

Valorization of *Miscanthus x giganteus* for sustainable recovery of anthocyanins and enhanced production of sugars

Background/Objective

Plant-based pigments have significant interest from consumers and dyeing industries because synthetic pigments cause significant pollution and environmental damage. However, supply is competitive since their most abundant sources are fruits and vegetables from the food sector. Bioenergy crops such as miscanthus, sorghum, and sugarcane naturally accumulate anthocyanins and hold enormous potential as a resource for extracting these pigments as a co-product. We evaluated purple stemmed *Miscanthus x giganteus* (*Mxg*), a perennial grass with favorable characteristics for bioenergy crop production, as a potential source of anthocyanins.

Approach

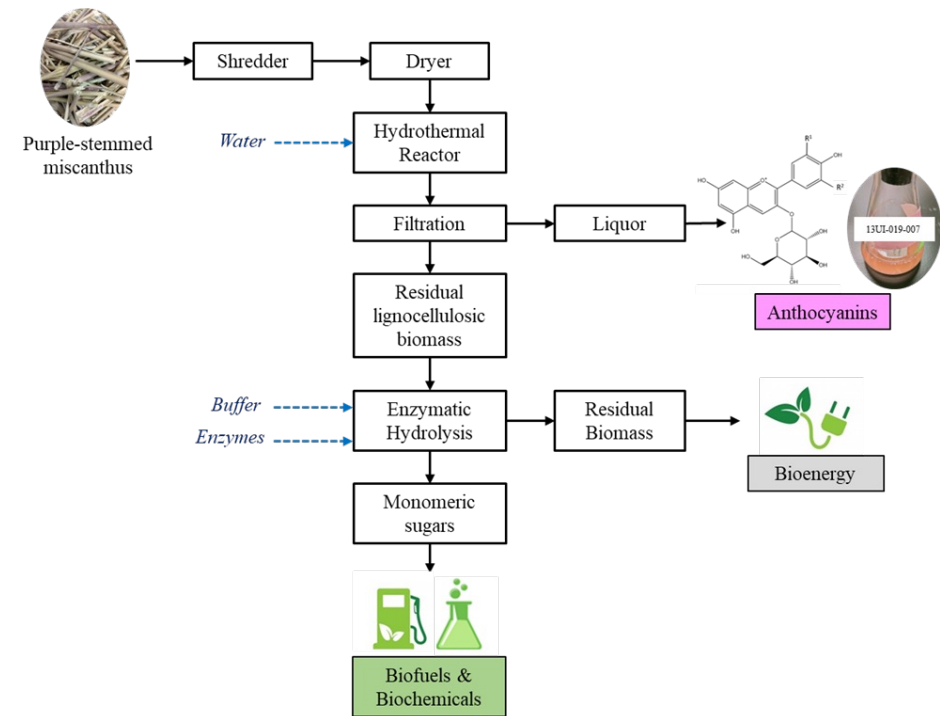
Hydrothermal pretreatment was studied as a green, chemical-free process for recovering maximum anthocyanins in the pretreatment liquor.

Results

- The highest total anthocyanin concentration obtained was $94.3 \pm 1.5\%$ w/w at 170 °C and 10 min. pretreatment conditions.
- The pretreatment also improved the enzymatic digestibility of the biomass and so led to a 2.1-fold increase in the overall recovery of glucose ($70.6 \pm 0.5\%$ w/w).

Significance/Impacts

When processed with chemical-free hydrothermal pretreatment methods, bioenergy crops such as *Mxg* are viable sources of plant-based pigments that could both produce additional product streams and increase the sugar yields from crop biomass that are further fermented to biofuels or biochemicals in an integrated biorefinery.



Process flow diagram for recovery of anthocyanins and enhanced production of sugars from *Miscanthus x giganteus*.