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Why conservation systems are the right choice this fall

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Energy Use

This year, like any year, producers have to make a decision whether they till or not. This year is especially more challenging for producers to carefully consider their tillage decision because of high fuel prices. Generally, producers know what it takes to operate tillage implements and how much fuel it would take to finish the work. Conventional tillage in general would require approximately 4.1 gal of fuel per acre compared to 1 gal per acre for no-tillage. Field operations in general, including tillage and harvesting, consume about 15 percent of the crop production energy.

Soil Compaction

If fuel cost is not enough reason for farmers to consider no-tillage, several other benefits need to be considered when making a decision this fall whether to till or not to till. The risk of soil compaction and soil nutrient losses, whether through reduced soil tilth or potential soil erosion, is another loss that will add to the total cost of energy and farming input. These losses are real and well documented as reflected in yield, fertilizer energy costs, and environmental risks for soil and water quality.
Conservation practices for protecting water quality near Red Rock Lake in central Iowa. (USDA Natural Resources Conservation Service)

The decision to till at any time (fall or spring) needs to be carefully planned. When soil conditions are near field capacity, soil aggregates are "lubricated" by water and readily reposition themselves through the air spaces, especially when heavy harvest or tillage equipment is used. In addition, equipment operators need to remember that soil compaction can occur during the application of manure or anhydrous as well when soil moisture exceeds field capacity (maximum amount of moisture retained by the soil). Under wet conditions, the use of heavy equipment, such as tractors, grain carts, and combines, can significantly change soil structure and cause soil compaction. Operating in wet conditions and especially doing extra tillage will increase fuel use per acre as well.

Compaction near the surface, within the top 3 to 6 inches of the soil, is generally associated with the amount of surface pressure. Compaction below that is primarily associated with axle weight. For example, if soil a foot below the surface is at field capacity and the tractor's axle load is 7 to 8 tons or greater, compaction can occur at this depth, despite lower surface pressures.

To mitigate the risk of compaction, use controlled traffic lanes for harvest and avoid driving loaded grain carts randomly through the field. Most damage occurs in the first pass of the implement. Grain tank extensions on combines also add to the load on soil. Check tire size and pressure, since larger tires allow for better "flotation" and lower tire pressure reduces the load on the soil.

Residue Cover

To minimize overwinter soil erosion, work on getting even distribution of crop residue while harvesting. Doing so is critical in preventing soil erosion throughout most of the coming fall, winter, spring, and well into 2006, until next year's crop establishes a canopy. Any residue
down to the finest material—straw, chaff—can potentially reduce erosion by stopping rain splash, slowing and trapping runoff, and allowing for better water infiltration. But it has to be in place to be effective.

Large combine heads tend to concentrate material, especially fine material, in a narrow swath behind the machine. Concentrated residues are not only less effective in stopping erosion throughout the field, they also insulate the soil surface from the sun, reduce seed-to-soil contact, and make it tougher to plant in the spring, inhibiting crop growth. Furthermore, doing a good job of straw and chaff spreading this year could eliminate the need for tillage passes this fall or next spring.

Have combine operators set up and run equipment so that straw and chaff spreaders or choppers operate properly and the combine distributes residue evenly. Corn residue is usually heavier and most corn heads do a good job of chewing up the stalks and dropping them back in place. But the challenge is greater in soybeans, where essentially the whole plant goes through the combine and residue becomes fragile.

Combine operators also should pay attention to the height of the crop stubble left in the field. Crop stubble can protect the soil by limiting exposure to wind and water erosion and trapping snow through fall, winter, and early spring. Of course, soybeans need to be cut near the ground to avoid grain loss, but operating the corn head higher leaves more stubble and fewer stalks are run through the machine.

Producers who want to establish a goal of 30 percent residue at planting time next year probably should not go to the field this fall with a tillage implement, particularly into soybean residue. Soybean fields should be left in no-tillage. The amount of soybean residue is not significant enough to cause any change in soil conditions, especially for those who are concerned about soil wetness. If there is such a concern, then a good evaluation of the field conditions and assessment for tile drains needs to be considered rather than continuous tilling, which increases the potential for energy loss, soil loss, yield loss, etc.

**Conclusion**

As Iowa producers start to make decisions for the 2006 growing season, it is important to reflect and evaluate the outcomes of the previous season during the conservation planning process. Observations of yield performance, residue cover, and soil conditions should be guiding principles that minimize the potential of repeating any conditions that caused problems in the previous year.

Above all, conservation tillage and no-tillage are great systems and 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. Use the time after harvest to gather information and make sound decisions about conservation systems.

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