Effect of Alkali-Treated Birch Sawdust on the Lignocellulase Secretion and Exo-Polysaccharide Production by *Inonotus Obliquus* Under Submerged Fermentation and its Lignocellulose Degradation Patterns

Jiaming Zhang

China Agricultural University

Xiaohong Lu

China Agricultural University

Zhezhen Zhao

China Agricultural University

Mengya Wang

China Agricultural University

Ping Liu (✉ liuping@cau.edu.cn)

China Agricultural University <https://orcid.org/0000-0003-0649-8244>

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Abstract

The objectives of this study were to investigate the medicinal mushroom *Inonotus obliquus* on the production of polysaccharides and changes of extracellular lignocellulolytic enzymes during submerged fermentation using alkali-treated birch sawdust as substrate. Meanwhile, in order to explore the degradation mode of lignocellulose in alkali-treated birch sawdust, degradation analysis of three components of lignocellulose was carried out. The fungus process in alkali-treated birch sawdust medium resulted in a higher degradation rate of cellulose, hemicellulose, and lignin of 39.24%, 51.00% and 31.3% after 11 days of submerged fermentation by the mycelium of *I. obliquus*, respectively. Maximal polysaccharide production and α -glucosidase inhibition rate determined in the alkali-treated birch sawdust medium were 6.93 mg/mL and 55.80%, while they were 4.98 mg/mL and 27.89% in the control. Moreover, high activities of Laccase (51.95 IU/mL) , CMCase (1.35 IU/mL) , FPA (0.50 IU/mL) and β -glucosidase (0.55 IU/mL) were observed in alkali-treated birch sawdust medium, respectively. The results demonstrated that the addition of alkali-treated birch sawdust could promote the yield of active polysaccharides and induce the production of cellulase and xylanase, indicating that alkali pretreatment was conducive to utilization of birch sawdust by *I. obliquus*.

Full Text

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Figures

Figure 1

Dynamic changes of biomass and reducing sugar content in fermentation broth of *I. obliquus*

Figure 2

Dynamic changes of extracellular polysaccharide content and α -glucosidase inhibition rate of *I. obliquus*

Figure 3

Changes in content of three major components of birch sawdust during fermentation. (a) Alkali treatment medium, (b) Washed control medium.

Figure 4

Changes of lignin enzyme production of *I. obliquus* during fermentation

Figure 5

Changes of cellulase enzyme production of *I. obliquus* during fermentation