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Do I need to till my soil?

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Abstract
There was a considerable amount of tillage activity during fall 2001 in different parts of the state, which suggests that we have a long way to go in adopting conservation tillage practices. In 1999, a survey of 340 corn and soybean producers in 19 Iowa counties was conducted by the Iowa Resources Management Partnership, established in 1999 as an informal partnership of private and public organizations promoting and addressing issues related to conservation tillage in Iowa.

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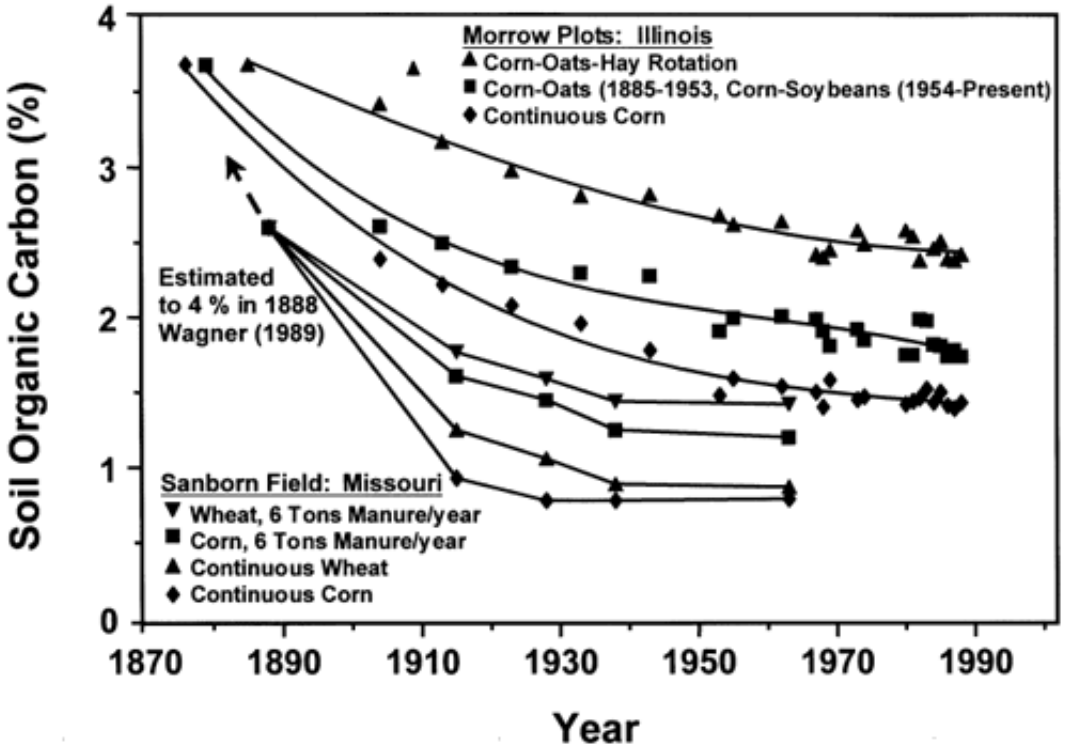
There was a considerable amount of tillage activity during fall 2001 in different parts of the state, which suggests that we have a long way to go in adopting conservation tillage practices. In 1999, a survey of 340 corn and soybean producers in 19 Iowa counties was conducted by the Iowa Resources Management Partnership, established in 1999 as an informal partnership of private and public organizations promoting and addressing issues related to conservation tillage in Iowa. Survey results showed that conventional tillage, various types of conservation tillage, and no-till systems were equally used (one-third each) by producers on corn and soybean.

These findings bring us back to our observation about the level of tillage activity during fall 2001, when weather conditions seemed to provide ample opportunities for recreational tillage. The fall weather (warm temperature and lack of moisture) and the current mild winter are the conditions under which conservation tillage is most needed. Our hope is that you think twice about any tillage operation this spring and ask yourselves the following question: Do I need to till my soil and why? If you can answer based on facts and not hearsay then you are justified to use tillage operations; otherwise, do not waste your time and money on an operation you do not need.

