

# Conservation Tillage

## What

**Conservation tillage is a method used to plant and grow a crop while leaving a year-round cover of living or residual plant material on the field.** As opposed to conventional plowing and seed bed preparation, conservation tillage limits soil-disturbing activities to only those necessary to place nutrients and plant crops. Practices known as no-till, strip-till, ridge-till, and mulch-till are different methods of conservation tillage and managing residue. In a no-tillage or direct seeding system, plants are grown directly in residue with no full-width tillage. In strip-tillage systems, strips are tilled in narrow strips (no greater than 1/3 of the row width) and the rest of the field is left undisturbed. A ridge tillage system involves maintaining the residue as previously mentioned and preparing ridges or shallow beds for establishing crops. Mulch-tillage system preserves one third of the surface residues. These systems often use aeration and manure injection equipment to amend the soils.

## Why

**Conservation tillage boosts soil organic matter, improves soil tilth, and increases infiltration and the soil's capacity to hold and provide root-layer moisture — which may all together improve crop yields.** Conventional tilling of soil leaves the soil surface bare and exposes it to the erosive action of water and wind, increasing erosion and sediment and nutrient losses. Conventional tillage can also create a so-called "plow pan," a zone of compaction which roots can barely penetrate. With conservation tillage, farmers instead leave much of the soil and crop residue intact, reducing compaction caused by plowing and minimizing erosion. These techniques reduce nitrous oxide emissions and create a more natural soil profile that retains nutrients and water (an added benefit during drought), prevents soil erosion, compacts less and has improved soil biology and aeration. Comparably, conservation tillage may require less time on the tractor and offer savings in labor, fuel, and equipment maintenance costs.

## How

**Conservation tillage is practical for any farmer who grows annual crops** though it often requires the use of equipment customized for the practice. This may include devices such as no-till or strip-till planters or drills, strip-type fertilizer applicators, in-row chisels, coulters, sweeps, aeration tillers, and others. Where low-residue crops such as silage corn are grown, a fall-planted cover crop may be necessary to protect the soil surface from erosion. Fall-planted cover crops also provide a number of agronomic benefits and should be considered for those reasons as well. To reduce the need for spring-applied herbicide, consider growing a cover crop, such as forage radish, which winter-kills after producing a heavy residue. (Radishes and other brassicas may also help reduce pest pressures of many kinds.) Other cover crops may require an application of herbicide in addition to those needed to grow the main crop.

## Costs

Costs will vary according to what kind of equipment is available to the farm, whether existing machinery can be adapted, and the period of time that investments will be made. While transitioning into conservation tillage may require additional capital investments, these costs are generally offset by reduced fuel, labor, and machinery maintenance expenses going forward. Studies from the Midwest have shown that no-till systems can cost less than half that of conventional tillage systems.

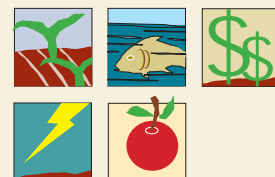


**A corn grain field after harvest with corn stover/residue covering the ground. Corn stover protects the soil during winter which in turn helps to build up the organic material and additional nutrients.**

### Associated and Complimentary Practices

- Cover Cropping,
- Integrated Pest Management

### Benefits





Above, left: Aerator slits in annual crop land. Right: Tines on an aerator cut into compact soil and incorporate liquid on annual crop land.



Above, left: Ryegrass planted with a no-till seeder. Right: A no-till seeder being used to plant a field.



Above, left: A corn grain field after using a tillage machine creates a seed bed. Right: A Zone Builder tillage machine. The front disk cuts through residue, an adjustable shank breaks through different lengths of compacted soil layers, and the rolling basket in the rear breaks up soil clods.