**Feed Microbes**

Jane Zelikova is director of Colorado State University’s Soil Carbon Solutions Center and a faculty member in the Department of Crop and Soil Sciences. She writes:

“To bring back soil, we have to feed the microbes. A tablespoon of soil contains billions of microbes. These tiny bacteria, fungi, protists, and archaea make up the bulk of life in soils. There may be a trillion species of microbes on Earth—99.999 percent still undiscovered. Though invisible to the naked eye, microbes collectively hold more carbon than all animals combined. Billions of tons of carbon sit underground, three times more than in the atmosphere.

“Microbes are the movers and shakers of carbon sequestration. They transform organic matter from plants and animals into soil organic carbon (SOC) and other nutrients, a process that builds soil fertility and draws down carbon from the atmosphere and locks it away.

“Plants don’t use every ounce of carbon they capture through photosynthesis for their own growth. The extra seeps out of roots into soil as *exudates*, a secretion hungry soil microbes consume. Microbes use some of the *exudates* for their own growth, keeping that carbon underground, and release some back into the atmosphere.

"Plant roots not only directly feed carbon to microbes but also stimulate the creation of pores, small pockets between soil particles and clumps. Scientists have only recently uncovered how important soil pores are for carbon storage. Locking away carbon in pores or in clusters of soil particles protects it from being consumed and partially exhaled by microbes. It turns out that the bulk of stored carbon is actually dead microbes.

“Having more carbon in the soil is transformative. It means better water infiltration and higher nutrient and water retention. As soil health improves, agricultural fields become more resilient to the ups and downs of a changing climate. That resilience helps plants grow more consistently, even when the weather is fickle. To put it simply: *Healthy soils matter now more than ever*.

“Diverse plant communities deliver a greater variety of carbon *exudates* through their roots, feeding a rich patchwork of microbes. The virtuous cycle continues as microbes transform and store more carbon, delivering additional soil-health benefits that help support diverse and thriving plant communities.

“Though microbes operate at microscopic scales, they’re a huge deal. The *wee beasties* hold the power to restore our diminished soils and work in collaboration with plants to absorb and store atmospheric carbon for centuries or millennia. That means soils can deliver a simple but major climate solution: *They can help us put carbon back where it belongs*.”

**You can “feed microbes” by mulching around your plants and trees and by composting food waste for your garden at home or using a local composting program. Might this eco-choice be your new year’s resolution?**

Jane Zelikova, “Solutions Underfoot” in Ayana Elizabeth Johnson & Katherine K. Wilkinson, editors, *All We Can Save: Truth, Courage, and Solutions for the Climate Crisis*, (Random House Publishing Group. Kindle Edition, 2020), pp. 289-290. Jane Zelikova is the co-founder of *500 Women Scientists*, which strives to make science open, inclusive, and accessible and more resistant to racism, patriarchy, and oppressive societal norms.