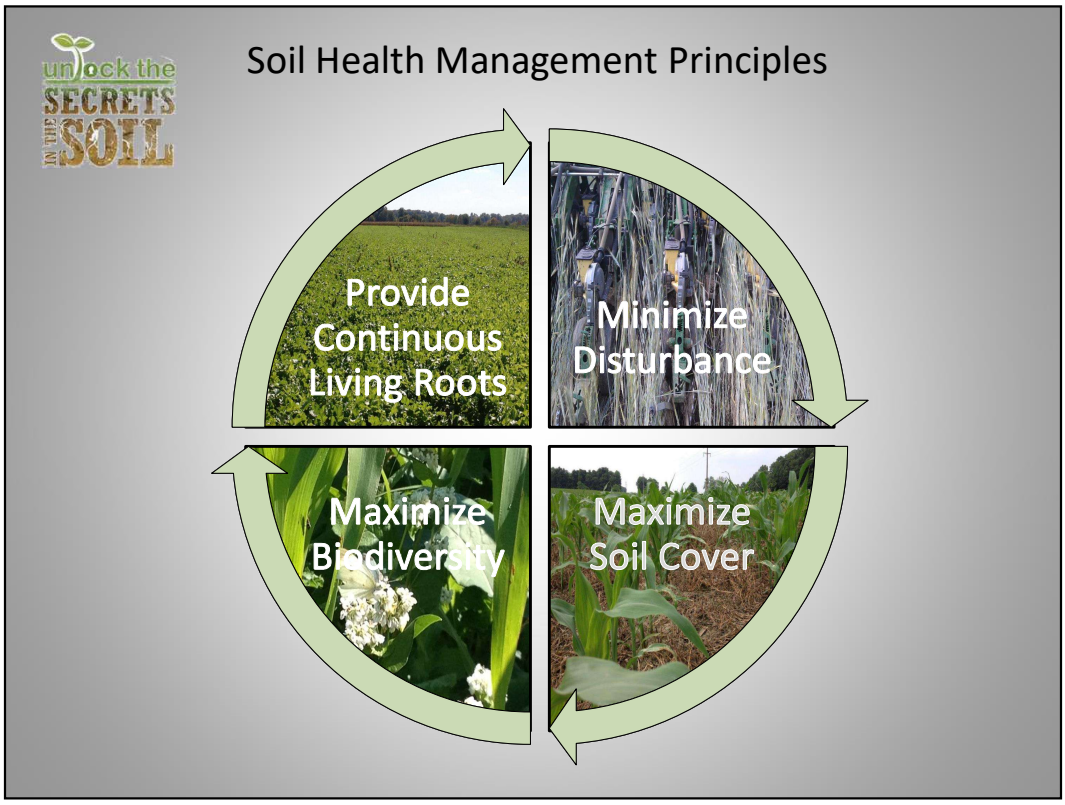
Soil Health Management Systems are good for the productive capacity and function of the soil… good for the environment…. they are great for the water we drink and the very air we breathe …and best of all they are doable!

