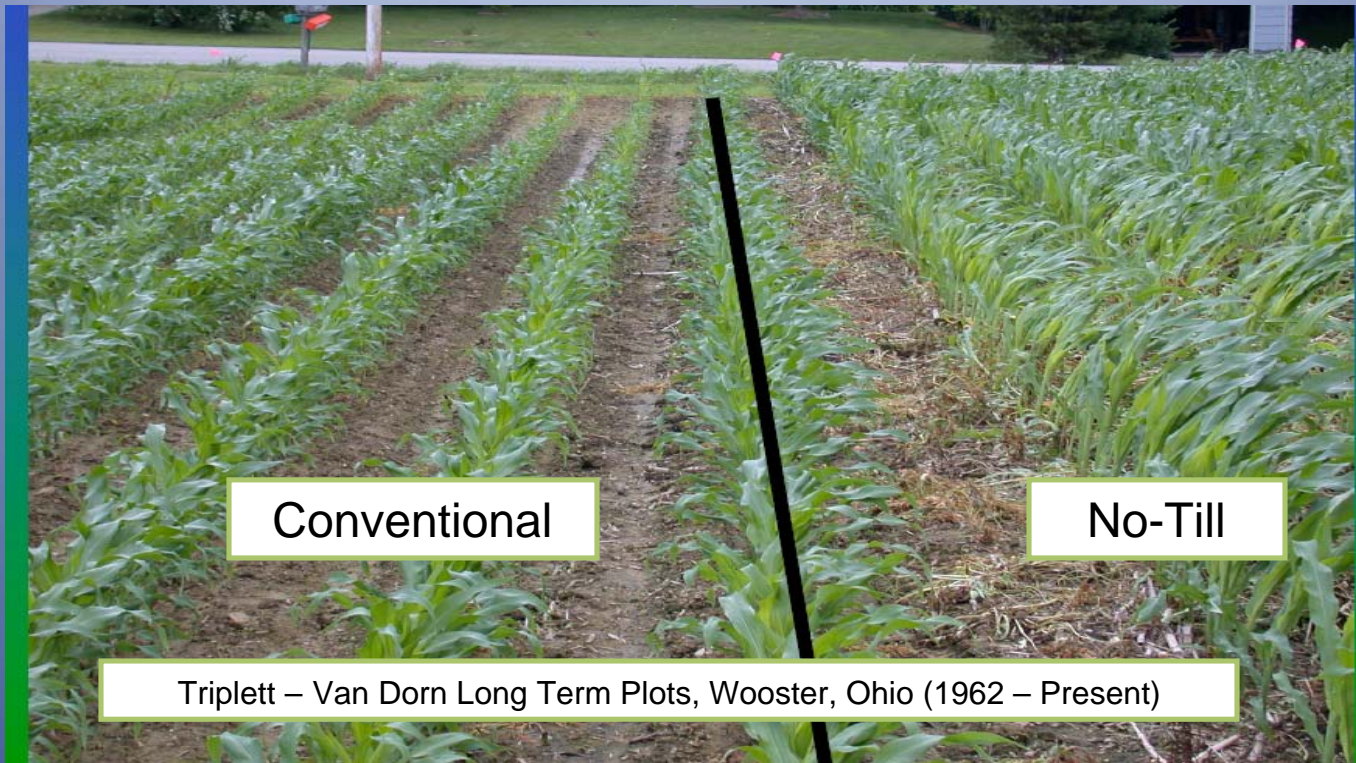


Tillage or No-Tillage? That is the question.



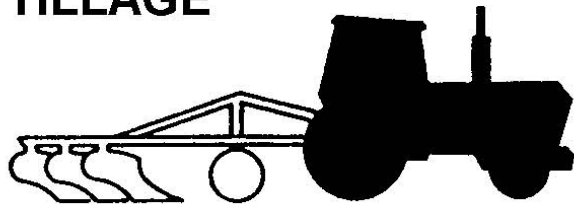
Prepared by:
Ernie Flint, Ph.D., CCA
Area Agent – Agronomic Crops
Mississippi State University Extension Service
November 2007

Conservation Agriculture

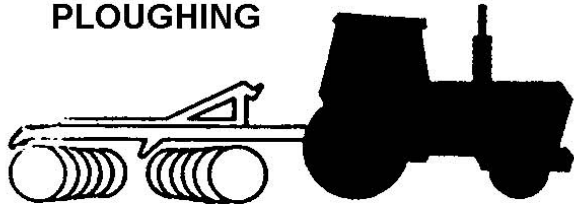
What is it?

