

TITLE: POLY(3-HYDROXYBUTYRATE) PRODUCTION FROM DIFFERENT SUGARCANE MOLASSES CONCENTRATIONS BY *Burkholderia glumae* MA13

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ABSTRACT:

Polyhydroxyalkanoates (PHAs) are microbial polyesters accumulated as intracellular granules of energy reserve, which are synthesized from excess carbon source and nutrient limitation. Poly(3-hydroxybutyrate) [P(3HB)] is the most common and widely studied of PHA family and its properties resemble those of polypropylene (PP) and make it suitable as a substitute for this nonbiodegradable plastic. In order to reduce PHA production costs, several works have focused on the utilization of renewable carbon sources to make feasible the wide commercial application of bioplastics. Sugarcane molasses has been widely studied as a promising carbon source for P(3HB) production due to high sugar content besides micronutrients playing an important role in the microbial growth. Since Brazil is the world's largest sugarcane producer towards to sugar and bioethanol generation, which results in a surplus of sugarcane molasses, the implementation of a bioplastic production set associated with a biofuel biorefinery is an ecologically interesting alternative to petrochemical compounds. Therefore, the main objective of this work was to evaluate the ability of the strain *Burkholderia glumae* MA13, isolated from Atlantic forest soil, to produce P(3HB) from different concentrations of sugarcane molasses. The experiments were carried out in shake flasks at 34°C and 150 rpm for 72 h. Molasses were tested for bacterial growth at 10, 20, 30, 40 and 50 g/L added to 2 g.L of (NH₄)₂ SO₄ in mineral salts medium. The cells were harvested by centrifugation and lyophilized to a constant weight. Biomass was determined gravimetrically as cell dry weight (CDW). The freeze-dried pellets were subjected to methanolysis reaction to obtain methyl esters which were analyzed by GC-MS for quantitative and qualitative analysis of PHAs. The supernatant was analyzed by HPLC to determine the consumption of sugars (sucrose, glucose and fructose) from sugarcane molasses. The available excess of carbon source resulted in an intracellular polymer accumulation of 50.85% CDW and 2.93 g/L of P(3HB) from 40 g/L sugarcane molasses. However, the highest P(3HB) yield expressed as grams of produced polymer per grams of consumed carbon source was obtained from 10 g/L sugarcane molasses with a value of 0.18 g/g. The results obtained from this study reveal *B. glumae* MA13 as a promising P(3HB) producer from sugarcane molasses.

Keywords: bioplastic, poly(3-hydroxybutyrate), sugarcane molasses, *Burkholderia glumae*

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