OPTIMIZATION OF LIPASE PRODUCTION BY *Aspergillus niger* GH1 IN A SUBMERGED CULTURE

Rodríguez-Gutierrez, A.[1], Belmares-Cerda, R. [1]*, Montañez, J.C., Cruz, M.A[2], Aguilar, C.N[1].
[1]Universidad Autónoma de Coahuila. Food Research Department, School of Chemistry.
Blvd. Venustiano Carranza PO BOX 252, ZIP 25 000, Coahuila, México.
[2]Universidad Autónoma Agraria Antonio Narro. Food Science and Technology Department.
Buenavista. Saltillo, Mexico
*e-mail: ruthy_251m@yahoo.com.mx

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Introduction. Lipases (EC 3.1.1.3) are enzymes, which hydrolyze triglycerides into glycerol and fatty acid. Under certain conditions these enzymes catalyze the reverse reaction. (Pokornovy, 1994). Lipases are produced by a large number of microorganisms, either fungal, bacterial or yeast fungi. Among these microorganisms, fungi are recognized as the best lipase producers (Contesini, et al., 2009). Lipases of microbial origin are used in the food, dairy, detergent, cosmetic and tanning industries (Cihangir and Sarikaya, 2004.). *Aspergillus* species are the most well known lipase producers and their enzymes are suitable for use in many industrial applications (Fu *et al.* 1995). In this study was optimizated lipase production in a submerged culture with *Aspergillus niger* GH1 strain.

Methods. Fermentations were carried out with the strain *Aspergillus niger* GH1 in a Czapeck-dox media. The lipase production was monitored by 7 days at temperature of 30°C. A Plackett-Burman design was use to select factors that have the highest influence on the lipases production. The culture medium components evaluated were $NaNO_3$, K_2HPO_4, $MgSO_4.7H_2O$, KCl, $FeSO_4.7H_2O$, olive oil and pH. The above-mentioned factors were analyzed at two levels, high (+1) and low (-1). The optimum medium values were determinate by response surface methodology based on a central composite design. Lipase activity was evaluated using the technique of pNPP (Bastida *et al.,* 1988).

Results. A total of seven components were screened, where the factors that showed statistically significant effect (90%) on lipase activity were $FeSO_4$, $MgSO_4$ and K_2HPO_4. The remaining factors had not significant effect on lipase production by *Aspergillus niger* GH1.

The results for the evaluation of each individual factor showed that $FeSO_4$ was the most influential factor on the lipase production, followed by $MgSO_4$ and K_2HPO_4, Figure 1 illustrates the interaction between the factors $MgSO_4$ and $FeSO_4$ where the highest lipase activity was observed at high concentration of $MgSO_4$. Finally the lipolytic activity was higher when the concentration of $FeSO_4$ and KH_2PO_4 where in the highest level of concentration tested. The highest activity obtained was 27.36 UE/mL at the combination of 2.5 g/L K_2HPO_4; 0.75 g/L $MgSO_4.7H_2O$; 0.025 g/L $FeSO_4.7H_2O$, 2 g/L $NaNO_3$; 0.5 g/L KCl and 1% olive oil.

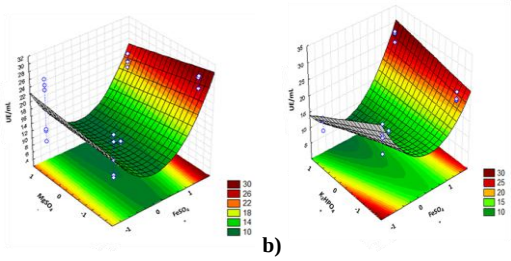

Fig.1 Effect on the interaction between a) $FeSO_4$ and $MgSO_4$. b) Interaction between K_2HPO_4 and $FeSO_4$.

Conclusions. The results demonstrated the high potential of the *Aspergillus niger* GH1 strains for lipases production in a optimizated culture medium with a good activity for industrial purposes.

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