Earthworms, covers benefit soil

BY **ANN STAUDT**

WIDELY recognized as incredible ecosystem engineers, common nightcrawlers improve our soil through the processes of fertilization and aeration. Long respected by farmers, gardeners and anglers alike, the earthworm's presence is often seen as a good thing. As highly tangible biological indicators of soil health, earthworms may help to unlock the secrets of soil health and show how different conservation practices impact our land resources.

Cover crops are one of the key practices that can help reduce nutrient losses, minimize soil erosion and improve soil health on agricultural lands. While cover crops offer the potential to improve soil health, changes in soil health are notoriously difficult to measure. Intensive grid soil sampling is required, as well as time.

Studies have shown that detecting significant organic matter changes related to cover crops can take 10 years or more. Farmers are looking for tangible and earlier indicators of soil health beyond soil testing that may not show significant results for a decade or more.

Enter the power of the earthworm! A new study underway by the Iowa Learning Farms, funded by a Conservation Innovation Grant through the Natural Resources Conservation Service is digging into the connections between earthworms, cover crops and soil health.

Earthworms do good work

The common nightcrawler (*Lumbricus terrestris*) is a deep-burrowing earthworm, which builds vertical tunnels that extend 5 to 6 feet deep. It tends to live semi-permanently in one single tunnel or burrow.

Earthworms come up to the soil surface at night or after a rain to feed, consuming cornstalks, bean stubble and fresh cover crop residue. The earthworms then pull plant material back into their tunnels, leaving well-defined clumpy mounds, called middens or casts, on the soil surface.

The Iowa Learning Farms team is now evaluating earthworm population dynamics on six cereal rye demonstration sites across the state of Iowa.

Each of these six long-term cover crop demonstration sites is integrated within a traditional corn-soybean rotation and no-tilled. All sites include side-by-side replicated strips with cereal rye cover crop, alternating with strips that do not have a cover crop.

There is an abundance of observational data from farmers who find more worms existing in places managed under cover crops. While soil sampling has not yet indicated significant changes in soil health related to the cover crop, can earthworms help to tell that story?

The Iowa Learning Farms team set out to answer this question by counting earthworm mounds (middens), with their presence, absence and abundance being one indicator of soil health.

Earthworm midden counts were conducted in side-by-side strips in June, shortly after cereal rye termination, when fresh rye residue was still present in the field. Physical earthworms themselves were not extracted; only middens on the soil surface were counted. Within each replicated strip, a PVC frame was placed four times, and earthworm mounds were counted within each of the frames.

They love cover crops

Data collected in 2016 indicate a positive and significant correlation between earthworms and cereal rye cover crops. When comparing side-by-side treatment strips, sampling in no-till strips with cover crops yielded an average of 33 middens per square meter (133,000 middens per acre), while no-till strips without cover crops yielded 24 middens per square meter (96,000 middens per acre).

Across the six sites, Iowa Learning Farms found 38% more earthworms with a cereal rye cover crop! Earthworms love the fresh rye residue and feed on it readily, bringing organic matter from the surface down into the soil profile, as well as returning nutrients held in the rye cover crop back to the soil for the growing crop.

Next time you stumble upon a lowly earthworm, consider its important roles as an ecosystem engineer of the soil and indicator of soil health. There's a whole lot more there than meets the eye!

Staudt is assistant program manager for the Iowa Learning Farms.

Apply now for CSP program

USDA'S Natural Resources Conservation Service is accepting applications for enrollment in the Conservation Stewardship Program, the nation's largest conservation program. Applications are available at local USDA Service Centers. NRCS will process applications received by Feb. 3 for the 2017 sign-up period.

NRCS has made several updates to the program to help farmers better evaluate their conservation options and the benefits to their farm and natural resources. New methods and software for evaluating applications will help farmers see upfront why they are not meeting stewardship thresholds, and allow them to pick practices and enhancements that work for their conservation objectives. These new tools also allow farmers to see potential payment scenarios for conservation early in the process.

"Now the CSP provides even more opportunities for conservation and greater flexibility at the local level to prioritize resource concerns and conservation approaches," says Kurt Simon, state conservationist with NRCS. "Customized CSP tools for Iowa will improve the customer experience during application evaluations."

More information about the updated CSP is at *nrcs.usda.gov/csp*. CSP now offers nearly double the enhancements and conservation practices, and the better reporting tools tell farmers the results of their conservation efforts on the land.

Through CSP, farmers can earn payments for managing, maintaining and expanding conservation activities like cover crops, buffer strips and pollinator habitat, while maintaining active agriculture production on their land. CSP also encourages adoption of cutting-edge technologies and management techniques such as precision ag applications, on-site carbon storage and planting for high carbon sequestration rate, and new soil amendments to improve water quality.

CSP is for farmers who are already established conservation stewards, helping them to deliver multiple conservation benefits on working lands.

Source: Iowa NRCS