Improved Soil Health Can Be a Major Weapon in the Fight Against Climate Change

When people think about the impact of agriculture on climate change, they mostly think about the methane given off by livestock. This is a significant source of greenhouse gas pollution that warrants strong action. According to the US EPA, Agriculture, Forestry and Other Land Uses is responsible for 24 percent of greenhouse gas emissions, making it the second largest economic sector, behind only Electricity and Heat Production. However, that doesn't include the positive impact of agriculture on the carbon cycle, which reduces carbon down to 18 percent.

These reductions have come about through a largely unmanaged process, which means that the potential to increase it is enormous, and that's good news.

According to the Nature Conservancy, roughly 350 million metric tons of carbon emissions have occurred over the past century in the U.S. alone as the result of agricultural soil management practices that ignore the importance of carbon in the soil.

Soil organic carbon content has declined by as much as 60 percent in many important agricultural soils, escaping into the atmosphere. Reports estimate the economic impact of these emissions at $85.1 billion in the U.S.

Numerous studies have shown that specific soil management practices reduce atmospheric carbon by capturing and retaining it in the soil. They also increase soil fertility, reduce runoff, and greatly improve the soil's water absorption capacity. This, in turn, improves resilience to both drought and flooding while reducing irrigation requirements. A number of organizations are promoting these practices and providing tools to farmers to put them on a path to more sustainable agriculture. We spoke with C. Wayne Honeycutt, President and CEO of the Soil Health Institute (SHI), about the organization's Soil Health Action Plan.

What's interesting about the SHI plan is that it did not emerge as a solution to climate change, but rather, as an attempt to improve the productivity and resilience of the agricultural sector. Indeed, these are the desired outcomes of the plan, along with, “increasing available water holding capacity, increasing water infiltration, suppressing soil-borne plant pathogens, and increasing nutrient availability."

Honeycutt calls this fortuitous alignment between the benefits of building organic carbon in the soil from a global climate perspective, as well as those more immediate benefits to the farmer, “one of those rare win-win situations."

For example, no-till farming is a primary practice that produces a significant increase in soil carbon. Turning over the ground allows soil carbon to be given off as carbon dioxide when it mixes with oxygen in the air. No-till farming reduces this while allowing the soil microbiome, whose importance to agriculture has long gone unrecognized, to flourish.

Another beneficial practice is crop rotation, where residues, such as leaves and stems, are returned to the soil helping to build its carbon level. Varying the crops in a given location also helps discourage crop-specific insect pests. Instead of allowing the land to remain bare after harvesting a crop, planting a cover crop takes advantage of all the sunshine and rain between harvest and planting to shore up the amount of carbon in the soil while feeding the microbes in the soil. The roots of the cover crops also help to break up the soil and provide channels for new roots from the next crop. This also improves water infiltration. Finally, manure, if applied and managed properly can help to quickly build soil organic carbon levels.

All of these actions, says Honeycutt, are also considered “risk management tools," something that farmers have a great appreciation for. “When I think of the opportunity, I look at all of the landmass that's out there, and know that a plethora of research has shown that well-informed soil management provides a solution to the excess carbon dioxide levels in the atmosphere. Our opportunity, and indeed our responsibility to future generations, is to conduct the research and education efforts needed to help our farmers and ranchers become even better carbon managers."

The same principles apply to grazing livestock on rangeland. William Payne, owner of Destiny Ranch in St. Louis, Oklahoma, spoke with Eniday about his experience raising cattle in a very challenging environment. When he and his wife bought the ranch 11 years ago, they found that the land had been seriously overgrazed despite drought conditions. They couldn't get the grass to grow tall enough to sustain the cattle.

Payne had moved from the Oklahoma Panhandle where his homesteading family had survived the Dust Bowl. His new neighbors were all having trouble with the conditions, but the land there was what he could afford. Relying on a combination of advice from the nearby Noble Research Institute, a willingness to experiment, and a determination not to fail, Payne came upon a management practice called high-intensity rotational grazing that worked.

By concentrating large numbers of cattle in small paddocks and moving them frequently, he avoided overgrazing while stimulating the growth of native prairie grasses and fertilizing them with manure from the grazing animals. Eleven years later, grass that would not grow beyond 3-4 inches high, was above his head. When the cattle first go in, they disappear from sight. What Payne had done was to build up the soil organic carbon, which, in turn led to better fertility, better water retention along with drought resilience and better nutrition for his animals. Native prairie grasses had been re-established. Productivity soared.

Payne's experience is backed up by data. A 21-year study by Ganjegunte et al., 2005, showed that light grazing increased both soil carbon and soil nitrogen by as much as 27.8 percent and 30.9 percent, respectively.

Consumers might not think that buying habits and eating choices have much impact on the methods that farmers use. But in this world of increasing traceability and transparency, tools like the Fieldprint® Calculator, developed by Field to Market®—a not-for-profit alliance of growers, researchers, brands, NGOs and retailers dedicated to the realization of a sustainable food supply—help to close the loop.

Allison Thomson, Science and Research Director at Field to Market says that the Fieldprint® Calculator is an environmental impact score card that farmers and the brands that buy from them can use to ensure that sustainable practices that enhance soil health are being followed. Soil carbon is tracked, along with energy use, biodiversity, greenhouse gas emissions and several other parameters. When consumers show interest in sustainable foods, brands then look to work with growers to improve their scores on the calculator. Likewise, the tool can also guide farmers towards more sustainable practices that will improve their productivity, help the environment, and make them more appealing to brands moving in this direction.