Residue Management – Horizontal vs. Vertical Tillage

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Residue Management

- Defining vertical and horizontal tillage
- Setting tillage goals
- Some tillage related issues and solutions

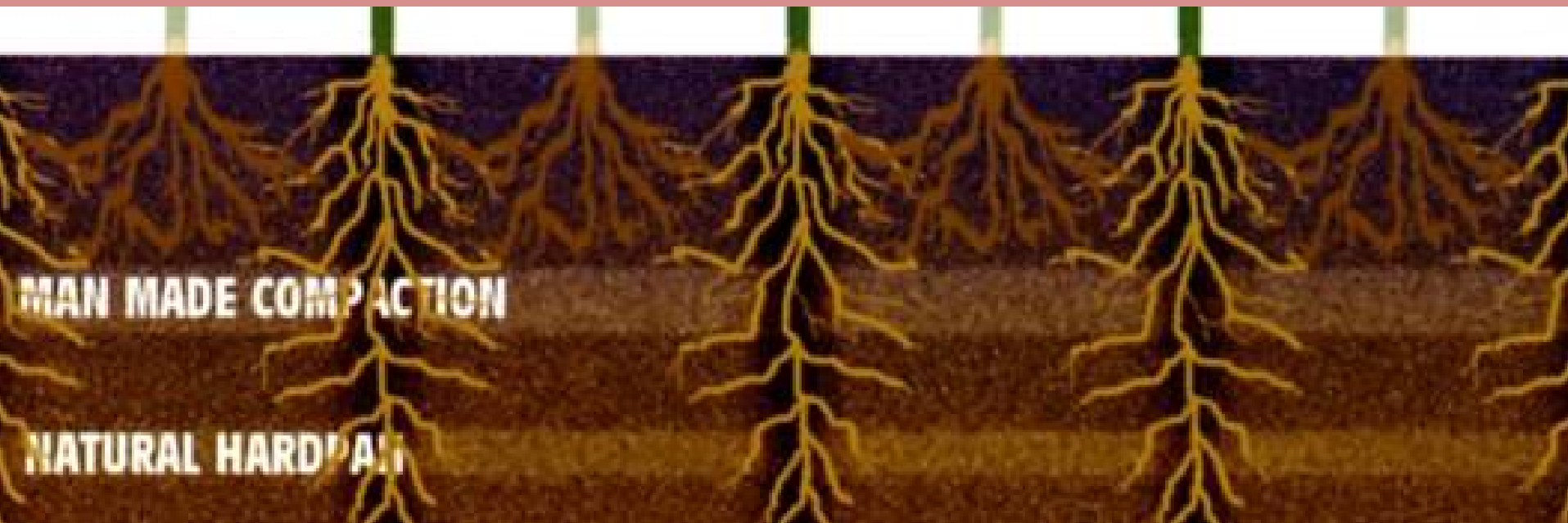
Traditional Purposes of Tillage

- Loosen soil
- Create desirable seedbed
- Control pests
- Incorporate fertilizer and lime
- Incorporate manure
- Create desired surface roughness
- Create the desired residue cover

Horizontal tillage

- Broadcast tillage creating horizontal layers of soil density
- Examples-disking, chisel moldboard, field cultivate, soil finisher
- Density layers may impact rooting pattern
- Uniform across the field
- Fall or spring
- Mechanical weed control
- Water movement downward may be impeded

