

# Production of Xylose-Enriched Hydrolysate from Bioenergy Sorghum and its Conversion to $\beta$ -carotene Using an Engineered *Saccharomyces cerevisiae*

## Background/objective

Recent work on producing value-added chemicals, such as  $\beta$ -carotene, from engineered yeasts found that xylose improved yields as compared to glucose because xylose consumption avoided ethanol production. Lignocellulosic biomass is an abundant natural feedstock that may be hydrolyzed to produce xylose. Here, researchers demonstrate  $\beta$ -carotene production by *Saccharomyces cerevisiae*-fed xylose syrup derived from bioenergy sorghum.

## Approach

- ❖ Bioenergy sorghum was pretreated in a pilot scale continuous hydrothermal reactor followed by disc milling. Xylose was extracted using low-severity dilute acid hydrolysis.
- ❖ Xylose extract was concentrated to a syrup and fed to *S. cerevisiae* SR8B, which had been engineered for xylose consumption and  $\beta$ -carotene production.

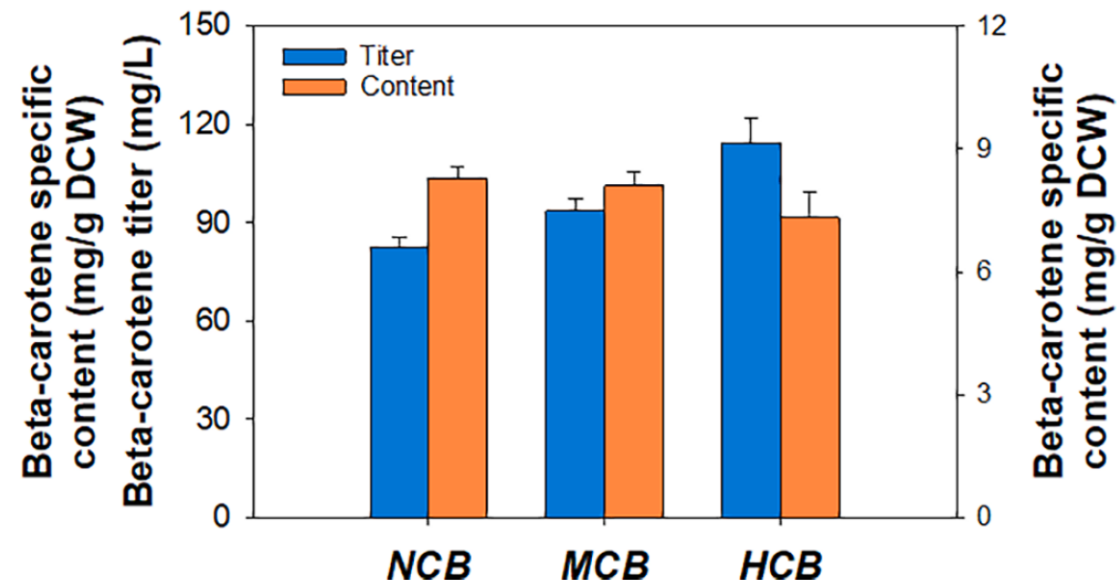
## Results

- ❖ Biomass pretreatment and hydrolysis resulted in a xylose yield of 64.9%.
- ❖ *S. cerevisiae* grown on the most concentrated xylose syrup (HCB) yielded a  $\beta$ -carotene titer of 114.50 mg/L, corresponding to specific yeast biomass production of 7.32 mg/g DCW.
- ❖ Small amounts of inhibitory compounds generated via hydrolysis had negligible effect on yeast growth.

## Significance

This work demonstrates a complete workflow linking biomass processing and yeast engineering to produce a value-added chemical from xylose derived from lignocellulosic biomass. This workflow can be built upon to produce other bioproducts from lignocellulosic biomass.

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Non-concentrated (NCB), medium concentrated (MCB), and high-concentrated (HCB) xylose syrups containing 17.4, 32, and 66 g xylose / L, respectively, were fermented by *S. cerevisiae* SR8B. Increased xylose content resulted in increased  $\beta$ -carotene titers but lower specific content.