

The Hows and Whys of No-Till Farming



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Hard times seem to stimulate people to change what they do or how they do it. With fuel prices and the economy being what they are, some agricultural producers are contemplating no-till options on their farms. For many years, NRCS has promoted no-till planting as a solution to erosion. But reduced soil loss is just one of many potential benefits of a no-till system. Erosion may just be a late symptom of soil biology and function disruption. In parts of the Midwest where no-till has become the new conventional way to farm, *it is not erosion control but soil quality that is the goal, and reduced erosion is a fringe benefit.* A huge benefit to seeking soil quality through reduced tillage is fewer passes over the fields, resulting in reduced fuel and labor costs, and less rock picking.

So why are there only a handful of Mainers doing no-till? The conventional wisdom was (is) that no-till doesn't work in cold regions because the soil doesn't warm up enough for corn to germinate, and that weeds are a problem when fields aren't tilled. So how is it working in the upper Midwest and Canada? Wonderfully, they will tell you. Technology has changed. New herbicides and improved planters, among other things, are making a difference.

Many newer planters are easily converted. No-till planters utilize row cleaners to remove residue from the planting row, allowing better seed /soil contact, and allowing the sun to warm those areas faster. Machines that Zone till (~ 4 inches depth) and Strip till (~ 8 inches depth) are also available for those who feel they need some kind of till action. These create rows that are about 8 inches wide, leaving the rest of the field undisturbed.

Undisturbed soil means that organic matter can accumulate and soil organisms can take up residence, and that is a good thing for them and for crops. Soil bacteria, fungi, and invertebrates cycle nutrients and improve drainage, aeration, structure, and moisture

retention. In short, *the soil becomes more resilient* to outside factors, such as drought and wetness. Over time it may need fewer inputs in the form of fertilizers and pesticides.



Adopting a no-till system doesn't just mean changing your planter, or changing some parts on one that you have. Adopting reduced tillage means adopting a new system of growing crops, and that means planning ahead. For sure there is a transition time to overcome, as well as a learning curve for the operator. It may take several years or longer to transition the biological activity of the soil and develop a healthy, productive system. However, most people who change over to no-till and give it a chance don't go back to inverting the soil. Dollar and time savings and improved farmlands are too attractive.

Tips on Transitioning:

- Plan ahead. Find someone who is using no-till who can answer your questions. Start small with limited acreage. Use land that is productive, not your worst and not your best.
- South-facing slopes are most likely to warm early. Soil temperature should be at least 50 degrees Fahrenheit at a depth of 2 inches below the soil surface for corn.
- For best results when starting out, plant corn into fall-killed hay fields, or plant winter grains

after silage corn or spring small grains. Burn-down herbicides or a roller-crimper will be needed to kill pre-existing live sod or cover crops.



- Insecticides will be needed to control grubs, webworms, or wireworms after sod. Greatest insect pest problems are expected after sod or green cover crops. Scout for corn rootworm, slugs, and cutworm. Utilize other Integrated Pest Management (IPM) practices that can prevent or alleviate problems.
- Where large amounts of residue are present and will interfere with crop establishment, such as small grain straw and high-yielding corn, harvest some of the straw or stalks, leaving tall stubble. A good alternative is the use of Zone or Strip-Tillage to allow the sun to warm the areas where seed is placed.
- Look for cold-tolerant seed varieties with early vigor and resistance to diseases common to the area.
- Weed populations in no-till will shift to perennial species and small-seeded annuals. Rotation with perennial sod crops or between summer crops and winter crops (such as small grains) can help to break weed cycles. Round Up-resistant weeds are becoming an issue, so other herbicides should be considered.
- Split nitrogen applications will reduce N loss and increase N efficiency. During transition, extra N may be needed if residue is increasing, especially on wetter soils. Over time, the need for extra N will diminish. A phosphorus-containing starter is recommended except on soils that test high for it. Since potassium is more important in no-till than conventional tillage systems, it is recommended to use a complete N-P-K starter fertilizer.
- Get pH to the ideal range before converting to no-till. To maintain appropriate pH, lime must be applied in smaller amounts, and more frequently than with conventional tillage (generally every other year). This does not necessarily mean that more lime is required for this system! Since lime is not mixed into the soil, large applications will cause dramatic pH swings in the upper layer. Soils should be tested at both 2 inches and 6 inches. Acidity will tend to be greater at the surface. If the 2 inch samples test less than 6.2, but the 6 inch samples do not call for lime, apply lime at a rate of one ton per acre.
- Use of nitrate N will minimize surface acidification as compared to ammonium and urea fertilizers and manure.
- Manure additions can help in the soils transition to no-till. N losses to volatilization will be greater on manure that is surface-applied. To reduce odors and N losses, consider injecting manure. Over time, the stable forms of N from manure will break down in the soil and become available. Avoid applying manure on wet soils, as soils will become compacted.
- **Cover crops and rotations are important**, especially where crops are grown that do not provide a lot of surface residue. Cover crops serve several important functions:
 - Hold nitrates over winter, may provide additional nutrients
 - May have allelopathic action for weed control
 - Add organic matter and plant diversity for improved soil biology and plant health and vigor
 - Radishes and other tap-rooted cover crops can be used to provide deep soil penetration and aeration.

Based on “*Steps Toward a Successful Transition to No-Till*”, by Sjoerd W. Duiker and Joel C. Myer: <http://pubs.cas.psu.edu/FreePubs/pdfs/uc192.pdf>

For more information, also see *Penn State’s Conservation Tillage Series* at: <http://cropsoil.psu.edu/extension/ct/ct.cfm>