Disturbances in the Ethanol Production by *S. cerevisiae* Cells Due to Lactic Acid Added to a Synthetic Medium

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Lactic acid bacteria and yeasts survive together in nature and industrial reactors competing for nutrients and survival. In the present work, increasing amounts of the lactic acid were added initially to a synthetic medium at pH 4.5 (Thomas *et al*., *J. Ind, Microbiol.,* 21: 247, 1998) in order to study the effects of this weak acid on ethanol yields and fermentation parameters, when alterations in sucrose concentration and inoculum size of the yeast *S. cerevisiae* were made. Sucrose was the limiting nutrient added to start the fermentation at 34°C using a feeding strategy based on the addition of pulses containing decreasing amounts of sucrose. Increases in the lactic acid concentration had a greater effect on cell viability than on either the yeast growth rate or the ethanol production. The cellular lethality was reduced by the buffering of the medium at pH 4.5, adding lactic acid concentrations above 1.0 $g.L^{-1}$ and increased inoculum sizes. In non-buffered medium, lethality increased followed decreases in pH during fermentation. Small variations in viability were observed at lactic acid concentrations $\leq$ 3.0 $g.L^{-1}$ due to the maintenance of intracellular pH (Narendranath *et al. J. Ind. Microbiol. Biotechnol*, 26: 171, 2001). In addition, decreases in the sucrose concentration led to increases in growth rates despite the presence of added lactic acid. Thus, the use of large inoculum, lower sugar concentrations and pH $\geq$ 4.5 are recommended in the presence of lactic acid.

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Key words: Lactic acid effects, ethanol, sucrose concentration, inoculum size, fermentation parameters.