

Ripping No-till Soils

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Overview

- ◉ Does Ripping prior to No-till implementation make a difference?
- ◉ How long do the effects of Ripping last?
- ◉ Does the type of Ripper used influence effectiveness?

Does Ripping prior to No-till implementation make a difference?

- First need to know if compaction is a problem?
- How deep and significant is the compaction

Evaluating Soil Compaction

- Using a Penetrometer.
 - Sensitive to soil moisture
 - Dry soils will have high resistance to penetration
 - Used when soils are at field capacity
 - Spring time after soaking rain
 - Root growth is restricted at 300psi



Evaluating Soil Compaction

- Best tools are a shovel and your eyes
- Look for horizontal soil structure and root growth
- Evaluate root growth of tap rooted plants. Fibrous roots can also show compaction.



Does Ripping prior to No-till implementation make a difference?

- Short-term: **Maybe**
- Research in the region is very limited
 - In tilled systems, yield has inconsistent response to ripping
- Producers are uncertain about benefits
 - Soils perceived as compacted may have other problems
 - Fertility, salinity, or naturally poorly drained clayey soils
 - Clayey soil may appear compacted but are generally not.
 - Surface hardness more of a problem than subsurface compaction?

Why are short-term affects inconsistent

1. Soils are not sufficiently compacted to respond to ripping
 - › Sandy soils will respond more readily than clay soils
2. Insufficient rainfall after ripping to recharge subsoil.
3. Rainfall is sufficient to maintain adequate moisture in surface soil
 - › Improved rooting depth is of little value
4. Response to ripping is optimized when rainfall recharges subsoil shortly after ripping and mid to late season rainfall is limited!