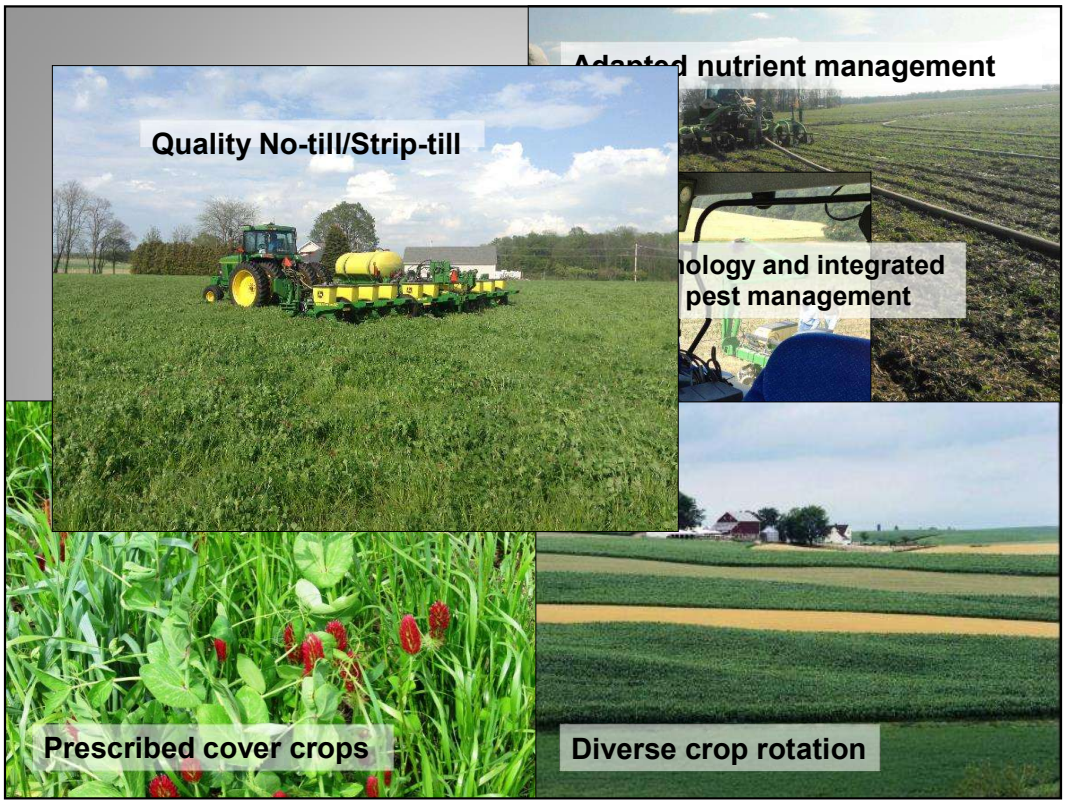


Review the SH Management Principles- We must integrate the Core Management Principals of Improving Soil Health into every operation and management decisions.

How does a system of practices achieve the SH Principles? Improving soil function is about optimizing and understanding all aspects of the conservation cropping system such that soil health is the central focus with every operation. Each practice should complement and enhance the others of the system.

Have an in depth class discussion on the difference between each single practice and how to integrate them into a SH system.

Quality No-till vs No-till…Adapted Nutrient Management vs Nutrient Management and so on for each.



This is highlighting Quality notill :

This photo can be adapted to localize conditions

So lets discuss what we mean by-Quality No-till vs No-till…You may have heard several negative references to no-till (ask the class for examples). In many cases, poor results stem from mismanagement or a lack of understanding of changes needed in equipment, nutrient management or pest management. Lets review and discuss a few of the key points (many of which we may have discussed this week)

Strategies we'll discuss come from countless collaborations, education, working with top consultants, industry reps, researchers, strategies shared by top SH farmers and personal experience.

General Crop Management Among the Soil Health Pros

- Most manage traffic and use floatation or tracks
- Most have specific residue management strategies
- Automated/realtime planter adjustment
- Most pay attention to C:N balance, timing and placement of amendments to increase nutrient efficiency
- Feed/enhance soil biology to cycle water and nutrients so the soil can better feed the crop

So what key strategies do top Soil Health Farmers have in common? ….these are just a few

What are the key goals of planting into heavy residue?

- may require many additional adjustments and/ or add- ons.

Many options available etc.etc.

…every seedling access to the **same** resources

…The 4**S**s!

Every plant growing and developing at the same rate.

“Picket Fence Stands” are very possible in High residue systems

If you don’t accomplish the primary goals, the penalty could be great!

We must spread the resi “due” of our growing yield and carry the weight of our growing equipment more wisely.

