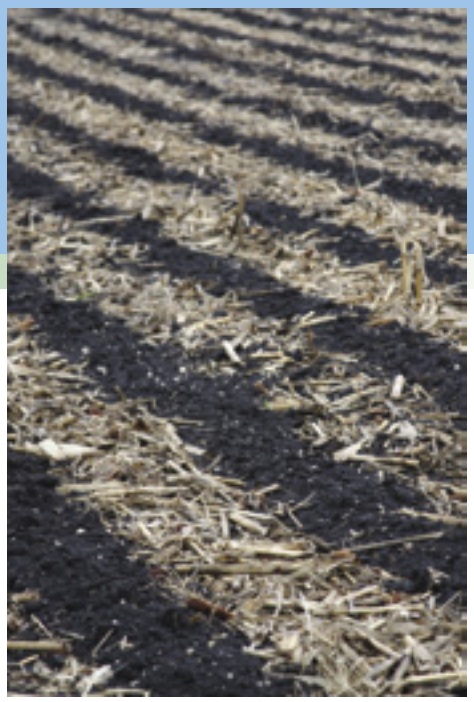
Iowa Learning Farms

Building a Culture of Conservation

Farmer to Farmer: Iowan to Iowan



Strip-tillage Crop Management

It begins with you: Improving soil, water and profitability

As attention increases on protecting Midwest water bodies from agricultural fertilizer and sediment runoff while diesel fuel prices rise, farmers and landowners may be interested in learning more about strip-tillage as a farming practice. Strip-tillage conserves soil and valuable crop fertilizer nutrients while reducing fuel and related operating costs.

Improved planting equipment and herbicides make no-till crop management an option. Long-term no-till crop management very effectively reduces soil erosion, restores soil structure and improves water infiltration. But heavy Des Moines Lobe soils typical of north-central Iowa and southern Minnesota farmland commonly feature poor internal drainage and can be slow to warm in the spring. Increased amounts of surface residue typical of no-till crop management can be a hindrance if not managed properly. This can result in planting delays and poor early seedling vigor of no-till planted corn, potentially reducing grain yields.

Strip-tillage crop management may be a viable alternative to full-width tillage.

What is strip-tillage?

Strip-tillage implements create a narrow, residue-free strip, or berm, of soil about six inches wide, four to eight inches deep, and mounded about three to four inches high on 30-inch crop row centers. The soil surface between tilled strips is left undisturbed, as in no-till. Strip-tillage creates an environment favorable for rapid corn seed germination and seedling growth. The strip-tillage operation can be completed after harvest, or in early spring before planting. The tilled soil strips with less surface residue are dark, so excess moisture dries and the soil is quicker to warm for timely spring corn planting.

Strip-tillage is a happy medium between the benefits of no-till and the drawbacks of traditional full-width tillage. Farmers considering strip-tillage should evaluate the costs and benefits to decide on the best fit for their farming operation. Specific components of a strip-tillage implement vary, but the basic configuration includes coulters, disks, a subsurface shank or mole knife to inject fertilizer at depth within the tilled strip, and covering disks.

Making the Switch

When switching from full-width tillage to strip-tillage farmers must understand that they are making the transition to a system that requires a higher level of management. With strip-tillage, correcting primary tillage traits (e.g. soil clods or wheel tracks) with a spring seedbed preparation pass is eliminated—the subsequent crop's seedbed is being established with a single strip-tillage operation in the fall or early spring. This makes it especially important to monitor soil moisture conditions as well as the condition of the soil berms being created by strip-tillage equipment. As with any tillage operation, avoid field operation when soil conditions are too wet, as clods and compaction can result.

Before investing in your own equipment, ask a neighbor with strip-tillage experience to custom strip-till a portion of one of your fields to demonstrate how best to set up and adjust the equipment. Newcomers to strip-tillage quickly recognize the importance of proper equipment set-up, monitoring and willingness to make adjustments based on soil and weather conditions.

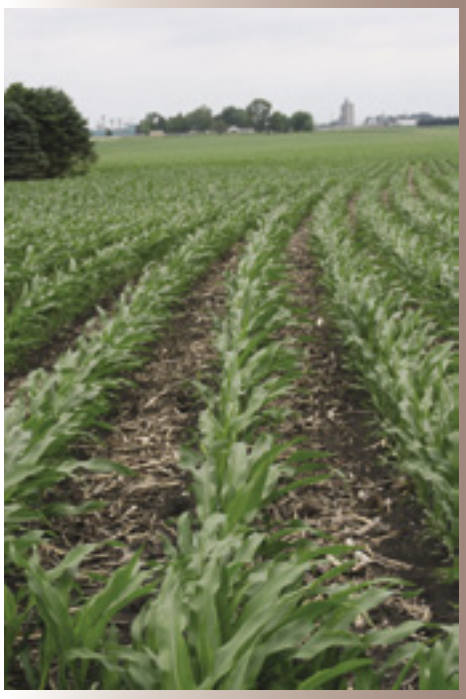
Fertilizer Application

Strip-tillage allows the farmer to prepare the seedbed only, or to simultaneously sub-surface apply nitrogen, phosphorus, and potassium fertilizers in the bottom of the tilled strip. Some farmers broadcast dry phosphorus and potassium fertilizer and follow up with the strip-tillage operation. This approach incorporates dry fertilizer into the tilled soil strips where it is readily available for uptake by young crop seedlings. Many farmers apply anhydrous ammonia fertilizer as part of their fall strip-tillage operation; however, it is important to balance fall strip-tillage with the need to delay anhydrous ammonia fertilizer application until soil temperatures stabilize below 50°F degrees. Cooler soil temperatures slow the rate of microbial conversion of ammonia to nitrate and reduce the risk of subsurface nitrate losses to groundwater.

