

Soil health in the southeast: Two approaches, one goal



Left: Jake Overgaard, agriculture production systems educator for the University of Minnesota Extension, speaks at an August 2018 soil health field day at Olmsted SWCD's soil health farm near Rochester.
Photo Credit: Olmsted SWCD

Below: Researchers take soil samples from a cover crop plot near Elkton, part of Mower SWCD's efforts to collect data on local soil types and landforms.
Photo Credit: Mower SWCD

In southeastern Minnesota, two soil and water conservation districts are taking different approaches to determine how cover crops can affect soil health.

Mower Soil & Water Conservation District (SWCD) is in the midst of analyzing grant-funded test plots. Olmsted SWCD is continuing work in its self-supporting, county owned soil health farm. Each has the same goal:



Promote soil health by making region-specific data available to farmers.

In Mower County, conversations among Mower SWCD supervisors and staff were a catalyst for establishing a data set of soil health

parameters focused on the county's common soil types and landforms. The Hormel Foundation in 2017 awarded Mower SWCD a \$98,000 grant to collect soil health data on Mower County farms and to conduct comparative analysis of cover crops and conventional farming systems.

SWCD staff in 2018 established a series of farm plots. Involving farmers with established soil health best management practices who were willing to allow research on their land was a priority. Plots were sampled in June and July 2018. The variety of tests included infiltration, aggregate stability, bulk density, resistance to penetration, soil structure analysis, soil biology and carbon tests, plus basic nitrogen, phosphorus and potassium tests. A research assistant at the University of Minnesota is running a statistical



analysis of many of those parameters.

Mower SWCD staff plans to replicate the work at the same sites in 2020. The project is scheduled to finish in 2021 with an analysis of 2020 field data. The Minnesota Office of Soil Health (MOSH) — a collaboration between the Minnesota Board of Water Resources (BWSR) and the University of Minnesota's Water Resources Center — will also use this project's plot locations and design for soil health metrics as a component of a Conservation Innovation grant it secured. Because these two projects are working simultaneously, the Hormel Foundation funding and associated work could be extended.

"The data collected so far is helping us achieve an important goal — providing a base of local soil information not commonly available that can be used to communicate with producers about the benefits of soil health practices with real data that supports farmers' anecdotal observations," said Steve Lawler, a Mower SWCD soil scientist.

Mower SWCD hired a student intern from Riverland Community College to work on the project, and the college also provided a soils lab for soil sample preparation and storage. Mower SWCD also contracted with the University of Wisconsin-River Falls for student workers and lab work. Additional funding comes from a BWSR Local Capacity grant to Mower SWCD.

Just northeast of Mower County, Olmsted SWCD is also gathering data on cover crops and soil health through a soil health demonstration farm.

The idea started in 2014, when Olmsted SWCD staff started talking about how beneficial it could be to start a cover crop and soil health farm in southeastern Minnesota. With a local soil health farm, people wouldn't have to travel to see cover crops in action, and the data would reflect the local climate and soils.

At that time, Olmsted County owned 56 acres of cropland near the SWCD



Olmsted SWCD contracts a local farmer to seed and harvest the six plots that make up the soil health farm. Photo Credit: Olmsted SWCD

office that was not being farmed. SWCD staff proposed a soil health farm to the county, which was very supportive of the idea, and planning began in earnest. Olmsted SWCD is a department of Olmsted County, and will manage the county-owned land until there is a proposal for development on the site or a land use change, according to Angela White, Olmsted SWCD district technician.

The two main goals of the farm are to study how cover crops can work in a typical corn-soybean crop rotation (this includes trying different planting techniques, rates and species mixes to determine if and how much these affect yield) and to determine if cover crops affect the amount of nitrate nitrogen that is leached through the soil profile into the groundwater.

On the farm, six plots are replicated three times in a random block design to account for field and soils' variability. One of the six plots is a control, with no cover crops planted. In the other five plots, cover crops are planted throughout the growing year using different timing, rates and species. Twelve lysimeters (groundwater collection systems) are installed, two lysimeters per plot. The lysimeters collect water samples below the rooting zone of the crop weekly throughout the growing season to determine how

much nitrate is leaching through the profile. The water samples are then analyzed at the Southeast Minnesota Water Analytics Laboratory (SEMVAL) in Olmsted County. Crop yields and cover crop stands are also measured and evaluated.

Results from the farm have been shared with producers and other agency staff during three field day events, and referenced in numerous groundwater studies and soil health workshops. The data from the lysimeters has become an integral part of ground water monitoring in southeast Minnesota.

Partners in this project include Olmsted County, the Minnesota Department of Agriculture, and the USDA's Natural Resources Conservation Service (NRCS), which assisted in establishing the lysimeter network; and the lab that analyzes the weekly lysimeter water samples. The project is self-funded through a share-cropping arrangement where the SWCD receives half of the farm's net profit. The funding supports the trials, analytics, and many local educational field day events held at the farm and throughout the area.

"We plan on continuing the work as long as the county allows us to utilize the property, and there is value in the work to demonstrate the benefits of using cover crops in our region" White said.