Options are available for all makes

Full Width Residue and Chaff Spreaders

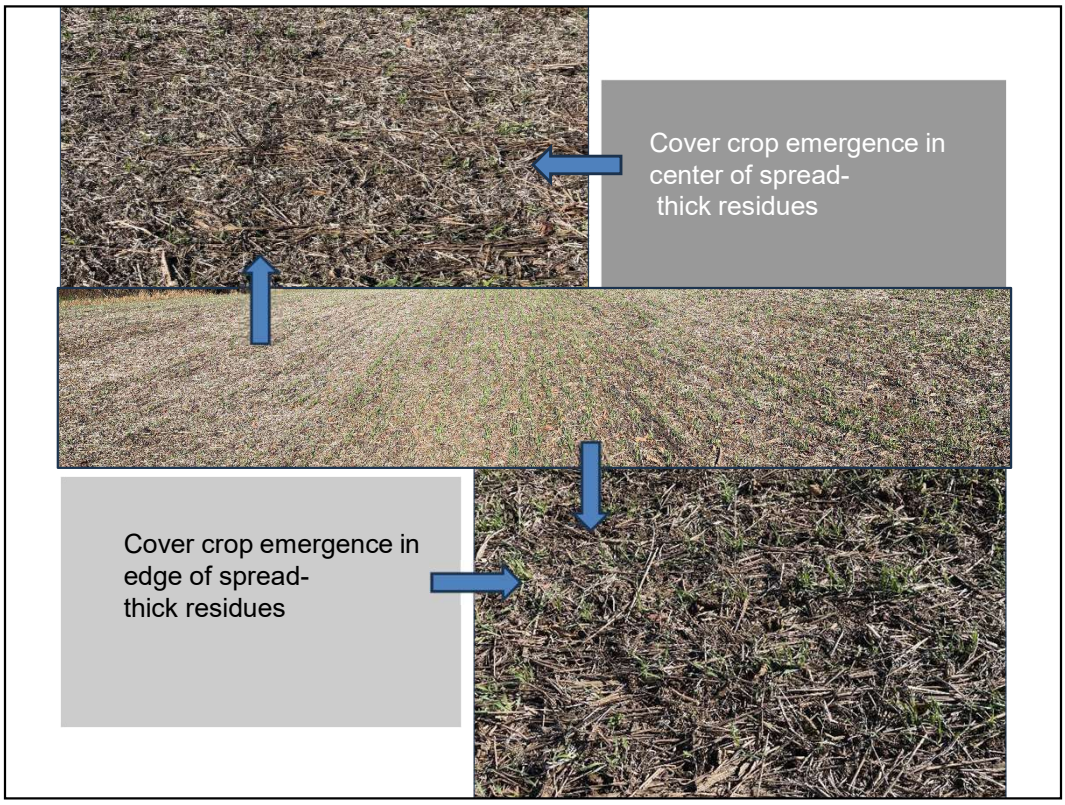
Pests like residue and grain reduce habitat at harvest

Spread chaff out thin – full width to reduce slug & vole habitat

Many options and aftermarket add-ons today that do a better job of spreading residue.

…every seed the exact same environment?

Uneven residue distribution make the 4 Ss very difficult



Uneven emergence and growth of cover crops further compound the problems

Uneven emergence due to uneven residue. As the cover crop emerges and grows at uneven rates, resources are tied up and released at different rates and the 4 Ss are now beyond reach

Stalk-chopping Corn Heads

Front mount choppers chop stalks before the ear is removed.

Drago chops stalks after the ear is removed.

Some are Good for strip-till, fall till and VT

Processing the corn stalks into small pieces may be preferred for systems like strip-till or fall VT so the heavy residue doesn't impede fall operations.

Some are Good for No-till and CCs

Damaging, but leaving stalks attache and in larger pieces may be preferred for No-till or No-till plus Cover Crops.

