Coming in from the cold

The 1990s left a lot of no-till corn growers in the cold. During eight out of 10 years of that decade, Illinois corn farmers encountered cool, wet soil conditions at planting time. This caused grief for some no-till corn farmers, who found that the cold, wet soils slowed germination and early season corn growth. In fact, some no-tillers tossed in the towel and made the switch back to conventional tillage.

However, others warmed up to the idea of strip-till—a no-till variation that helps to solve the problem of cold, wet soils.

With strip-till, producers till a narrow, 4- to 5-inch-wide strip of soil, normally while applying anhydrous ammonia in the fall—creating a 3- to 4-inch mound. In the spring, these mounds will "mellow," settling down to about an inch or two below their original height.

Producers plant into this tilled strip—a seedbed that is every bit as warm and dry as with conventional tillage. At the same time, at least 80 percent of the soil remains undisturbed, providing most of the erosion-control benefits of traditional no-till.

The following are some basic management tips for strip-till.

Fall strip-till equipment

The best system for building strips in the fall includes the following equipment:

Residue manager (optional). A residue manager is beneficial in heavy residue, such as wheat or corn. But it usually is not necessary following soybeans, if the residue is uniformly spread.

Coulters. Large (20- to 24-inch), smooth, sharp coulters cut the residue and fracture the soil about 1 foot ahead of the knife.

Tillage shank. A B-33 mole knife, attached to a heavy-duty C shank, is the preferred choice. This knife maximizes the heaving-up of soil while minimizing topsoil disturbance. It also leaves a “mole hole” at the bottom of the opening in the furrow, reducing the potential for ammonia escape.

Tillage operations are typically 6 to 8 inches deep, with equipment moving at 5 to 7 miles per hour.

Covering disks. Two large (17- to 20-inch) closing disks, mounted on the C shank, catch the soil heaved up by the knife and form it into a mound. The center of the disks is 4 to 8 inches behind the mole knife.

The covering disks should be blunt (unsharpened) to avoid cutting the residue and folding it into the mound. This also prevents the equipment from cutting a groove next to the mound, a problem that can create a channel for runoff water, resulting in greater soil erosion.

Once water starts moving in these grooves, it can quickly wear away the entire mound, carry off nutrients, and leave a depressed area in which to plant.
Matching the planter

When using markers for guidance, it is crucial that you match the row width and number of rows of the strip-till equipment with those of the planter.

However, with the trend to larger planters and the declining cost of GPS guidance systems (which have 2- to 3-inch accuracy), an attractive alternative is to use the same guidance-equipped tractor that you use for planting to pull a narrower strip-till bar without markers.

Planter attachments

Stabilizing coulter. Mounting a stabilizing coulter between the outside rows at each end of the planter will help to keep the planter centered on the mounds.

Residue managers. Residue managers, mounted on the row units, should be set to just skim off lumps of soil or residue left on the mounds.

Coulters. Coulters are normally not necessary and can even be detrimental. In most soils, the strips will still be loose in the spring, so the coulters tend to run too deep, throwing excessive soil off of the mounds ahead of the disk openers.

What about spring strip-tilling?

Fall is the recommended time for strip-till. But what if you cannot create mounds in the fall? Do you create them in the spring?

The answer is generally “no” for the following reasons:

1. In wet springs, when the strips are most needed, soil smearing and slabbing in the strip can result in a poor seedbed, while compaction between the rows can result in poor root development.

   Also, there can be seedling damage if ammonia is placed under the row when soils are wet in the spring. As the soil dries, cracks can develop in the compacted zone, making it possible for ammonia to move up and damage the seeds.

2. In dry springs, when traditional no-till presents few problems, spring strip-tilling can result in an excessively dry seedbed.

   Therefore, if you can’t create strips in the fall, it’s better to use no-till or mulch-till in the spring, combined with an early sidedress application of anhydrous ammonia.

   If conditions are excessively wet, adding spike closing wheels and chains to the planter units and/or making a preplant pass with a rolling harrow may be better alternatives than spring strip-tilling.

Timing your N application

In Illinois, follow these recommendations when applying anhydrous ammonia while strip-tilling in the fall:

1. Apply N after the soil temperature at 4 inches is below 50 degrees F. For farmers who use a nitrification inhibitor, the target temperature is below 60 degrees F.

2. Do not apply N before the third week of October, even if soil temperatures drop below 50 F before that time. By applying nitrogen before the third week, you run the risk that soil temperatures will warm back up above 50 F, creating a greater risk for N loss.

These guidelines are set up so farmers have enough time to apply anhydrous before soils freeze, without running the risk of applying N when the soil is too warm. But because strip-tillers are so dependent on creating strips during the fall, they have an even greater temptation to push up the dates.

Resist temptation.

What about Southern Illinois?

Fall application of anhydrous ammonia is not recommended south of Highway 16 in Illinois because some soils in the southern part of the state never freeze. If the soil does not freeze, the nitrification process continues through the winter, converting the ammonium form of nitrogen to the nitrate form. This means greater losses because the nitrate form of N is highly susceptible to denitrification and leaching.

If producers south of Highway 16 want to strip-till, they should create the strips in the fall but not apply nitrogen until the following spring.

Starter fertilizer

University of Illinois research during the 1990s has shown good starter fertilizer responses in virtually all of the no-till plots across
the state. Three years of strip-till research did not show the same good response, but those three years were warmer and drier than normal—conditions that do not usually lead to a starter response.

In cold, wet years, expect a boost from starter fertilizer.

**P and K**

Many producers will broadcast P and K in late winter because it is quick, easy, and efficient. The main drawback is the risk of running over and destroying the mounds during the application.

To solve this problem, some strip-tillers (in a corn-soybean rotation) will broadcast two years of P and K just before the soybean crop—instead of before the corn crop.

One problem with applying P and K ahead of soybeans is that farmers are not able to take advantage of the low-cost nitrogen associated with ammoniated phosphates.

Another option, banding P and K in the fall with the anhydrous application, can increase fertilizer efficiency and cut the cost of a separate pass. Its major drawback is the increase in horsepower necessary to pull the dry applicators—plus the added time required.

This may be an efficient option on short-term, leased land that is low in fertility or is about to succumb to development.

**Disease management**

Like mulch-till, strip-till controls most soil-borne diseases by creating a warm, dry seedbed. It also disperses pathogens, diluting them and reducing concentrations. In particular, the warmer soil conditions with strip-till can effectively control Pythium seed decay and root rot.

Pythium seed decay and root rot prefer soil temperatures between 50 and 55 F. So, in saturated environments, if you can get the soil temperature above 55 F in the spring, corn may escape these diseases. Strip-till can go a long way to battling Pythium seed decay and root rot by warming the soil faster than no-till.

Also, a seed treatment will protect against Pythium seed decay and root rot.

**Soils and slopes**

Strip-till is ideally suited to heavy, black soils that tend to be very wet in the spring.

However, on steep, highly erodible slopes, be cautioned. Strip-till can increase the erosion problem on these steep slopes, so no-till may be a better option. When strip-tilling up and down steep slopes, channels of water can form between the rows, especially in the wheel tracks, cutting deeply into the soil.

**Corn after corn**

Strip-till has proven to be a very effective method of producing continuous corn. You don’t even need markers. When strip-tilling corn after corn, center the strip between the previous year’s rows.

Strip-tilling in the same direction as the combine will improve residue clearance and reduce plugging. If the strip-till rig is twice the width of the combine head, then combine in two-pass lands to allow the strip-till rig to match the direction of the combine.