XYLANASE PRODUCTION BY *ASPERGILLUS SP*. IN SUBMERGED CULTURE FERMENTATION

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Introduction. Xylanases (EC 3.2.1.8) catalyze the hydrolysis of xylan, the hemicellulose major constituent. Filamentous fungi are very important industrial producers of this enzyme due to the extracellular release of xylanase and to their easy cultivation. In order to get industrial production of enzymes, the cost reduction at the process is critical and it's achieved by the low cost substrates utilization during the fermentation. Therefore, solid agricultural wastes can be used to make the process cost effective[1].
Thus, the objective of this study was to evaluate several agricultural wastes and better culture conditions in order to obtain maximun yield of xylanase enzyme out from *Aspergillus sp*. in submerged fermentation

Methods. A strain of *Aspergillus sp*. was grown in a liquid medium containing either corn cob (CC) or organic wastes gotten out from the supply center market (OW) in flask at 72 hrs of incubation time. Two experimental designs were adopted in order to determine the medium where the highest yields xylanolytic activity is obtained at. Then, a fermentation was done in a BIOFLO III bioreactor at 37 °C, pH4, aireation rate 1SLPM and 140rpm. After 66 hours of incubation time the extracellular xylanase activity[2] and concentration of soluble protein were determined[3].

Results. The higher enzyme activity (4.55 U/mL) was found with CC carbon source, pH=5, T=48°C and C/N=14 and the less favorable conditions were found when OW was used as carbon source(Fig 2).The best xylanolytic activity in a latin square design was 14.65 U/mL at T=37°C, pH=4, C/N=14.

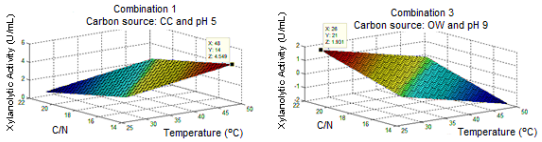

Fig. 1 Response surface plots of PB design showing the effects of the most significant factors

The relationship of biomass growth is partially associated with the product and this reaches its exponential phase approximately at 20 hours (Fig 2). The xylanase production shows an adaptation period between 0 and 20 hours. At this moment the xylanolytic activity increases, reaching its highest level at 63 hours (22.57 U/mL). However, the maximum productivity (440.85 U/L*h) is obtained at 44 hours.

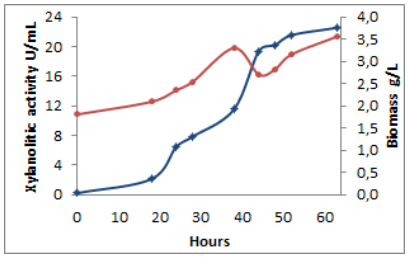

Fig.2 Profile of xylanase activity (♦), biomass (●), at the optimized medium by experimental designs.

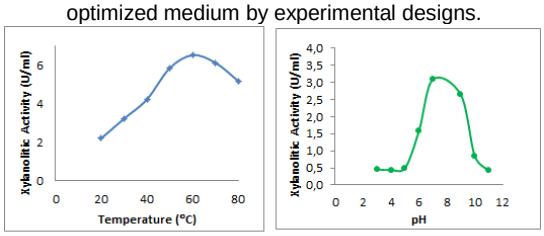

Fig. 3 Temperature dependence (a) and pH dependence (b) of xylanase from *Aspergillus sp.*

Conclusions. The enzyme extract from the Aspergillus sp. shows an important xylanolytic activity (22.57 U/ml) used corn cob at carbon source which is a similar value reported for A. niger by Suprabha et. al. The optima temperature and pH at xylanolytic activity were 60°C and 7 (Fig. 3). The value of the Aspergillus sp. temperature optimum is very close to that described for crude preparation from A. nidulans[4] and A. versicolor[5].

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References.

1. Wizani, W., H. Esterbauer, W. Steiner, J. Gomes and H. Verfauzer, (1990). *Exo and Endo-cellulase xylanase*. 40: 431-435.
2. Miller, GL. (1959). *Use of dinitrosalicylic acid reagent for determination of reducin sugars*. *Analytical Chemistry,* 31:426-428.
3. Bradford, M.M., *Estimation of protein*: Anal. Biochem. (1976). 48:208-217
4. Fernandez-Espinar MT, Ramon D, Pinaga F, valles S. (1992). *Xylanase production by Aspergillus nidulans.* FEMS Microbiol. 91: 91-96
5. Carmona, E., Pizzirani,A.(1997). *Xylanase production by Aspergillus Versicolor,* J. Basic Microbiol 37:387.