Development of Industrial Yeast Platform Strains

Most of the current metabolic engineering projects are carried out using laboratory strains as the starting host. Although such strains are easily manipulated genetically, their robustness does not always meet the requirements set by industrial fermentation conditions. In such conditions, the cells frequently encounter high substrate concentrations, low pH, high temperatures and various inhibitory compounds originating either from the raw material used or from cellular metabolism. The aim of this research project is to develop robust platform strains of *Saccharomyces cerevisiae* based on industrial and environmental isolates. The project is expected to relate the genetic diversity among a group of 36 natural and domesticated isolates of *S. cerevisiae* strains to the observed phenotypes, with special focus on extreme phenotypes characterized by high robustness and specific metabolic traits. The genetic diversity will further be harnessed to generate completely new strains with selected, desirable traits. These new platform strains will be a preferable choice as starting hosts in which to implement existing and new metabolic engineering designs for the production of specific classes of compounds. The project has four main tasks that are interconnected to reach the final goal (Fig. 1). It is highly multidisciplinary and involves several research fields. In this communication, we will present selected results from ongoing activities, such as the whole genomes sequencing, intracellular metabolite profiling and tolerance screening of the 36 industrial and laboratory yeast strains. In addition, progress in the development of molecular biology methods for generating the new strains will be presented.

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