Effects of Air Pressure on Batch Cultures of *Kluyveromyces marxianus* With Different Lactose Concentrations

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Oxygen is an indispensable nutrient and can be the limiting factor for growth or product formation [1]. The traditional way of improving oxygen transfer rates to bioreactors, by increasing stirring rate, have several limitations like power consumption and cell sensitivity to high shear stress. Several *Kluyveromyces* strains have been reported to exhibit a "Kluyver effect" for lactose: even under oxygen limited growth conditions, certain disaccharides that support aerobic, respiratory growth, are not fermented [2]. Therefore the aim of this work is to improve biomass yield of these types of yeasts increasing the oxygen in the culture with the increase in air pressure.

Batch fermentations, in a pressure reactor, were carried out using different air pressures and different lactose concentrations. Non-aerated fermentations were also made as control. Under non-aerated conditions the strain, *Kluyveromyces marxianus* ATCC10022, grew poorly, and ethanol production was high for all lactose concentrations. A small increase in air pressure, 2 bar, led to a 3 fold increase in biomass yield, for all lactose concentrations. Alcoholic fermentation occurred till lactose was exhausted and the ethanol produced was completely consumed. Maximal ethanol yield decreased with the increase of air pressure. The growth of this yeast in 100g lactose/L confirmed its lactose fermenting capacity however, with lower lactose concentrations it was possible to observe the total consumption of lactose. The presence of alcoholic fermentation in the culture leads to the conclusion that this *Kluyveromyces* strain is not a "Kluyver-positive" yeast.

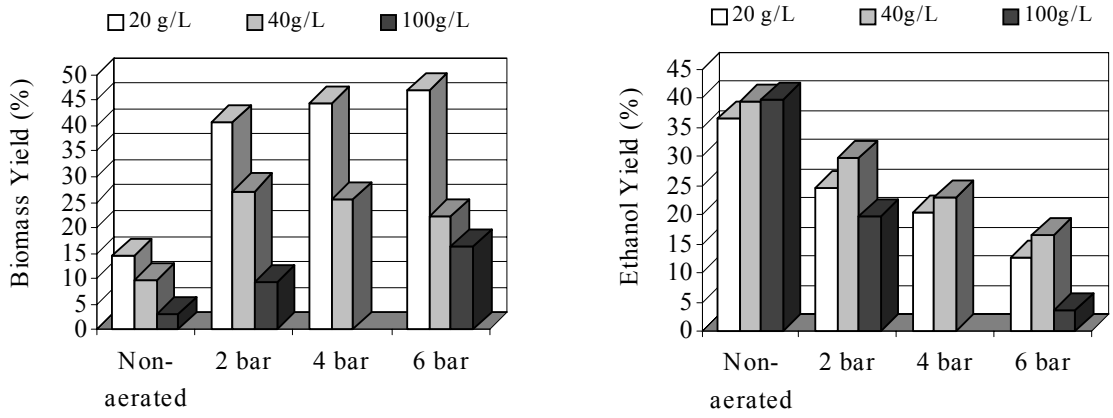

Figure 1. Biomass and ethanol yield with air pressure and without aeration for different lactose concentrations.

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