BRC Science Highlight
July 2021

Planting Miscanthus Instead of Row Crops May Increase the Productivity and Economic Performance of Farmed Potholes

Objective

Projections of more intense, frequent spring rains for the central United States under climate change could adversely impact crop yields, especially in flood- and ponding-prone areas known as potholes. Cultivation of flood-tolerant perennial crops in potholes could help mitigate losses. To evaluate potential benefits, researchers developed a framework to assess the viability of planting perennial miscanthus in farmed potholes under varying precipitation patterns and ponding conditions.

Approach

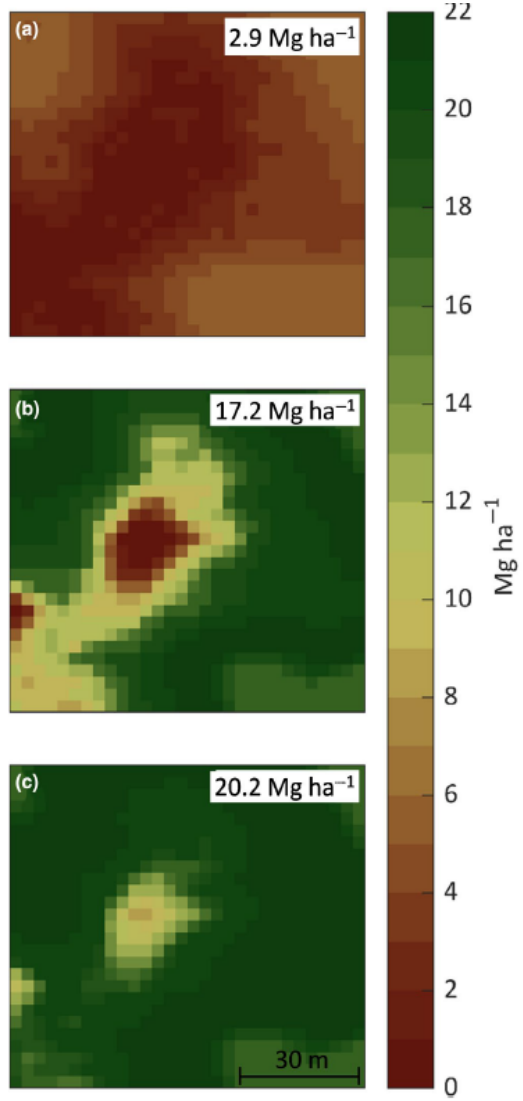
- Biomass, leaf area index, and grain yield data were collected in Ames, IA for both *Miscanthus x giganteus* (M x g) and corn/soy rotation plots. M x g data was collected from a two-year-old stand age with 0 kg/ha nitrogen application.
- Five future precipitation scenarios were generated from 15 consecutive years of observed data (control).
- The Agro-IBIS VSF model was modified to incorporate a drowning function for each crop to simulate ponding effects. Scenarios ran for 15 years for each cropping system and precipitation scenario, including observed.

Results

- Across the majority of scenarios, the corn/soy rotation experienced greater loss of yield in comparison to M x g both spatially and across the 15-year simulation.
- Agro-IBIS VSF was demonstrated to effectively model and capture ponding dynamics in discrete farmed potholes

Significance

This study supports the use of M x g as an economically viable and more flood-tolerant alternative to corn/soy for farmed potholes in the Midwestern U.S.



15-year average spatial yield for (a) corn/soy, (b) low-drown threshold miscanthus, and (c) high drown threshold miscanthus for 2002-2016 under the Control scenario.

Edmonds et al. 2021. "Planting Miscanthus Instead of Row Crops May Increase the Productivity and Economic Performance of Farmed Potholes." GCB Bioenergy. DOI:10.1111/gcbb.12870.

CABBI CENTER FOR ADVANCED BIOENERGY AND BIOPRODUCTS INNOVATION
U.S. DEPARTMENT OF ENERGY