

## **Effect of alkali pretreatment of rice straw on cellulase and xylanase production by local *Trichoderma harzianum* SNRS3 under solid state fermentation**

### **ABSTRACT**

Use of alkali-pretreated rice straw and untreated rice straw as substrates for enzyme production under solid-state cultivation was investigated. Cellulase produced from untreated rice straw showed higher activity of FPase, CMCase,  $\alpha$ -glucosidase, and xylanase at 6.25 U/g substrate, 111.31 U/g substrate, 173.71 U/g substrate, and 433.75 U/g substrate respectively, as compared to 1.72 U/g substrate, 23.01 U/g substrate, 2.18 U/g substrate, and 45.46 U/g substrate for FPase, CMCase,  $\alpha$ -glucosidase, and xylanase, respectively, when alkali-pretreated substrate was used. The results of the X-ray diffractogram analysis showed an increase in relative crystallinity of cellulose in alkali-pretreated rice straw (62.41%) compared to 50.81% in untreated rice straw. However, the crystalline structure of cellulose was partially disrupted after alkali pretreatment, resulting in a decrease in absolute crystallinity of cellulose. The higher the crystallinity of cellulose, the more cellulase production was induced. The structural changes of rice straw before and after alkali pretreatment were compared by using Scanning Electron Microscopy. Fungal mycelial growth was also observed for both untreated and alkali-pretreated substrates. The results of this study indicated that untreated rice straw is a better substrate for cellulase and xylanase production under solid-state fermentation with low environmental impact.

**Keyword:** Alkali pretreatment; Cellulase; Rice straw; Solid state fermentation; *Trichoderma*; Xylanase