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RESEARCH PAPER

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Xylanase production from *Aspergillus wentii* using wheat bran as a carbon source

V. SASHI AND N.S. MALATHY

Department of Plant Biology and Plant Biotechnology, P.S.G.R.Krishnammal College for Women, COIMBATORE (T.N.) INDIA

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The production of xylanase by *Aspergillus wentii* in submerged fermentation at different ranges of pH, temperature and time periods was studied. The maximum xylanase production, was obtained at pH 6.0, temperature 40^{0}C but it was at par with 35^{0}C and time period of 120hrs. Optimization studies were carried out to find the effect of carbon and nitrogen sources on xylanase production and it was observed that wheat bran xylan medium supplemented with methyl - β - D xylopyranoside and $NaNO_3$ supported good yield of xylanase.

Key words : Xylanase, Liquid state fermentation (LSF), *Aspergillus wentii*, Wheat bran, Static conditions

INTRODUCTION

Agricultural residues contain 20-30% hemicellulosic material, which can be utilized by microorganisms. The main carbohydrate constituent of the lignocellulosic material are cellulose, mannan and xylan. Xylan constitutes the major noncellulosic polysaccharides of primary cell wall of grasses and secondary wall of all angiosperms (Asbah *et al.,* 2000; Diaz *et al.,* 2004).

Xylan can be hydrolyzed to xylose by xylanase (1,4-b-D-glucanxylanohydrolase, EC.3.2.1.8) and b-xylosidase (1,4-b-D-xylan xylohydrolase, EC.3.2.1.3.7). Xylanases have attracted considerable research interest because of their potential industrial applications, including hydrolysis of lignocelluloses to biofuel fermentable sugars, bread making, clarification of beer and juices. The most important application of xylanases is the pretreatment of pulp prior to bleaching in pulp and paper industry (Sandrim *et al*., 2005). A variety of microorganisms including bacteria, yeasts and filamentous fungi have been reported to produce xylanolytic enzymes (Coughlan and Hazelwood, 1993).

Fungal xylanases can be produced using two main methods, solid-state cultivation system and liquid state cultivation systems (Bakir *et al.,* 2001). Using abundantly available agro residues in fermentation processes serve the dual purpose of cost – effective enzyme production and environment security. Wheat bran is a low cost raw material leads to reduction in the culture medium cost that generally range from 4-25% of the total production. In this paper the cultivation conditions for the production of xylanase using *Aspergillus wentii* under liquid state fermentation are reported.

MATERIALS AND METHODS

Chemicals :

Wheat bran was purchased from the local market. Oat spelt xylan (substrate) was purchased from Sigma Chemical Company, USA and other chemicals used were of analytical grade.

Organism and inoculum:*illus wentii* was isolated from coir pith soil samples collected in the Coimbatore region of the state of Tamil Nadu. The fungus was maintained at 4^{0}C on Potato dextrose agar slants (PDA).The fungus was identified with the help of standard manual (Gilman, 1957). Spore suspensions were prepared by adding 10mL of sterilized distilled water to the test tubes whose surface were gently scrapped with a glass rod. Then 10^6/ml of the spores were inoculated into the medium.

Liquid state fermentation (LSF) :

The production medium (Czapek Dox medium) had the following composition (g/L):Wheat bran-30; $NaNO_2$-20; KCl-0.5; $MgSO_4$,$7H_2O$-0.5;KH_2PO_4-1.0; $FeSO_4$.$7H_2O$-0.01. The conical flasks (250ml) containing 100ml of liquid medium were used for liquid state fermentation. The flasks were inoculated with the spores and incubated at 30^{0}C for 144 h at static conditions. At the end of fermentation the culture flasks were filtered through Whattman No 41 filter paper and the filterate was centrifuged at 3000 rpm for 30 min and assayed for enzyme activity.

Xylanase assay :

Xylanase activity was determined by the method of