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Bioremediation and biomass production from the cultivation of probiotic *Saccharomyces boulardii* in parboiled rice effluent

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Abstract

The parboilization of rice generates 2 L of effluent per kilogram of processed grain. Several methodologies have previously been tested with the aim of reducing the environmental impact of this effluent. The objective of this study was to evaluate the bioremediation of parboiled rice effluent supplemented with sucrose or residual glycerol from the biodiesel during the cultivation of the *Saccharomyces boulardii* probiotic. In the first stage of the experiment, cultures were grown in orbital shaker, and five media compositions were evaluated: 1) parboiled rice effluent; 2) effluent supplemented with 1% sucrose; 3) effluent supplemented with 3% sucrose; 4) effluent supplemented with 15 $g.L^{-1}$ of biodiesel glycerol and 5) standard yeast culture medium (YM). The addition of 1% of sucrose generated the most promising results in terms of cell viability, removal of nitrogen, phosphorus and chemical oxygen demand (COD). From these results, four independent cultures were grown in a bioreactor using effluent + 1% of sucrose as the medium. This assays generated a mean of 3.8 $g.L^{-1}$ of biomass, 1.8 x 10^{11} $CFU.L^{-1}$, and removal of 74% of COD and 78% of phosphorus. Therefore, the cultivation of *Saccharomyces boulardii* in parboiled rice effluent supplemented with 1% sucrose may represent a viable method by which the environmental impact of this effluent can be reduced while simultaneously producing probiotic culture for use in animal production.

Keywords: biodiesel glycerol; chemical oxygen demand; parboiled rice effluent; phosphorus; *Saccharomyces boulardii*; sucrose.

1. Introduction

Rice is an essential food that is regularly consumed by more than half the world population (FAO, 2013). In 2017 alone, over 406.6 million tons of rice were destined for human consumption (FAO, 2017). In Brazil, the 2017