Improving the stress tolerance of the oleaginous yeast Lipomyces starkeyi for biotechnological applications

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An emerging potential alternative for biodiesel production is represented by microbial lipids, also referred as single-cell oils (SCOs), which could lead to a green and sustainable biodiesel production process, with no competition with the food supply chain. Many microorganisms belonging to the genera of algae, bacteria, yeast and fungi can accumulate lipids under specific cultivation conditions. Among them, the utilization of oleaginous yeast is advantageous due to fast growth rate and high oil content compared to algae.

A sustainable production of SCOs implies the utilization of lignocellulosic biomasses as substrate for growth. Sugar beet pulp (SBP) is an abundant residue from sugar manufacturing industry that has high hemicelluloses and cellulose but a low (<2%) lignin content that make it a promising feedstock to produce second generation bioproducts, including bio-based oleochemicals. The release of inhibitors, especially acetic and lactic acids, during the pre-treatment of SBP limits cell growth and, consequently, SCOs production.

The development of robust cell factories is therefore crucial for the establishment of sustainable processes. The investigation of the stress response induced by SBP in the oleaginous yeast Lipomyces starkeyi suggested some strategies to improve cellular stress tolerance. Results are here described and discussed.