# Putting the Soil Health Principles to the Test in Iowa

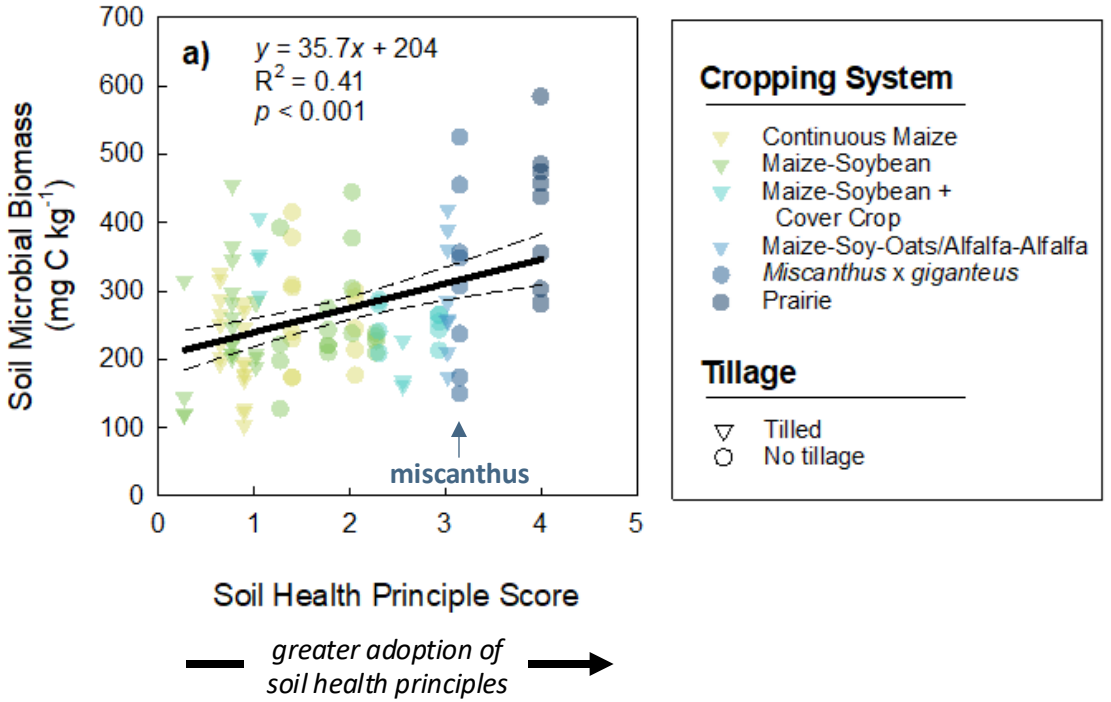
CABBI
CENTER FOR ADVANCED BIOENERGY AND BIOPRODUCTS INNOVATION

## *Background/Objective*

- The USDA Natural Resource Conservation Service identifies four Soil Health principles (NRCS-SHPs) for soil conservation: maximize presence of living roots, minimize disturbance, maximize soil cover, maximize biodiversity.
- The underlying assumption of the NRCS-SHPs is that soil health increases with increased practice of these principles. However, this hypothesis has not been tested.
- This work tests this hypothesis implied by the NRCS-SHPs on slow-changing and dynamic soil health indicators.

## *Approach*

A novel soil health principle scoring metric was developed from 109 plots across 9 long-term experiments located in central Iowa, USA – with varying degrees of NRCS-SHP adoption (see figure). Across this gradient of NRCS-SHP adoption, we compared 3 *slow-changing* (maximum water holding capacity, bulk density, and soil organic C) and 3 *dynamic* (microbial biomass, potentially mineralizable C, and permanganate oxidizable C) soil health indicators.




**Linear regression (95% CI bands) for soil microbial biomass plotted against their soil health principle score.**

## *Results*

Bulk density decreased, and microbial biomass & potentially mineralizable carbon increased with increased adoption of NRCS-SHPs, while soil organic carbon, permanganate oxidizable carbon, and water holding capacity did not relate to NRCS-SHPs.

## *Significance/Impacts*

Use of the novel, quantitative index adds credence to the NRCS-SHPs and provides an example of an evidenced-based conservation knowledge loop. Future work can build on this to broader scales and use as way to quantitatively assess a particular suite of management practices and their soil ecosystem service outcomes.

McDaniel, et al. 2024. "Putting the Soil Health Principles to the Test in Iowa." *Soil Science Society of America Journal*. DOI: 10.1002/saj2.20761.