

## **PENGARUH JENIS JAMUR DAN LAMA WAKTU BUDIDAYA TERHADAP SIFAT LIMBAH MEDIA TANAM SEBAGAI BAHAN BAKU PRODUKSI ETANOL**

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### **INTISARI**

Pemerintah Indonesia berkomitmen untuk mencapai kemandirian dan ketahanan energi dengan meningkatkan target campuran bioetanol (20%) dari total kebutuhan bensin nasional. Lignoselulosa sebagai bahan baku (*feedstock*) berpotensi sebagai sumber gula untuk produksi etanol. Pembudidayaan beberapa jenis jamur busuk putih yang merupakan jamur konsumsi di Indonesia menghasilkan limbah media sisa berupa lignoselulosa. Jenis jamur dan lama waktu dalam proses budidaya mempengaruhi karakteristik limbah media jamur yang dihasilkan. Oleh sebab itu penelitian ini dilakukan untuk melihat karakteristik kandungan kimia limbah budidaya jamur, peluang penggunaannya sebagai bahan baku bioetanol dan korelasi antar parameter.

Penelitian ini menggunakan media sisa budidaya dari 3 jenis jamur yaitu Kuping, Tiram dan Lingzhi. Media sisa tersebut telah mengalami proses budidaya (Inokulasi, inkubasi, pemeliharaan, pemanenan) selama 90, 100 dan 110 hari pada suhu  $25 \pm 2^\circ\text{C}$  dan kelembaban 70-90%. Kemudian media sisa tersebut dianalisis sifat kimia yaitu: kadar ekstraktif terlarut air panas, kadar ekstraktif terlarut etanol-toluena, holoselulosa,  $\alpha$ -selulosa, Klason lignin, lignin terlarut asam, nilai pH dan abu. Kemudian sampel dihidrolisis menggunakan metode hidrolisis asam dan hidrolisis enzim untuk memproduksi gula pereduksi. Setelah proses dihidrolisis, sampel kemudian dianalisis kadar gula pereduksi (dengan metode DNS) dan laju hidrolisis. Metode hidrolisis dengan kadar gula pereduksi tertinggi akan diperbanyak untuk mengetahui kadar etanol dan rendemen etanol.

Hasil penelitian menunjukkan bahwa sifat kimia media sisa budidaya jamur memiliki potensi yang baik sebagai bahan baku bioetanol. Selama proses budidaya terdapat penurunan kandungan kimia dari media, kecuali kadar ekstraktif larut air panas dan lignin larut asam. Media sisa jamur Lingzi yang dibudidaya selama 100 hari dan dihidrolisis enzim menghasilkan gula pereduksi paling tinggi sebesar 4,35g/L. Kadar etanol dan rendemen etanol tertinggi yaitu pada media sisa jamur Lingzi budidaya 110 hari yang dihidrolisis dengan enzim (38,26g/L atau rendemen 37,86%). Hasil korelasi menunjukkan bahwa produktivitas etanol media sisa budidaya jamur berkorelasi negatif terhadap kadar ekstraktif larut etanol-toluen, holoselulosa,  $\alpha$ -selulosa, hemiselulosa, Klason-Lignin, abu dan, nilai pH.

Kata Kunci: media sisa budidaya jamur, sifat kimia, gula pereduksi, laju hidrolisis, bioetanol.

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## Effect of Mushroom Species and Cultivation Period to The Spent Culture Media Characteristic as Raw Materials for Ethanol Production

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### ABSTRACT

Indonesian government committed to achieve independency and protection energy by increasing bioethanol mixture target (20%) from the total needs of national gasoline. Lignocellulose as raw material (*feedstock*) has potency as a sugar source for ethanol production. Several species of edible white rot fungus are cultivated in Indonesia and they produce lignocellulose spent media waste. The mushroom species and cultivation period influence the characteristics of mushroom spent media waste. Therefore, this research was conducted to determine the chemical content of mushroom cultivation waste, estimate the potency of waste as bioethanol feedstock and the correlation between parameters.

This research used the spent media from 3 species of mushrooms: Ear, Oyster and Lingzhi. This spent media had had been trated by cultivation process (inoculation, incubation, cultivation, harvesting) for 90, 100 and 110 days at of  $25 \pm 2$  °C temperature and 70-90% humidity. Then spent media was analyzed the characteristic such as: hot water-soluble extractive, ethanol-toluene soluble extractive, holocellulose, Klason lignin, acid-soluble lignin,  $\alpha$ -cellulose, pH value and ash content. Then it hydrolyzed by using acid hydrolysis and enzyme hydrolysis methods to produce reducing sugars. After hydrolyzing process, sample was analyzed the reducing sugar content (using the DNS method) and hydrolysis rate. The hydrolysis method with highest reducing sugar content would be reproduced and determined the ethanol content and yield.

The results showed that chemical content of mushroom spent media has a good potential as bioethanol feedstock. Cultivation process can decrease the chemical content of spent media, except hot water-soluble extractive content and acid-soluble lignin. The spent media of Lingzi mushroom for 100 days cultivation period with enzymes hydrolysis method had produced the highest reducing sugar content (4.35 g/L). The highest ethanol content and ethanol yield were found on spent media of Lingzi mushroom for 110 days cultivation period with enzymes hydrolysis (38.26 g/L and rendemen 37.86%). This result showed that ethanol productivity was negatively correlated with chemical component especially: ethanol-toluene soluble extractive, holocellulose,  $\alpha$ -cellulose, hemicellulose, Klason-Lignin, pH values and ash content.

Keywords: mushroom spent media, chemical content, reducing sugar, hydrolysis rate, bioethanol.

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