3-5-2009

Moving to No-tillage: Challenges and Opportunities

Mahdi Al-Kaisi
Iowa State University, malkaisi@iastate.edu

Moving to No-tillage: Challenges and Opportunities

Abstract
Wet conditions last fall and potential wet conditions this spring make this a good time to consider tillage choices. It is a good time to examine the value of no-till or strip-tillage, especially for producers that have not tried these methods. Before making tillage choices in the field, producers should consider their overall approach to tillage management.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

search

Subscribe to Crop News

Archives

2015
2014
2013
2012
2011
2010
2009
2008

Previous Years

ISU Crop Resources

Extension Field Agronomists
Crop & Soils Info
Pesticide Applicator Training
Agronomy Extension
Entomology Extension
Plant Pathology Extension
Ag and Biosystems Engineering Extension
Agribusiness Education Program
Iowa Grain Quality Initiative
College of Agriculture and Life Sciences
ISU Extension

Integrated Crop Management NEWS

Print story
Email story
Add to Delicious
Atom Feed
Follow on Twitter

Moving to No-tillage: Challenges and Opportunities

By Mahdi Al-Kaisi, Department of Agronomy

Wet conditions last fall and potential wet conditions this spring make this a good time to consider tillage choices. It is a good time to examine the value of no-till or strip-tillage, especially for producers that have not tried these methods. Before making tillage choices in the field, producers should consider their overall approach to tillage management.

No-till and strip-till systems are best if the goal is a conservation tillage program that maintains least 30 percent of the previous year's crop residue after planting. However, every choice requires considerations well in advance of going to the field.

Once a producer has made a management commitment to implement a new tillage system, several steps should be taken to achieve maximum results. Included in those decisions are ones related to equipment and attachments, nutrient management, seed selection, weather and soil conditions, and tillage timing.

Soybeans planted in no-till.

One of the first things producers can do is to take an inventory of their current equipment, especially the planter. It is important to know what attachments may be needed – such as row cleaners and stronger down-pressure springs – when adopting no-till.

To successfully adopt no-till in cold-wet soils producers should be aware of soil conditions. Field internal drainage is an important factor in making site-specific decisions. In approximately half of Iowa cropland, subsurface drainage is used to lower the water table and improve growing soil conditions. Early spring is an ideal time to identify and check drainage systems for potential problems, such as misaligned, collapsed, or broken tiles. Make sure every terrace drains completely in approximately two days after a normal rainfall. If the water stands too long, check for a plugged inlet or outlet.

Soil temperature is critical in tillage management systems that leave significant amounts of residue on the soil surface. As a rule, the farther north in the state the longer it will take for soil to reach planting soil temperature. Strip-tillage is an excellent conservation tillage system option in areas with cold and wet soil conditions in north central Iowa. The use of no-tillage will be less challenging in area where soils are well drained in the state.

Soil texture variability plays a significant role in crop performance, especially in dry conditions where moisture shortage can affect plant stand variability across the field. Soil texture is a key factor in influencing soil's water-holding capacity and drainage of excess water.

Challenges
Managing conservation systems at the right field moisture is a critical factor to ensure successful outcomes. Plants showing a delay in growth can be explained by improper planting depth, soil surface or side-wall compaction due to planting in wet soil conditions, and nutrient deficiencies, such as phosphorus or potassium. Seedbed preparation along with tillage or planting equipment settings can have a combined effect on plant performance.

It is very difficult to isolate the exact cause of poor plant performance when soil conditions and management practices are not at their best. While scouting fields and evaluating soil conditions, producers need to check soil moisture below the soil surface at the seedbed where the nodal root system gets established – at a depth of 3/4 to 1 inch deep under normal conditions. Adequate soil moisture with adequate nutrient availability, less compacted seedbed and sidewall compaction, can provide a good growth environment for these root systems.

To ensure the successful transition from conventional to no-tillage or minimum tillage systems, nutrient management considerations including starter fertilizer and timing of nutrients application are critical. A proper fertilizer program is necessary. Plant needs for N, P, and K are basically the same regardless of the tillage system; current research shows that the tillage system has little effect on N or P crop needs. However the timing and method of application are vitally important to no-tillage success, especially in cold-wet soil conditions where mineralization of soil nutrients is much slower compared to conventional tillage.

Conservation tillage and no-tillage have a positive impact on soil productivity and profitability, no matter what the weather does. These systems conserve energy, improve soil tilth and soil organic matter, and can reduce the capital costs associated with the tillage equipment used in conventional tillage. Conservation decisions made now can affect soil erosion over the next several years.

Research on soybean after corn shows no yield or economic return advantages for any conventional tillage system over no-till. Our studies show that no-till economic return for corn on well drained soils is much greater than other conventional tillage systems. Even in cold and wet soils with adequate drainage, both no-till and strip-tillage performed very well compared to conventional tillage systems. No-till and other conservation tillage systems are very effective systems from both production and environmental perspectives.

Mahdi Al-Kaisi is an associate professor in agronomy with research and extension responsibilities in soil management and environmental soil science.
