

Soil Management Now Affects Long Term Outcomes

By Janelle Atyeo for the South Dakota Soil Health Coalition

“Tillage in soil is like if a tornado went through the heart of Sioux Falls.”

That’s how Roscoe, South Dakota, farmer Dennis Hoyle describes the practice of churning soil to prepare fields for planting. Houses may remain in the aftermath of a tornado, but some are uninhabitable, and some are completely destroyed.

“Whoever survives that is going to have to start over,” Hoyle said.

Likewise, the soil is home to a busy community of microbes. Pulling a tiller through even once disrupts the natural balance of microbes that can be so beneficial for farming.

Many farmers broke out their tillage equipment this spring as they eagerly waited for fields to dry out, so they could plant between what felt like endless spring rains. Tillage is a standby method for drying soils quickly, but soil health experts say the practice does more harm than good.

“Tillage is very hard on soil structure,” said Sara Bauder, Agronomy Field Specialist with South Dakota State University Extension.

The practice can add oxygen to top soil and increase soil temperature in the short term, but the damaging effects of tillage are long term. It actually contributes to the excess moisture problem farmers are battling this year.

Tillage decreases water infiltration by disturbing the root channels and worm holes that provide a path for water.

“This generally results in more runoff and hard pan issues that cause moisture management problems in the long run,” Bauder said.

The urge to till can be strong in a wet year, however. Hoyle watched his neighbors work their low ground to prepare for planting this spring.

“I understand the temptation, but soil health is a long-term deal,” he said. “It’s not about this year. It’s about the next generation.”



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Photo Credit: USDA-NRCS South Dakota

He has spent decades reversing effects of tillage on his farm ground. In recent years, his focus has turned to building organic matter that will make for more productive soils when he passes his operation on to his kids and grandkids.



Tillage reduces organic matter soil microbes need to thrive, noted Kent Vlieger, South Dakota’s Soil Health Specialist with the Natural Resources Conservation Service. He listed other problems the practice causes: it destroys soil structure, creates a space for weeds to thrive and always increases erosion.

No-till fields, on the other hand, hold up better in wet years. Water moves through its porous layers instead of ponding on the surface, and crop residue helps hold soil in place, so it doesn’t wash away in heavy rain.

Pictured above, infiltration test performed in a no-till soybean field.

Photo Credit: USDA-NRCS South Dakota

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“It’s kind of a snowball of good benefits you’re going to have not tilling,” Vlieger said. Back in Roscoe, Hoyle tested one of his fields to see how different management practices affected the way they handled water. One area was green with a full season cover crop. Twenty feet away, the other spot was brown with wheat stubble. An inch of water took more than four minutes to soak in through the soil surface in the wheat stubble field. The cover crop area handled the water in 28 seconds.

Not disturbing the soil structure also allows layers to build strength. A no-till field will support heavy equipment better than one with disturbed soil. Hoyle is often out in his fields earlier than farmers next door – planting in muddy conditions or spraying when heavy equipment would sink into tilled acres. “It allows me to do things the neighbors question,” he said. “You have the structure to hold you up.”

Hoyle and another northeastern South Dakota farmer both gave up tillage during a dry period in the 1980s as a way to save moisture. The soil health they’ve built in the decades since then has helped them through the recent wet cycle, too.

Ryan Wagner farms in the heart of Prairie Pothole country in Day County, where there's been an overabundance of moisture in recent years. His dad started the transition to no-till before Wagner was in school, and their farm has been 100 percent no-till since the 1990s. The younger Wagner said it's helped them manage moisture.

"If you get that water to go through the soil rather than pond on the surface, you're better off," he said. His planting season went smoothly this spring compared to what fellow farmers had to deal with in southeastern South Dakota. Wagner caught good stretches between rains and got his corn planted in early May before many other farmers in the state could even get in the field. He feels for them but hopes it doesn't cause them to lose faith in no-till.

"It's definitely been one of the more challenging years," he said. "Just because we're in the wet cycle, I hope we don't see people going backwards on no-till." Bauder urges those getting into no-till to allow time for soil structure and water infiltration to improve. In some cases, this year, the soil was so saturated it was unlikely anything could fix it overnight, she said.

Vlieger agreed there is no quick fix for saturated fields and warned against undoing the good effects of no-till. "One tillage pass can set you back quite a ways," he said.

A healthy soil structure is built up over years and years of no-till management, he said. He encourages farmers to use a diverse crop rotation mixed with small grains and consider planting cover crops to use excess moisture in the fall. A cover such as cereal rye seeded after harvest can grow before planting work begins in the spring, soaking up early season rains.

"When mother nature slams us with crazy amounts of rain and flooding, there really aren't a lot of things we can do to control or fix the situation but having healthy soils with good structure and a growing, living root can help us be as prepared as possible," Bauder added.

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A cover such as cereal rye seeded after harvest can grow before planting work begins in the spring, soaking up early season rains. Pictured above, cover crops planted in a crop field that was flooded out in June of 2014, near Canton, SD to protect soil from erosion and utilize excess moisture.

Photo Credit: USDA-NRCS South Dakota