Here are a few facts to help you make the decision whether to use conservation tillage. Conservation tillage benefits are numerous and include moisture conservation, improved organic matter by minimizing carbon release due to oxidation of organic matter, and water quality improvement by stabilizing the soil surface by keeping more plant residue on the soil surface. The point is that you need to look at the sustainability of your soil. Producing high yields is important for your economic well-being. However, the intensity of tillage does not contribute to increasing yield without substantial input of fertilizer, a cost that needs to be considered for any production system. Research shows that intensive tillage and lack of diverse crop rotation result in a significant decline of organic carbon content over many years. Long-term studies of different crop rotations have been conducted since 1885 and show a significant decline in soil organic matter with continuous crop rotation (Fig. 1). The rate of organic matter decline is not going to be realized in a short time and neither is the improvement of soil organic matter after an intensive tillage system.

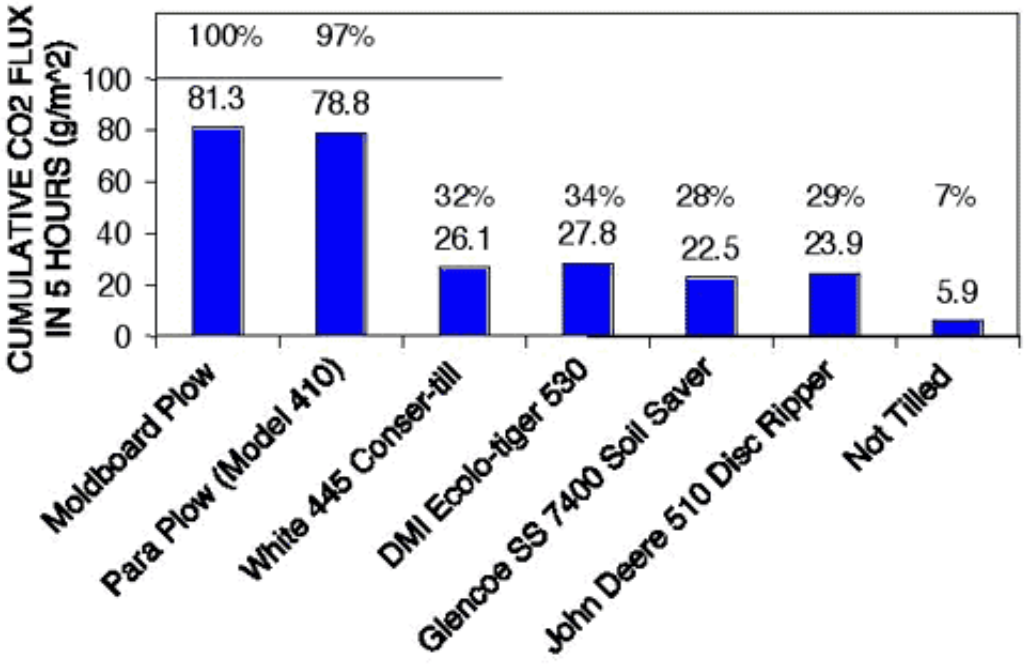
Figure 1. Long-term effects of crop rotations on soil organic carbon.



There is a misconception that conventional tillage and high fertility can increase soil organic matter, but here are some facts to the contrary. First, intensive tillage causes oxidation or burning of soil organic matter, leading to an increased release of carbon dioxide. Second,adding more nitrogen can increase yield and plant residue; however, if these residues are plowed or chiseled in, they are subsequently broken down, which increases loss of stored soil carbon from the previous season. Thus, there will be a net loss of soil carbon. Third, a reduction in plant residue cover and exposure of bare soil surface lead to soil organic matter loss due to soil erosion. Research has shown that a significant loss of soil carbon due to tillage systems ranges from 7 percent under no-till to approximately 30 percent when using disc rippers compared with moldboard plow. The short-term carbon dioxide loss from the paraplow was similar to that from the moldboard plow due to similar soil fracturing, but without inversion (Fig. 2).

In summary, the intensity of a tillage system has serious negative impacts on soil degradation and water quality. The adoption of conservation tillage systems and the payoff of such systems take time. There are no quick fixes for soil properties that have been destroyed by intensive tillage practices. For no-till or any other conservation tillage to work, you need to think long-term environmental benefits and give it time.

Figure 2. Impact of different conservation tillage tools on soil carbon loss.



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