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Let's Talk No-till

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Abstract
As of October 14, 2018, Iowa soybean harvest was only about 20% complete, making it the latest soybean harvest on record. This was caused by the prolonged heavy rains in September and early October. As a result, field losses, abnormally high harvest moisture content and moldy/weathered soybeans are all issues this year.

Disciplines
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Integrated Crop Management

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Late harvest and the rush to get grains out of the fields may present an opportunity to rethink the need for tilling fields this fall or not. The question to ask is, “Do I need to till this fall?” Given the economic and environmental challenges farmers are facing, the answer in most cases is no. With harvest under way, now is a good time to start thinking about this decision. Take into consideration your specific situation, and whether tillage will provide economic and environmental benefits. Be sure to consider the costs associated with tillage and the impact tillage has on soil health and water quality. Even though you may think tillage may be needed in certain situations and field conditions, a well-managed field and proper crop rotation may not call for tillage.

Two main considerations for making any tillage decisions:

1. Soil conditions: It is important to take into consideration natural drainage, top soil depth, soil slope, organic matter, and soil texture. These factors have significant effects on how tillage affects soil health, productivity, and water quality.
2. Management considerations: These include residue management, crop rotation, equipment availability and efficiency (planter suitability for different tillage systems, calibration of combine to ensure uniform residue distribution, etc.), drainage tiles for managing excess soil water, soil test and fertilizer management, suitable varieties for your area, and insect and disease control. These management decisions are equally important to determine the success of crop production.

Think long-term

Over the past 16 years, long-term tillage and crop rotation studies were conducted across Iowa. The studies document the most effective tillage and crop rotation combination for each region. Results showed a wide range of yield responses in corn and soybean for different regions, which reflect soil and climate conditions across the state. Also, the

research shows that tillage systems did not affect soybean yields after corn. Soybean in no-till performed as good as or better than conventional tillage systems. Also, the research shows a reduction of $15-30/acre in input costs with no-till compared to conventional tillage systems (chisel plow, deep rip, and moldboard plow).

The choice of tillage for corn is more complex; careful consideration should be given to the soil's long-term health and productivity as decisions are made. Research demonstrated that no-till and strip-till are as competitive as any conventional tillage system in well-drained soils or where field drainage is available to remove excess water in poorly-drained soils with corn after soybean (C-S) or continuous corn (C-C) rotation.

Figure 1. No-till field after corn harvest

Benefits of No-till

Conservation tillage systems such as no-till have a positive impact on soil health, productivity, and profitability under extreme weather events of wet or dry conditions. These systems protect soil, conserve energy and improve soil health by improving soil organic matter (0.17-0.23 ton carbon/acre/year increase with no-till). In addition, conservation tillage reduces costs associated with tillage operations by almost 17%.

Agricultural row cropping systems places significant stress on soil functions through tillage, chemical applications, and mono-cropping systems (i.e. continuous corn). Conservation practices, including no-till, cover crops, and extended crop rotations can mitigate the negative effects on soil health and productivity. A no-till system can restore soil health over time by improving soil infiltration, organic matter, microbial diversity, and soil structure. Extended crop rotations that include small grains, legumes, and cover crops

will equally increase soil biodiversity, protect the soil surface physically during the off season, and provide organic carbon input.

There may be some challenges in managing corn residue, but tillage is not the answer. Modification of the planter to include residue cleaners, heavier down-pressure springs, or other residue management attachments are far more cost effective given the environmental cost and economic expense associated with conventional tillage.

The extended period of time when the soil has no living cover or residue in Iowa, presents a major environmental challenge that needs consideration when deciding on a tillage practice for this fall. Tillage can contribute to the acceleration of soil and nutrient loss given the uncertainty of weather events and their variability, as demonstrated yearly and most particularly this year from early wet season to late wet-fall.

Category: Soil Management

Crops:

Corn Soybean

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Mahdi Al-Kaisi is a professor of agronomy and extension soil and water specialist at Iowa State University. His current research and extension in soil management and environment focuses on the effects of crop rotation, tillage systems, residue management, and nitrogen input on soil carbon dynamic...