

POLY(3-HYDROXYBUTYRATE-CO-3-HYDROXYVALERATE) PRODUCTION FROM GLYCEROL AND PROPIONIC ACID BY MUTANTS STRAINS OF *Pandoraea* sp. AFFECTED IN THE PROPIONATE METABOLISM

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Abstract

The polyhydroxyalkanoates (PHAs) are microbial polyesters composed of 3-hydroxy fatty acid monomers varying from one carbon to over 14 carbons and although approximately 150 different constituents of PHAs have been identified, the poly(3-hydroxybutyrate) (P3HB) is the most common type and extensively studied. Although the P3HB could replace some petrochemical plastics like the polypropylene its application range has been limited due to its high crystallinity and low extension to break. These P3HB unfavorable characteristics can be improved by co-monomers incorporation such as 3-hydroxyvalerate (3HV) to produce the copolymer poly(3-hydroxybutyrate-co-3-hydroxyvalerate) P3HB-co-3HV thereby resulting in suitable properties for thermoplastic processing such as low crystallinity and greater flexibility as compared to P3HB. The *Pandoraea* sp. MA03 isolated from Atlantic ecosystem soil, at Ubatuba, SP, Brazil, was spread plated in Mineral Salts Medium (MSM) containing glycerol and submitted to UV mutation for 7s. The mutants strains were transferred to MSM containing 10 g.l⁻¹ glycerol or propionic acid 1 g.l⁻¹, separately. The strains were incubated up to 72 h at 30 °C. It was selected the mutant strains which were able to grow in glycerol (*gly+*) and unable to grow in propionic acid (*prp-*). The polymer production experiments were carried out by inoculating harvested cells from Luria-Bertani (LB) cultivations after 24h. The centrifuged cells were washed with saline (0.85%) and transferred to free nitrogen MSM containing 10 g.l⁻¹ glycerol and 0.5 g.l⁻¹ propionic acid with shaking at 150rpm for 24h. The cell dry weight was determined gravimetrically. The glycerol concentration was determined by liquid chromatography with Prominence UFLC apparatus (Shimadzu®). Samples of about 10mg of freeze-dried cells were subjected to propanolysis for P3HB-co-3HV determination. The propyl esters were assayed by GC-MS QP2010 Ultra (Shimadzu®) with the column Rtx®-5MS. It was analysed up to 10,000 mutant strains from which was obtained 52 clones affected in the propionate metabolism. The *Pandoraea* sp. MA03prp25 was the most promising strain and showed a 3HV yield of $Y_{3HV/prp}=0.78$. Further, it was observed a 3HV monomer production of 27.13 mol%. These results suggest that the *Pandoraea* sp. MA03prp25 is a suitable mutant strain for future experiments for P3HB-co-3HV production from biodiesel glycerol and propionic acid.

Key-words: P3HB-co-3HV, *Pandoraea*, biodiesel, glycerol, biopolymer

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