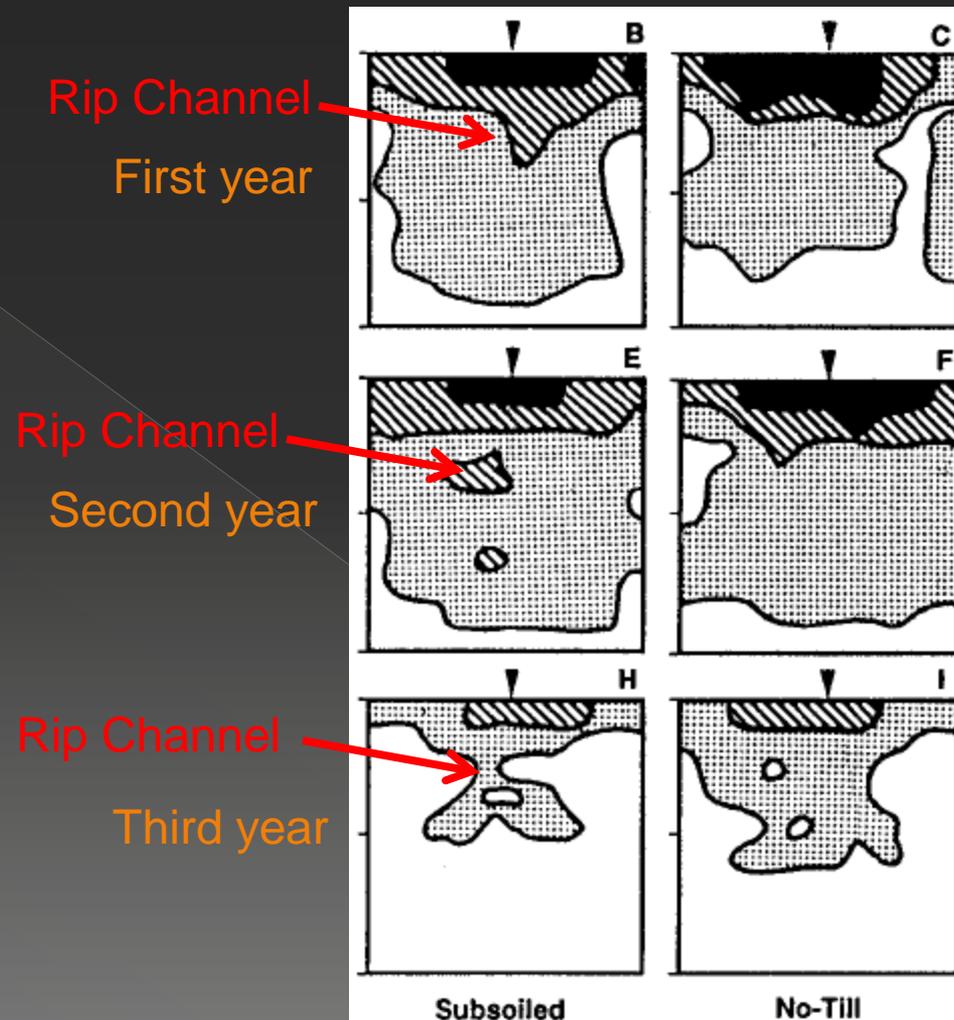
Long-term Affects of Ripping

- ◉ Water movement in soil can seal cracks
- ◉ Continued traffic will compact soils
 - > Efforts must be made to minimize compaction

Corn Root Distribution during 3-yrs after Ripping

- No significant differences in total root density
- No significant yield differences

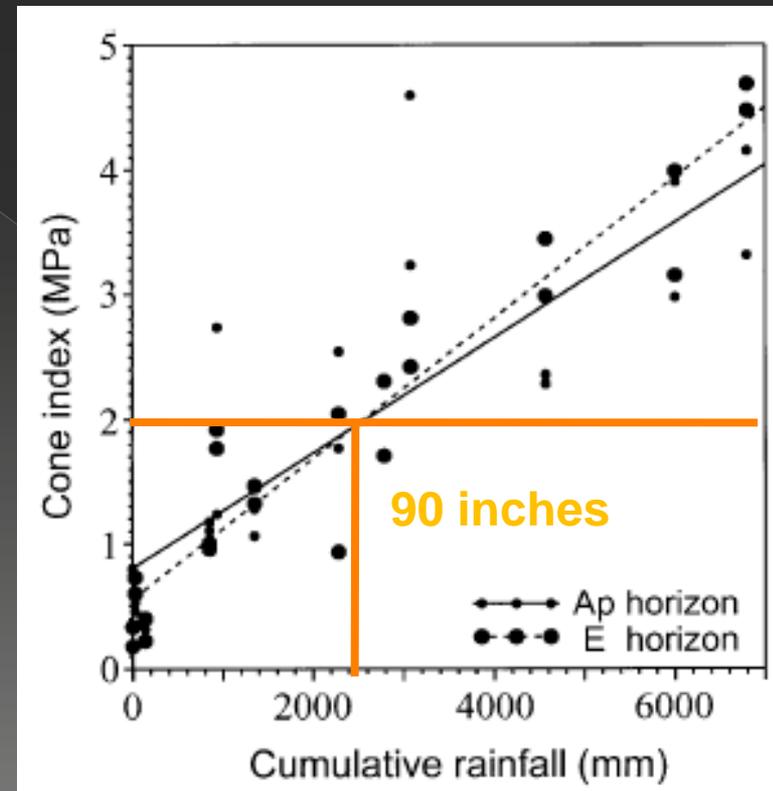
	1990	1991	1992
	Grain yield (bu/acre)		
Subsoiled	26.4	120	103
No-till	29.1	120	116



Loamy sand, Coastal Plain of SC,
Vepraska, et al. (1995)

Influence of rainfall on penetration resistance after ripping in conventional tillage system

- Resistance to penetration in ripped channel increased as a function of cumulative rainfall

