

**TITLE:** SUGARCANE VINASSE AS SUPPLEMENT CARBON SOURCE FOR POLY(3-HYDROXYBUTYRATE) PRODUCTION BY *Burkholderia glumae* MA13

**AUTHORS:** <sup>1</sup>DE PAULA, C.B.C.; <sup>2</sup>DE PAULA, F.C.; <sup>3</sup>RODRIGUES, M.N.; <sup>1,3</sup>CONTIERO, J.

**INSTITUTION:** <sup>1</sup>INSTITUTO DE PESQUISA EM BIOENERGIA, UNIVERSIDADE ESTADUAL PAULISTA (UNESP), RIO CLARO, SP (AVENIDA 24A, 1515 - CEP 13560-900, RIO CLARO – SP, BRAZIL); <sup>2</sup>UNIVERSIDADE FEDERAL DO TOCANTINS (UFT), PALMAS, TO (QUADRA 109 NORTE, AVENIDA NS15, CEP 77001-090, PALMAS–TO, BRAZIL); <sup>3</sup>INSTITUTO DE BIOCIÊNCIAS, UNIVERSIDADE ESTADUAL PAULISTA (UNESP), RIO CLARO, SP (AVENIDA 24A, 1515, CEP 13560-900, RIO CLARO – SP, BRAZIL)

**ABSTRACT:**

Sugarcane vinasse is the main byproduct from bioethanol production in Brazil which comprises an average of 13 liters generated per liter of bioethanol. Sugarcane vinasse is generally utilized as fertilizer though this high utilization implies in environment impacts resulting in soil, water and aquifer contamination. On the other hand, sugarcane vinasse can be used for the synthesis of value-added chemicals such as biopolymers. Poly(3-hydroxybutyrate) [P(3HB)] is a biodegradable and biocompatible biopolymer, well-known in the polyhydroxyalkanoate (PHA) family, which are synthesized by several microorganisms and stored as reserve granules, whose production cost is still higher than petroleum-based plastics. The main goal of this work was to evaluate the production of PHAs by *Burkholderia glumae* MA13 using sugarcane vinasse as a supplementary carbon source in order to save additional media supplements and water for bacterial cultivations. *Burkholderia glumae* MA 13 was cultivated in mineral salts medium containing 2 g/L (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and different concentrations of sugarcane vinasse (100%, 50% and 25% v/v) for 72 h at 150 rpm and 34 °C. The experiments conducted with media containing 50% and 25% sugarcane vinasse were supplemented with 20 g/L<sup>-1</sup> sugarcane molasses. In addition, these experiments were performed at different initial pH values (5.0, 5.5, 6.0, 6.5 and 7.0) and temperatures (27, 30, 34, 37 and 40°C). Cells were harvested by centrifugation and lyophilized. Biomass was determined gravimetrically as cell dry weight (CDW). Lyophilized cells were subjected to methanolysis reaction to obtain methyl esters which were analyzed by GC-MS. Supernatant was analyzed by HPLC to determine sucrose, glucose and fructose. *B. glumae* MA13 was not able to grow using 100% sugarcane vinasse. On the other hand, the experiments with culture media containing 25% sugarcane vinasse and molasses resulted in an intracellular polymer accumulation of 32.4% CDW and a polymer yield of 0.18 g/g at 34 °C and initial pH 6.0. Low amounts of 3HV were also detected in the PHA biopolymer not exceeding 0.6 mol%. The authors conclude that *Burkholderia glumae* MA13 is able to synthesize a PHA biopolymer comprised mainly of P(3HB) using sugarcane molasses and sugarcane vinasse as supplementary nutrient in the culture media whereas the use of 100% sugarcane vinasse was deleterious for the bacterial growth.

**Keywords:** polyhydroxyalkanoates, sugarcane vinasse, biopolymer, *Burkholderia glumae*

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