CORN TILLAGE AND SEEDBED PREPARATION

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In the spring of 1981 tillage treatments were established on a Hadley fine silt loam at the University of Massachusetts Agricultural Experiment Station Farm in South Deerfield. Tillage treatments are shown in Table 1. The moldboard plow primary tillage followed by a single pass of the notched disk harrow acted as the control. All treatments were planted May 18 with International 295 planters which are modified with a third disk, mounted ahead of the double disk opener, for no-tillage planting. Starter fertilizer was used with each tillage treatment and these were later sidedressed with 200 lb of urea in mid-June.

Table 1. Influence of tillage on corn yields.

Tillage Treatment	Silage* (70% moist.)	Earcorn* (25% moist.)	Percent Ears†
Moldboard plow-Disk harrow	25.9	5.9	57
Disk harrow (notched) 2 passes	25.7	5.7	55
Disk harrow (plain) 2 passes	25.2	5.5	55
No-tillage	25.5	5.4	53

* Tons per acre † Dry matter basis

Table 1 shows that tillage had no influence on the various measures of corn yield. There may have been a slight improvement in silage quality because of a small increase in percentage ears of the conventional tillage crop compared to the no-tillage crop. All tillage treatments gave acceptable corn silage yields. Other researchers have shown similar results where no-tillage plantings achieved similar yields to conventionally tilled and planted fields so long as an adequate or similar plant stand was established with each method. Moisture conservation may be greater with no-tillage if cover crops are controlled early. However, no-tillage corn production is less likely to produce higher yields because in normal years in Massachusetts moisture is not severely limiting growth, especially early in the season.

Some general principles of tillage perhaps should be reviewed:

(1) The effects of tillage tend to be short-lived, lasting for one season or for only a few weeks after planting.

(2) Tillage will not compensate for other neglected management practices.

(3) Soils need to be worked only enough to ensure optimum crop production. That is to ensure good seed to soil contact and to allow incorporation of lime, fertilizer and manure.

(4) Much research shows benefit from tillage is confined (with rare exceptions) to the surface layer of soil, i.e. 'seedbed' preparation. Deep plowing or subsoiling is often self-perpetuating requiring increasingly heavier machinery and deeper penetration. Both may only further compound the situation because. . .

(5) tillage is most needed to alleviate compaction from farm machines and implements.

(6) A soil undisturbed by tillage implements or machine traffic will have improved soil structure and eventually may not benefit from tillage. If the soil (and subsoil) is not disturbed or compacted roots are capable of penetrating the many pores and cracks created by frost, wetting and drying cycles, earthworms and roots of the previous crop.

(7) Travel on and tillage of wet soils is especially damaging. Cracks and pores can easily be sealed by implement travel or operation on wet ground. Damage created in the autumn may be partially or completely obliterated by winter frost action. However soil has almost no opportunity to recover from damage caused by implement damage in the spring.

(8) No-tillage fields take longer to warm up in the spring and they dry slower so earlier planting than conventionally tilled fields may not be possible.

(9) Reduced tillage and no-tillage can provide savings of energy and time, both important inputs in producing a corn crop. The energy used in tillage represents less than 25% of the total energy inputs but growing a no-tillage corn crop may save 40% of your time compared to establishing a crop in a conventionally prepared seedbed.

(10) No-tillage systems increase herbicide costs and may require more fertilizer and management skills.

Conventional tillage using the moldboard plow and disk harrow gives good consistent results in most of the soil conditions in Massachusetts. However, as I have said before there is a tendency often to overwork soils with repeated secondary tillage. An alternative to conventional tillage on sandy loams and silt loams might be a single heavy disking before planting, or the use of the chisel plow with the disk.