Optimization of β-1,4-endoxylanase production by a new *Aspergillus niger* strain growing on wheat straw and application in xylooligosaccharides production

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Abstract

Plant biomass constitutes the main resource of renewable carbon in the planet and its valorization has traditionally been focused on the use of cellulose, although hemicellulose is the second most abundant group of polysaccharides on earth. Enzymes involved in its degradation are usually glycosyl hydrolases and filamentous fungi are good producers of these enzymes. In this study, a new strain of Aspergillus niger was utilized for hemicellulase production under solid state fermentation using wheat straw as a single carbon source. Physicochemical parameters for production of an endoxylanase were optimized by using one factor at a time approach and response surface methodology (RSM). Maximum xylanase yield after RSM optimization was increased 3-fold. The enzyme was purified by ultrafiltration and ion-exchange chromatography1.41-fold, with 6.2 % yield. Highest xylanase activity was observed at 50 °C and pH 6. A high pH and thermal stability were found, greater than 90% residual activity between pH 3.0-9.0 and between 30-40°C, after 24 h of incubation, presenting half-lives of 30 min at 50 and 60°C. Enzyme was mostly active for wheat arabinoxylan, and displayed the following kinetic parameters Km of 26.06 mg*ml-1 and Vmax of 5,647 U*mg-1min-1.Wheat straw xylan hydrolysis with the purified β-1,4 endoxylanase showed that it was able to release xylooligosaccharides, making it suitable for different applications in food technology.

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