

Reference

272

Selection of natural materials for use on yeast immobilization

Genisheva, Zlatina Asenova; Mussatto, Solange I.; Oliveira, José M.; Teixeira, José A.

IBB - Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Campus de Gualtar, 4710-057, Braga, Portugal.

E-mail: zgenisheva@gmail.com

Keywords: immobilization

Abstract

The interest in cell immobilization for alcoholic beverage production has increased in the last decades due to the several advantages that this process presents, including increased productivity, reduced risk of contamination, biocatalyst recycling, rapid product separation and others. As a consequence, it is of great importance to find cheap, abundant, non destructive and food grade purity immobilization supports for a good quality of the final product [1]. In the present work, three different materials were tested as support for yeast immobilization: corn cobs, grape stems and grape seeds.

The support materials were prepared by washing with distilled water and drying at 60 °C until constant mass. A commercial *Saccharomyces cerevisiae* was the yeast strain used in the experiments. For inoculum preparation, the yeast was cultivated in YPD medium in static conditions at 30°C for 24h. Fermentation runs were performed in semi-synthetic medium with the following composition (% w/v): glucose 9, yeast extract 0.4, (NH₄)₂SO₄ 0.1, KH₂PO₄ 0.1, and MgSO₄ 0.5. The assays were carried out in 500 ml Erlenmeyer flasks containing 200 ml of medium and 2 g of the material carrier. The flasks were statically incubated at 30 °C for 60 h. For comparison, assays under the same conditions described above were also performed without support addition. Fermentations were carried out in duplicate, and samples were taken every 12 h for estimation of biomass, glucose consumption and ethanol production. Immobilized cells concentration was determined at the fermentation end, according to Brányik et al. [2].

All the fermentation runs with immobilized cells lasted after 24 h, half of the necessary time for total glucose consumption in medium containing free cells. Among the three evaluated materials, grape seeds gave the highest cells immobilization results (52 mg/g support), while corn cobs gave lower results (46 mg/g support) and no cells adhesion was observed into grape stems. Ethanol production was maximum (47.9 g/l) in the medium containing grape stems; however, cells were totally in the free form in this medium. Cells immobilized in grape seeds gave ethanol production (44.9 g/l) higher than cells immobilized in corn cobs (41.8 g/l). It was thus concluded that grape seeds is a wine-making residue with great potential for use as immobilization support during the ethanol production by *Saccharomyces cerevisiae*.

[1] Kourkoutas, Y., Bekatorou, A., Banat, I.M., Marchant, R., Koutinas, A.A. Food Microbiology, 21 (2004) 377-397.

[2] Brányik, T., Vicente, A., Oliveira, R., Teixeira J. Biotechnology and Bioengineering, 88 (2004) 84-93.