- Four Key Principles
 - Stop (or reduce) mechanical soil disturbance
 - Maintain soil cover with crops and/or residue
 - Crop rotation (for multiple reasons)
 - Maintain consistent field traffic pattern

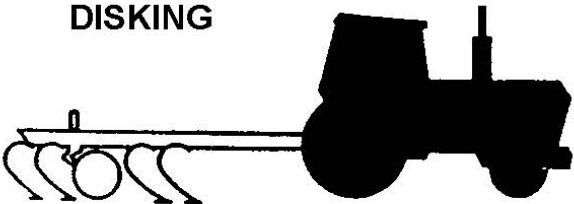
CONVENTIONAL TILLAGE



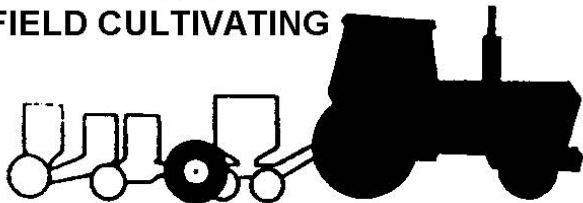
PLOUGHING



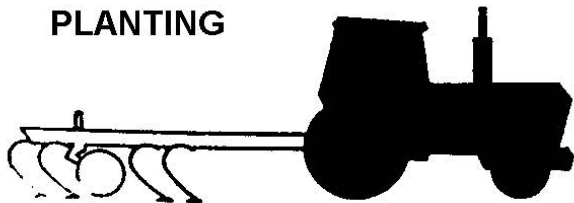
DISKING



FIELD CULTIVATING



PLANTING



CULTIVATING

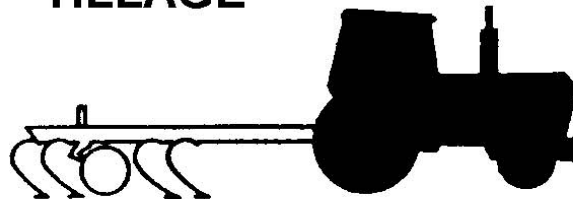
R. Barber, FAO

The Tillage Triangle

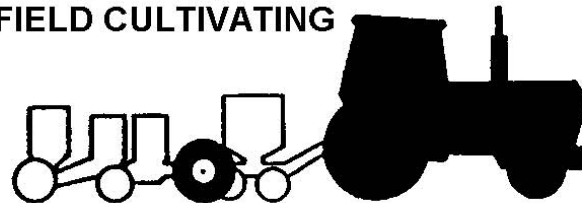
CONVENTIONAL TILLAGE - A full tillage program consisting of both primary and secondary tillage operations.

CONSERVATION TILLAGE - Any tillage sequence which reduces loss of soil or water relative to conventional tillage by maintaining plant residue on the soil surface.

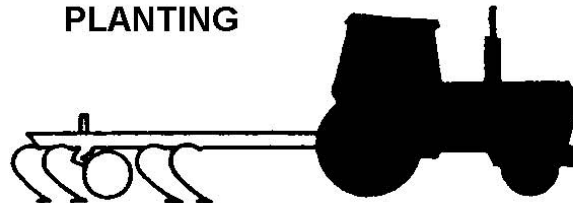
REDUCED TILLAGE



FIELD CULTIVATING

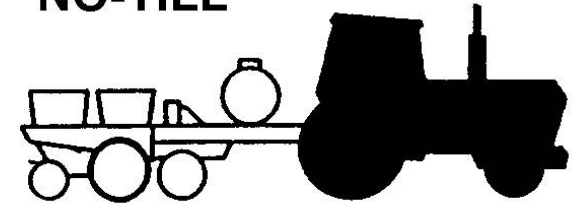


PLANTING



CULTIVATING

NO-TILL



PLANTING AND
SPRAYING ONLY

CONSERVATION TILLAGE



CROP RESIDUE IS STILL THE BEST FOR EROSION PREVENTION

- REDUCES DETACHMENT**
- SLOWS RUNOFF**
- IMPROVES INFILTRATION**
- ROTATIONS MAINTAIN SOIL STRUCTURE**
- 30% RESIDUE REDUCES EROSION 60%**

Tillage or No-Tillage



If we continue to do this, we have learned nothing from our past.



If we do this, we can feed ourselves and many others today and in the future.

A picture is worth a thousand words.

