Effects of change in activity of plasma membrane H\(^+\)-ATPase on growth and ethanol production in *Saccharomyces cerevisiae* cultures

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*Saccharomyces cerevisiae* is the main agent involved in fermentative production of ethanol, producing energy both anaerobically (fermentation) and by respiratory metabolism. Some microorganisms have lower energetic efficiency during alcoholic fermentation, but have a greater production of ethanol. Thus, it is possible that a reduction of energetic efficiency in *S. cerevisiae* during fermentation process could provide an increase on ethanol production. This work aimed to evaluate growth and ethanol production of *S. cerevisiae* strains: PJ69 (wild-type), *arg82* \(^\Delta\) (gene that deletion increases plasma membrane H\(^+\)-ATPase activity), *yvc1* \(^\Delta\) and *arg82* \(^\Delta\) *yvc1* \(^\Delta\) (these latter two strains have a reduced H\(^+\)-ATPase activity). Cultures were grown in YPGlucose medium at 30 °C, under 200 rpm agitation for 32 hours, and ethanol was quantified by gas chromatography. The cultures had a growth rate as follows: PJ69 (0,28 h\(^{-1}\)), *arg82* \(^\Delta\) (0,14 h\(^{-1}\)), *yvc1* \(^\Delta\) (0,29 h\(^{-1}\)) and *arg82* \(^\Delta\) *yvc1* \(^\Delta\) (0,24 h\(^{-1}\)). The *arg82* \(^\Delta\) strain showed lower growth rate but had a higher ethanol production (1.40% v/v) compared to wild-type (1.09% v/v), *yvc1* \(^\Delta\) (0.95% v/v) and *arg82* \(^\Delta\) *yvc1* \(^\Delta\) (1.09% v/v) strains, after 24 hours of growth. This suggests that *arg82* \(^\Delta\) higher H\(^+\)-ATPase activity can result in a greater ATP consumption, reducing its energetic efficiency, and increasing ethanol yield. These results indicate a possible candidate for subsequent construction of mutant *Saccharomyces cerevisiae* strains with higher levels of plasma membrane H\(^+\)-ATPase expression and/or activity, allowing the investigation of these mutations on ethanol productivity and their use in industrial scale.

Keywords: ethanol, growth, H\(^+\)-ATPase, *Saccharomyces cerevisiae*, yeast

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