Today's Most Innovative Farmers Are Getting Down To Earth, Says Soil Scientist

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Healthy soil needs to be relatively undisturbed and covered by crops that are planted in rotation. Photo by Photo by Rob Mattson/Samuel Roberts Noble Foundation

by Bryce Oates

A global study of land and agricultural methods shows dramatic differences in soil quality between farms that employ some simple management tools and those that don't. "Clever farmers" show how we can make healthier, more productive soil.

The latest trendy capital improvements in farming include items like GPS-guided tractors and aerial photography drones, but a University of Washington scientist says farmers get their biggest return on investment from something much more down to earth: soil improvement.

"Soil health is the best infrastructure investment the world has to offer," said David Montgomery, a professor of geomorphology, which is the study of the earth's surface. And he's optimistic about the future of farming, as a result.

"Almost all of our food comes from the soil. We see a declining volume of farmland from urbanization and development, a history of losing soil to erosion and weathering. Better farming practices, the kind that build soils, is the direction that responsible public policy would take us."

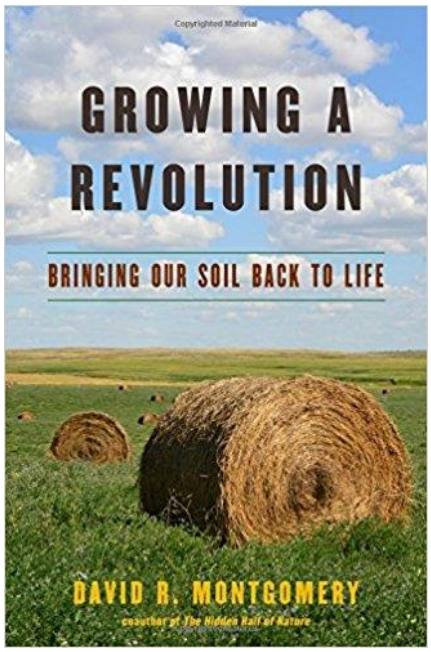
Montgomery has spent the last few years digging into the soil of farms in the U. S., Canada, Costa Rica, South Africa, and Ghana. The "global listening tour," as he calls it, looked at differences in soil quality among neighboring farms around the world. He found that adjoining

farms can have very dissimilar soil qualities, and that the best explanation is differences in farming and soil-management practices.

Montgomery's findings are the basis of his new book, Growing a Revolution: Bringing Our Soil Back to Life.

"I wanted to take a look, to observe for myself, whether conservation-based agriculture, regenerative agriculture made a difference," Montgomery said. "Does it work?"

He organized his travels to visit regions that grew large amounts of commodities like soybeans and corn as well as small subsistence communities. He compared the difference in soil quality of lands that were intentionally managed for soil health and lands that were not.



David Montgomery's new book, "Growing a Revolution: Bringing Our Soil Back to Life."

Montgomery said he predicted that there would be noticeable differences between practices, but he was floored at the visual evidence.

"When we compared the soils, same soil types, same area, same crops, the difference was remarkable," he said. "The most obvious difference was in color, but also in soil structure."

He says that across the board the samples beneath the soil-health-minded farms were much darker in color and had significantly more life and water penetration than soil from neighboring farms that weren't managed for soil health. In the managed soil, there were burrows, holes, and pathways created by soil organisms.

"It was clear that agricultural practices matter, that conventional practices are not a smart long-term strategy," he said.

Montgomery organizes his book around three major themes, inspired by the practices he learned from the "clever farmer" he visited who "figured it out." The themes are:

- Minimal disturbance of soil, through no-till or minimum tillage.
- Keeping the soil covered with plants, particularly legumes.
- Diversification of crops, with a rotation of at least four species.

"The 'revolution' in the book's title is a marriage of the ancient wisdom of crop rotation and cover crops combined with the new technology of no-till. All of the farmers I visited subscribed to these three elements," Montgomery said. "The crops they planted, the specific practices varied depending on the farm and the region. But the three combined themes made all the difference for health of the soil food web. It's the pattern evident in regenerative agriculture, in different places and among different people, that tells you something big is happening. Practices that build soils are the foundation."

The "revolution" was also a change in thinking for the scientist. His previous book, Dirt: The Erosion of Civilizations, documented agriculture's history of soil loss and erosion. He came away from that work with many questions about the long-term trajectory of agriculture and society's ability to feed itself.

But now, Montgomery counts himself an optimist. "What I learned is that farmers are very clever, very creative. The farmers I talked to were curious, they watched and they messed around, they experimented while keeping an eye on the life happening in the soil. And it's working."

Farmers who are building healthy soil are not using conventional methods of monoculture and heavy tillage. Instead, the creative farmers are "modeling their practices on biophysical processes, on looking for ways to pull carbon from the atmosphere as an energy source that drives the microbial system. Carbon is the battery in the soil, the key to the living system that generates healthy soils."

Montgomery said farmers were not necessarily motivated by storing more nitrogen in the soil as a way to reduce the greenhouse gas nitrous oxide. Rather, inventive farmers were primarily after better soil.

"The practices that build fertility are what matters," he said. "That's what everyone viewed as the clear winner, for the long-term economic future of the farmers and for the microbial life in the soil. The climate benefits that are harvested by the farmers, that's just seen as a bonus."