Limiting field operations

Maintaining equipment, proper ballasting and tire inflation, and selection of the proper tractor and gear setting all directly affect fuel savings during field operations and will be covered in this series. Individual savings in these categories are significant and can range from 3 – 5 percent up to 20 – 25 percent or more. An even larger impact, 100 percent fuel savings, results when equipment stays parked in the machine shed and a trip across the field is eliminated.

Certain field operations are required in modern crop production. Seed must be planted. Crop must be harvested. Some type of weed management strategy must be used. If chemical weed management is chosen this involves spraying. Approximate fuel required for many field operations are listed in PM 709, Fuel Required for Field Operations.

For row crops, tillage is the other major category of field activity in addition to planting, weed control, and harvesting. Approximately 2 to 2.5 gallons per acre of diesel fuel are necessary for planting, spraying, and harvesting. Combine use is a significant part of this total, planter use is intermediate, and each sprayer pass is a minor portion of it.

Figure 1 shows typical fuel use in corn and soybean production for some common tillage operations and a combined total for planting, spraying, and harvesting. Almost an equivalent amount of fuel is used for a single primary tillage operation with a chisel plow, subsoiler (ripper), or moldboard plow plus a single secondary tillage operation with a field cultivator or disk. Multiple secondary tillage operations can increase the total fuel for tillage requirement to 3 gallons per acre or more.

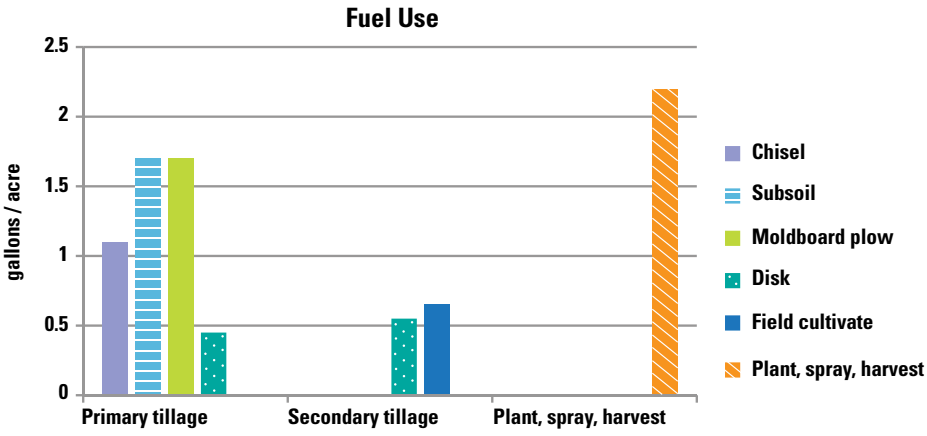
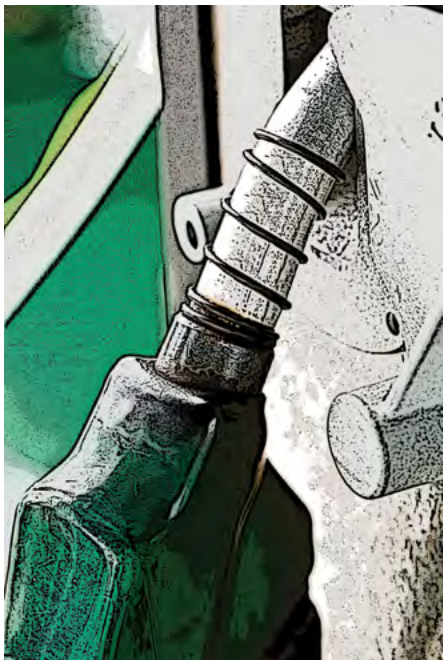


Figure 1. Fuel used for various operations in row crop production.

Selecting the right amount of tillage is a critical decision for farm energy use and profitability. Similar to other farm management decisions such as nitrogen fertilizer use for corn, or ventilation rate in a livestock confinement, overuse wastes energy but underuse can lower profitability. A key is to carefully consider potential for gross revenue returns to tillage operations, (i.e., crop yield), in comparison to fuel, labor, and machinery costs for doing tillage. Put another way, are tillage passes beyond a no-till management scheme returning costs of fuel, labor, and machinery that are required of the tillage?



