

Variability across Switchgrass Varietals and Tissues Impacts Conversion to Fuels

Background/Objective

- Switchgrass (*Panicum virgatum* L.) is a promising lignocellulosic biomass crop for biofuel production, especially on marginal lands with minimal competition with food crops. Significant variability exists in switchgrass biomass yield, composition, and cell wall chemistry both across genotypes (ecotypes: upland, lowland, coastal) and within individual cultivars, particularly between leaves and stems.

Approach

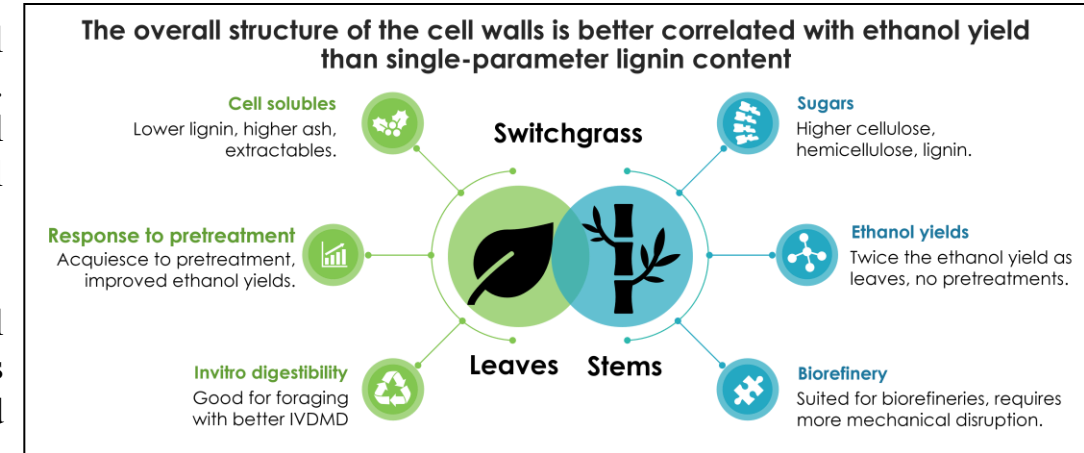
- This review investigates the variation in switchgrass biomass yield, composition, and cell wall chemistry, and their effects on conversion to fuel/ethanol. We provide valuable insights and guidance to support efforts in optimizing switchgrass biomass composition and chemistry for improved biofuel production.

Results

- The range of biomass and cell wall chemistry variability among switchgrass genotypes is discussed.
- Differences in lignin, cellulose, and hemicellulose content between leaf and stem tissues were highlighted for their impact on saccharification and ethanol yield. Notably, hydrothermal and dilute acid pretreatments have tissue-specific effects in enhancing sugar release from switchgrass.
- The recent advances in switchgrass breeding/genetic modifications targeting lignin biosynthesis to improve biomass digestibility and biofuel production potential were discussed.

Significance/Impacts

- Comprehensive phenotypic and chemical analyses of both genotypes and tissues can help guide breeding switchgrass towards high-yield, low-recalcitrance feedstocks for bioenergy production.



Switchgrass genotypes displaying visual phenotypic variation.

Kousika R. et al. *Biofuels, Bioprod. Bioref.* (2025); DOI: 10.1002/bbb.70104