

Conventional plowing is 'skinning our agricultural fields'

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Traditional plow-based agricultural methods and the need to feed a rapidly growing world population are combining to deplete the Earth's soil supply, a new study confirms.

In fact, long-established practices appear to increase soil erosion to the point that it is not offset by soil creation, said David Montgomery, a University of Washington professor of Earth and space sciences.

No-till agriculture, in which crop stubble is mixed with the top layer of soil using a method called disking, is far more sustainable, he said.

"Soil loss through conventional agriculture is in a range of 10 to 100 times greater than the rate at which soil is created. No-till agriculture brings it into the ballpark, surprisingly close to being balanced with soil creation," he said.

Montgomery looked at data from more than 1,650 measurements published in more than 200 studies examining various aspects of farming practices, soil creation and erosion. His findings are being published this week in the online edition of the Proceedings of the National Academy of Sciences, and will be published in a print edition later in the year.

Long-term erosion rates worldwide average less than one-tenth of a millimeter per year, which is similar to the rate at which soil is produced through mechanical, chemical and biological processes that dissolve rock and mix the grains with organic matter. The research shows that erosion

rates consistently exceed 1 millimeter a year – less than a half-inch per decade – only in steep alpine terrain, and plowed fields erode at about the same pace as the Himalayas, home to the highest mountain peaks in the world.

The paper supports arguments Montgomery put forth in a popular book, "Dirt: The Erosion of Civilizations," published earlier this year by the University of California Press. In the book, he linked the demise of history's major civilizations to how long it took them to deplete their soil supply.

In the case of civilizations past, when the soil wore out the people could move to other places and find rich enough soil to sustain them. But with the world population now exceeding 6.6 billion people, Montgomery argues that there are few, if any, places left where the soil can feed a large population for very long.

"We are skinning our agricultural fields," Montgomery said. "But there are methods of farming, no-till in particular, that don't have to lead to that result."

No-till agriculture does away with plowing, which often involves stripping crop stubble from fields before deeply turning the soil. Often a plowed field will be disked to remove stubble and weeds. No-till agriculture uses disking to turn only the top layer of soil. Some other methods, such as hand-tilling on terraced fields, also preserve the soil but are more labor intensive and so are not practical on a large scale, Montgomery said.

He noted that as oil becomes more expensive and less available, it will be even more important to preserve soil fertility through methods such as no-till farming, which requires less fertilizer and many fewer passes with a tractor.

No-till farming can build soil fertility even with intensive farming methods, he said, and it could prove to be a major benefit in a warming climate. By stirring crop residue into the soil surface, no-till farming can gradually increase organic matter in soil, as much as tripling its carbon content in less than 15 years.

"Returning the organic matter to the soil stores carbon," Montgomery said. "If all farms on the planet were converted to no-till, the range of estimates for sequestered carbon runs from 10 percent of current carbon emissions to about half.

"It's probably closer to 10 percent, but even that would be a significant benefit," he said. "It's one of the few win-win options in trying to forestall the effects of climate change."

Source: University of Washington

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