Crush, crimp, cut, lacerate the stalk

Enhance the decomposition process

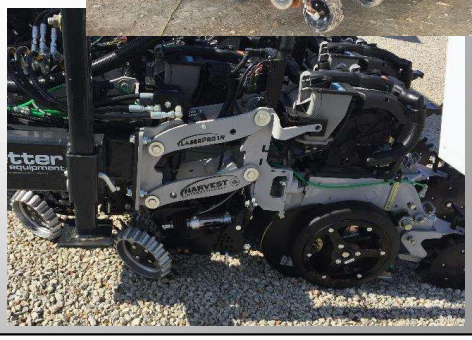
Crush, crimp, cut, lacerate the stalk

Enhance the decomposition process

Allows Bacterial and fungal colonization

Each pinch point still allows microbes to start the breakdown process

Planting Through the Residue
No-Till Planter Set-up Choices

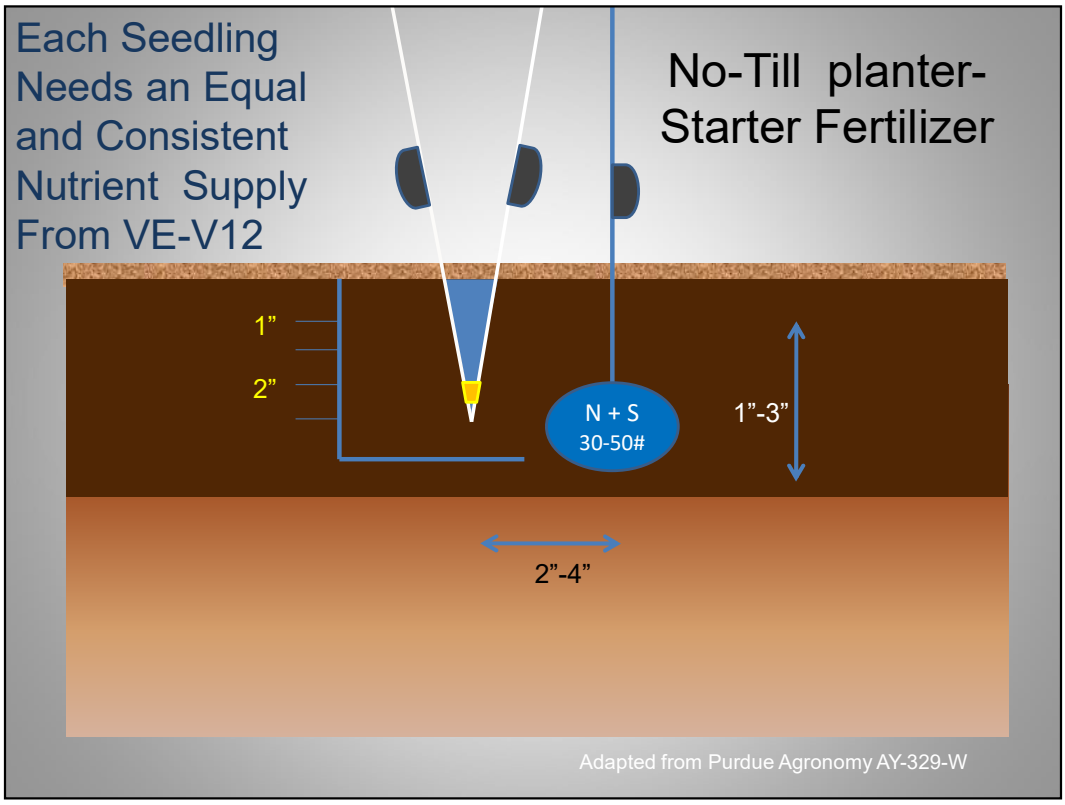


Planter setup- Fortunately there are lots of planter options available…

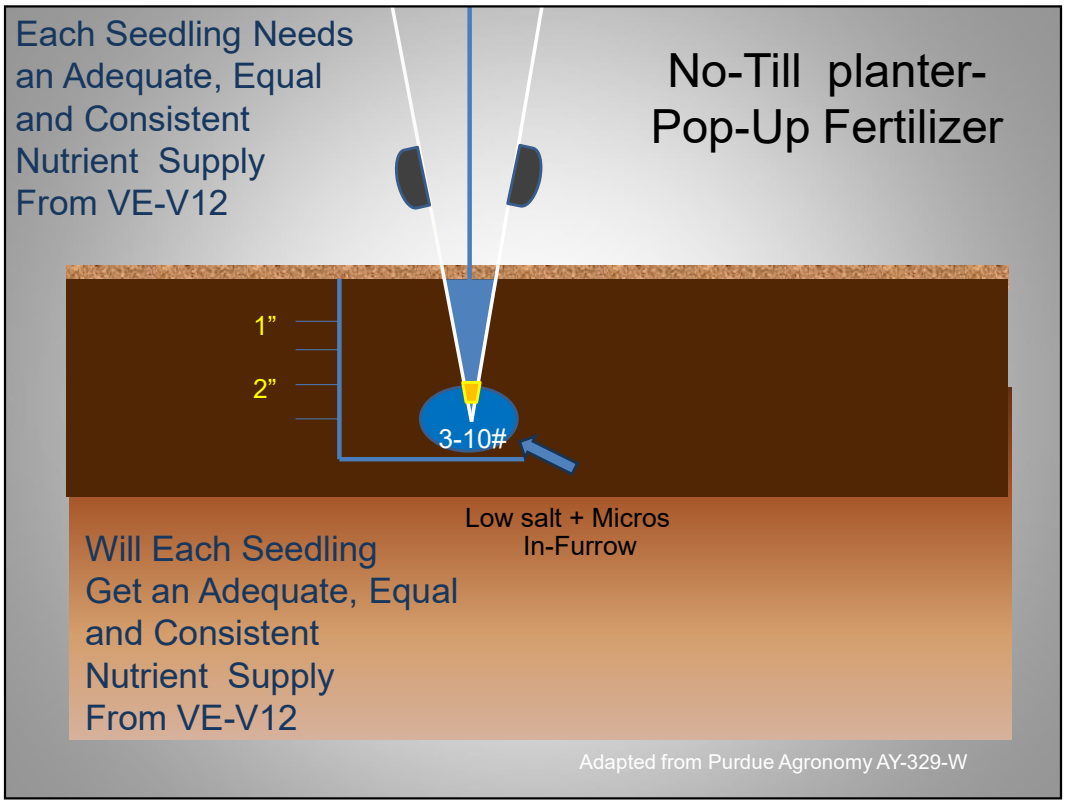
If you choose to run coulters, they should be set to run no deeper than the double disk openers, but most veteran notillers have removed them

