

Partners involved in the INTACT project

Project coordinator

Dr. Ton van Maris - Delft University of Technology - The Netherlands

Project leaders

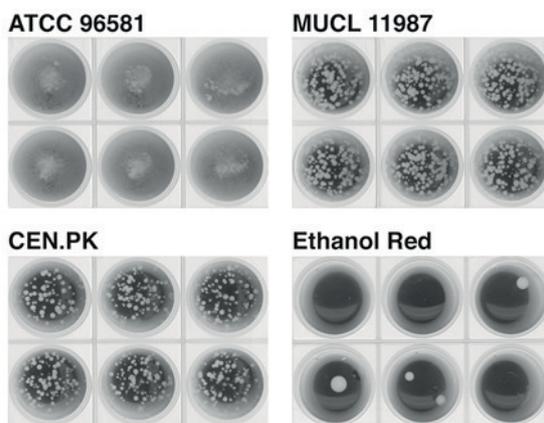
- Prof. Isabel Sá-Correia - Technical University of Lisbon - Portugal
- Prof. Elke Nevoigt - Jacobs University Bremen - Germany
- Prof. Joaquín Ariño - Universitat Autònoma de Barcelona - Spain

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INTACT

Integral Engineering of Acetic Acid Tolerance in Yeast



Phenotypic intraspecies diversity of *S. cerevisiae* with regard to acetic acid tolerance. Swinnen et al (2014) in *FEMS Yeast Research*.

The INTACT consortium focused on the use of integral, genome-wide approaches to improve the acetic acid tolerance of the yeast *Saccharomyces cerevisiae*.

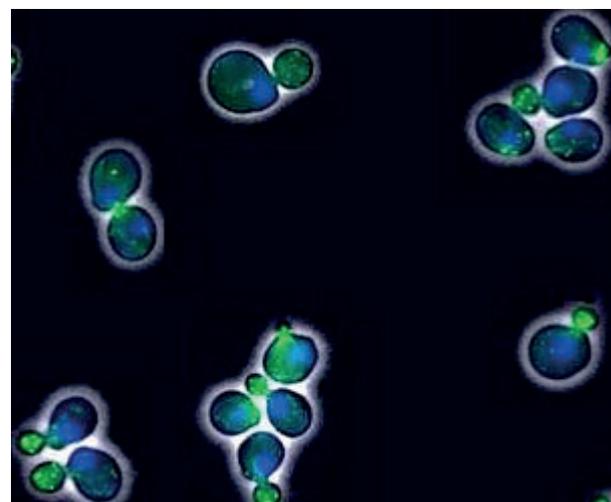
Carbon efficiency and food security dictate that a substantial replacement of current petrochemical production by industrial biotechnology should be based on crude plant biomass hydrolysates as feedstocks rather than on refined, food-grade carbohydrates. The presence of acetylated polymers in these crude hydrolysates implies that the acetic acid tolerance of industrial microorganisms is and will remain a

key issue in the implementation of sustainable, non-food feedstocks in industrial biotechnology. The yeast *Saccharomyces cerevisiae* is one of the most important microorganisms in industrial biotechnology. In addition to bioethanol production, large industrial research programs now seek to develop *S. cerevisiae* for bulk production of isoprenoids, succinic acid and isobutanol. Improved understanding of acetic acid tolerance was and is urgent, since the first full-scale factories for yeast-based production processes from lignocellulosic feedstocks are currently starting up. However, tolerance to acetic acid, especially at low pH, is multifactorial in nature.

To address this complexity, our complementary consortium integrated classical genetic mapping, comparative genomics, genome-wide expression analysis, evolutionary engineering and global transcription machinery engineering with targeted genetic modification, with the aim to understand and rationally improve acetic tolerance in *S. cerevisiae*.

The integrated approach in this project resulted in:

- Successful identification of natural tolerant yeast isolates. Additionally, methods were developed to facilitate the identification of causative genetic differences.



Saccharomyces cerevisiae. Photo by Mark Bisschops