Uniform depth horizontal layer



Combination Chisel - subsoiler

Coulter Tillage - Horizontal

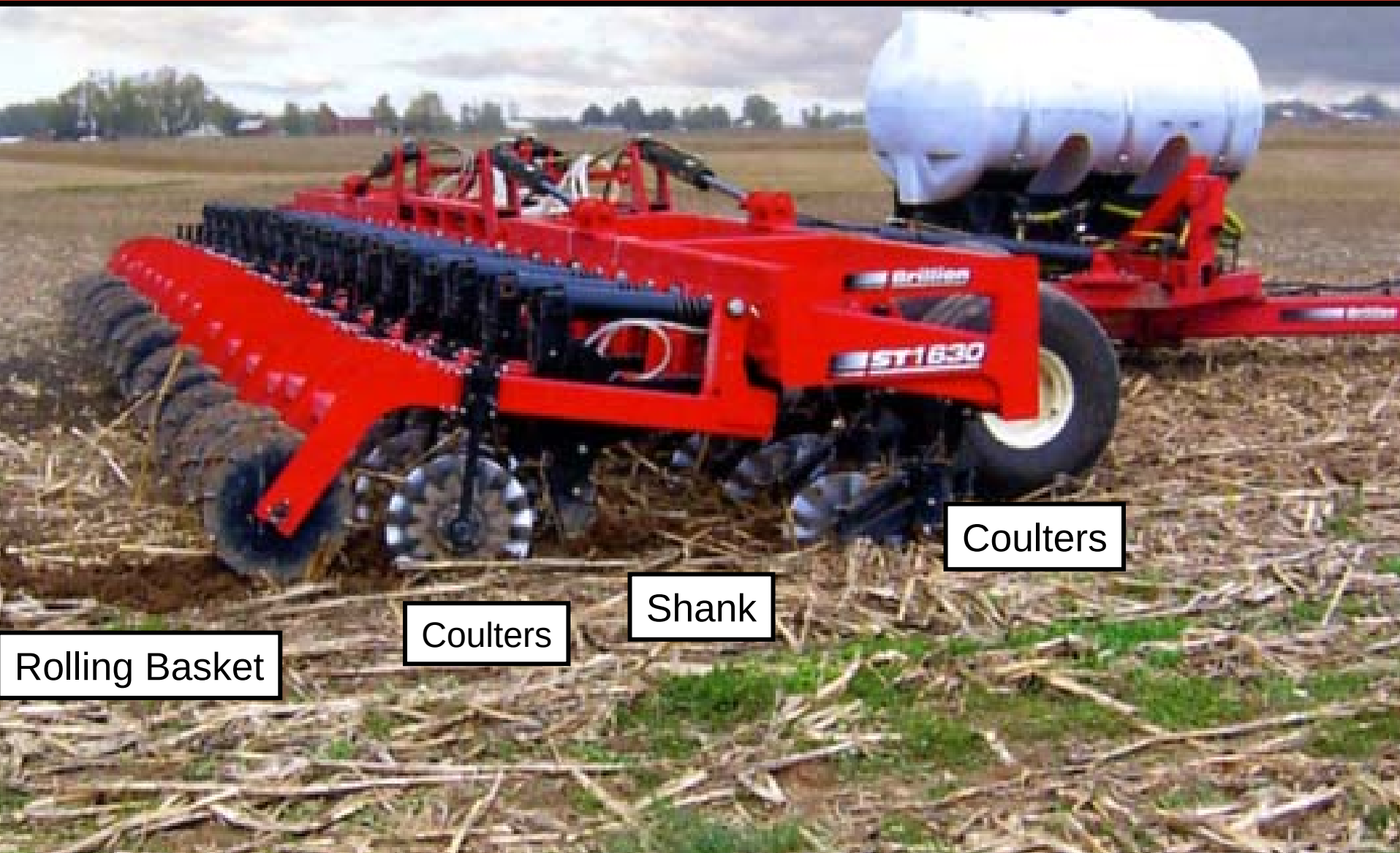
Vertical tillage

- Not uniform depth across the field
- May have vertical layers
- Examples-ridge till, zone till, strip till
- Width of zone or strip tilled
- Depth of zone or strip tilled
- Fall or spring
- Localized soil warming

Vertical - Strip tillage

Vertical – Strip Tillage

Vertical – Strip Tillage



Vertical Tillage – pair of coulters on chisel shank

Another definition vertical and horizontal tillage

Horizontal – tillage where the soil engaging element is pulled through the soil, non-rolling and tills by being drawn through the soil

- moldboards
- shanks

Vertical – tillage where soil engaging element rolls over the soil

- rolling coulters
- rolling spike harrows (Aerway)

Vertical or horizontal tillage

Vertical tillage study Van Dee, 2004

Study

- Previous crop – soybeans
- Crop during study - corn

Treatments:

- Conventional-spring disk and field cultivate
- No-till
- Vertical-Phillips rolling spike tooth harrow

