

PRODUCTION OF XYLANASE USING WHEAT BRAN BY SUBMERGED FERMENTATION BY *THERMOMYCES LANUGINOSUS*

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Abstract

The application of hydrolytic enzymes, such as xylanases, have proven to be very valuable in the industry. Their application ranges from paper industry, animal feed, food additives, silage and baking industry, and many others. These versatile enzymes were found to be produced by many microbial species. The aim of this research was to establish whether the fungi *Thermomyces lanuginosus* has xylanase production potential.

The strain was screened for xylanase activity on a selective plate containing beech wood xylan. Production of xylanase enzyme was done by submerged fermentation (SMF) in wheat bran broth medium (WBBM) over a period of 10 days at 50 °C, by using wheat bran as a substrate. Xylanase activity of the produced enzyme was measured according to 3,5-dinitrosalicylic acid (DNS) assay for reducing sugars for each day of fermentation. Total protein content was determined by Bradford method. Cellulase, mannanase, amylase and pectinase enzyme activities were determined by DNS assay, while protease activity was measured using azo-casein as substrate. The effect of substrate concentration on the enzyme activity was investigated by DNS method.

The maximum activity of 17.74 ± 0.48 IU/mL was reached on day 7 of fermentation. pH and temperature optimum were analyzed and it was determined that the optimum pH for the enzyme activity was 6, showing the high activity also in the pH range 5 - 7.5. Temperature optimum was 60 °C. The research has shown that the enzyme was stable even after 5 hours of incubation at optimal conditions, reaching maximum activity after 2 hours. In the presence of metal ion Mn²⁺ the activity of enzyme was increased. All other tested enzymes were found to be present in the crude enzyme extract.

The tested strain *T. lanuginosus* is a good producer of xylanases, and may be used for hydrolysis of lignocellulosic waste materials. Due to its temperature stability and wide pH range of activity, it shows potential for application in many different industries.

Key words: Xylanases, Xylan, *Thermomyces lanuginosus*, Submerged fermentation, Fungi.