Science Societies

Root-zone enrichment targets in the southeastern United States

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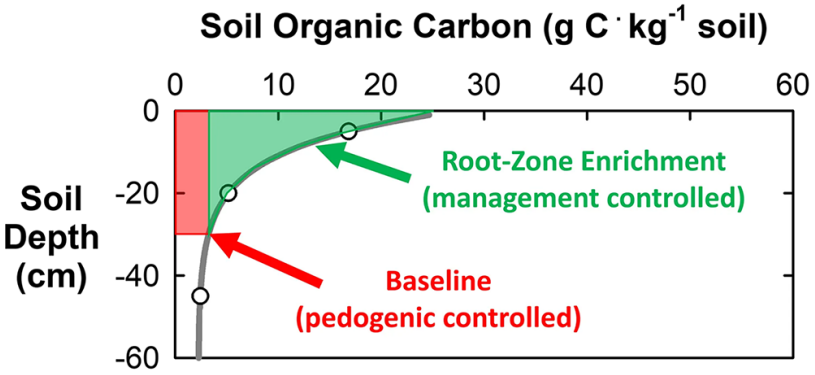

Soil organic matter can be conceptually separated into (1) pedogenic-controlled baseline and (2) contemporary management-controlled root-zone enrichment components. Photo courtesy of Alan Franzluebbers, USDA-ARS.

A scientist with the USDA-ARS in Raleigh, NC compiled a unique set of calculations on total and root-zone enrichment stocks of soil organic carbon,

nitrogen, and soil-test biological activity across a diversity of land uses, management, and soil types throughout North Carolina and surrounding states. Target soil health values were developed in three broad soil textural groups. This database of 1470 observations serves as a reference for evaluating the 0- to 12-inch depth characteristics of soil carbon, nitrogen, and biological activity.

Functioning soil is fundamental to food and fiber production. Soil organic carbon and nitrogen are two important indicators of soil health. Soil-test biological activity (STBA) is another key soil property indicating soil fertility from the mineralization of organic matter. However, concentrations of soil organic carbon and nitrogen can be influenced by **(1)** historical soil formation factors dictated by environmental conditions (pedogenesis) and **(2)** contemporary management factors, complicating soil health analyses.

A scientist with the USDA-ARS in Raleigh, NC compiled a unique set of calculations on total and root-zone enrichment stocks of soil organic carbon, nitrogen, and STBA across a diversity of land uses, management, and soil types throughout North Carolina and surrounding states.

Target soil health values were developed in three broad soil textural groups (fine-, medium-, and coarse-textured soils). Overall, conservation management under grasslands and woodlands led to greater soil health than under no-till cropland, which was greater than under conventional-till cropland. This database of 1470 observations serves as a reference for evaluating the 0- to 12-inch depth characteristics of soil carbon, nitrogen, and biological activity and will be valuable to soil scientists, agronomic advisers, farmers, and extension specialists to promote better soil health.

Dig deeper

Franzluebbers, A. J. (2025). Defining soil-health targets for root-zone enrichment of soil organic carbon, nitrogen, and soil-test biological activity in the southeastern United States. *Agricultural & Environmental Letters*, 10, e70049. https://doi.org/10.1002/ael2.70049

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