

Field-Scale Analysis of Miscanthus Production Indicates Climate Change May Increase the Opportunity for Water Quality Improvement in a Key Iowa Watershed

Background/Objective

- Nitrogen (N) leaching from corn-soybean cropping systems poses a threat to local drinking water quality and exacerbates water quality issues in the broader Mississippi River Basin. These effects may worsen under future climate change.
- Researchers in this study used a paired agroecosystem and hydrology model to understand how incorporation of bioenergy crops (i.e., miscanthus) into the corn-soybean landscape may impact nutrient leaching under climate change.

Approach

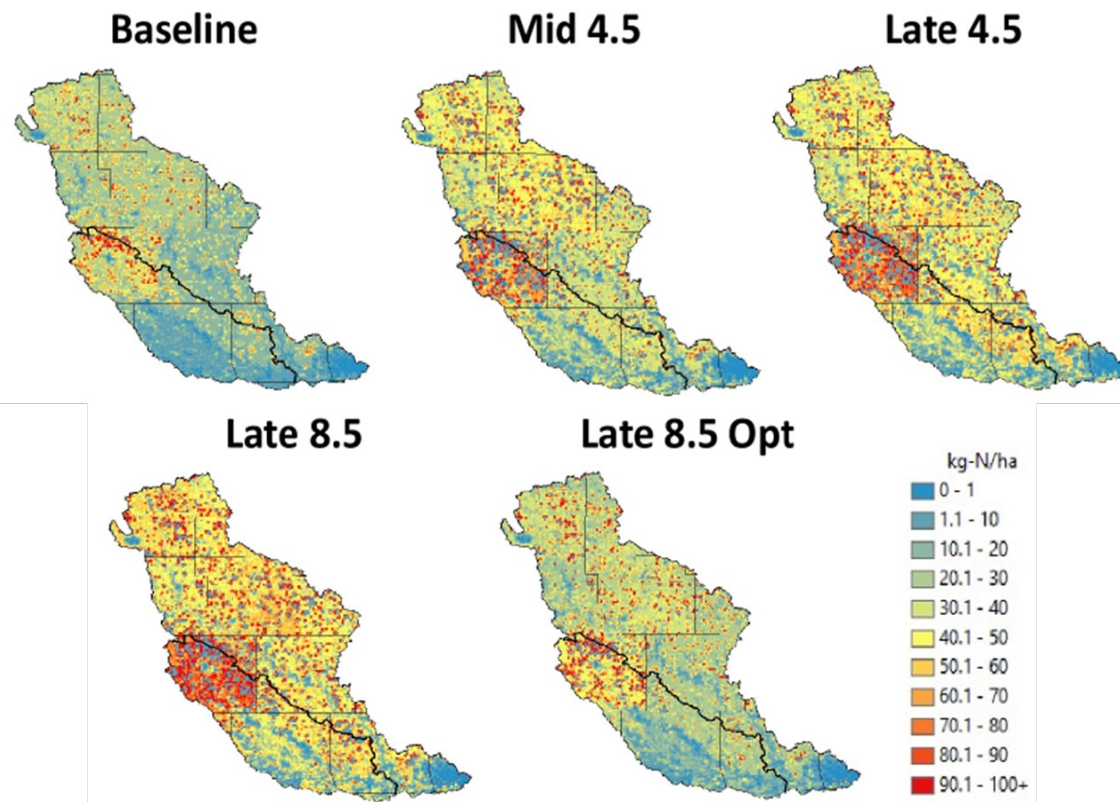
This study simulated N export for historical and future land use scenarios using the Agro-IBIS agroecosystem model and THMB hydrology model at 500 m resolution under the RCP 4.5 and 8.5 warming projections. Crop profitability maps and N-leaching thresholds were used to determine where miscanthus should replace corn-soybean area to maximize N pollution reduction.

Results

Model results suggest that miscanthus planting on low-profit and high-N-leaching land can result in 4% decrease in N losses under the current climate and up to 21-26% N loss under future climate conditions.

Significance/Impacts

This work implies that N-leaching may potentially continue to decline under future climate conditions if strategically implemented conservation practices, including strategic placement of perennial bioenergy crops are included in future farm management plans.



Ten-year average simulated N leaching rate for each modeled warming projection with the inclusion of miscanthus.

Ferin et al. 2023. "Field-Scale Analysis of Miscanthus Production Indicates Climate Change May Increase the Opportunity for Water Quality Improvement in a Key Iowa Watershed." *GCB Bioenergy*. DOI:10.1111/gcbb.13078.