Long-Term Yields in Annual and Perennial Bioenergy Crops in the Midwestern United States

CABBI
CENTER FOR ADVANCED BIOENERGY AND BIOPRODUCTS INNOVATION

Background/Objective

- This study compared multiple perennial bioenergy crops with the dominant annual agricultural vegetation over long periods of time.
- Researchers analyzed 11 years of data from the Illinois Energy Farm to probe the impacts of drought, stand age, and stand management on yield.

Approach

Collected yield data from miscanthus, switchgrass, a prairie mix, and corn-corn-soy rotation plots at the Energy Farm from 2008 to 2018. Applied nitrogen (N) to miscanthus subplots annually following 2012-13 drought. Used DayCent model to disentangle impacts of drought, stand age, and N fertilization on productivity.

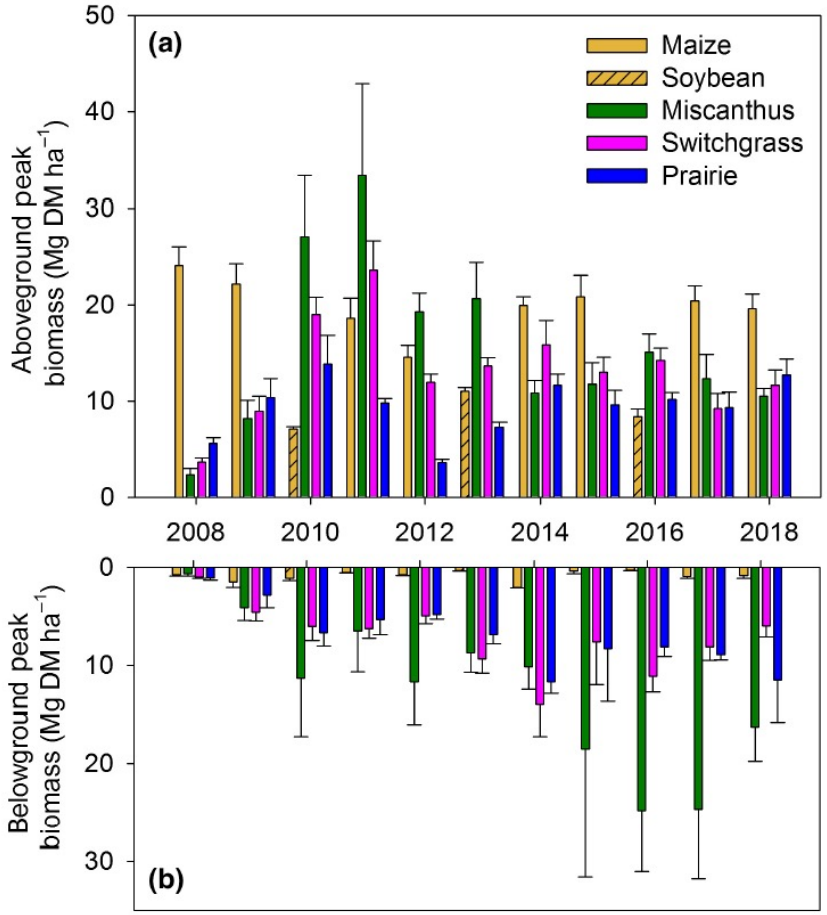
Results

Long-term yields for perennial bioenergy grasses undershot initial predictions, but miscanthus yield recovered with N application following drought. Root-to-shoot ratio increased with miscanthus age.

Significance/Impacts

Belowground biomass allocation in mature plants which exceeds predictions based on the establishment phase increases the potential for underground carbon storage in perennial bioenergy cropping systems. Vulnerability to extreme weather events indicates the influence of climate on yield predictions and the importance of management strategies for mitigating negative impacts on yield.

Kantola et al. 2022. "Long-Term Yields in Annual and Perennial Bioenergy Crops in the Midwestern United States." *GCB Bioenergy*. DOI:10.1111/gcbb.12940



Above- (a) and 0-30 cm below-ground (b) biomass derived from hand harvests in four bioenergy crops from 2008 to 2018.