Phillips rolling spike tooth harrow

Vertical tillage study Van Dee, 2004

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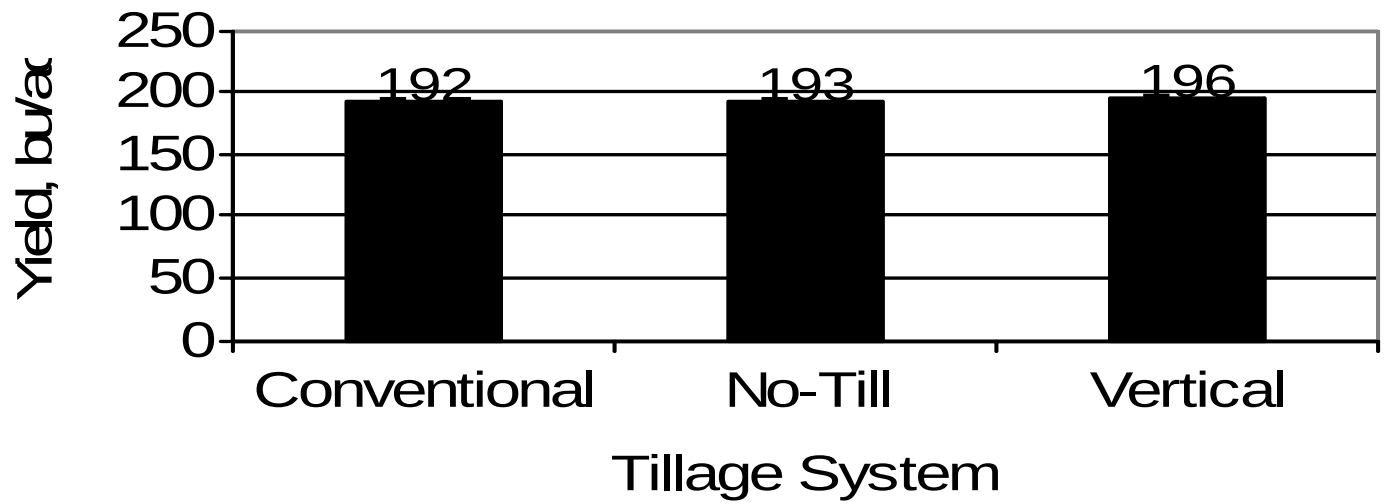
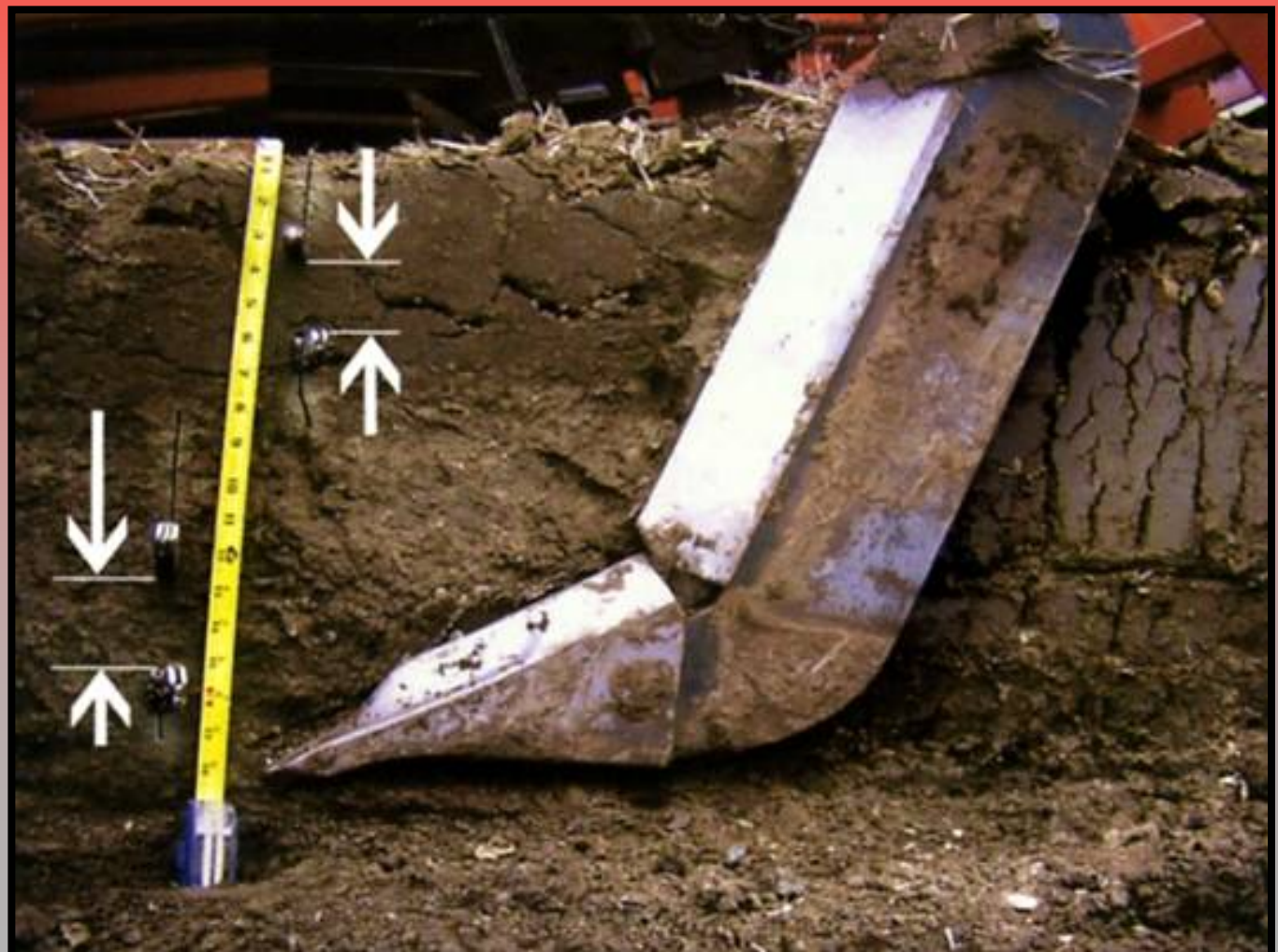