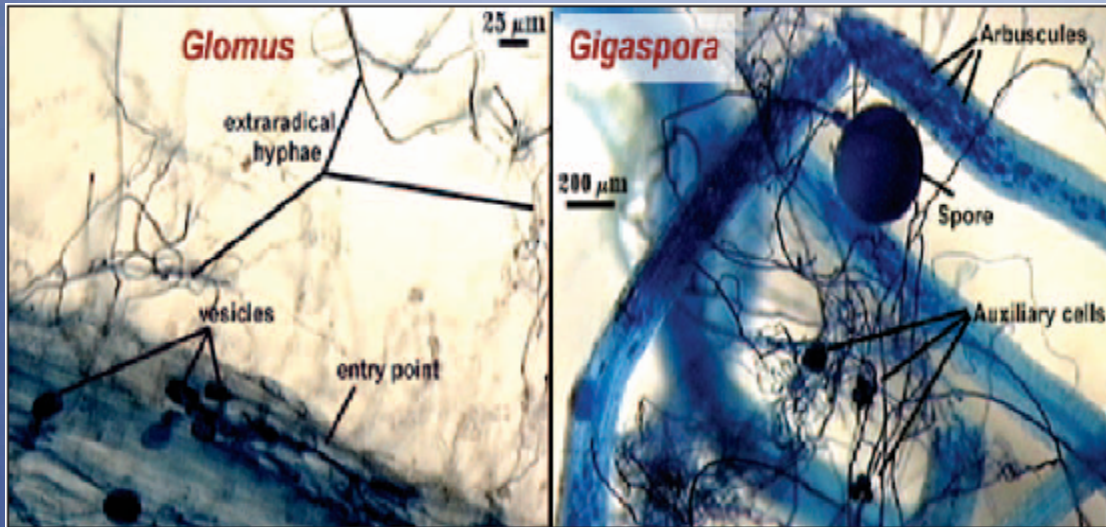


No-till cotton

Tilled Cotton

Univ. TN, Milan

Important soil organisms are damaged by tillage.



Examples:

