

## Evaluation of Liquid Fermentation Strategies to Obtain a Biofertilizer Based on Rhizobium sp.

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**Abstract :** This paper describes the initial technological development stages in the area of liquid fermentation required to reach the quantities of biomass of the biofertilizer microorganism Rhizobium sp. strain B02, for the application of the unitary stages downstream at laboratory scale. In the first stage, the adjustment and standardization of the fermentation process in conventional batch mode were carried out. In the second stage, various fed-batch and continuous fermentation strategies were evaluated in 10L-bioreactor in order to optimize the yields in concentration (Colony Forming Units/ml•h) and biomass (g/l•h), to make feasible the application of unit operations downstream of process. The growth kinetics, the evolution of dissolved oxygen and the pH profile generated in each of the strategies were monitored and used to make sequential adjustments. Once the fermentation was finished, the final concentration and viability of the obtained biomass were determined and performance parameters were calculated with the purpose of select the optimal operating conditions that significantly improved the baseline results. Under the conditions adjusted and standardized in batch mode, concentrations of  $6.67 \times 10^9$  CFU/ml were reached after 27 hours of fermentation and a subsequent noticeable decrease was observed associated with a basification of the culture medium. By applying fed-batch and continuous strategies, significant increases in yields were achieved, but with similar concentration levels, which involved the design of several production scenarios based on the availability of equipment usage time and volume of required batch.

**Keywords :** biofertilizer, liquid fermentation, Rhizobium sp., standardization of processes

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