

Purpose of Tillage

- Weed Control
- Decomposition of crop residue
- Prepare seed bed
- Increase soil temperature
- Alleviate compaction

Conservation Tillage

- The term encompasses many tillage practices
- Traditionally the NRCS used this term for any tillage system resulting in 30% or more residue cover at planting of the next crop
 - Mulch tillage = full width tillage with at least 30% residue cover.
- This was generally acceptable to reduce erosion to below T if structural controls were in place

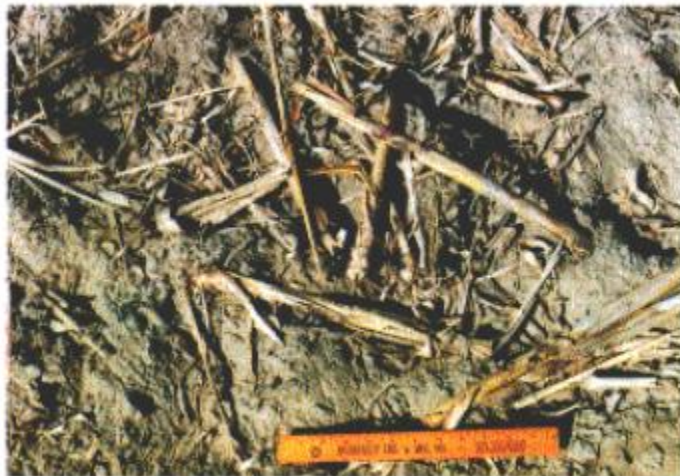
Residue Cover for Sorghum



7,000 lbs/A 80 percent cover 2,200 lbs SGe



700 lbs/A 30 percent cover 240 lbs SGe



2,300 lbs/A 50 percent cover 775 lbs SGe



590 lbs/A 15 percent cover 200 lbs SGe

Residue Cover for Wheat



1,200 lbs/A 75 percent cover 1,900 lbs SGe



350 lbs/A 25 percent cover 700 lbs SGe



875 lbs/A 45 percent cover 1,400 lbs SGe

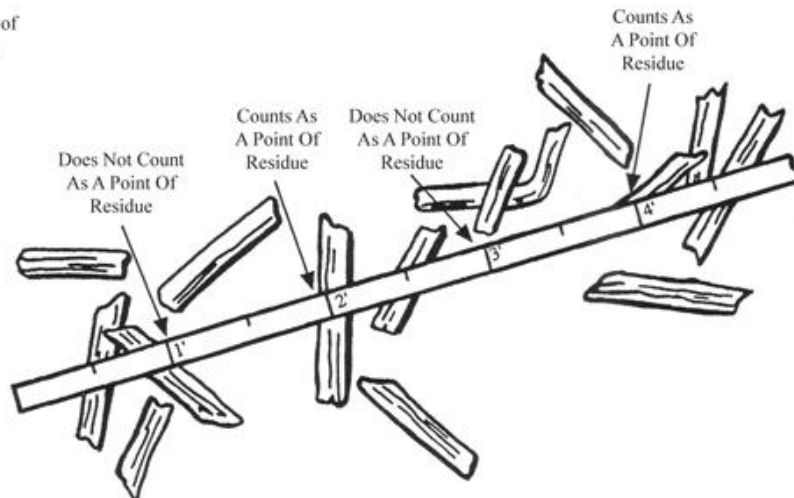


225 lbs/A 15 percent cover 500 lbs SGe

Line Transect Method for Determination of Residue Cover

- Pull a tape measure to 100 ft
- Count the # of foot marks that touch a piece of residue
- Residue should be greater than 3/32 inch to be counted
- University of Nebraska [Factsheet](#)

When using the top edge of the tape, this foot mark...



Estimating Residue From a Tillage System

- Missouri [factsheet](#) on conservation tillage planning
- Residue cover can be estimated based on yield of crop, and type of tillage used.

Primary and Secondary tillage

- Primary:
 - Provide initial fracture of soil surface
 - Initiate the decomposition of residue
 - Kill weeds
- Secondary:
 - Seedbed preparation
 - firm soil and break clods
 - Weed control
 - Countless Options!

