OPTIMIZATION OF CHITIN PRODUCTION BY *Aspergillus niger* USING RESPONSE SURFACE METHODOLOGY

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Chitin and chitosan have found important applications in biomedical and pharmaceuticals fields including wound healing and dressings, blood anticoagulants, drug delivery systems, anti-tumor and anti-cholesterolemic agents, immunoadjuvants, antimicrobial agents and gene therapy (1). They are also valuables in biotechnology and food industry as supports for enzyme and cell immobilization, food additives and clarifying agents for beverage manufacture (2).

Chitin is industrially produced from shrimp, crab, lobster and antarctic krill shell wastes. However, during last years, several fungi such as *A. niger, M. rouxii*, *A. coerulea* and *R. oryzae* have been considered as alternative sources of chitin due to its presence in the cell walls (3). These fungi are widely employed for producing enzymes and other biotechnological products, and the optimized conditions for these fermentation productions are well established. However, little has been done for optimizing the production of chitin from these fungi.

In this study, a response surface approach was used to determine the optimum parameters for the production of chitin by *Aspergillus niger* in agar plate cultures and submerged fermentation. In both cases, temperature, time and pH were found to significantly affect the production of the polymer. The predicted maximum chitin production in agar plate cultures was 56.2 µg/ml when temperature, time and pH had the optimized values of 36ºC, 69 h and 6.5, respectively. A 2^4 factorial central composite design was employed to optimize the parameters for submerged fermentation, which showed that an incubation temperature of 35ºC, pH 6.0 and a fermentation time of 69 h were the best conditions to produce the polysaccharide (150.4 mg/g biomass) with *A. niger*. Experiments conducted at the predicted optimum levels fitted well with the predicted optimum response. It was demonstrated that the concentration of chitin in the cell wall of *A. niger* can be increased by the optimum selection of the submerged fermentation conditions.

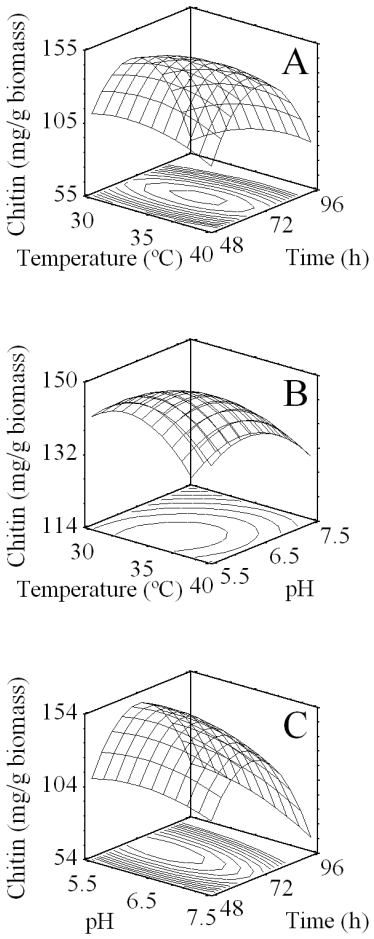

Figure 1: Temperature, time of incubation, pH and their mutual effect on the production of chitin by *A. niger* in submerged fermentation.

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