Mycorrhizal fungi



Earthworms and beneficial soil insects

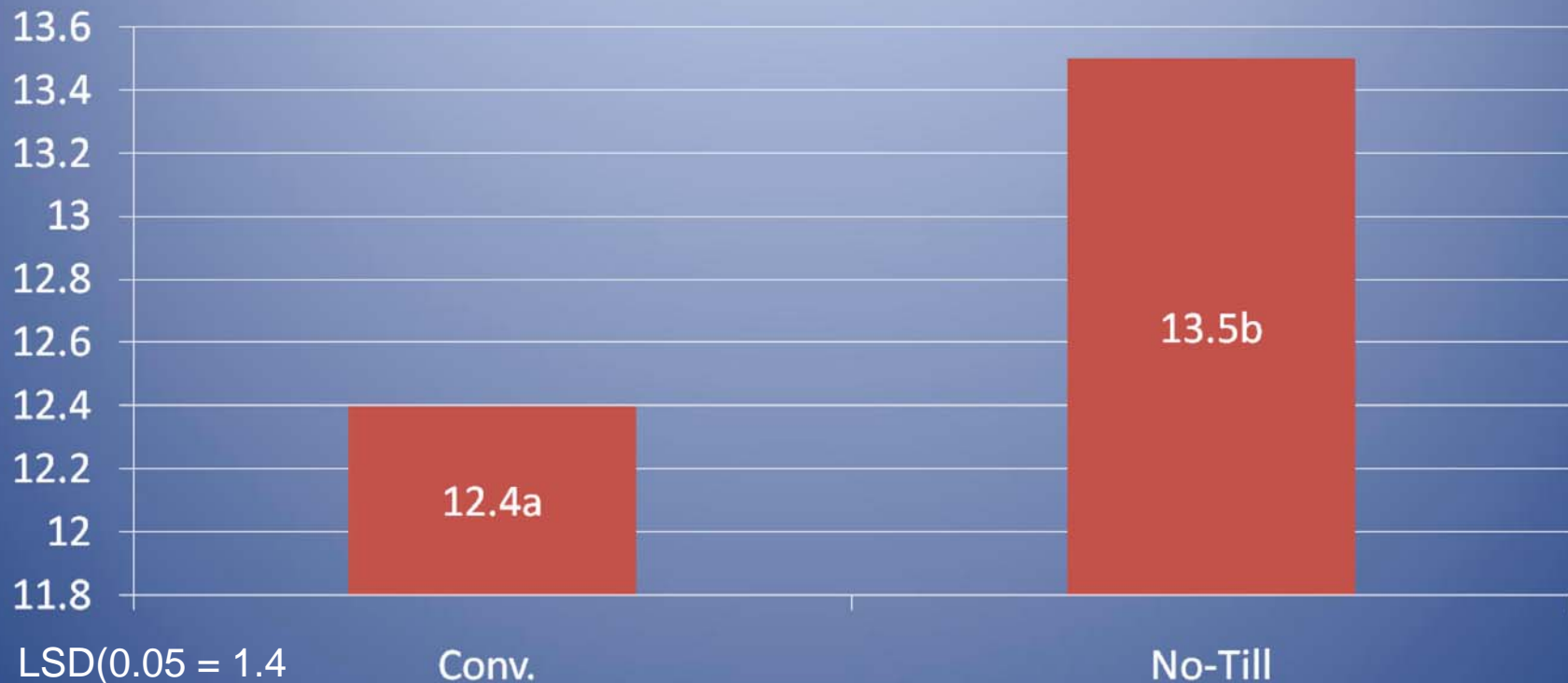
Sod Planting



Sod planting is just what it sounds like – planting a crop into sod that is either dead or in the process of dying at the time of planting.

Issues: Soil temp.
pests, mulching effect,
nutrient availability
starter fertilizers
wicking effect

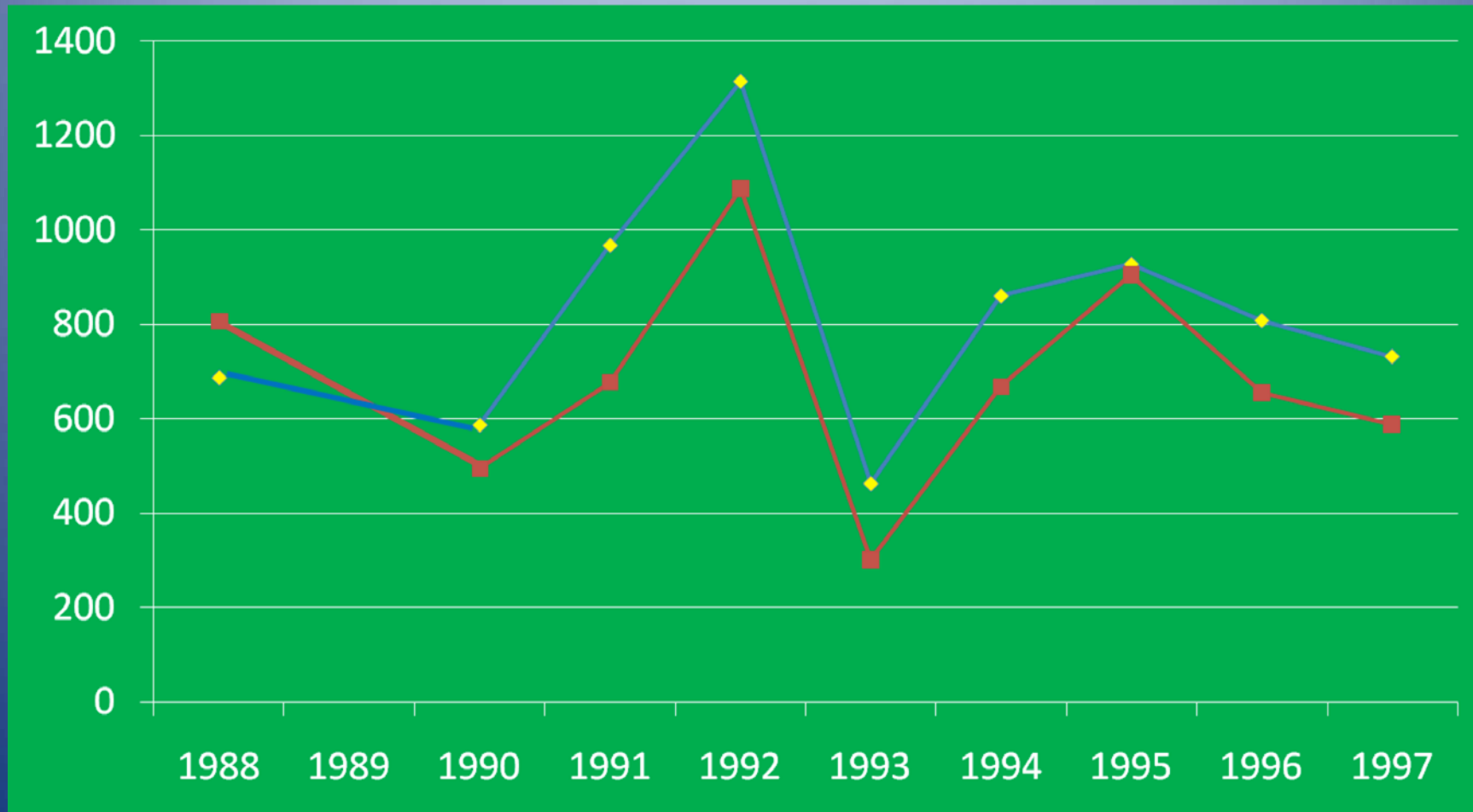
Cotton plants produce more nodes in NT than in CT.



