

Objective

Miscanthus x giganteus is a promising, high-yielding perennial bioenergy crop. While agronomic practices such as harvest timing and nitrogen (N) fertilization have been shown to greatly impact yield, it is not yet understood how best to manage these factors for large-scale cultivation of this crop. Researchers in this study sought to: 1) understand whether pre-senescence harvest impacted future harvest yields; 2) understand if N application mitigates yield loss from pre-senescence harvesting; and 3) identify optimal N fertilization rates to maximize yield with pre-senescence harvesting.

Approach

- ❖ *M. x giganteus* plots in Savoy, Ill., were assigned harvest treatments (August, September, November, December, and March). Sub-plots were assigned N fertilization treatments (0, 56, 112, 156, and 224 kg N ha⁻¹), which were applied in April of each experiment year.
- ❖ Biomass samples were collected annually from 2009 to 2011.
- ❖ Biomass yield and chemical composition data were analyzed using the PROC MIXED and GLIMMIX procedures in SAS statistical software.

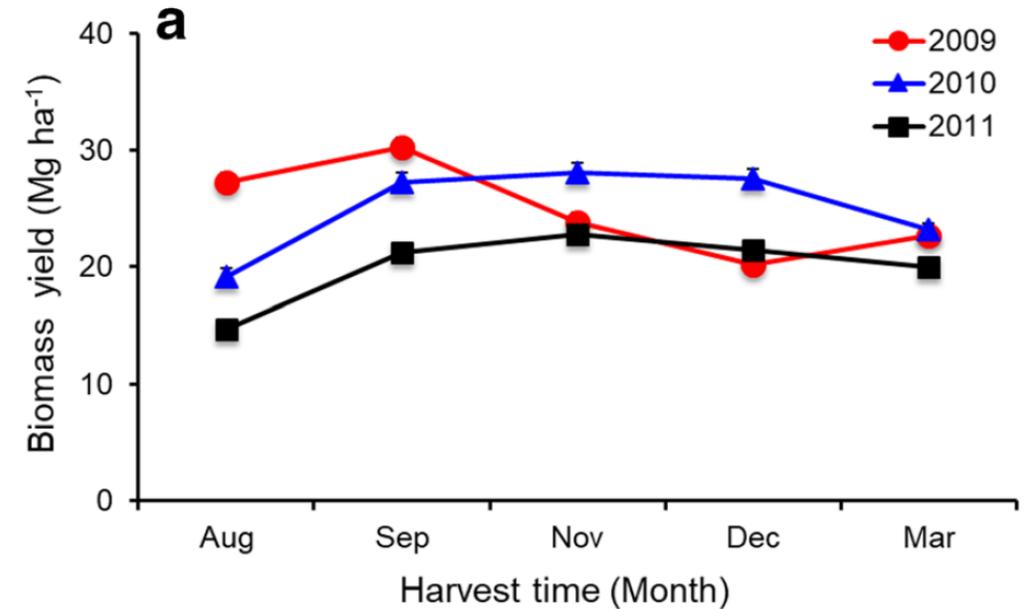
Results

- ❖ Annual harvest of *M. x giganteus* prior to senescence reduced biomass yield.
- ❖ N fertilization improved yields but did not compensate for yield loss in early (August, September) harvests.
- ❖ Delayed harvest allowed for maximum biomass yield with lower N fertilization.
- ❖ Long-term production and biomass quality were enhanced when harvest was delayed to November, December, or March.

Significance

This work illuminates the interacting impacts of harvest timing and N fertilization on *M. x giganteus* biomass yields and may be used to inform optimal long-term management of *M. x giganteus* to achieve maximum yield with minimum fertilizer requirements.

Miscanthus x giganteus Responses to Nitrogen Fertilization and Harvest Timing in Illinois, USA



After the first year, maximum biomass yield was achieved with later-season harvest (November, December, March).