



## Modulation of growth condition and trehalose metabolism in S. cerevisiae

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Our Lab has been engaged for several years on the characterization of glutamic acid metabolism in Saccharomyces cerevisiae. We found that the use this nitrogen source determines an enhanced growth phenotype with biomass yield increase compared to the standard growth condition on ammonium. During the study, we came across an unexpected phenomenon: in specific cultural conditions, the strain showed the capacity of utilize glutamate as unique carbon and nitrogen source. This transient phenotype has been characterized and a protocol triggering the growth has been developed. Furthermore, we developed procedures based on modulation of physiological conditions and environmental stress, aimed to increase trehalose content in the cell dry mass. Trehalose is a disaccharide of glucose that is mainly produced in bacteria, fungi, plants, and invertebrates. In yeast, trehalose metabolism is deeply involved in several fundamental cellular processes, like stress resistance and long term survival. Due to these protective characteristics, trehalose is a metabolite of applicative interest, being used in several fields including cosmetics, pharmaceuticals and the agri-food sector (Schiraldi, Di Lernia and De Rosa 2002). Since the regulation of this pathway has not been studied in our experimental conditions, we investigated the interconnection between trehalose content, glutamate metabolism and gene-related pathway. To this aim, neutral and acid trehalase-deficient mutants ( $nthl\Delta$ ,  $athl\Delta$  and  $nthl\Delta/athl\Delta$ ) were constructed, and thermal shifts (38-42 °C) were performed in bioreactor. The effects of such modifications on trehalose metabolism will be presented. Since pathways controlling growth in response to nutrients play an important role in the nitrogen metabolism, we plan to include in our future researches modification of Ras-cAMP and TOR pathways, in the effort to further modulate trehalose synthesis.