Node counts for NT and CT cotton on July 6, 1996 at Senatobia, MS

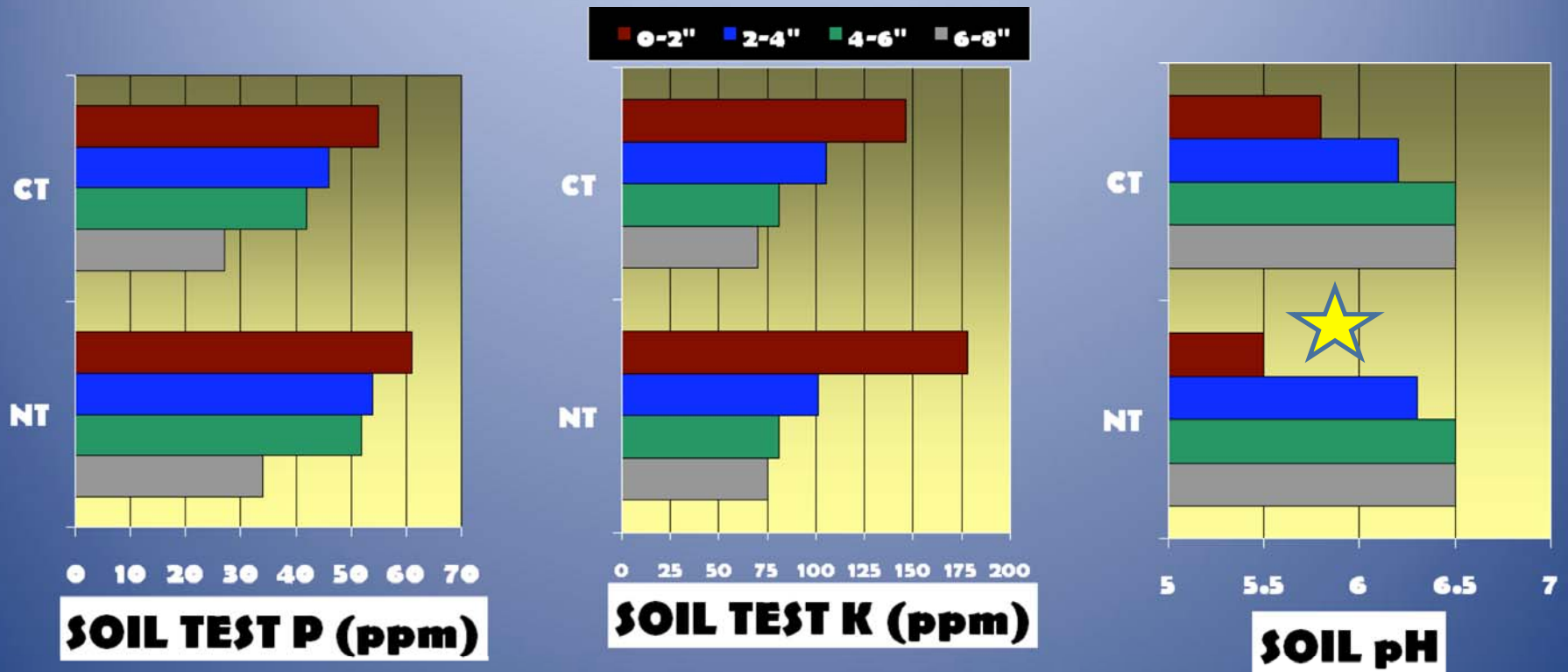
E. Flint, 1999

Cotton can yield better in NT than in CT.



