

**TITLE:** BIOGAS PRODUCTION POTENTIAL THE OF *IN NATURE* SUGARCANE JUICE AND DETERIORATED SUGARCANE JUICE

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**ABSTRACT**

The sugar-energy industries play an active part in the national economy, being responsible for the production of products of great importance such as: sugar, ethanol, bioelectricity and biogas. However, one of the crucial problems in this sector is the deterioration of post-harvest sucrose in the sugarcane, causing a loss of sugar, which can reach high percentages, which can reach more than 12%, which makes the deteriorated of sugarcane unfeasible for ethanol processing and production. As an alternative to circumvent this problem, the application of anaerobic digestion (AD) in the processing of deteriorated sugarcane is suggested. For this reason, the aim of this study was to evaluate the capacity to produce biogas from *in nature* sugarcane juice and deteriorated juice, using batch reactors. The AD tests were performed in triplicate, in 500mL flasks, consisting of 2 treatments (*in nature* and deteriorated juices) and two control tests (inoculum and inoculum with microcrystalline cellulose), which were used to calculate the mass balance and in the validation of the inoculum. Substrates were diluted in 15000 mgCOD.L<sup>-1</sup>. The test was performed in an environment with a controlled temperature of 38 °C ± 2 and constant agitation at 150 rpm. The composition of acetic, lactic and butyric acids in the juices that were used in experiments was assessment using an ion chromatograph, model IC 930, Compact from Metrohm. The mass of inoculum and substrate added in the reactor were calculated based on the analysis of volatile solids, described by Standard Methods, establishing a substrate inoculum ratio of 2: 1. The monitoring took place through the daily record of biogas production, with the aid of a differential digital manometer and a plastic syringe (60mL). There was no significant difference in the accumulated gas volume between the two substrates (372.00 ± 0.129 deteriorated juice and 332.67 ± 0.228 *in nature*), but the deteriorated juice reached its maximum production peak in less time (6: 00h) than *in nature* juice (12:00h). This can be explained by the concentration of acetic acid (10.06mg L<sup>-1</sup> ± 0.0079) in the deteriorated juice composition, which makes this substrate more easily metabolized by biogas-producing microorganisms, thus increasing its conversion efficiency for the production of biogas. It is concluded that the application of DA in the processing of deteriorated sugarcane can be an alternative for greater generation of bioenergy in the sugar-energy sector.

**Keywords:** Anaerobic digestion, sugarcane juice, deterioration, biogas