





The rediscovery of trehalose production by Saccharomyces cerevisiae

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Abstract:

Trehalose, a disaccharide involved in cellular fundamental processes, is considered a valuable commodity for chemical, pharmaceutical, food industries^[1] and is currently under investigation for treatment in an increase number of medical diseases^[2,3]. Stateof-the-art production methods involve cellular/enzymatic biotrasformation from oligosaccharides chains which lead to high yields but due to low purity it has been used principally in food and beverage industries so far^[4]. Trehalose produced from yeast cells by cellular accumulation is very pure, but cell lysis and purification steps are required. The aim of this work is to produce and improve the trehalose titer using Saccharomyces cerevisiae on glutamate-enriched medium directing fluxes toward excretion. We started working with a specific yeast strain showed a transient capability to redirect fluxes from glutamic acid towards the production of reserve carbohydrates. Trehalose reaches concentrations close to those reported in production but avoiding typical carbon or nitrogen starvation steps. We are working on Metabolic engineering and fedbatch strategies that exerted a strong influence on the final product. Finally, a kinetic model was developed in order to describe the essential reactions involved in glutamate assimilation and to predict different feeding profiles protocols which could allow to maximize trehalose production in a bioreactor.

References

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