USDA Sed. Lab., Nelson Farm, Senatobia, MS

SOIL TEST STRATIFICATION FOLLOWING FIVE YEARS OF TILLAGE MANAGEMENT

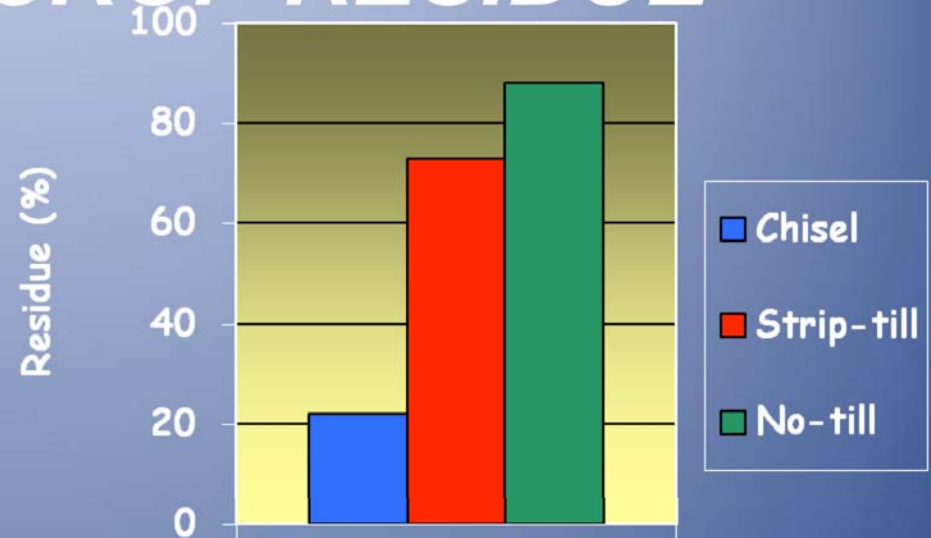


Soil P and K levels showed little difference; but soil pH was lower on the surface in NT.

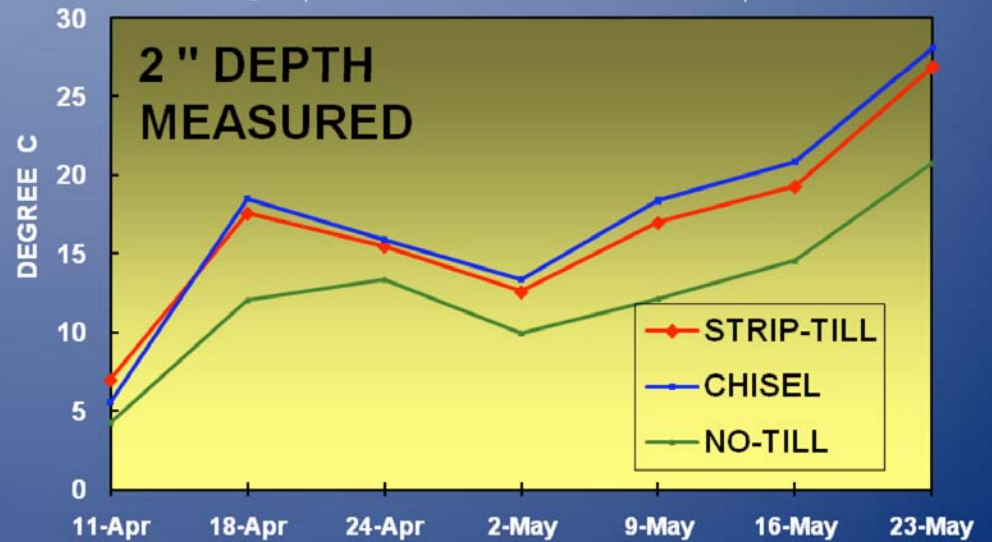
Wolkowski, 2003 (Corn/soybean rotation)