SETTING YOUR GOALS FOR TILLAGE

- Soil to be tilled
  - volume and location
  - broadcast or zone
  - degree of soil mixing
- Residue
  - before tillage – quantity and condition
  - after tillage
- Soil surface roughness
  - before tillage
  - after tillage
- Control pests
- Control erosion

If compacted conditions exist, the tillage depth should be two inches below the compacted layer. Dealing with compaction will usually require vertical tillage



If a smooth soil surface is desired, horizontal tillage can be used or vertical tillage with very little soil inversion or a leveling attachment may be useful.

If large quantities of crop residue need to be buried, some soil inversion will be needed.

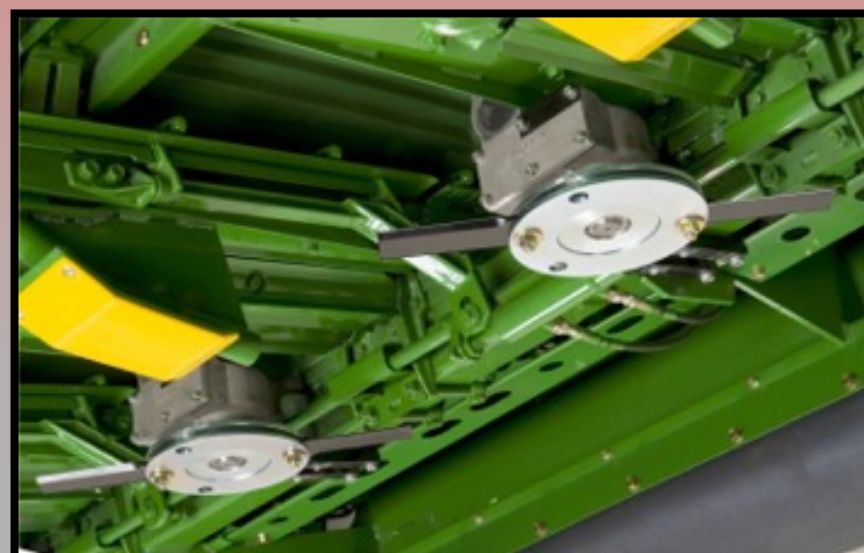
If crop residue needs to be sized smaller, some cutting coulters or disks may be needed.

Coulter tillage

Coulter chisel

If strips of soil must be cleared of crop residue for better soil warm-up, some form of strip or zone tillage may be needed.

If excessive residue carries over to succeeding growing seasons, corn head stalk chopper on the combine may be useful.



Concluding Remarks

- Vertical and horizontal tillage
- Tillage goals
- Issues and solutions

QUESTIONS