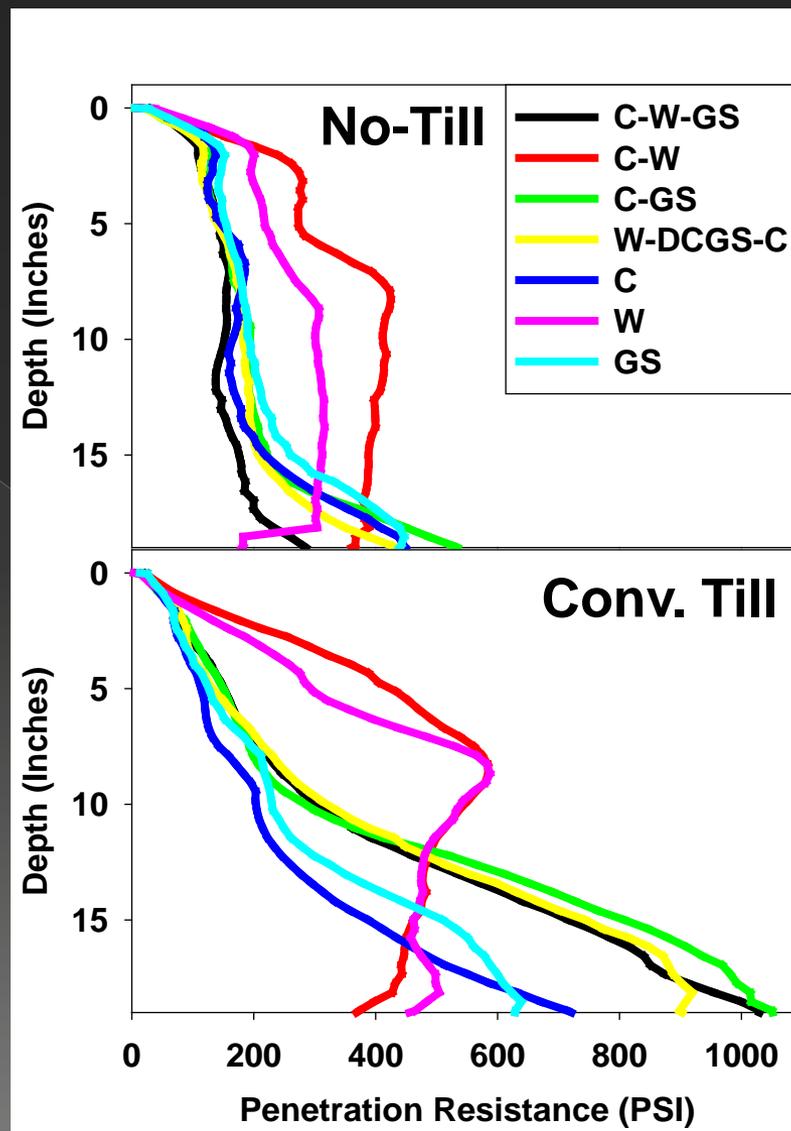


Does it pay to Rip Prior to No-Till

- Most information suggests that ripping prior to no-till has limited long-term effect
- Maybe valuable under highly compacted soil conditions
- Accumulation of organic matter and improvements in soil structure will alleviate compaction
 - Intensive tillage prior to no-till conversion may delay this OM accumulation.

Penetration Resistance in 7-yr No-till, Altus, OK

- Long-term No-till decreases penetration resistance.



Ripper types:

- There are numerous ripper designs
- Even more numerous shank points available

Disk Ripper

- ◉ Combines deep tillage with surface tillage
- ◉ Generally greatest horsepower requirement
 - > 37-55 hp per shank