SOIL TEMPERATURE AFFECTED BY TILLAGE AND CROP RESIDUE

Effect on crop residue, 1994



Effect on in-row soil temperature



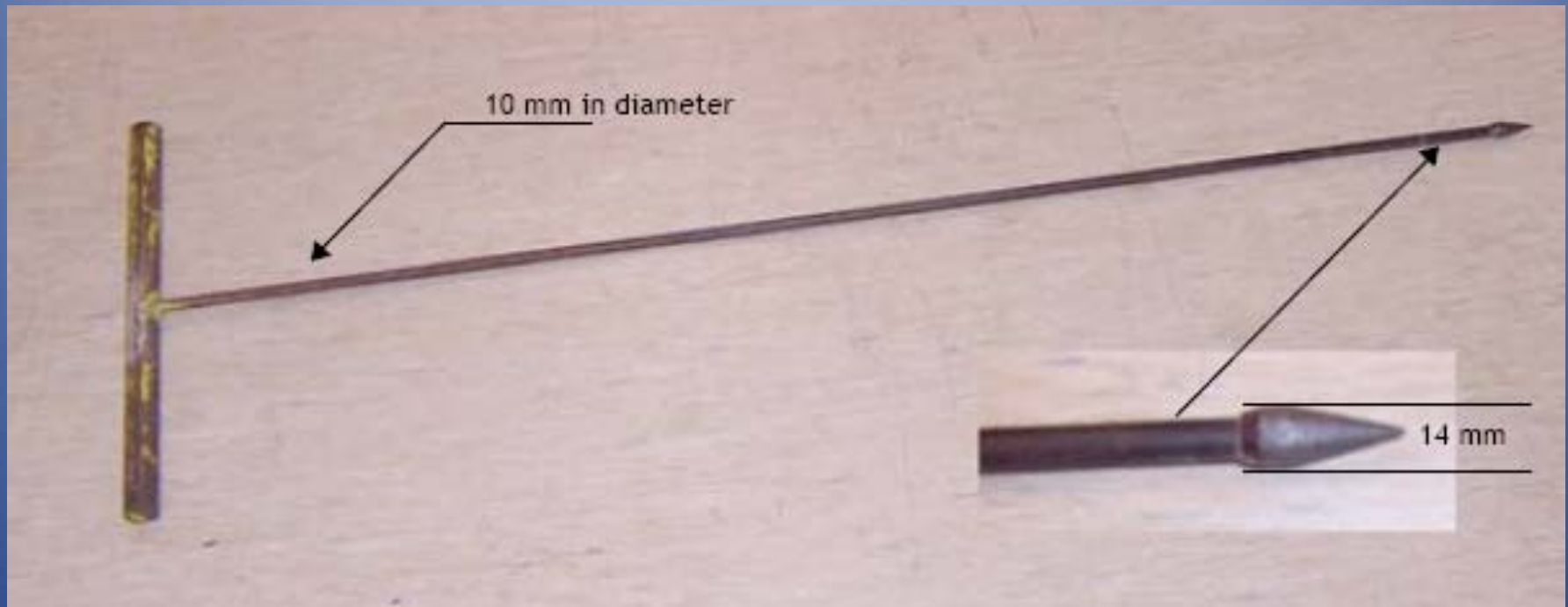
Wolkowski, 2000

Use a penetrometer to identify compaction:



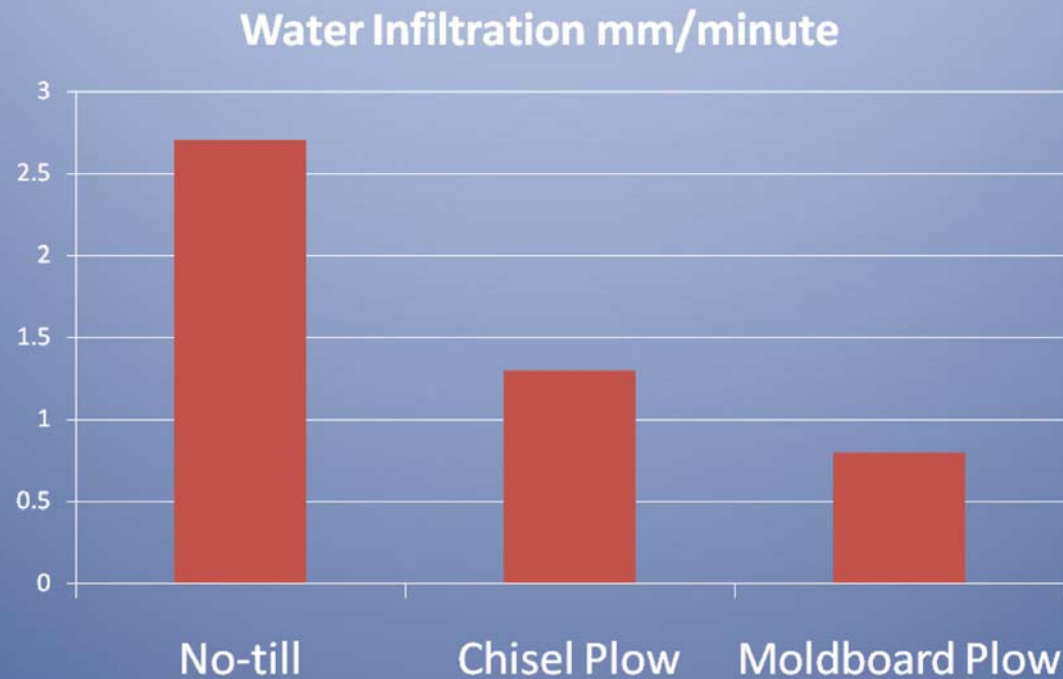
Penetrometer should be used when soil moisture is near field capacity – very moist.

Soil probe for identifying compaction layers:



A very simple hand probe can be used to determine relative levels of soil compaction.

One of the most difficult ideas to accept



Sullivan, USDA, 2002

Infiltration rate into no-till soil with cover is faster than for tilled soil.

