

## Abstract

The purpose of this experiment was to digest the cellulose inside rice straw into monosaccharides which can be used as the substrate for alcohol fermentation. Both of chemical and enzymatic methods were used to digest the rice straw. The enzymes used in the experiment were found and secreted from the 8 selected fungi (identified as *Aspergillus*, and *Trichoderma* species) which were taken from the rotten rice straw, termite, and soil. The chemical pretreatment was used to remove lignin and hemicellulose out of the rice straw. Treating rice straw with 4% w/v NaOH for 15 min at 100 C was done to remove lignin and result in less complex structure but after this pretreatment, rice straw was still too complex for enzymatic digestion. Therefore, there is no sugar yielded after using the enzymes to digest rice straw. After that, treating rice straw with  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$  (0.5 mM  $\text{Fe}^{2+}$  + 1 M  $\text{H}_2\text{O}_2$ ) for 1 hr at 60 C was done to oxidize lignin. Treating rice straw with 1.5% w/v HCl for 15 min at 100 C was also done to remove hemicellulose. After these pretreatment techniques, the rice straw was still too complex to digest with the prepared enzymes. The reasons of inability to digest rice straw were discussed into two ways. The first reason was the improper pretreatment methods. It should be done orderly by using all of three methods to remove all lignin and hemicellulose. The second problem was the small amount of used enzyme. The enzyme concentration method should be done before using the enzyme to digest rice straw. It would not be too diluted for enzymatic reaction. The use of mixed cultures was also suggested to enhance the efficiency of enzymes.