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A decade of rye cover crops builds stronger soils

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Field plots in southeastern Indiana with cereal rye cover crops (green) growing alongside plots without cover crops in a no-till corn–soybean system. Photo courtesy of Yichao Rui, Purdue University.

Healthy soils are essential for sustaining crop production and improving the resilience of agricultural systems. Cover crops are widely promoted as a way to improve soil health, but measurable benefits can vary across regions and soil types, making long-term field studies especially important.

Poorly structured silty soils in the eastern Corn Belt often respond slowly to management changes. Earlier results from a cover crop experiment in a no-till corn–soybean rotation in this region (southeast Indiana) showed that cereal rye improved soil aggregation after four years, but other soil health indicators (e.g., soil organic carbon) showed little change. This raised an important question: Do additional benefits emerge with longer-term use?

Over a decade later, the experiment was revisited to evaluate longer-term soil responses. Cereal rye cover cropping increased soil organic carbon by about 7.5% and total nitrogen by nearly 13%. Soil structure also improved, with greater aggregate stability, higher water-holding capacity, and increased pore space that supports water movement and root growth.

These findings highlight the value of long-term management strategies. While soil improvements may take years to become measurable, sustained use of cover crops can gradually build healthier soils and improve the resilience of cropping systems.

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Pearsons, K. A., Rui, Y., & Kladvko, E. J. (2025). Decade-long cereal rye cover cropping improved soil carbon and physical properties of a poorly structured silt loam. *Soil Science Society of America Journal*, 89, e70165.

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