

Conservation Corner for April 25, 2017

To Till or not to Till-That is the Question

By Jodi DeHate
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Tillage – “It’s complicated” might be a better statement rather than asking a question of whether to do it or not. Tilling is the action of working a field or land to prepare the ground for the next crop. There are a multitude of options for tillage types. Conventional, conservation, ridge, strip, vertical, or just not tilling at all. Seriously, that’s an option to not till. Why would anyone do field work if they didn’t have to? Well, that’s where it gets complicated.

Pros of No-Till

The “no-till” method of farming can certainly be beneficial over many years. Organic matter is carbon based decaying plant and animal matter. That matter contains nutrients that growing plants can use. Tillage breaks up the organic matter and releases the carbon into the air, destroying the beneficial organic matter in the soil. In no-till farming, organic matter builds up in the soil profile which helps hold water in the soil, release nutrients, and improve soil tilth which just means that the soil is easier for plants to grow in, especially clay soils.

By not tilling fields, soil erosion is reduced dramatically as is the release of carbon dioxide and nitrous oxide. Both are greenhouse gasses. There is reduced labor on the farmer’s part as well. There is less time spent working the fields. The fuel savings from not having to use multiple tillage tools to prepare a field are huge.

Cons of No-Till

This sounds fairly magical right? So why isn’t every farmer practicing no-till farming? It definitely has its challenges, and for some crops, such as root crops, it’s not very feasible.

Challenges of using no-till include either retrofitting planting equipment or buying new specialized planting equipment. Without tillage before planting, the planter has to do more work to get the seed where it needs to be. Regular planters aren’t equipped to do that. No-till planters usually have more down pressure and better equipment to clean the row right in front of where the seed needs to be dropped into the soil. New equipment always costs money and when crop prices are low like they are right now, that’s a huge decision for the farmer as to whether to invest in a new piece of equipment or buy a good used piece.

Pests can be more of a challenge too in a no-till system. Since the previous crop residue like corn stalks or soybean stubble is still on the soil, more pathogens live on the decomposing residue. Pathogens like fungi that can kill a new crop. Weeds are a problem in all crops, but in no-till it can be a bit worse. So what do no-till farmers do about it? They typically use herbicide-tolerant crops and spray herbicides, often before planting and then again after planting to ensure a weed-free crop. For bugs, if the farmer is planting corn that is herbicide tolerant and contains Bt (*Bacillus thuringiensis*), many insects like corn rootworm will die from ingesting any of the corn plant. Bt isn’t harmful to all bugs, just many that target corn and cotton. Some insecticides may

need to be used depending on the bugs and crop that the farm is growing. So, while more pesticides may be used in a no-till system, the overall benefit to the environment is still a positive.

There is an art to no-till that a farmer needs to learn. The real teacher in using no-till is how the crops perform. If the crops perform poorly a farm may not recover from switching to no-till and that's a risk that many farmers don't want to take. The art isn't something that can be learned in a book or in a class, but needs to be learned by experience.

What about the other types of tillage?

Conventional and conservation tillage are methods that incorporate crop residues and manure into the soil to prepare the seed bed for the new crop. The soil is loosened and aerated, which can help a seed grow faster especially in heavier soils. Weeds and other pests are disturbed so the tillage is trying to prepare a clean seedbed for the new crop.

The drawbacks to conventional tillage are that water and wind erosion can be very high depending on the terrain. It's not unheard of for newly planted alfalfa or corn fields to have gully washouts after a heavy rain, requiring the farmer to go back and fix the washout and replant in those areas. Conservation tillage is where a farm keeps enough crop residues on the field so that after planting, at least 30% of the field is covered with a piece of crop residue. Those residues help absorb the impact of rain drops, thereby helping the soil stay in place, much like the no-till system.

Strip till is gaining traction in this area. It's a bit of a hybrid between no-till and conventional till. Like the name implies, strips of land are tilled leaving other strips not worked. This leaves about 50% of a field not worked up overall. This can help build up soil biology and organic matter in those strips for at least a year if not longer if the farm uses GPS guidance to help them use the same tilled parts of the strips year after year.

Vertical tillage is the newest concept / buzzword in agriculture. This type of tillage does not move soil horizontally across the soil profile. Instead, it moves soil vertically, which breaks up soil compaction layers that may have been created by conventional tillage. Usually it breaks up crop residue, breaks up soil clods, incorporates manure at the surface, and tends to be able to move fast across the landscape. The benefit to this type of tillage is that it helps seeds have a good establishment in a residue-heavy field without creating that plow pan or compaction layer in the deeper soil layers.

A drawback to any tillage is that it destroys soil organic matter and microbes in the soil. Something that any tillage system can use to help increase soil health and organic matter is cover crops.

Farmer preference

Each farmer uses a tillage system that they feel works for their fields and their goals. Each type of system requires something different from the farmer to learn. Typically change in tillage happens in a couple of different ways: someone else in the community is having good success and others want to see how it works on their farm, a new generation is taking over the farm and

wants to try a new system, or the farm wants to cut costs without sacrificing too much of what they know so they may ease into a something like strip till.

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During a field day at Bob Lee's farm in Osceola County, participants had the opportunity to see the below-the-surface benefits of no-till to the health of the soil.



The black dots in this slice of soil from Bob Lee's farm are holes made by worms. Worms help improve soil structure and cycle nutrients.