

Manure improves soil and microbe community

March 10 2021



Some of the research pastures included warm-season old world bluestem grass (left) mixed with legumes including alfalfa (purple blooms, center) and yellow sweetclover (yellow blooms, lower left). The legumes provide an organic source of nitrogen to the grasses and microbes, as well as a source of protein for grazing cattle in the pastures. Credit: Lindsey Slaughter

In the dry air and soil of Texas' Southern High Plains, improving soil health can be tough. We usually think of healthy soil as moist and loose with lots of organic matter. But this can be hard to achieve in this arid area of Texas.

Lindsey Slaughter, a member of the Soil Science Society of America, set out with her fellow researchers to test a solution that kills two birds with one stone. They put excess cow [manure](#) on these soils to see if they could make them healthier.

The team recently published their research in the *Soil Science Society of America Journal*.

"We know that planting perennial grasslands for cattle production can help protect and restore [soil](#) in semi-arid lands that are likely to erode and degrade from intense farming," Slaughter says. "But producers need additional ways to increase soil carbon and nutrient stores."

What makes a healthy or unhealthy soil?

Slaughter describes soil health as the ability of a living soil ecosystem to perform a variety of important functions. These include cycling nutrients, storing and purifying water, helping plants and animals, and more.

This "living" part is made up of various microorganisms that help a soil be healthy. They, for example, help break down materials like manure so that it and its nutrients become part of the soil.



The researchers used excess cattle manure from local producers. Here a donor deposits composted cattle manure prior to spreading it over the field sites.
Credit: Paul Green

"Improving the soil's ability to perform these roles and support plant and animal life is our target for soil health," Slaughter says. "Adding the manure can provide a boost of material that can be incorporated into soil [organic matter](#). This helps provide a stronger foundation for more microbial activity and nutrient cycling."

This is why in their study they applied a low one-time amount of manure to two types of pastures to look into this. The pastures they put the

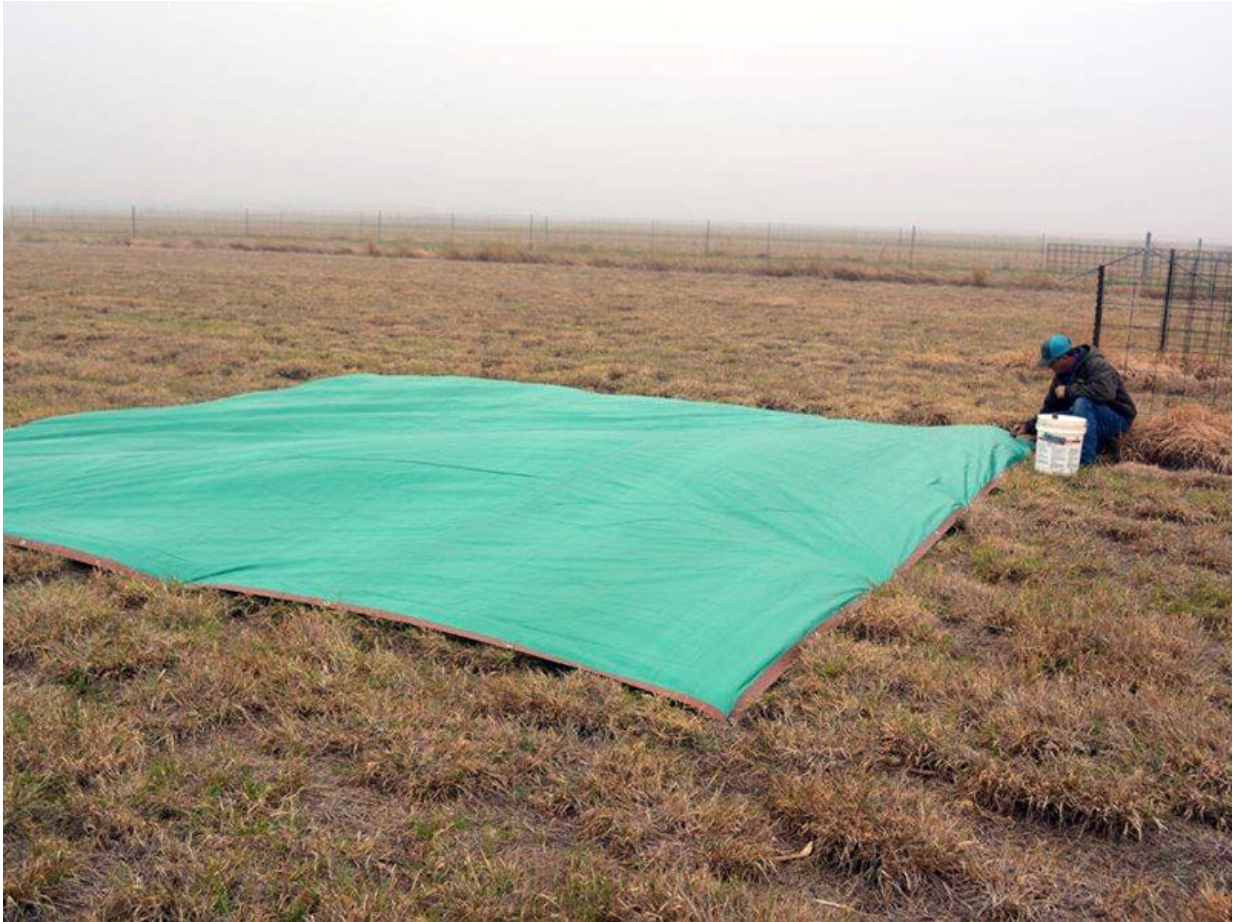
manure on had either grass only that was fertilized occasionally or were a mix of grass and legumes that was not fertilized.

Manure helps, but results take time

Overall, they did find that manure helped increase soil organic carbon and the number of microbes in the soil. These are two important characteristics of a healthy soil.

It took almost a year and a half to see these changes, although they say this is not totally surprising.

"This tells us that it can take a long time for even a little added compost to become incorporated into the soil organic matter of semi-arid grasslands, but it definitely helps," Slaughter explains.



Farm manager Paul Green of Texas Tech University anchors tarps in the pasture just before compost was spread onto the fields. This created treatment areas in each field where compost application was excluded. Credit: Phil Brown

"We think this is mostly due to the dry climate at our study site," says Slaughter. "We commonly get little rainfall per year. The microbial community was not able to work quickly or efficiently to decompose the manure without water."

Their results also showed that the pastures receiving fertilizer responded better to the manure. They believe this is because the nitrogen in the fertilizer helped the microbes decompose the manure better.

"Microbes help directly with releasing nutrients from organic material in a form that plants can use, as well as decomposing those residues to build soil organic matter," Slaughter says. "A lot of work has been done on how this can help improve cropping systems. However, we wanted to also test this on forage pastures."

Slaughter adds that the next steps in this work include whether more manure or multiple applications would get faster results. In addition, they hope to investigate if irrigation or fertilizer would help incorporate the manure faster.

"We need more research along these lines to help us design strategies that quickly and effectively increase [soil health](#) and productivity in these grasslands," she says. "This helps farmers save money on nutrients and amendments while building soil organic matter and nutrient cycling capacity. This also saves them water and protects against soil degradation."

More information: Rael Otuya et al, Compost and legume management differently alter soil microbial abundance and soil carbon in semi-arid pastures, *Soil Science Society of America Journal* (2020). [DOI: 10.1002/saj2.20215](#)

Provided by American Society of Agronomy

Citation: Manure improves soil and microbe community (2021, March 10) retrieved 17 April 2024 from <https://phys.org/news/2021-03-manure-soil-microbe.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.