Primary Tillage Implements

- Moldboard plow
 - Full inversion of soil surface
 - Removes 90 to 100% of residue
 - 10-12 inches deep



Primary Tillage Implements

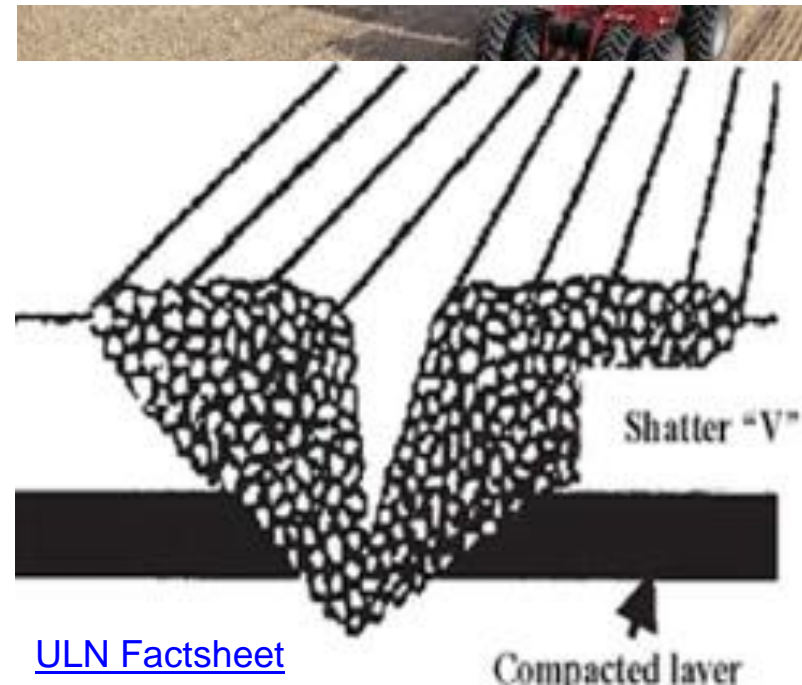
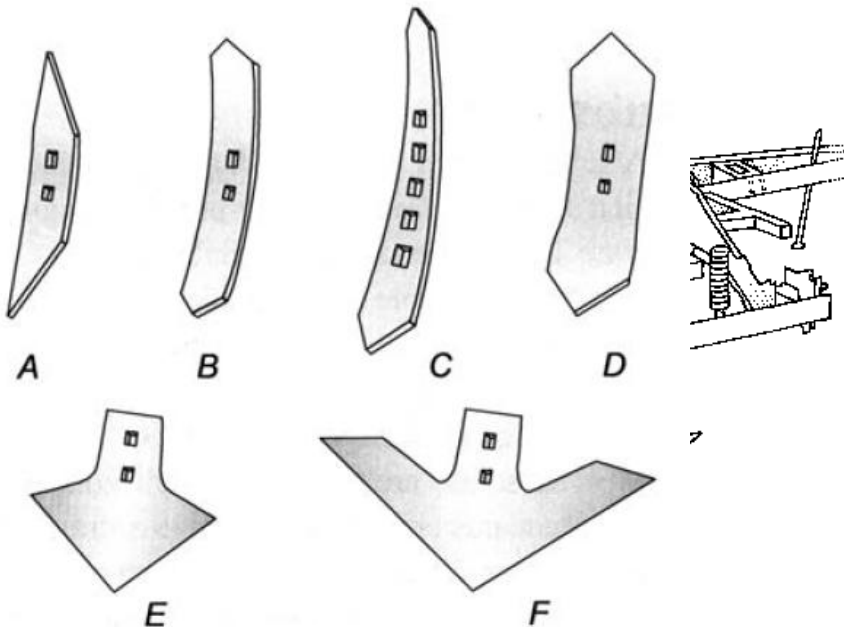
- Heavy Offset Disk
 - Can bury 40 to 75% of residue depending on depth and ground speed.



