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Miscanthus x giganteus Increases Soil Maximum Water Holding Capacity Compared to Maize

Background/Objective

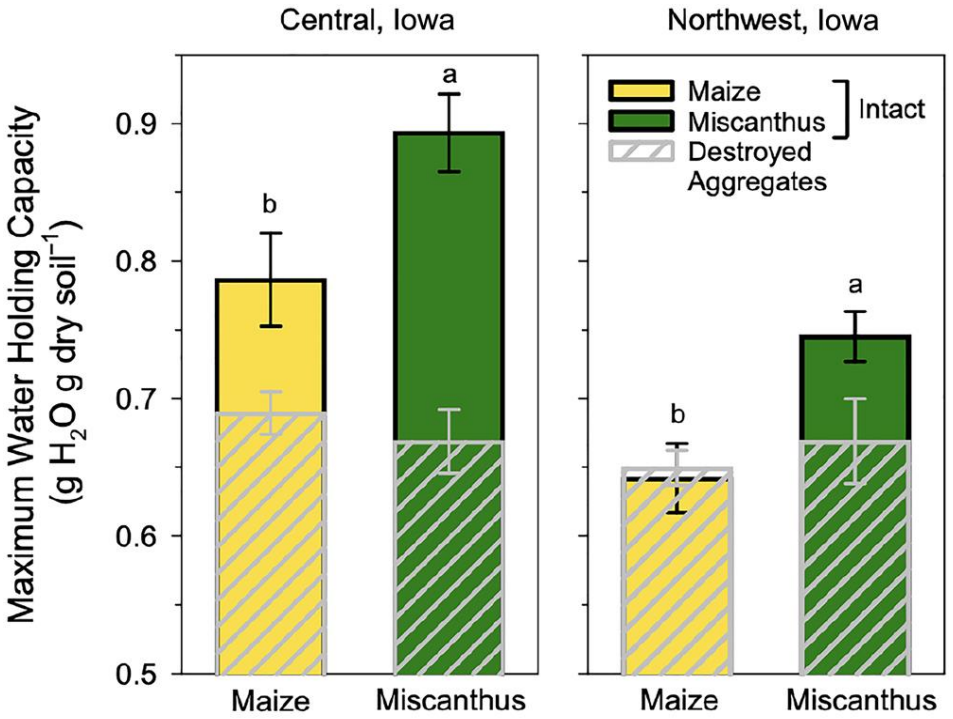
Conventional annual cropping systems reduce the capacity of soils to store water, but evidence suggests that perennial crops such as the bioenergy grass *Miscanthus x giganteus* (miscanthus) can help restore this important soil function. Here, researchers directly compared maximum water holding capacity and other related soil properties under conventional maize and perennial miscanthus cropping systems.

Approach

After three growing seasons, the following soil metrics were compared between continuous corn and miscanthus cropping systems across two field sites in Iowa: maximum water holding capacity (MWHC) with and without soil structure, soil organic matter (SOM), soil texture, and total porosity and pore size distribution determined via micro-computed tomography.

Results

Miscanthus increased MWHC across both sites by 14.7% compared to maize. This increase disappeared when soil aggregate structure was destroyed pointing to a structural influence. There were no significant differences in SOM, texture, total porosity, or pore size distribution between the two crops. Researchers conclude that increased MWHC under miscanthus is due to soil structural changes not captured by these metrics.



MWHC was greater for soils under miscanthus than under continuous maize at both field sites when soil aggregates were left intact.

Significance/Impacts

This work highlights the potential of miscanthus to enhance soil water storage and demonstrates the need for further work to elucidate the mechanism by which it influences soil structural properties which enhance MWHC.

Nelson et al. 2025. "*Miscanthus x giganteus* Increases Soil Maximum Water Holding Capacity Compared to Maize." *Agrosystems, Geosciences &Environment.* DOI: 10.1002/agg2.70181.