

Production of Galactitol from Galactose by the Oleaginous Yeast *Rhodospiridium toruloides* IFO0880

Background/objective

Sugar alcohols are valuable as low-calorie sweeteners and as industrially useful chemical precursors. While *Rhodospiridium toruloides* has been studied largely for the production of lipids and lipid-based products, the strain *R. toruloides* IFO0880 was recently shown to produce arabitol from xylose. Here, researchers explored if *R. toruloides* can produce additional sugar alcohols.

Approach

- ❖ Cultured *R. toruloides* IFO0880 under nitrogen-rich conditions on multiple sugars to identify additional sugar alcohols.
- ❖ Compared growth on galactose under nitrogen-rich and nitrogen-poor conditions.
- ❖ Characterized metabolic pathways responsible for galactose metabolism.
- ❖ Compared intracellular metabolites on glucose and galactose.

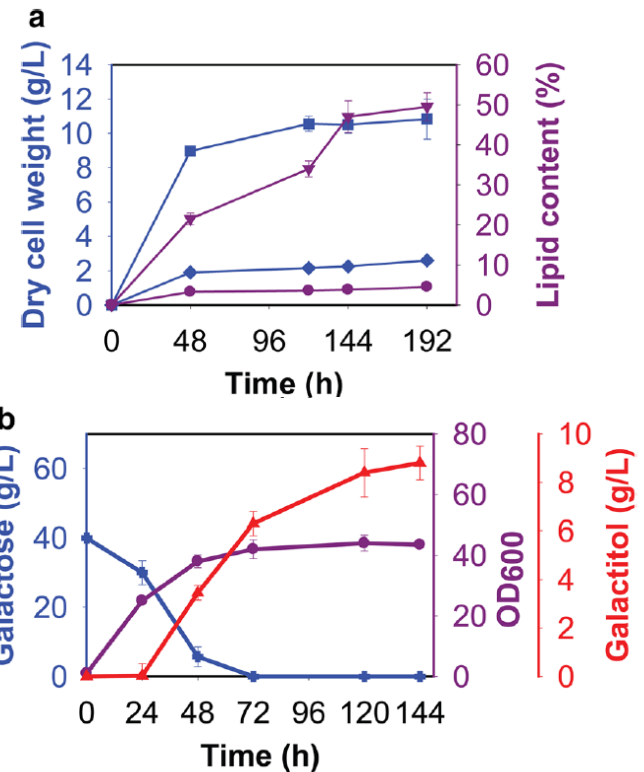
Results

- ❖ Of the sugars tested, only galactose yielded sugar alcohol.
- ❖ Simultaneous galactitol production (0.028 g/L/h, 0.136 g/g) and lipid accumulation (45% w/w) were achieved via cultivation under nitrogen-poor conditions.
- ❖ Leloir pathway confirmed as mechanism of galactitol production. The aldose reductase *AldR* was characterized as an NADPH-dependent enzyme.

Significance

This work demonstrates that galactitol, a valuable bioproduct, may be co-produced with lipid from galactose under nitrogen-poor conditions, demonstrating the flexibility of the *R. toruloides* IFO0880 yeast strain for production of valuable coproducts.

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Lipid content (a, triangles) and galactitol production (b) in N-poor media with 40 g/L galactose.