

# Pilot-Scale Processing of *Miscanthus x giganteus* for Recovery of Anthocyanins Integrated with Production of Microbial Lipids and Lignin-Rich Residue

## Background/Objective

*Miscanthus x giganteus* (Mxg) is a high-yielding perennial C<sub>4</sub> crop with potential to produce biofuels and chemicals. Previously, miscanthus was evaluated as an alternative source of natural pigments, namely anthocyanins, and a chemical-free pretreatment process was developed for recovering these pigments as co-products at the lab scale. Here, the scale-up potential of that recovery process was evaluated as an important step toward commercialization.

## Approach

The previously developed chemical-free pretreatment process was scaled up using a continuous hydrothermal pretreatment reactor operated at a low liquid-to-solid ratio (50% w/v solids) to recover anthocyanins. The pretreated biomass was then refined and enzymatically hydrolysed, and two strains of *Rhodospiridium toruloides* were evaluated for converting the hydrolysate sugars into microbial lipids.

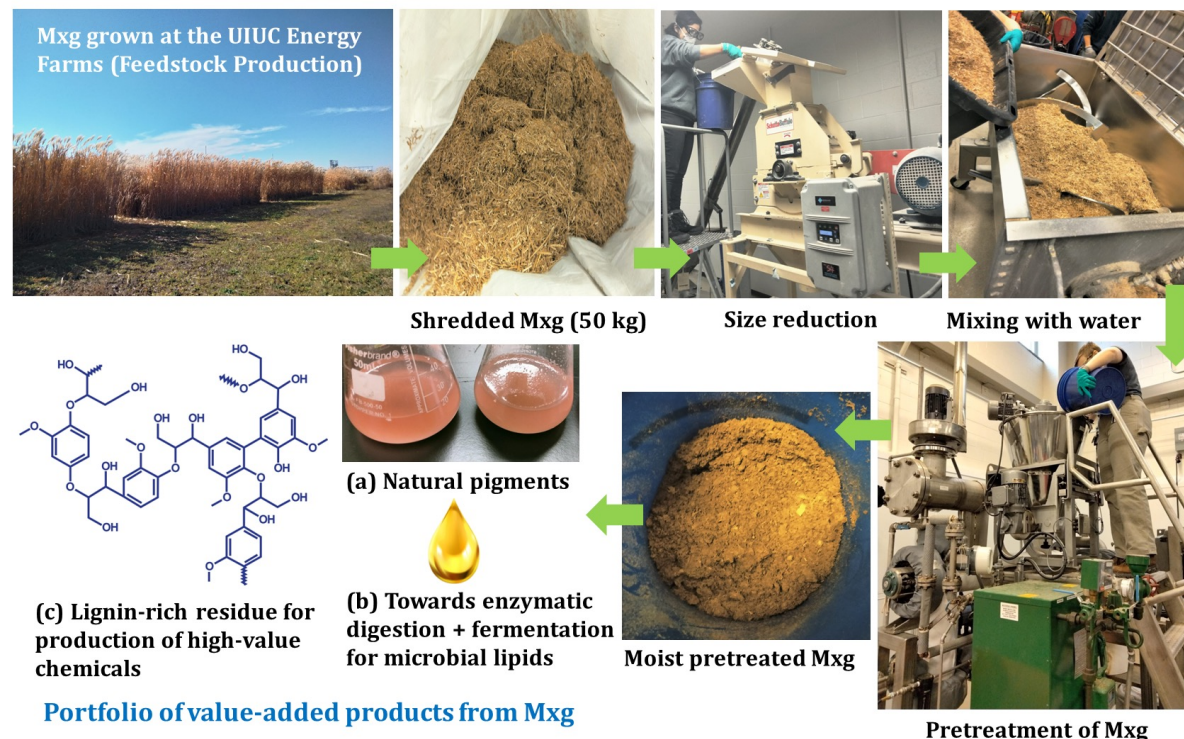
## Results

The scale-up process yielded >70% w/w anthocyanin, compared to 94% w/w achieved previously at the lab scale. Subsequent enzymatic hydrolysis of the pretreated biomass produced ~238 g/L of total sugars, and *R. toruloides* strain Y-6987 produced 10-11 g/L lipids during fermentation. Further, the post-enzymatic hydrolysis residue was enriched in lignin (1.7-fold).

## Significance/Impacts

This zero-waste Mxg scale-up process successfully recovered multiple high-value products, such as natural pigments, microbial lipids, and lignin-based chemicals, at a commercially relevant scale.

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**Pilot-scale processing of Mxg generates a portfolio of value-added products.**