

Effect of trehalose on alcoholic fermentation efficiency

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Trehalose is a non-reducing disaccharide, consisting of two glucose residues connected by a glycosidic linkage of the type α 1-1. This sugar has been historically considered as a reserve carbohydrate similar to glycogen. In *Saccharomyces cerevisiae*, it is accumulated only after nutrient starvation and when cells are subjected to stress conditions, as a heat shock at 40°C. To investigate the effect of trehalose on alcoholic fermentation efficiency, mutant strains possessing different deletions in the metabolism of trehalose were used: defective in synthesis, *tps1*; in transport, *agt1*; and in degradation, *ath1*, *nth1* and *nth2* (although it has not been fully elucidated whether the product of the *NTH2* gene has trehalase activity). With exception of the *tps1* strain, cells of all strains, growing on glucose, accumulated trehalose after heat treatment at 40°C for 1 h. The highest levels were reached in the mutant *nth1*. Therefore, after the heat treatment, cells were inoculated in a fermentation medium (0.4% (NH₄)₂SO₄; 0.4% KH₂PO₄ and 5% Glucose) for 24h at 30°C/pH 5.0. The *tps1* mutant strain showed the lowest fermentation yield indicating that trehalose is important to improve ethanol production.