

TITLE: *Chlorella vulgaris* BIOMASS PRODUCTION IN CRUDE, DILUTED AND TREATED VINASSES

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ABSTRACT:

The world's ethanol production from sugarcane is led by Brazil, with 28 billion liters of ethanol and 360 billion liters of vinasse in 2018. Vinasse is a residual liquid generated in the distillation of ethanol after the fermentation of sugarcane molasses. This wastewater shows high pollutant potential when reaching soil or groundwater. Microalgae biomass production can significantly benefit from the use of vinasse as the main cultivating medium because of its mineral content. Consequently, such approach results also on a vinasse treatment strategy valued by the accumulation of algal lipids for biodiesel production. The aim of this work is to test the growth of *Chlorella vulgaris* (IBL-C05) in three distinct vinasse media (crude vinasse, diluted vinasse and treated vinasse by anaerobic digestion). For each medium was tested: (i) without supplementation, (ii) supplementation with antibiotic, (iii) supplementation with NO₃ e PO₄, (iv) supplementation made with NO₃, PO₄ and antibiotic. The vinasse was kindly provided by Agrovale (Agro-Indústrias do Vale do São Francisco S.A). Trials were carried out at constant mixing (100 rpm), aeration (with 2.5% CO₂ supplementation), photoperiod of 12:12 light:dark cycles, luminance of 3500 lux at a controlled temperature of 25±1°C. Microalgae growth was monitored by optical density (OD_{680nm}), total chlorophyll content, pH and bacterial density (c.u.f/ml). Total lipids were assessed by chloroform/methanol (2:1) extraction approach. The diluted vinasse supplemented with NO₃, PO₄ e antibiotic (T4VD) was the best result in specific growth ($\mu = 0.76 \text{ d}^{-1}$) and biomass accumulation ($0.05 \text{ g l}^{-1} \text{ d}^{-1}$). However, the trials with the best results of lipid productivity were T4VD and vinasse treated with antibiotic (T2AD) with 13.9 and 13.1 mg l⁻¹d⁻¹, respectively. It is important to note that there is a decrease of 10% on biomass productivity without supplementations. On the other hand, NO₃ and PO₄ supplementation increases on 18.9% chlorophyll accumulation. Therefore, it is possible to reduce the adverse effects caused by the presence of bacteria by using NO₃ and PO₄ or antibiotics supplementation. The present work demonstrated the positive potential for using vinasse from the ethanol industry as a substrate-medium for biomass production of *Chlorella vulgaris*.

Keywords: microalgae, vinasse, anaerobic digestion, lipids.

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