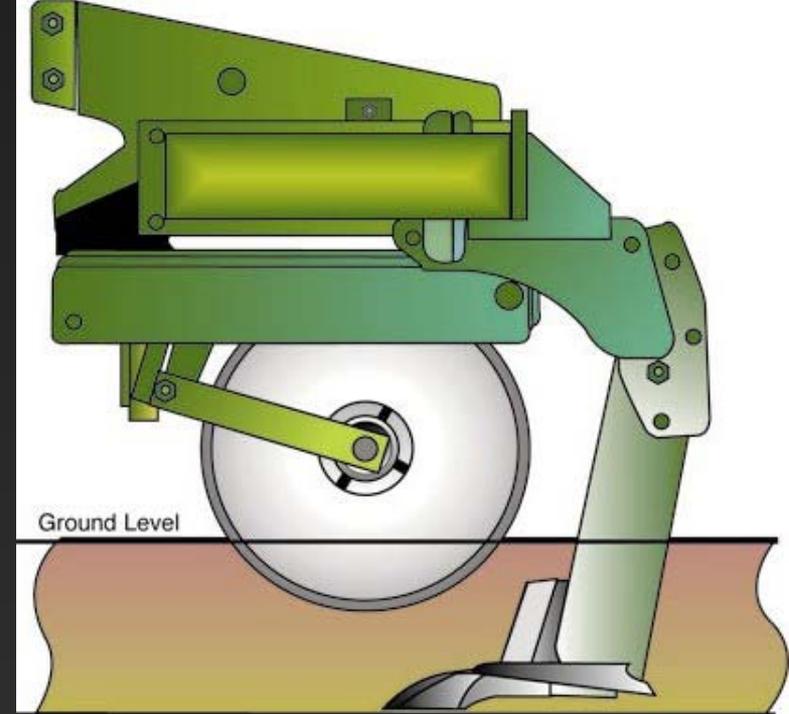
V Ripper

- ◉ Slightly less horsepower than disk ripper
 - > 25-40 hp per shank
- ◉ May require secondary tillage to smooth surface



Straight-line Rippers

- Designed to minimize surface disturbance
- Has a rolling coulter and straight shank
- Horsepower
 - > 30-40 hp per shank



Paraplow

- ◉ Designed to minimize surface disturbance
- ◉ Slanted legs are meant to lift soil
- ◉ Horsepower
 - > 25-35 hp/shank



Paraplow vs. In-Row Subsoiler for Corn Production

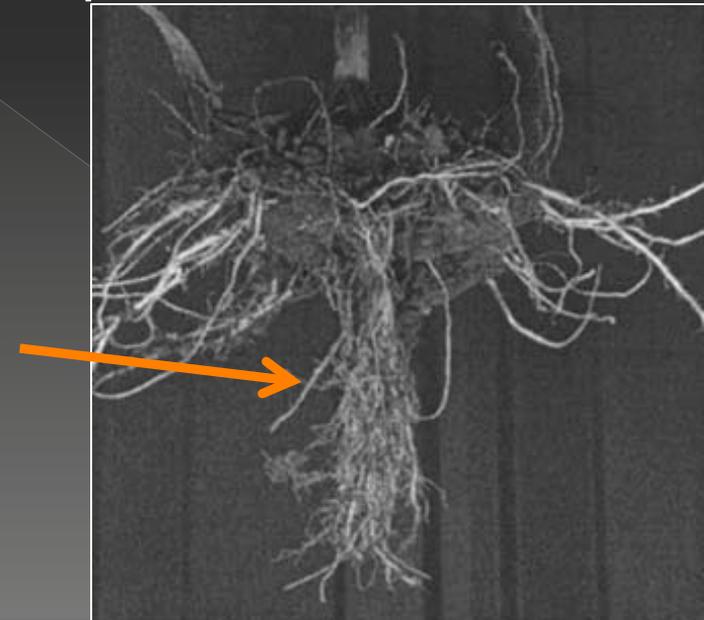
- Annual ripping with a standard straight shank can provide the same benefit as a Paraplow

	1999	2000
	-----Bu/acre-----	
Subsoiler	167	175
Paraplow	162	167
No-Till	145	137
Least Significant Diff.	14	14

Soil Condition is Important!

- Soil moisture at time of ripping can have greater impact on effectiveness of ripping than does the ripper itself.
- Soil needs to be dry to allow for shatter
- Set depth to just below compacted layers.

Roots growing into slits left after ripping wet soil



Questions on Ripping