2.59 INFLUENCE OF MOISTURE CONTENT AND BED LOADING DURING THE SOLID STATE FERMENTATION OF CORNCOB BY *ASPERGILLUS NIGER* CECT 2700

Pérez-Bibbins, B.[1]
Pérez-Rodríguez, N.[1]
Araújo-Oliveira, F.M.[2]
Belo, I.[2]
Torrado Agrasar, A.[1]
Domínguez, J.M.[1]

The existence of pollution problems associated with agro-industrial wastes, scarcity of places for its disposal, costlier treatment options and increased need to save valuable resources have forced to encourage the utilization and bioconversion of waste into high value industrially useful products including xylanases (Chapla *et al.,* 2010). Solid state fermentation (SSF) has been used for the production of microbial enzymes due to several economic advantages over conventional submerged fermentation (Pal and Khanum, 2010). Filamentous fungi are the most widely exploited microorganisms used in SSF because of their ability to grow on the complex solid substrate and production of a wide range of extracellular enzymes. Microbial xylanases are the preferred catalysts for the hydrolysis of xylan, the major hemicellulosic polysaccharide of wood and agricultural wastes, due to their high specify, mild reaction conditions, negligible substrates loss and side product generation (Chapla *et al*., 2010).

The aim of this work was to optimize the production of xylanases by *Aspergillus niger* CECT 2700 from corncob. To achieve this goal, a Box-Behnken design was performed in order to study the influence of bed loading (*BL*) and moisture content (*MC*) on xylanase activity. Erlenmeyers flasks containing 5, 10 or 15 g of ground corncob were treated with

[1] Department of Chemical Engineering, Faculty of Sciences, University of Vigo (Campus Ourense), As Lagoas s/n, 32004 Ourense, SPAIN. *E-mail:* pbbelinda@uvigo.es
[2] IBB – Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Campus de Gualtar, 4710–057 Braga, Portugal.

salts solution to moisten the substrate with moisture ratios of 1:2.4, 1:3, or 1:3.6 (w/w).

The results showed a significant effect of moisture content on xylanase production. Values varied from 648 at 1:2.4 w/w and 15 g of BL and 1818 U/g at 1:3.6 w/w of moisture ratio and 5 g of BL. Increasing moisture ratio clearly improved xylanase production; meanwhile, bed loading showed a non linear effect on that. In order to optimize xylanase activity, a polynomial equation was fitted to xylanase activity of experimental data:

$$X/(U/g) = -193422 + 103165\,MC + 9223\,BL + 13.03\,MC^2 + 0.27BL^2 - 35.88MCBL$$

A coefficient of determination of 0.928 revealed a good fit of the polynomial equation to experimental data. Scaling up of the process in horizontal tube reactors is being performed to improve the efficiency of the process.

Chapla, D., Divecha, J., Madamwara, D., Shah, A. (2010). Utilization of agro-industrial waste for xylanase production by *Aspergillus foetidus* MTCC 4898 under solid state fermentation and its application in saccharification. *Biochem. Eng. J.* 49, 361–369.

Pal, A., Khanum, F. (2010). Production and extraction optimization of xylanase from *A. niger* DRF-5 through solid-state-fermentation. *Bioresour. Technol, 101*, 7563-7569.

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