



Transition to No-till



Conserving the soil: It begins with you

Have you experienced any of these scenarios?

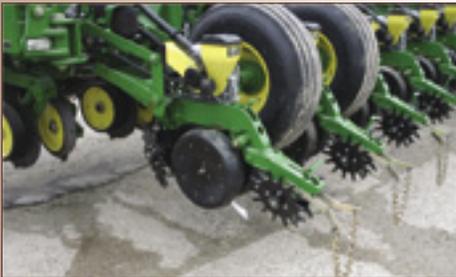
- Heavy rains washed topsoil from your fields, filling the roadside ditches.
- A brief but heavy rainfall left water standing on your tilled fields for several days. Meanwhile, your neighbor's no-till field did not show signs of ponding.
- Diesel fuel prices have increased considerably and you are looking for ways to become more efficient with your fuel use.
- During the last growing season spring rains delayed your corn planting. Fall weather conditions further delayed harvest and an early winter prevented you from completing your normal post-harvest tillage operations.
- Your father, wife and teenage son have all contributed to your farm labor force, but this spring you are facing a labor shortage because of your father's failing health, your wife's decision to work off the farm, and increasing time demands on your son from school.



If these reasons, or others, are causing you to think about trying no-till for the first time there are several things to consider.

What is no-till?

No-till is a system in which the soil is not disturbed before planting, except for injecting fertilizer nutrients such as liquid manure or anhydrous ammonia. A coultter, or disk seed-furrow, opens narrow strips for planting. Tillage is entirely eliminated. Residue from the previous crop remains on the soil's surface to protect it from erosion.



Under moist seedbed conditions, spike-style closing wheels will crumble the soil around the seed furrow. Adding drag chains behind the closing wheels also helps. In dry soils, spike-style closing wheels may not be as effective as the standard style.



Making the transition to no-till

First, you need to make the decision that you want to stop your current conventional tillage practices. Secondly, consider intensive soil sampling of your fields. If soil test results call for the addition of nutrients, incorporate the fertilizer throughout the top six to eight inches of soil with your final tillage operation.

If you farm poorly-drained soils, install tile for improved soil drainage before transitioning to no-till. Improved subsurface soil drainage provides good return on investment regardless of tillage system, but it is particularly important in no-till because soils are not worked to create a dry surface.

Finally, if you decide prior to harvest to no-till in the spring, make sure your combine settings are properly adjusted to uniformly distribute crop residue, avoiding windrows of residue that may slow spring soil warm-up and planting.

Planter recommendations

Following these tips can help make no-till planting more successful:

- No-till planter depth-gauging wheels must firmly contact the soil surface. If they are “floating,” tighten the down-pressure springs on parallel links or add more weight to row units. When the seedbed is moist, springs that are too tight can cause soil compaction, limiting plant growth and yield.
- No-till planter double-disc seed openers and closing wheels should be in top condition for best seed-to-soil contact and consistent seed placement. This will aid in uniform seeding depth and spacing between plants.
- When no-till planting soybeans after corn, the use of row cleaners will clear enough residue for seedling establishment. Also called residue managers or trash whippers, these cleaners should ideally be height-adjusted to operate about 70 percent of the time as you go through the field.
- If you use a coultter behind the row cleaners, set it about a half-inch shallower than the double-disc seed openers.
- In-furrow seed firmers, or seed rebounders, placed directly in front of the closing wheels may improve seed placement consistency in furrow, particularly in dry conditions.
- Increased surface residue may slow soybean germination and emergence. Consider using fungicide and insecticide seed treatments for no-till planted soybeans—particularly if soybeans are planted in April.

For individual help, contact your area ISU Extension agricultural engineering field specialist.

Fertilizer nutrient management

- Under no-till management, surface-applied phosphorus (P), potassium (K) and aglime may become concentrated near the surface. Soil testing of the top two inches of soil, and at a six to eight-inch depth, may be useful. If the deeper soil test results indicate optimum or higher nutrient values, nutrient concentrations near the soil surface should not be a concern. If six to eight-inch depth soil test results are Low or Very Low, consider injecting P and K with the planter or a separate fertilizer injection.
- Ammonium-based nitrogen (N), such as urea or UAN solutions, can be lost to volatilization when surface-applied, making coulter injection of N a better option. Select coulters to minimize soil disturbance.