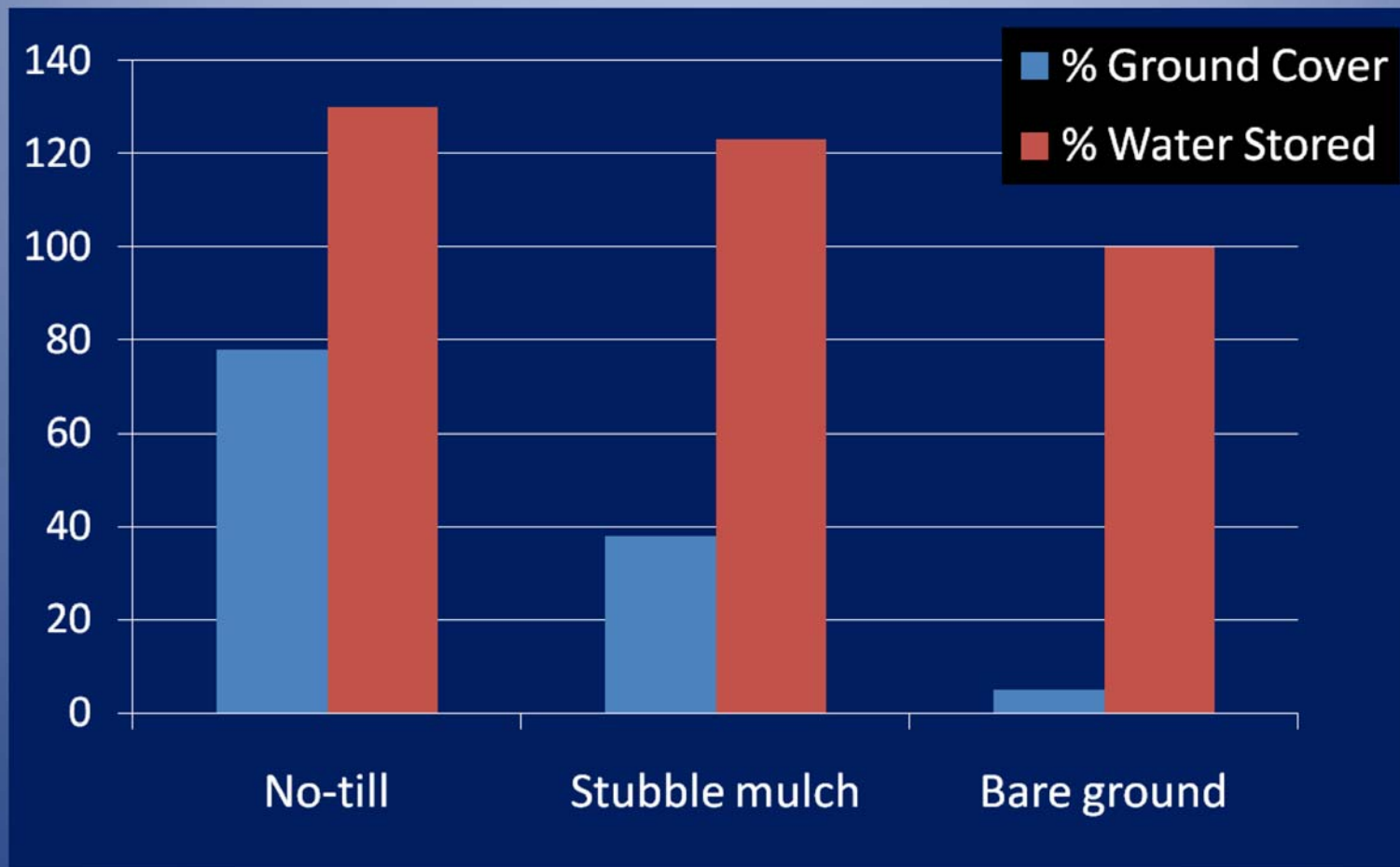
Water infiltration

(after $\frac{3}{4}$ inch rain)

Field cultivator Strip-till



Effect of ground cover on percent soil water storage:



How to make no-till fail:

		Cotton Yield	Soil pH	Soil P	Soil K
<u>Conv. Tillage</u>	• 1990	1250	6.2	120	420
	• 1995	1075	6.4	95	375
	• 2000	1140	6.1	105	350
<u>NT</u>	• 2005	1220	5.7	87	290
	• 2007	625	5.2	45	150

Field was changed from conventional tillage to no-tillage in 2001.
 Only N fertilizer applied since conversion to no-tillage.

Conclusion

- No-till/Reduced tillage can work if YOU want it to.
- Reduced tillage does not mean reduced management.
- Soil fertility must be maintained as in any other system.
- No-tillage system must be “learned” as any other method.
- It’s worth the effort.

Conservation tillage is not an easy shot like this. Every field is different.

