

# Study proposes new approach to retaining soil carbon

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For those familiar with the practice of composting, seeing—and smelling—the breakdown of plant and organic material over a long period of time is quite familiar. In a Colorado State University-led study, published in the journal *Nature Geoscience*, a new approach to soil management for carbon sequestration may help combat climate change.

## Vital to humanity

Soil [organic matter](#), that very thin skin on the world's terrestrial surface, serves many functions vital to humanity, such as supplying nutrients to plants and sequestering carbon. Traditional dogma has held that the slower-decaying components of plant residues, such as fibers, help build [soil](#) organic matter. The new study suggests that the early by-products of plant residue decomposition, generally water-soluble materials, can also result in the formation of soil organic matter. The study demonstrates that these fast-decomposing materials are used more efficiently by the soil microbes, thus leaving more carbon in the soil as microbial products, which bond to the soil minerals and therefore stay in the soil for longer periods of time.

## Retaining carbon

"We know that 'slow' decomposing plant residues help keep carbon in the soil, delaying its release into the atmosphere for a few years or decades," said Francesca Cotrufo, a professor of soil and crop sciences

and lead investigator on the study. "Our results showed that the water-soluble material released early in the decomposition process can be used to retain carbon for longer periods, on the order of decades to centuries."

Cotrufo notes that these water-soluble materials help retain carbon when they are bonded to minerals, thus making areas without mineral-rich soils incompatible with this particular type of [carbon sequestration](#).

Cotrufo worked on the study with a number of researchers, including Diana Wall, director of CSU's School of Global Environmental Sustainability. Cotrufo is also a senior scientist at CSU's Natural Resource Ecology Lab, housed in the Warner College of Natural Resources.

## Addressing global climate change

"Addressing global [climate change](#) requires a suite of approaches, including strategies for mitigation, adaptation and reduction of the accumulation of greenhouse gases," said Warner College Dean John Hayes. "A key element in these strategies is capturing and storing carbon. These findings are remarkable because they dramatically shift our fundamental understanding of mechanisms responsible for [carbon sequestration](#) in soils, setting the stage for stronger ecological and climate models and potential new avenues to address climate change."

To help the public better understand the study and its results, a video was produced in partnership with Nature Geosciences.

**More information:** "Formation of soil organic matter via biochemical and physical pathways of litter mass loss." *Nature Geoscience* (2015)  
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