Do they solve a problem or merely a decoration…New uses for Coulters… repurpose

Most farmers using No-till and/or cover crops can compensated for the absence of the early burst of nutrients with starter fertilizer with a significant N component. Today's planting technology can be custom designed for any condition and we no longer have to be satisfied with less than perfect stands. And- We can place nutrient as we plant and place it where it is needed.

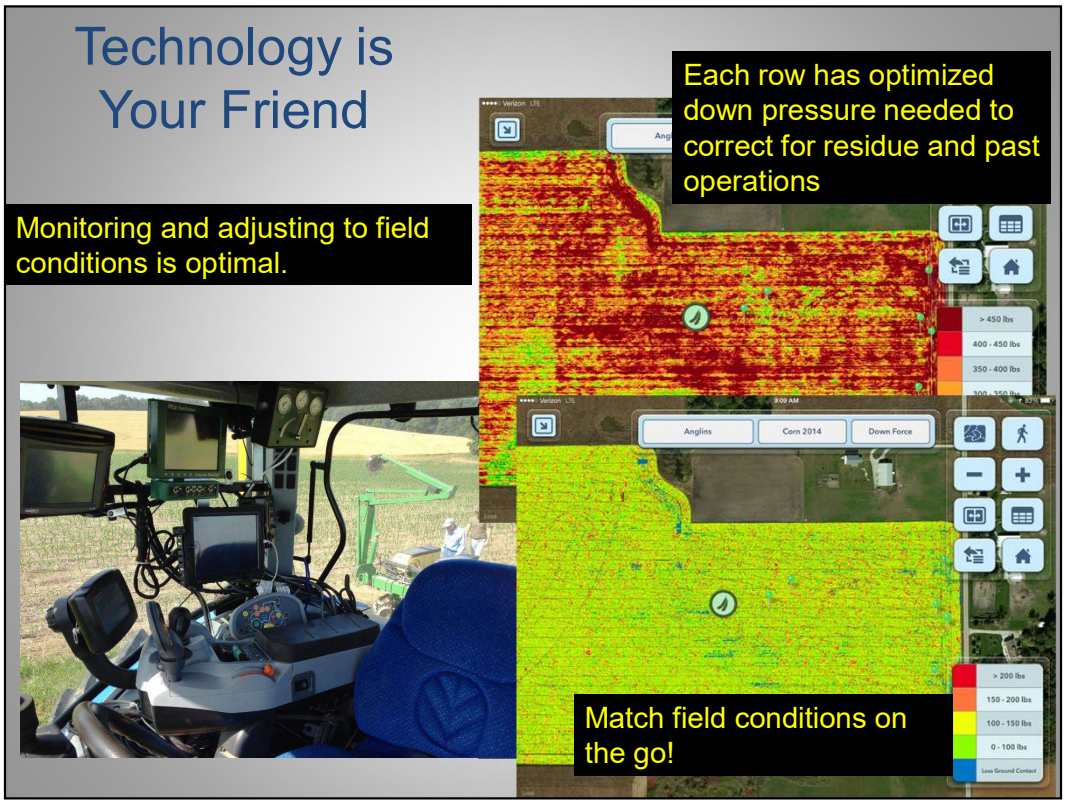


Even if emergence is uneven…providing a consistent nutrient supply and uniform environment will lessen the impact. Studies have shown benefit from as much as 30-45 # of Nitrate nitrogen in the first 45 days (Martens et al) for No-till. Increase this if NT into Grass CC.



