

**PENGARUH WAKTU FERMENTASI DAN VOLUME ENZIM SELULASE
BATANG JAMUR TIRAM PADA PEMBUATAN BIOETANOL DARI
JERAMI PADI MENGGUNAKAN METODE *SIMULTANEOUS
SACCHARIFICATION AND FERMENTATION (SSF)***

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INTISARI

Penelitian tentang pembuatan bioetanol dari jerami padi menggunakan metode SSF telah dilakukan di Laboratorium Terpadu Universitas Islam Indonesia, Jalan Kaliurang Km 14,5. Jerami padi merupakan limbah pertanian yang mengandung lignoselulosa yang dapat dimanfaatkan untuk pembuatan energi alternatif seperti bioetanol. Penelitian ini bertujuan untuk menentukan waktu fermentasi dan volume enzim selulase terbaik terhadap kadar etanol yang dihasilkan, serta mengetahui pengaruh praperlakuan basa pada sampel jerami terhadap kadar etanol yang dihasilkan. Metode yang dipakai adalah SSF (*Simultaneous Saccharification and Fermentation*) dimana proses hidrolisis dan fermentasi dilakukan secara serempak. Kelebihan dari metode ini yaitu tanpa melalui tenggang waktu yang lama, dilakukan dalam satu reaktor sehingga menghemat biaya. Proses hidrolisis dilakukan oleh enzim selulase yang diekstrak dari batang jamur tiram, sedangkan proses fermentasi dilakukan oleh ragi *S. cerevisiae*. Sampel jerami padi dihaluskan dan dikeringkan terlebih dahulu untuk menghilangkan kadar airnya. Kemudian dimasukkan kedalam medium SSF yang berisi akuades, enzim selulase dan ragi *S. cerevisiae* dan difermentasi selama beberapa hari. Kandungan selulosa pada jerami akan terhidrolisis menjadi glukosa dengan bantuan enzim selulase, kemudian akan langsung dikonversi menjadi etanol dengan bantuan ragi *S. cerevisiae*. Pemurnian etanol dilakukan dengan cara distilasi sederhana. Variabel yang digunakan yaitu volume enzim selulase dan waktu fermentasi. Variasi volume enzim selulase mulai dari 0, 10, 15, 20 dan 25 mL. Sedangkan waktu fermentasi mulai dari 2, 4, 6, 8 dan 10 hari. Dari hasil penelitian yang dilakukan didapat kadar bioetanol yang tertinggi 14,52% dengan variasi waktu fermentasi 10 hari dan volume enzim 25 mL, sedangkan kadar bioetanol pada sampel kontrol (praperlakuan basa) sebesar 9,75%.

Kata Kunci : *Bioetanol, Jamur Tiram, Jerami Padi, Simultaneous Saccharification and Fermentation (SSF).*

**THE INFLUENCE OF FERMENTATION TIME AND CELLULASE
ENZYME VOLUME OF OYSTER MUSHROOM STEM AT
BIOETHANOL PRODUCTION FROM RICE STRAW USING
SIMULTANEOUS SACCHARIFICATION AND FERMENTATION (SSF)
METHOD**

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ABSTRACT

A study about production of bioethanol from rice straw using SSF method had been done at Integrated Laboratory of Islamic University of Indonesia, Jalan Kaliurang Km 14.5. Rice straw is an agricultural waste containing lignocellulose that can be utilized for manufacturing alternative energy such as bioethanol. This study aimed to determine the optimum both fermentation time and volume of cellulose enzyme on the concentration of ethanol produced, also to know the effect of base pretreatment on straw sample on the concentration of ethanol produced. The method used is SSF (*Simultaneous Saccharification and Fermentation*) where the process of hydrolysis and fermentation was done simultaneously. The advantages of this process are the short period of Saccharification and Fermentation, occurring in one reactor and saving the production cost. The hydrolysis process was carried out by cellulase enzyme extracted from oyster mushroom stem, while the fermentation process was done by yeast *S. cerevisiae*. First, the rice straw samples were smoothed and dried to remove the moisture content. Second, the samples were mixed into an SSF medium containing aquadest, cellulase enzymes and yeast *S. Cerevisiae* and then fermented for several days. Cellulose content in straw would be hydrolyzed into glucose by cellulase enzymes, and then would be directly converted to ethanol by yeast *S. Cerevisiae*. Purification of ethanol was done by simple distillation. Variables used were cellulase enzyme volume and fermentation time. Variations in cellulase enzyme volume ranged from 0, 10, 15, 20 and 25 mL. While the fermentation time starts from 2, 4, 6, 8 and 10 days. Based on the results of the research, it was found that the highest bioethanol concentration was 14.52% with the variation of 10 days fermentation time and 25 mL enzyme volume, while the bioethanol concentration in the control sample (base pretreatment) was 9.75%.

Keywords : *Bioethanol, Oyster Mushroom, Rice Straw, Simultaneous Saccharification and Fermentation (SSF).*