFECT OF CELLULOSE ENZYME CONCENTRATION AND INCUBATION TIME ON BAGGASE REDUCING SUGAR CONCENTRATION**

**By**

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Baggase, solid by product of sugar cane industries, contains high lignocellulose. The lignocelluloses consist of 46.0% cellulose, 21.6% hemicellulose and 20.4% lignin. Baggase can be used as raw materials of bioethanol production. Before fermenting into bioethanol, the baggase needs to submerge into base solution in order to dissolve lignin component. After filtering the solution, the residues (cellulose and hemicelluloses) are hydrolyzed with cellulase enzyme into reduced sugar.

The objective of this research was to study effects of enzyme concentrations and incubation times on reduced sugar concentration of baggase. Baggase was submersed in 1 M NaOH solution at 121°C for 15 minutes for degrading lignin component. After filtering the solution, residues were dried up to constant weight. The residues were hydrolyzed into reduced sugar with cellulase enzymes at concentrations of 0, 5, 10, and 15 FPU for 0, 6, 12, 18, and 24 hours at a shaking of 100 rpm, a pH of 4.8, and at a temperature of 50°C. At the end of incubation times, filtrate was taken and reduced sugar concentration was measured. Data of reduced sugar concentrations were processed and presented in table and graphic, and then discussed descriptively. Research results indicated that the higher concentration and the higher incubation time of enzymes resulted in the higher concentration of reduced sugar. The best treatment was occurred at a combination of 10 FPU enzyme concentration and 18 hour enzyme incubation. The treatment provided a reduced sugar concentration of 14,07 mg/mL.

**Keywords :** Baggase, lignocellulose, cellulose enzyme, reducing sugar

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## **ABSTRAK**

### **PENGARUH KONSENTRASI DAN WAKTU INKUBASI ENZIM SELULASE TERHADAP KADAR GULA REDUKSI AMPAS TEBU**

**Oleh**

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Ampas tebu, yang merupakan hasil samping pabrik gula, mengandung komponen lignoselulosa yang terdiri dari 45,96% selulosa, 21,6% hemiselulosa dan 20,4% lignin. Ampas tebu dapat digunakan sebagai bahan baku pembuatan bioetanol. Sebelum difermentasi menjadi bioetanol, ampas tebu perlu diberi perlakuan awal terlebih dahulu untuk mendegradasi lignin dan menghidrolisis selulosa dan hemiselulosa menjadi gula reduksi.

Tujuan penelitian ini adalah untuk mengetahui pengaruh konsentrasi dan waktu inkubasi enzim selulase terhadap kadar gula reduksi ampas tebu. Untuk mencapai tujuan tersebut, ampas tebu direndam dalam larutan NaOH 1M pada suhu 121°C selama 15 menit untuk mendegradasi komponen lignin. Setelah disaring dan dikeringkan sampai berat konstan, selulosa dan hemiselulosa ampas tebu dihidrolisis dengan 0 FPU, 5 FPU, 10 FPU and 15 FPU enzim selulase selama 0 jam, 6 jam, 12 jam, 18 jam dan 24 jam pada goyangan 100 rpm, pH 4,8 dan suhu 50 °C. Pada akhir waktu inkubasi, filtrat diambil dan dianalisis kadar gula reduksinya. Data yang diperoleh disajikan dalam bentuk tabel dan grafik, kemudian dibahas secara deskriptif. Hasil penelitian menunjukkan bahwa makin tinggi konsentrasi enzim dan makin lama waktu inkubasi menghasilkan makin tinggi konsentrasi gula reduksi. Perlakuan 10 FPU dan lama inkubasi 18 jam merupakan kombinasi perlakuan terbaik dan menghasilkan gula reduksi pada konsentrasi 14,07 mg/mL.

Kata kunci: Ampas tebu, lignoselulosa, hidrolisis enzimatis, gula reduksi

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