While pop-up (in-furrow) is often added to the starter system, it is not a substitute for 2x2 type options that safely deliver higher rates of N and S

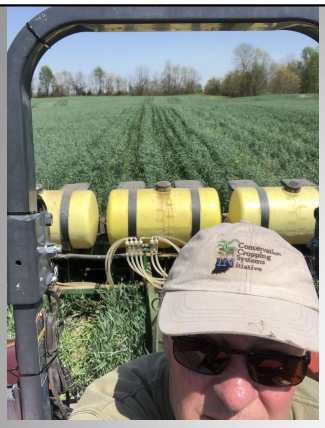
Many options for starter plus many more for pop-up/in-furrow



Planters today are designed to adjust to residue and field conditions in real time by the operator or automated control.

Cover Crops?
…Planting Green?

Planting Green gets a lot of press… ask for audience definitions

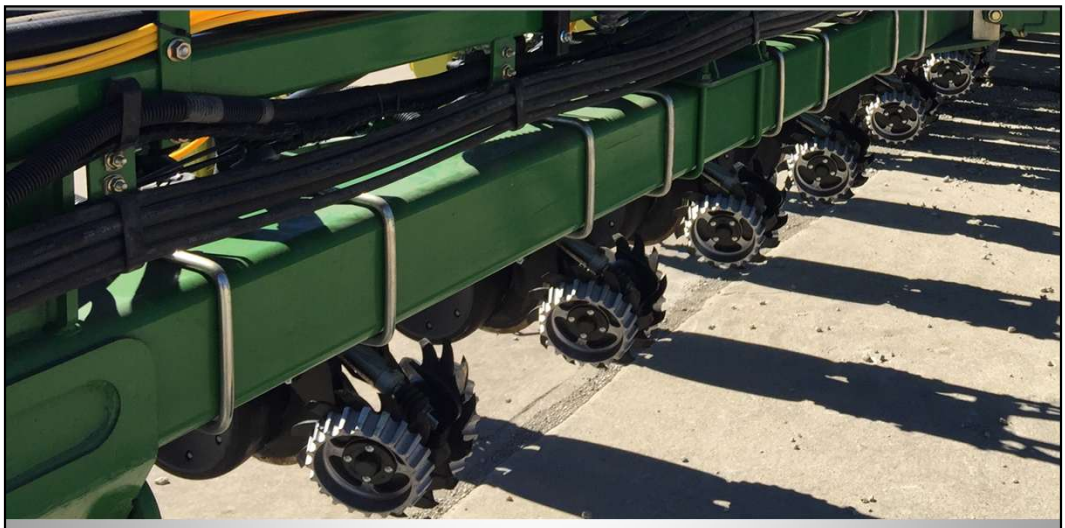


Considerations

- Sharp coulters,
- Fewer spikes and fingers to wrap
- Lots of zip ties

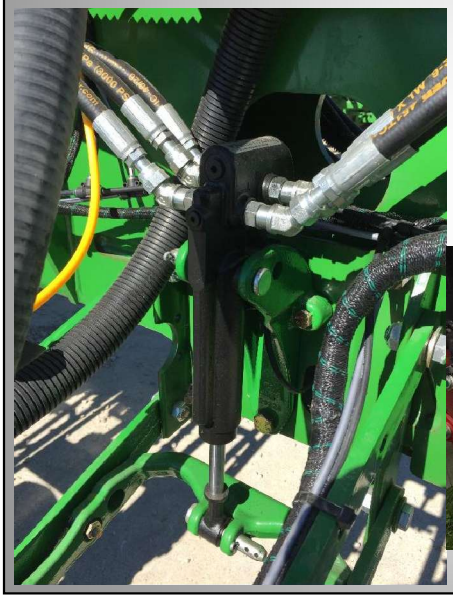
Planting into heavy residue requires coulters to be sharp, fewer spikes and fingers to wrap will likely be better…

