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Can Farming Practices in Oklahoma Solve Climate Change?

The Sooner State is part of a trend toward leaving farmland untilled to tackle runoff and climate change, but some remain wary of associated pesticide use

By [Brian Bienkowski](#) and [Environmental Health News](#) | October 15, 2015 | 0

NORMAN, Oklahoma—When Greg Scott teaches people about soil health, the front row better beware.

The soil scientist from Oklahoma hauls around a rain simulator that holds bins of soil you'd see on different types of farmland.

When he flicked his contraption on in Norman, Oklahoma, last week at a journalist's conference, shoes and notepads got wet. But what didn't get very wet was the bin of dirt that mimicked tilled land, a common method of digging and stirring up the soil before planting.

The water passed quickly through the soil and ended up in a jug, resembling a thick, hoppy ale when the demonstration was over.

The lesson was simple: that jug represents a river. Tilled land does not hold water well, leading to excess runoff, which sends dirt, phosphorous, nitrogen and pesticides into nearby waterways.

Scott, with his thick mustache and dusty jeans, looks more cowboy than scientist but is one of the state's leading voices in advocating for switching to no-till farming. It's not just rivers benefitting, he said, but more fertile soil, less irrigation and fuel needs, and soil better equipped to sequester carbon dioxide from the air.

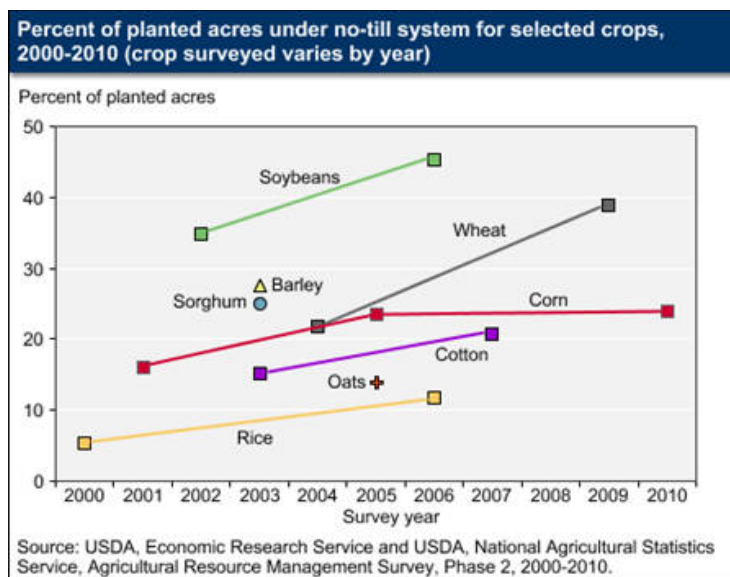
While Oklahoma doesn't force farms to change through regulation, people are still listening—almost one-third of Oklahoma's farm acreage is now no-till, an increase of about 20 percent over the past 15 years, [according to estimates from Oklahoma State University](#).



Greg Scott and his rain simulator.

Credit: Brian Bienkowski

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Despite the benefits, no-till is still a relatively new concept and, in some parts, is a tough sell. It's not easy to "undo 300 years" of farming knowledge, said Scott, who works for the Oklahoma Conservation Commission.

But with a growing population, such changes are necessary for food security and resilience in the face of climate change, he said. No-till is on the rise in the United States, increasing about 1.5 percent per year. About 35 percent of the land that grows the eight major U.S. crops used some type of no-till in 2009, according to a [2013 U.S. Department of Agriculture report](#).

For centuries, farmers have tilled the land—think a tractor and plow. This turning over the soil is largely to stop weeds from popping up and to loosen the soil for planting.

Farmers using no-till don't break up the dirt but rather rotate crops—often controlling weeds with pesticides—and use a drill to plant the seeds, said Shannon Phillips, a spokeswoman at the Oklahoma Conservation Commission.

This type of farming means the soil is rarely disturbed, it's more diverse from the crop rotation and covered with plant residue to prevent evaporation.

