P-004 - SCREENING OF THERMOTOLERANT YEAST STRAINS FOR MORE SUSTAINABLE, ECO-EFFICIENT AND COMPETITIVE INDUSTRIAL FERMENTATIONS

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Background

Yeast play a major role in the production of valuable compounds through microbial industrial fermentations. Yeast performance and adaptation to harsh industrial conditions are related to the productivity and cost-effectivity of industrial processes. Among these factors, temperature has a major influence on the activity of microorganisms, and the industry spends huge amounts of energy to cool or heat fermentations to optimize its processes. Thermotolerant yeast strains are utterly important to several industrial processes. In this work and under the scope of the ERA-IB project YeasTempTation, a collection of yeast strains comprising isolates from different industries was screened at wide range of temperature for evaluation of thermotolerant profiles.

Method

Yeast strains isolated from different industrial backgrounds (beer, bioethanol, 'cachaça' and winery processes) (22 total) were screened at a wide range of temperatures (from 12 to 42°C) in minimal medium[1]. Assays were carried out in a microplate incubator with agitation (28/40°C) and in orbital incubator (12/40/42°C). Yeast cell specific growth rate (μ_{max}) was measured by optical density at 600 nm. Glucose concentration from growth assays was determined by HPLC.

Results & Conclusions

Yeast strains growth profiles at optimal temperature (28°C) exhibited subtle variations presenting μ_{max} between 0.2-0.3h^{-1}. Nevertheless, at 40°C, differences between strains were amplified, where two strains managed to uphold a μ_{max} above 0.25h^{-1}. Yeast strains were also evaluated at 12°C, with all strains being able to grow, although the μ_{max} dropped to values below 0.1h^{-1}, where the control strain (CEN.PK113-7D) exhibited the highest μ_{max}. The six strains with the most promising performance in microplate assays at 40°C were also studied in Erlenmeyer flasks. Two of these strains (bioethanol strains) exhibited a μ_{max} of ca. 0.5h^{-1}, while CEN.PK113-7D showed the lowest μ_{max} (<0.3h^{-1}). The four *S. cerevisiae* strains with uppermost μ_{max} at 40°C were selected to evaluate at 42°C. At this temperature, major differences in glucose consumption were observed, with one strain being able to consume ca. 97% of glucose in the first 24h, with the highest μ_{max} (ca. 0.25h^{-1}). This study represents a first approach to a more in-depth research on thermotolerant strains adaptation and tolerance to high-temperature processes for industrial application.

References & Acknowledgments

1. Verduyn *et al.* (1990) *J. Gen. Microbiol.* **136,**395–403.

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