Weed control

- You may see a shift in weed species as you transition to no-till, requiring changes in your weed management approach.
- Use surface-applied preplant or preemergence herbicides to control early-emerging weeds, even if herbicide-tolerant corn hybrids or soybean varieties are used.

Harvest-time recommendations

- Do not include stalk chopping as part of post-harvest field operations. Leave as much cornstalk height standing as possible, minimizing the mat of corn residue for easier planting.
- Combine settings for corn and soybeans should provide even distribution of stover to avoid windrowing, which are narrow bands of residue left on the field from the combine.
- Make an effort to minimize soil compaction. Keep heavy grain carts out of fields, or use controlled traffic patterns within the field. Avoid driving heavy carts across crop rows.

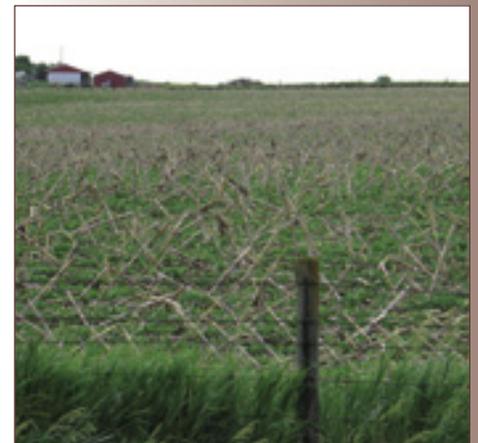
For more information about nutrient management, visit the ISU Agronomy Extension soil fertility web page: <http://www.agronext.iastate.edu/soilfertility/>

“People get the wrong idea that if they till every four or five years [in corn-soybean rotations] that they will get the benefits of no-till. No-till should be called never-till.”

–Randy Caviness
Adair County

No-till facts

- No-till reduces soil loss and improves soil structure over time.
- No-till works best in well-drained soil conditions.
- Soybean yield difference between no-till planting into standing cornstalks and planting into a tilled seedbed is generally less than five percent. No-till soybean net revenue per-acre often is higher due to fuel and tillage equipment cost savings.
- Usually, yield of no-till planted corn is competitive with corn planted into a tilled seedbed. Per-acre net revenue differences between no-till and tilled corn are generally small. This is especially true of corn rotated with soybean. For no-till planting, select corn hybrids with good seedling disease and insect resistance ratings, as many pathogens can overwinter in crop residue.
- No-till increases soil organic matter, which helps to stabilize the soil. Water infiltration and soil porosity are improved with no-till, and surface crusting is reduced.





Soil quality

Managing soil to increase organic matter can enhance productivity and quality, reducing the impact and costs of natural phenomena such as drought, flood and disease. In addition, increasing levels of organic matter can boost carbon sequestration (storage).

Keeping soil in place is only the beginning of soil conservation.

References

“Considerations in Selecting No-Till.” ISU Extension publication PM 1901d, December 2002.
<http://www.extension.iastate.edu/Publications/PM1901D.pdf>

Economic benefits of no-till

- Costs are reduced with no-till due to decreases in tractor power requirements, fuel consumption, labor and purchase costs.
- Field operations take less time, resulting in more timely planting for optimum yield potential.
- No-till leaves more crop residue on the soil surface, which benefits soil quality and results in high yields, less soil loss, less surface run-off and better infiltration of water.
- Based on the USDA estimates, the total cost of eroded soil is estimated to be \$7.03 per ton using 2012 values. The off-site costs, which are external to farmers and are often neglected, account for about 70 percent of that total cost. No-till retains more of that value in the field where it belongs.

Resources

- “A General Guide for Crop Nutrient and Limestone Recommendations in Iowa.” ISU Extension publication PM 1688
- USDA-NRCS Soils information:
<http://www.ia.nrcs.usda.gov/soils.html>
- ISU Agronomy Extension:
<http://www.agronext.iastate.edu/>
- Integrated Crop Management:
<http://www.extension.iastate.edu/CropNews/>

For more information

Contact your area Iowa State Extension Field Agronomist or Iowa Learning Farms for more information about transitioning to a no-till system.

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