

Fall Tillage Decisions in 2010 – (Tony J. Vyn)

In sharp contrast to last year's delayed crop maturity, late harvest and excessive rain, the 2010 corn and soybean harvest (thus far at least) has been extremely early and with mostly dry soil conditions. Those ideal conditions for harvest, and perhaps lingering frustrations over the inability to complete the intended fall tillage in 2009, have prompted many Indiana farmers to begin fall tillage within days of completing harvest on their individual fields.

Chisel plows, disks, disk-rippers, strip-till tools, moldboard plows and assorted vertical tillage equipment have seen lots of action already on many farms this September. The prevailing dry soil conditions have increased the draft (horsepower) requirements for operating at the intended depths, but there has been no shortage of traction. Generally higher crop prices this fall have made fuel costs for tillage seem less of a financial burden.

However, the main question is whether all that fall tillage should be done at all. Are this fall's tillage-conducive conditions (early harvest, dry soils, labor availability, etc.) reason enough for doing more intensive tillage than normal? Related questions involve considerations of what tool and how deep for specific soil type, field slope, and crop residue situations. I can't address all these and other relevant questions in this short article, but certain research experiences may be relevant to the tillage decisions still to be made in 2010.

Crop Rotation:

Historically, the majority of fall tillage occurs before corn in Indiana. Zero tillage is much more common for soybean (60-70% of the acreage) than it has been for corn (20-29%) over the last decade. Research results from our long-term (1975-2010) crop rotation and tillage experiment on a dark prairie soil (silty clay loam with an average of 4% organic matter) near West Lafayette over the 10-year period from 2000 to 2009 indicate that there is no yield advantage for chisel or moldboard plowing, relative to no-till, when corn follows soybean (Table 1). Fall tillage was only beneficial to corn yield when corn followed corn.

Corn yield results in 2010 confirm the fact that crop rotation had a much bigger impact than tillage systems (Table 1). Growing corn after corn can sometimes have a huge yield penalty associated with it; the cool and excessively wet conditions in May and June appeared to be detrimental to continuous corn yields in 2010 even though we applied 200 pounds per acre of N fertilizer to these plots. In fields with timely corn planting (April) and little flooding damage during June, corn yields in 2010 were much less likely to be affected by tillage (witness the small 3-6 bushel spread among tillage systems in Table 1) than by rotation (note the 35 bushel yield gain for corn after soybean versus corn). So although the use of more stress tolerant corn hybrids, better seed treatments, and superior equipment and fertility management has helped to diminish the rotation advantage for corn compared to that in earlier decades, there still is additional yield risk in planting corn after corn regardless of the tillage system that is selected.

Table 1. Corn yield response to rotation and tillage systems in an experiment initiated in 1975 on a dark prairie soil near West Lafayette, Indiana (Data courtesy of T. West, G. Steinhardt, and T. Vyn of the Agronomy Department)

Crop Rotation	Tillage System	Corn Yields 2000-2009 (Bushels/Acre)	Corn Yields in 2010 (Bushels/Acre)
Continuous Corn	Moldboard Plow	200	184
	Chisel Plow	195	187
	No-till	178	186
Soybean - Corn	Moldboard Plow	202	216
	Chisel Plow	204	222
	No-till	201	220

Field Leveling:

In some cases, fields are still rough from the ruts created during the wet harvest conditions of 2009. In those field and field-area specific situations, fall tillage operations may have additional justification. But recognize that tillage is always only a partial solution on compaction-damaged soils. Weather conditions (freeze-thaw and wetting and drying cycles) as well as crop root development (field crops and cover crops) have a lot of impact on soil structure development over time. The loosening forces of tillage tools result in short-lived changes in soil structure, and soil reconsolidation is likely due to natural (weather related) and management (e.g., wheel traffic) events.

The unusually dry soil conditions thus far this fall have actually created ideal situations for the breaking up of compacted layers and the smoothing over of previously rutted fields. But even then, care should be taken to going no deeper than necessary and to leave as much protective surface residue as possible. The wide range of soil wetting and drying cycles experienced this year have already restored some soil structure (and particularly for fields with swelling and shrinking clay soils). Taking a shovel to suspected compaction areas and probing down to 15 or 20 inches prior to tillage might give farmers a better idea of whether deep loosening is needed, and to what depth.

Planting Date Flexibility:

One of the key reasons many farmers prefer to do some tillage in the fall is to ensure that corn planting is not delayed in the spring. Achieving early planting goals is certainly possible in no-till systems, but good soil drainage, uniform residue distribution, and well adjusted no-till planters with sufficient banded N fertilizer are essential to achieve optimum results for a specific soil texture.

Our research experiences over the last 20 years have indicated that fall strip-tillage systems are ideal to give corn farmers additional planting flexibility than an undisturbed no-till situation, especially for situations when corn follows corn or winter wheat. Strip-till does not result in higher yields than no-till when corn follows soybean and all tillage systems are planted on the same date with good management. However, strip-till corn yields have exceeded no-till yields (even after soybean) when the earlier soil drying of properly formed strip-till berms enabled earlier planting than was possible with no-till. Corn yields when fall strip-tilled corn follows corn have consistently been higher than those possible with no-till corn on corn, and equal to those with chisel plowed corn on corn.

I can understand the frustrations and challenges of trying to complete strip tillage following harvest in a fall like 2009. But this year, we appear to have a much wider "window" to successfully create loosened soil strips that will facilitate stale-seedbed planting next spring. However, given the fact that so much crop has been harvested so early, farmers need to be aware that very early fall strip tillage also means more opportunity for berm consolidation re-occurring prior to soil freezing. Achieving good soil conditions in the strips next spring begins with achieving high enough berms this fall that later rain events this fall won't collapse the berms.

Final Comments:

Good weather conditions and an early harvest are, by themselves, insufficient justification for intensive fall tillage in 2010. Farmers are encouraged to think carefully through their reasons for doing a particular tillage operation on each field, and recognize that other management factors like crop rotation, hybrid selection and nutrient management will likely have much more impact on the final corn yield in 2011 than the tillage system itself. "Recreational tillage" is still "expensive entertainment."

As always, concern for soil conservation should be paramount. There is still a long time to go between late September of 2010 and April of 2011. Soil that is less subject to wind and water erosion events during that long exposure period will be more likely to be kept in place for near-term and long-term yield benefits.

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