Tillage

Cultivation

Photo H.F. Schwartz

The choice of tillage systems depends on a wide variety of factors:

- Soil erodibility - soil texture, slope, organic matter levels
- Irrigation system
- Equipment available
- Rotation with other crops

Choice of tillage system will impact:

- Soil organic matter levels
- Soil compaction
- Pest control options

Moldboard plowing

Photo H. Schwartz

Conservation tillage under furrow irrigation

Photo C. Pearson

See Guidelines for Using Conservation Tillage Under Furrow Irrigation, Agriculture Experiment Station Technical Report TR02-6.

Tillage in corn production aids in controlling weeds, managing residue, manipulating the physical condition of soil and creating ridges or beds to aid furrow irrigation. A variety of tillage systems can accomplish these goals, but the erosion potential among them varies highly.

Corn grows well under a variety of tillage systems. Because of its relatively large seed size and seedling vigor, corn does not require a finely prepared, clean seed bed. Good seed to soil contact and proper seed depth are more important and can be accomplished by properly adjusted press wheels or seed covering devices. Over-preparation of the seed bed causes more stand problems through excessive soil drying, increased crusting and greater potential for soil compaction.

Tillage Systems

Moldboard or conventional (clean) tillage

Moldboard plow or disk twice in fall or spring, followed by disk and/or mulch, plant and cultivate.

Advantages:

- Suited for most soils
- Well-tilled seedbed

Disadvantages:

- High erosion potential
- High compaction potential
- High fuel and labor costs
- High soil moisture loss
- No remaining residue cover

Reduced or conservation tillage

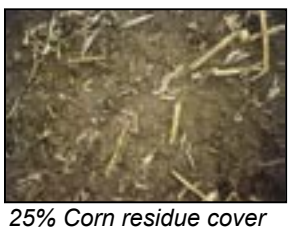
Any tillage system that leaves at least 30% residue cover on soil surface prior to planting.

Advantages:

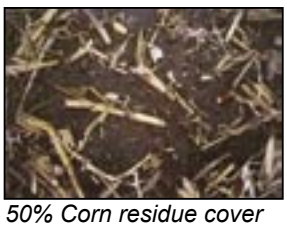
- Less erosion potential than moldboard or other clean till systems
- Chisel plow adapted to poorly drained soils
- Lower fuel costs than moldboard plow
- Saves soil moisture

Disadvantages:

- Stalk chopping necessary for chiseling
- Potential for compaction with disking under wet conditions



25% Corn residue cover



50% Corn residue cover

Generally, a minimum of 30% residue cover is needed for erosion control and 50% cover is required to significantly reduce evaporation loss.

No-till or Strip-till

No-till is similar to conservation tillage where the majority of crop residue is left undisturbed on the surface for maximum water conservation under dryland conditions. Strip-till differs from no-till in that narrow strips are cleared of crop reside to increase soil warming and drying either before or during the planting operation. Corn is planted in the tilled strips.

Advantages:

- Conserve moisture
- Greatly reduced erosion
- Increase organic matter
- Lower overall fuel costs (especially no-till)
- Less overall equipment

Disadvantages:

- Special equipment needed
- Greater reliance on herbicides
- Requires a larger horsepower tractor (strip-till)

Ridge Tillage

This system is suited best to poorly drained soils and heavier soils that tend to dry out slowly. The crop is planted from year to year on top of ridges which are formed during cultivation. Typical operations include chopping stalks, planting on ridges, cultivate to rebuild ridges.

Advantages:

- Reduce wind and water erosion, by leaving most residue on surface
- Saves water
- Lower fuel costs
- Minimizes soil compaction
- Maintains or improves yields
- Well adapted to furrow irrigation in heavy soils

Disadvantages:

- Light soils may crust
- Not well suited to all rotations (alfalfa, root crops or small grains)
- Must have equal wheel spacing on all equipment, including harvesting, and narrower tires

Planting corn in high residue

Photo C. Pearson

Ridge tillage

Photo J. Schneekloth

Producers should evaluate their entire crop rotation scheme before changing tillage systems. The ideal tillage practices will maintain or boost corn productivity, minimize input costs and protect soil and water resources for later generations of corn producers.

BMP

Cover Crops may be planted after harvest or crop failure to decrease erosion and use excess nutrients applied to the field.

Filter Strips may be planted on the down gradient side of the field to decrease the potential to transport phosphorus off-site.

Table 27. Reduced tillage after alfalfa can be more profitable than moldboard plowing. Five years of study at the Arkansas Valley Research Center in Rocky Ford has shown that reduced tillage is more profitable than moldboard plowing, especially during drought or years of low winter moisture. Plowing removes moisture by exposing the subsoil to evaporation while the alfalfa stubble can catch and preserve moisture. Instead of plowing, leave alfalfa in the field until it begins to green up and treat with a contact herbicide a few days before disking, bedding, and planting. Another successful strategy is to disk the alfalfa stand after green-up, bed, plant and then spray. Production costs on the reduced tillage corn were found to be $17/A lower then moldboard plowed corn while yields were maintained or, in some years, improved.

	Grain yield bu/A	Gross return $/A	"Prod." cost $/A	Adjusted return $/A
Moldboard plow*	194.3	$501.20	$209.30	$292.00
Reduced tillage**	197.9	$510.00	$192.30	$317.80
difference	+ 3.6 bu	+$8.80	-$17.00	+$25.80

* Moldboard: plow, mulch, disk (twice), float and bed.

**Reduced tillage: disk (twice), float and bed. Source: Jim Valliant