Production of cellulases and xylanase by Aspergillus fumigatus SK1 using untreated oil palm trunk through solid state fermentation

ABSTRACT

Direct utilization of untreated oil palm trunk (OPT) for cellulases and xylanase production by Aspergillus fumigatus SK1 was conducted under solid-state fermentation (SSF). The highest activities of extracellular cellulases and xylanases were produced at 80% moisture level, initial pH 5.0, 1 × 10^8 spore/g (inoculum) with 125 cm of OPT as sole carbon source. The cellulases and xylanase activities obtained were 54.27, 3.36, 4.54 and 418.70 U/g substrates for endoglucanase (CMCase), exoglucanase (FPase), β-glucosidase and xylanase respectively. The crude cellulases and xylanase required acidic condition to retain their optimum activities (pH 4.0). Crude cellulases and xylanase were more stable at 40°C compared to their optimum activities conditions (60°C for FPase and 70°C for CMCase, β-glucosidase and xylanase). SDS-PAGE and zymogram analysis showed that Aspergillus fumigatus SK1 could secrete cellulases (endoglucanase, exoglucanase and β-glucosidase), xylanase and protease. Enzymatic degradation of alkaline treated OPT with concentrated crude cellulases and xylanases resulted in producing polyoses.

Keyword: Oil palm trunk (OPT); Cellulases; Xylanase; Solid-state fermentation; Saccharification