*BRC Science Highlight*
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# Genotype-Environment-Management Interactions in Biomass Yield and Feedstock Composition of Photoperiod-Sensitive Energy Sorghum

## Objective

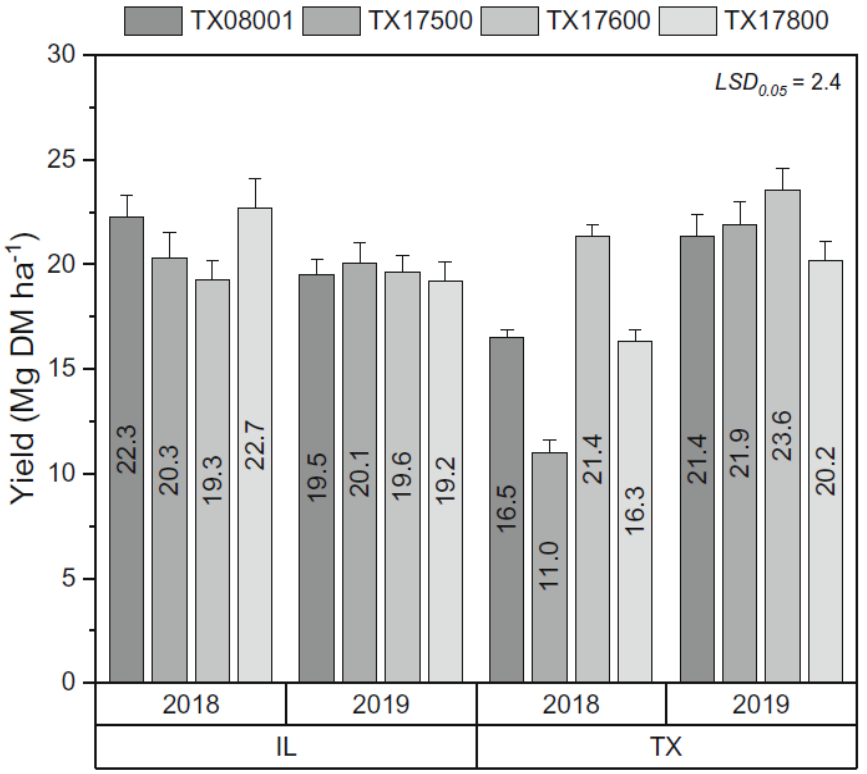
Recently developed photoperiod sensitive (PS) biomass sorghum is a promising bioenergy feedstock due to its high yield, energy-rich composition, and tolerance to environmental stressors. However, the relationships between degree of photoperiod sensitivity, feedstock quality, and nitrogen (N) application are not well understood and are the topic of this research.

## Approach

- Four PS biomass sorghum hybrids (TX08001, TX17500, TX17600, and TX17800) were grown in both Illinois (IL) and Texas (TX) under four N application rates (0, 56, 112, and 168 kg N $ha^{-1}$) in 2018 and 2019 using a randomized complete block design with four replications.
- Aboveground biomass tissue samples were collected and analyzed for yield, N, phosphorus (P), potassium (K), N uptake, N use efficiency (NUE), and chemical composition using the near-infrared spectroscopy (NIRS) compositional prediction model.
- The PROC MIXED procedure in SAS was used to test the effects of location, year, N application rate, and sorghum variety on yield, nutrient content, and NUE.

## Results

- The four hybrids showed similar yield response to N, with the lower N input treatments (<112 kg N $ha^{-1}$) having higher NUE in both IL and TX.
- TX17800 had the highest concentrations of energy-rich glucan, xylan, and lignin, while TX17600 had the lowest ash content.




**Annual dry biomass yields in 2018 and 2019 for two locations across four hybrid sorghum varieties.**

## Significance

This work demonstrates that the rainfed region of the United States has great potential for sustainable PS sorghum production due to high yield potential, stable production, and low N requirements.

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