An [Iowa State University study](#) reported that the rate of water infiltrating soil dropped from 5.67 inches per hour to 2.6 inches per hour when no-till was compared to tilled soil.

With tilling farmers lose the organic material—more than half of which is carbon—embedded in the soil. Soils with a lot of organic matter hold more water, Scott said.

In western Oklahoma, for example, prior to widespread tilling organic matter levels were up to 6 percent, whereas now they're mostly below 2 percent, according to the Oklahoma State University data.

Nutrient and water retention becomes even more important when you're in a state like Oklahoma, subject to long droughts.

With tilling, you don't just lose organic matter, but the soil itself through increased erosion. People in Oklahoma know drought and erosion well—in the 1930s they experienced one of the worst environmental disasters of all time, the Dust Bowl.

But change doesn't happen overnight. Scott said it could take about 3 to 5 years to start seeing the benefits of no-till and some farmers aren't willing to invest the time or effort.

"It's a thinking man's farming method," Phillips said. "The people who are successful are always wondering, questioning things, and

willing to explore and try something different.”

One of the biggest learning curves is crop rotation. Oklahoma is mostly farmed for winter wheat and many farmers only grow that, Phillips said.

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Rotating crops is key to no-till because the various plants help build up beneficial microbes and help with weed control, she said. Various crops planted throughout the year compete with weeds, reducing the need for pesticides. In a till system, farmers are constantly putting weed seeds at the right soil level to flourish, Phillips said.

Cost is another barrier to no-till, said Clay Pope, a managing partner of Conserving Soil Partnerships (CSP, LLC) and Oklahoma farmer.

“It’s probably an investment of at least \$150,000 to \$160,000 up front to switch, and that’s in equipment alone,” Pope said. “There’s also the learning curve.”

Years back Pope’s family switched to no-till on the 1,000 acres of winter wheat they grow in northwest Oklahoma.

Pope, like others, did experience increased pesticide use in the short-term, a major knock against no-till. Such usage is at direct odds with goals of improved soil health, said Jeff Moyer, the executive director of the Rodale Institute, a nonprofit dedicated to organic farming. Moyer said an unintended consequence of some herbicides is damage to beneficial microbes within the soil.

But no-till itself isn’t at odds with organic farming, said Moyer who, literally, [wrote the book](#) on no-till organic farming. He said, instead of pesticides, organic no-till farmers plant a field with a cover crop, kill it with a crimping tool and let it fall to the ground as mulch, much like you’d use in a backyard garden.

They then plant their cash crop in in the dirt beneath the dead cover crop, which will suppress weed growth.

“We’re trying to get across the idea that organic farming is modern farming,” Moyer said, adding that the method works best with crops such as corn, soybeans, sunflowers, wheat and some vegetables cucumbers.

Phillips admits the potential for more herbicide usage but said that, in the long run, pesticide use on no-till farms should decrease.

“As the soil structure improves with different varieties of plants, some people now that have been no-tilling for a while are only applying pesticides once every three years,” she said.

As no-till spreads in Oklahoma, the state has begun to see water quality benefits. This spring, federal data showed that Oklahoma was second among states for protecting waterways from phosphorous and nitrogen, which can cause algae blooms and hurt fish and other aquatic life.

These reductions are in spite of the state receiving less than 2 percent of the U.S Environmental Agency’s Clean Water Act funds.

And then there are the climate change impacts. “It can help farmers both adapt to and mitigate climate change,” Pope said.

Each acre of no-till farmland can take an estimated half metric ton of carbon per annually from the air. In addition, there is a reduction

in emissions from tractors used to till and from the carbon released when soil is turned over.

And, through water retention, it's a method to adapt to weather extremes such as prolonged drought, projected to increase in places like Oklahoma.

In a state rife with climate skepticism, Scott said farmers “don't really care” what's causing weather extremes but want to see improved production, and no-till can get them there.

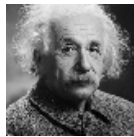
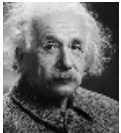
“Any [soil] management system that mimics nature will be successful.”

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