Strip-Till

Iowa Job Sheet

Natural Resources Conservation Service
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What is strip-till?

Strip-till is a system in which residue-free strips of soil are tilled ahead of planting using a knife apparatus such as a fertilizer injection shank. The strips are approximately 6 inches wide or about 1/3 the row width and 4 to 8 inches deep. These strips are cleared of residue and tilled for warming and drying purposes either before or during the planting operation. Fertilizer is often incorporated at time of strip tillage for better seed placement. The seeds are planted directly into the strip of loosened soil

Where soil moisture conditions are suitable, strip-till creates narrow-width tilled strips, traditionally in the fall, to increase early spring soil moisture evaporation and increase soil temperature in the top 2 inches.

How it helps the land

Strip-till systems provide many benefits:

- Reducing water erosion.
- Reducing wind erosion.
- Improving soil organic matter content.
- Reduce CO2 losses from the soil.
- Manage snow and water to increase available moisture.
- Provide food and escape cover for wildlife.
- Allows for injecting nutrients directly into row areas.
- Improved germination due to increased soil temperatures
- Conserve energy.

Where the practice applies

Strip-till is normally used as a component of a resource management system. It should be used in conjunction with crop rotation, nutrient management, pest management, various structures and buffer practices needed to address natural resource concerns and the landowner's objectives identified during the planning process. A strip till system is most beneficial in areas with cooler, poorly drained soils.

Where to get help

For assistance in planning and establishing a st rip-till systems on your farm contact your Natural Resources Conservation Service (NRCS) office. For more job sheets and conservation information visit the NRCS website at *www.ia.nrcs.usda.gov.*

Advantages and Disadvantages

Strip tillage creates an environment favorable for rapid seed germination and growth while providing excellent residue management and erosion control. Other potential advantages from strip tillage compared to no-till include optimum fertilizer placement for plant uptake, reduce compaction in the seed zone, warmer seed bed, earlier planting, ideal soil moisture and structure for seed-to-soil contact, rapid and more extensive early root growth, reduced disease pressure to the small seedling, greater early season plant growth, and reduced losses of nutrients (primarily P) in surface runoff water due to subsurface banding of fertilizers.

Possible disadvantages to consider include: Cost of preplant operation; Strips may dry too much, crust or erode without residue; Potential for nitrogen fertilizer losses.

Requirements of strip-till

- Residue shall be uniformly distributed over the entire field. Combines or other harvesting machines shall be equipped with spreaders capable of spreading residue over at least 80 percent of the combine header width.
- Secondary removal of crop residue by bailing or grazing shall be limited to retain the amount of residue needed to protect the soil from wind and water erosion and maintain soil organic matter.
- Residue shall not be burned or disturbed by full width tillage operations regardless of the depth of the tillage operation except for occasional row cultivation for spot treatment for weeds or limited use of undercutting operations, such as sweeps or blades used to level ruts or alleviate compaction in small areas of fields.
- Planting implements shall be equipped to plant directly in a tilled seedbed in a narrow strip along each row by planter attachments such as rotary tiller, sweeps, multi coulters or row cleaning devices.

Considerations

- Crop selection, including variety will influence residue amounts produced. Equally important is the crop rotation. Crop rotations that include high residue producing crops such as corn, sorghum and small grains maximize the benefits of strip till and other crop residue management practices.

- Planning for residue cover begins at harvest. Ensure the combine spreads ample residue evenly over the field. The amount of residue left on the surface determines the erosion reduction benefit.

- Leave crop stubble as high as possible during harvest. Standing residue is most effective for reducing wind erosion.

- Fragile residues such as soybeans are more easily buried with tillage.

- Reduce speed. Slower speeds leave more residues on the soil surface.

- Implement dealers and manufactures can provide information on how to adjust, modify and operate implements to leave more residues on the soil surface.

- Typography is important to consider. In areas of steep slopes or on highly erodible land (HEL), it is critical to lift the soil in the tilled strips to create a mound. This will ensure water runoff will occur in the lower residue covered areas of the field.

Applying the practice

In the fall, fertilizer injection knives, fluted coulters, or other tool attachments are used to create residue-free strips and tilled zones that are approximately 6 inches wide and 4 to 8 inches deep and 3 to 4 inch mounds. In the spring, seeds are planted directly in the same strips. Fertilizers may be incorporated while tilling these strips.

Main components of strip-tillage equipment can include but are not limited to anhydrous ammonia applicator knives or other subsurface fertilizer injection systems, rototillers, in-row chisels, row cleaners, double discs and planters equipped with fluted coulters.

Equipment Needed

The foundation of a strip-till system is a heavy tool bar to which row markers, coulters, knives, and covering disks are attached. The latter three must be located to exactly match the planter size (i.e., 8-row, 30 inches, or 12-row, 30 inches). The front running coulter must be large enough to cut through the residue without plugging. An injection knife, usually designed for fertilizer application follows immediately behind the coulter.

This knife is designed to till an area about 6 to 8 inches wide when operated at an 8-inch depth. Specially designed, wider knives that may be parabolically shaped—sometimes called mole knives— are more aggressive than most traditional anhydrous ammonia knives. This style of knife can till a somewhat wider area and lift soil, which aids mound formation.

A pair of covering disks flank each side of the knife and prevent the tilled soil from spilling into the inter-row area, leaving a 3 to 4-inch mound (berm) of soil in each strip. Disk size can vary from 3 to 19 inches, with larger disks being more effective at capturing the soil, especially when used at higher speeds.

Typical field operations in a strip-till system include fall strip-tillage, spray; plant row crops on cleared strips followed by post-emergent spray as needed.

Farmers should carefully consider the horse power (hp) requirements of the strip-till systems. Between 20 and 30 hp per knife is needed.