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Although soil type and moisture affect the relative ease of no-till, successful no-tillers are present in most counties. For many crop producers, whether or not no-till (or at least reducing tillage practices) is acceptable also may depend on comfort with the overall management scheme of a no-till system. Planting corn into significant amounts of residue calls for more attention to planter adjustment, fertilizer application, and weed management practices.

Eliminating tillage passes prior to soybean planting is a good place to start in making a transition to very reduced or no tillage. Numerous university field trials throughout Iowa over several years suggest that soybeans don't respond much if at all to tillage (Figure 2). Energy, labor, and equipment costs cannot be recouped without a reliable yield response.

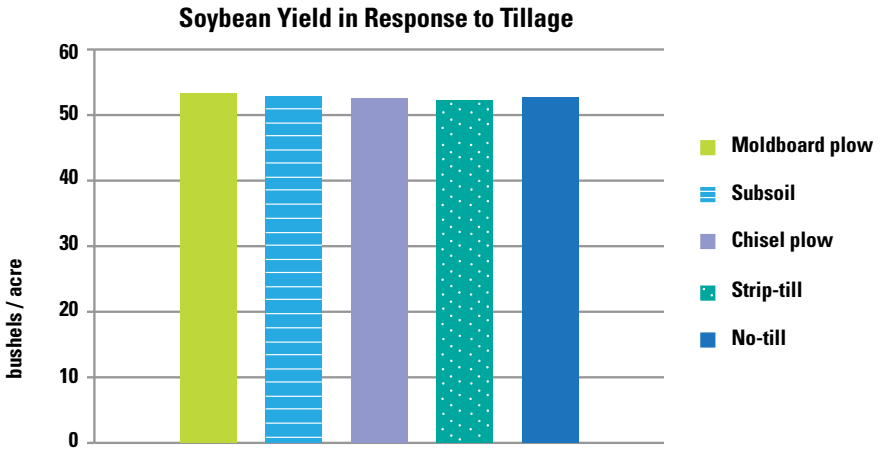

Figure 2. Soybean yield response to tillage (average of six ISU university farm locations across Iowa, 2003 – 2007, Al-Kaisi and Hanna).

Additional information to help with a transition to reduced or no tillage includes:

PM 1901D, *Considerations in selecting no-till – Resource Conservation Practices*
PM 1901C, *Consider the strip-tillage alternative – Resource Conservation Practices*
PM 1492J, *Adjustment and operation of planters in systems with high levels of surface crop residue*

If tillage is deemed necessary, consider raising up the tillage implement. The amount of fuel required for many tillage operations beyond those in the first 2 to 4 inches is directly related to depth of operation (see Figure 3).

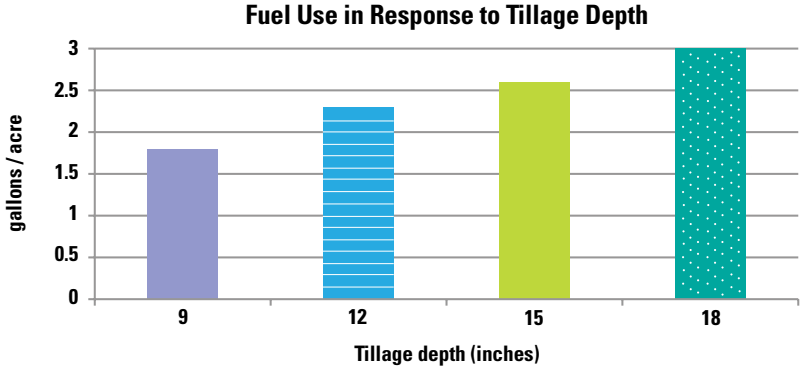

Figure 3. Diesel fuel used at different depths for subsoiler operation (Shinners, 1989).

Forage field operations

Tillage operations to establish crops such as alfalfa can be evaluated, but most harvest operations (cutting, windrowing, baling or chopping) are necessary and occur multiple times during the season for alfalfa or grass. Sharp knives can significantly lower fuel use, particularly on a forage chopper.

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Sponsored by the Iowa Energy Center.