



PRODUCTION OF ENTOMOPATHOGENIC FUNGI IN AIRLIFT BIOREACTOR

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Introduction. *Beauveria bassiana* is a fungus that produces spores that are pathogenic to insect pests of economically important crops. One way to produce the fungal spores is cultivating the fungus in liquid medium using bioreactors. Stirred tank bioreactors are already used and apparently have not been used airlift bioreactor, which has advantages over stirred tank bioreactors, because they have lower shear rates and the investment, operation and maintenance costs are lower (1).

The objective was to evaluate the production of spores of the fungus *Beauveria bassiana* in an airlift bioreactor.

Methods. *Beauveria bassiana* BbPM inocula were prepared using spores obtained in PDA medium after 21 days of growth at 21 °C, at a concentration of 10^6 spores/mL. The culture medium used in the inoculum and in the bioreactors was constituted by 14.5 mL/L of molasses, 6 g/L of $(\text{NH}_4)_2\text{SO}_4$, 3.5 g/L of KH_2PO_4 , 0.5 g/L of MgSO_4 , 0.1 g/L of NaCl and 0.1 g/L CaCl_2 . The temperature was 24 °C and pH 5.4. 0.5 L Airlift bioreactor was fitted with a glass porous plate sparger of 2.5 cm diameter (porous size 100-160 μm), $(H/D)=9$. Except for the D_t/d , the stirred tank was of standard design with four baffles, a multiport stainless steel head plate, a ring sparger with 0.8 mm pore diameter of 30 mm in diameter and two Rushton turbine impellers.

Results. Fig. 1 shows that the spore production in airlift bioreactor was similar to that obtained in stirred tank bioreactor. No difference in the production of spores was observed although the shear rate in the airlift bioreactor (40 s^{-1}) was less than the stirred tank bioreactor (180 s^{-1}). In contrast, cultures of *Trichoderma reesei* carried out without mechanical agitation resulted in higher volumetric enzyme productivity and soluble proteins when compared to those with agitation. Indeed, mechanical agitation resulted in shorter mycelial hyphae and larger numbers of tips (2).

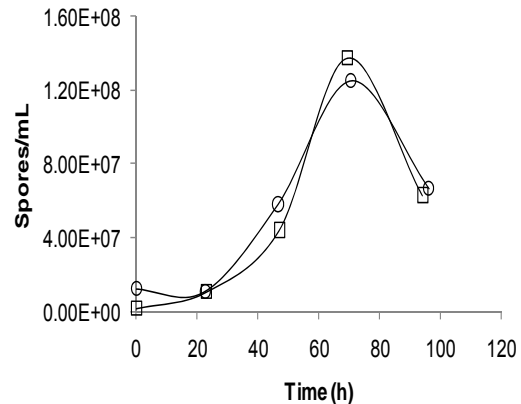


Fig.1 Spore production in 0.5 L airlift bioreactor at 1 vvm (\circ) and 0.5 L stirred tank bioreactor at 300 rpm and 1 vvm (\square).

Our results encourage to follow the scale up of the production of spores in airlift bioreactor, because the spore production was similar to that obtained in stirred tank, and to their lower energy consumption levels (3).

Conclusions. *Beauveria bassiana* cells were able to produce the same amount of spores in airlift bioreactor and stirred tank bioreactor, even though the hydrodynamic conditions were different.

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References.

- Roselei C. F., Tomás A. P., Mauricio M. S. (2009). Comparison of stirred tank and airlift bioreactors in the production of polygalacturonases by *Aspergillus oryzae*. *Bioresource Technol.* 100: 4493–4498.
- Aftab A., Patrick Vermette. (2010). Effect of mechanical agitation on the production of cellulases by *Trichoderma reesei* RUT-C30 in a draft-tube airlift bioreactor. *Biochem. Eng. J.* 49: 379–387.
- Shigenobu M., Tomohiro A., Minako H., Mami K., Lies D., Mitsuyasu O. (2003). Optimization and scale-up of l-lactic acid fermentation by mutant strain *Rhizopus sp.* MK-96-1196 in airlift bioreactors. *J. Biosci. Bioeng.* 96: 65-69.