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Characterization of cellulase from *Aspergillus tubingensis* NKBP-55 for generation of fermentable sugars from agricultural residues

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Abstract

The aim of this work was to characterize cellulase from *Aspergillus tubingensis* NKBP-55 for generation of fermentable sugars from agricultural residues. The strain produced high titres of cellulase (750 U/gds) on copra meal in solid state fermentation (SSF). The enzyme preparation also showed hemicellulolytic activities (U/gds) *viz.* endo-mannanase (1023), endo-xylanase (167), β-glucosidase (72) and α-galactosidase (54). Zymography revealed presence of six cellulases, six mannanases and one β-glucosidase. It effectively degraded sugarcane bagasse (SCB) and rice straw (RS) releasing xylose, glucose and cellobiose. One cellulase (***Cat 1***, Mr ~65 kDa) was purified and characterized. It retained more than 50% activity at 70°C after 150 minutes and its activity was enhanced in the presence of Mn^{2+} ions (130%) and β-mercaptoethanol (140%). FTIR and ^{13}C CP/MAS NMR analysis of the enzyme treated SCB and RS revealed degradation of cellulose and hemicellulose, while ^{1}H and ^{13}C liquid state NMR experiments confirmed release of glucose.

Key words: *Aspergillus tubingensis*, β-glucosidase, copra meal, cellulase, mannanase, zymography

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