

## Greenhouse gases emissions in sugarcane vinasse distribution system

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**ABSTRACT:** The objective of this study was to evaluate GHG emissions from vinasse distribution channel. The study was developed at Iracema ethanol plant, located in Iracemápolis (SP). GHG samples were taken at six points along the vinasse channel. The GHG analyses were performed by gas chromatography. Emissions rates of CO<sub>2</sub> and CH<sub>4</sub> were influenced by the physical-chemical composition of the vinasse. Although emission rates of CO<sub>2</sub> have been measured, they were not included in total emission calculations, since it is reabsorbed by photosynthesis. N<sub>2</sub>O emissions were very low, demonstrating that the vinasse does not promote favorable conditions to its formation. Significant variation in CH<sub>4</sub> emissions were observed among the sampling points. Mean emissions of CH<sub>4</sub> were 386, 1263, 1085, 1163, 1431 and 427 mg CH<sub>4</sub>-C m<sup>-2</sup> h<sup>-1</sup>, respectively for the points 1, 2, 3, 4, 5, and 6. The lower emission observed in point 1 is associated to high temperature (nearly 48°C) and other channels characteristics, such as soil covering. The higher emission of CH<sub>4</sub> between points 2 and 5 is associated to the anaerobic conditions, from the continuous flow of vinasse and high content of organic material in this part of the channel. In the last evaluated point was observed reduction of CH<sub>4</sub> emission, which is associated with low amounts of organic material. When converting GHG fluxes in CO<sub>2</sub> eq., it was observed that CH<sub>4</sub> is responsible for 99.8 % of total emissions from vinasse. Considering the vinasse transportation, it was estimated an emission of 2.23 kg CO<sub>2</sub> eq. for each m<sup>3</sup> of vinasse. This study confirms the hypothesis that vinasse is an important source of CH<sub>4</sub> in ethanol production. However, it is necessary to carry out further studies to support the results and propose strategies to GHG mitigation from the vinasse, aiming environmental sustainability in ethanol production from sugarcane.

**Keywords:** methane, vinasse, sugarcane, ethanol, nitrous oxide

*Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP)*

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