Primary Tillage Implements

- Chisel

- Can be pulled as deep as 10 inches or bit more?
- Sweeps and twisted points bury more residue than straight shanks



Secondary Tillage

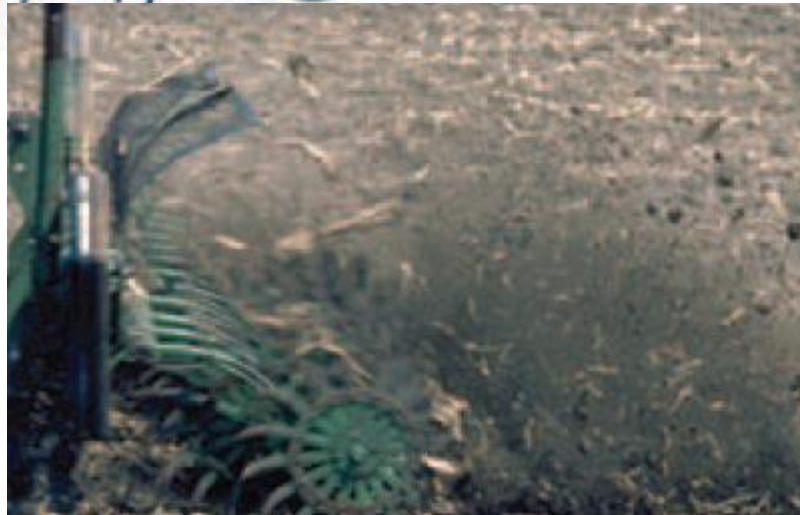
- Cultivator

- Lighter shanks than chisel



Secondary

- Harrow
 - Smooth the surface



Combination equipment



Disk ripper

Coulters followed by rotary harrow



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Soil Tillage Intensity Rating (STIR)

- Value calculated from RUSLE2
- Low #'s represent less overall soil disturbance
- No-till must have a STIR less than 15%
- Values are influenced by:
 - Operational speed
 - Tillage type and depth
 - Percent of soil surface disturbed
- Provide better assessment of soil quality degradation
- NRCS [Factsheet](#)

“Conservation” Tillage Equipment

- Sweep plow:
 - Under cuts soil and weeds
 - Most common primary tillage in stubble mulch system
 - Sweeps blades can range from 6ft to 8 inches
 - Wide blades minimizes surface disturbance



Conservation” Tillage (Vertical Tillage)

- Designed for a single pass tillage operation combined with capacity to plant into high residue
 - Residue to break down faster (Bt corn)
 - Anchor so it doesn’t wash or blow
 - Some levelling capability—improves “plantability”
 - Seedbed preparation
- This is a diverse class of equipment
 - Some are very aggressive, while others simply cut residue and fracture surface







Landoll

**Great
Plains**

Conservation Tillage: $>30\%$ crop residue on the soil surface

Mulch Tillage: Full width tillage that leaves $>30\%$ residue on the surface

Vertical tillage is not no-till (NRCS...), it is mulch tillage, which is conservation tillage

Other forms of Conservation Tillage include: No-till, Strip-till, and Ridge



Aggressive Landoll



Great Plains



Salford



Case IH

A wide-angle photograph of a harvested cornfield. The ground is covered in a dense layer of dry, brown corn stalks and leaves. The field extends to a flat horizon under a clear sky. In the distance, some faint structures and utility poles are visible. The word "Case" is overlaid in red text on the left side of the image.

Case

Salford

Vertical tillage: 2009 soybean yield (Kansas, No-Till fields)

- NT yield: 65.9
- VT yield: 67.1
- Not significant at $p < 0.05$

2010 Results: Meade Co. Continuous, Irrigated Corn

	Stand *1000/ac	Disease % pop	Severity lesions/plt	Yield bu/ac
No-till	29.9	90.0	78.5	195
Case	30.3	89.5	83.8	204
Landoll	29.7	91.8	96.0	190
Great Plains	29.8	89.3	89.8	204
LSD*	--	--	--	--

High levels of disease on all treatments

*0.05 level, all sites

2010 Results: Jefferson Co. Continuous Corn

	Stand *1000/ac	Disease % pop	Severity lesions/plt	Yield bu/ac
No-till	35.7	26.0 a	71.8 a	154
Case	37.6	17.0 b	46.3 b	176
Disk	38.2	16.0 b	42.8 b	154
LSD	--	1.9	6.4	--

Difference in disease didn't translate into significant difference in yield