Strip-tillage should not be seen as a substitute for no-till on highly-erodible land, where the tilled soil strips are subject to water erosion. This is especially true if the farmer strip-tills up and down field slopes, rather than following the contour.

Equipment Needed

Experienced strip-tillers emphasize the need for sufficient tractor horsepower to pull the equipment at optimum speed and operating depth for proper coulter and knife action, building the soil berm. A rule of thumb is to have a tractor with 15 to 20 horsepower (HP) per row of strip-tillage. For example, a 250-275 HP tractor will be needed to effectively pull a 12-row strip-tillage bar. This will allow operation of the equipment at about 5 to 6 MPH and at proper depth. Operating the equipment at greater depth and speed will require more tractor horsepower.



Strip-tillage can be implemented without precision guidance tools but most farmers suggest that dollars spent on the most-precise level of accuracy, such as RTK (Real Time Kinetic) guidance, is worth the investment. Effort should be made to plant the crop into the center of tilled strips. RTK guidance technology with sub-inch accuracy helps match up last fall's tillage and this spring's planting operations. Use of RTK guidance also reduces the need to match planter and strip-tillage equipment width. For example, an eight-row strip-tillage bar, with a lower investment cost and tractor horsepower requirement, can confidently be matched with a 12-, 16-, or 24-row planter.

Strip-till Advantages

Farmers who have adopted strip-tillage cite several advantages to using the practice:

- **Soil conservation.** Strip-tillage offers potential to reduce soil erosion because crop residue is maintained between the strips of tilled soil.
- **Reduced fuel usage and labor requirement**. In recent years more row crop acres are planted to corn-on-corn production. Full-width tillage corn-on-corn management may require multiple in-field passes between fall harvest and spring planting including cornstalk chopping, fall primary tillage (disk-chisel and other more aggressive forms of tillage) and one or more secondary spring tillage passes (field cultivator, disk, or soil finisher). Eliminating the need for spring pre-plant full-width tillage reduces labor costs, accelerates the pace of planting and fewer passes across the field means fewer gallons of fuel are being used.
- **Improved fertilizer nutrient placement.** Some farmers using strip-tillage choose to apply nitrogen, phosphorus, potassium and other fertilizer nutrients in-furrow with the strip-tillage operation. In-furrow fertilizer placement makes the nutrients readily available for young corn and soybean seedling growth and has potential to improve fertilizer use efficiency.
- **Improved soil structure and water infiltration.** Long-term no-tillers cite improved soil structure and improved water infiltration as benefits of eliminating tillage. But slow emergence and early vegetative growth of corn and soybean on poorly drained and colder soils can reduce crop yields. Strip-tilled soil warms and dries quickly for timely planting of corn and soybean. Surface crop residue between rows holds up the tractor at planting

and may allow earlier planting than tilled fields. Farmers using strip-tillage also report that there is less ponding and surface runoff in heavy rainfall, when compared to their neighbors' full-width tilled fields.

Innovative, successful farmers are enjoying the benefits of strip-tillage crop management and each farmer implements strip-tillage differently. It can be as simple as creating the tilled strips for seedbed preparation or as detailed as merging seedbed preparation and fertilizer nutrient application into a single field operation.

Resources:

Iowa Learning Farms video: "Strip-tillage Crop Management" DVD available for free or on the ILF website.

Iowa State University Extension Publication PM 1901c, from 2008, "Consider the Strip-Tillage Alternative". Visit the ISU Extension Crop News website at www.extension.iastate.edu/CropNews.

North Dakota State University Extension Publication AE-1370, from 2011, "Strip Till for Field Crop Production: Equipment, Production, Economics". Visit the NDSU Extension site at www.ag.ndsu.edu/agmachinery/conservationtillage, linking you to strip-till demonstration videos and strip-till equipment manufacturers. The University of Minnesota Extension website is www.extension.umn.edu.

Strip-Till Strategies newsletter is full of farmer insights how-to information and can be accessed at www.striptillfarmer.com.

For more information

Contact your area Iowa State University Extension and Outreach Field Agronomist, Iowa Learning Farms or your local Natural Resources Conservation Service office for more information about strip-tillage crop management. Midwest land-grant university extension websites, including Iowa State University, the University of Minnesota and North Dakota State University Extension, feature comprehensive strip-tillage publications.

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