Planting “green” can be done early or later, but if termination on high biomass is done preplant, and planting is delayed several days after terminating the results in residue can be that it won’t cut/slice easily, need to wait a week(s) or more



Planting Green Modifications

NT & CC Planter Modifications



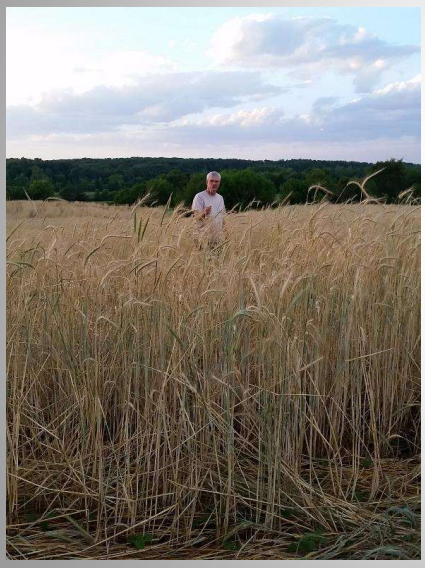
NT+ CC planter attachments- Closing Systems

Lots of options in closing wheels…Weight is a plus!

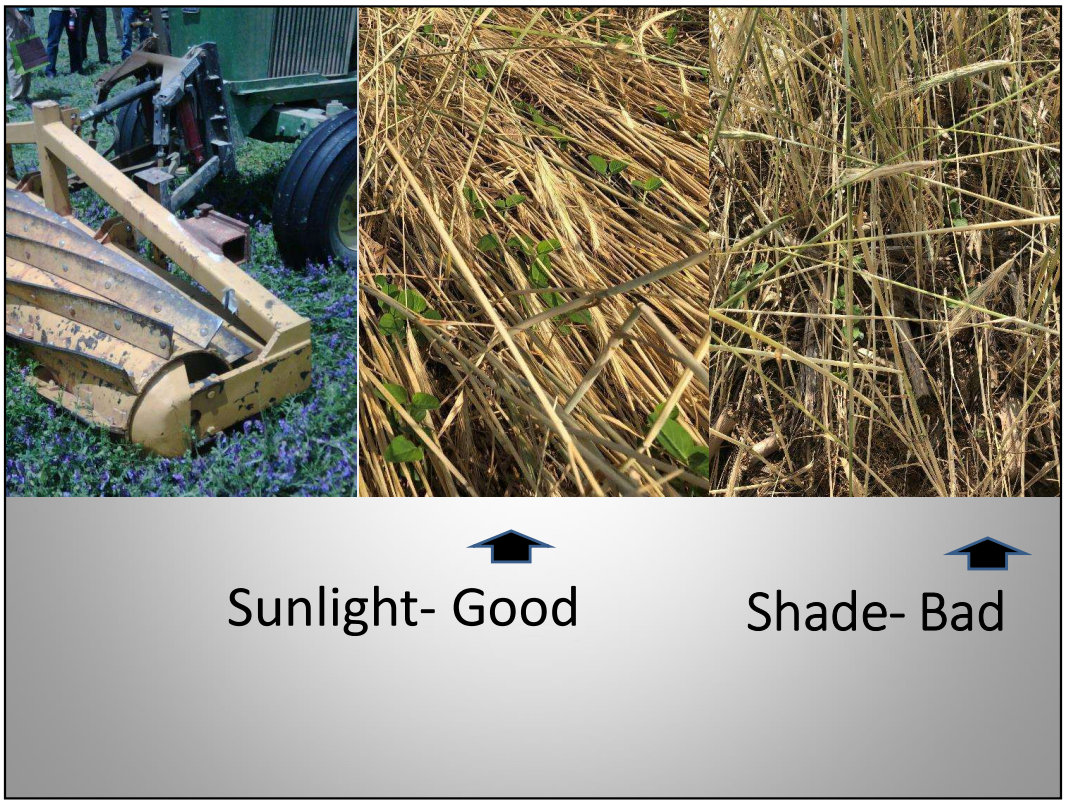
Planting Green Attributes

Look for planters exhibiting “ease of flow”, smooth edges and nothing to cause wrapping

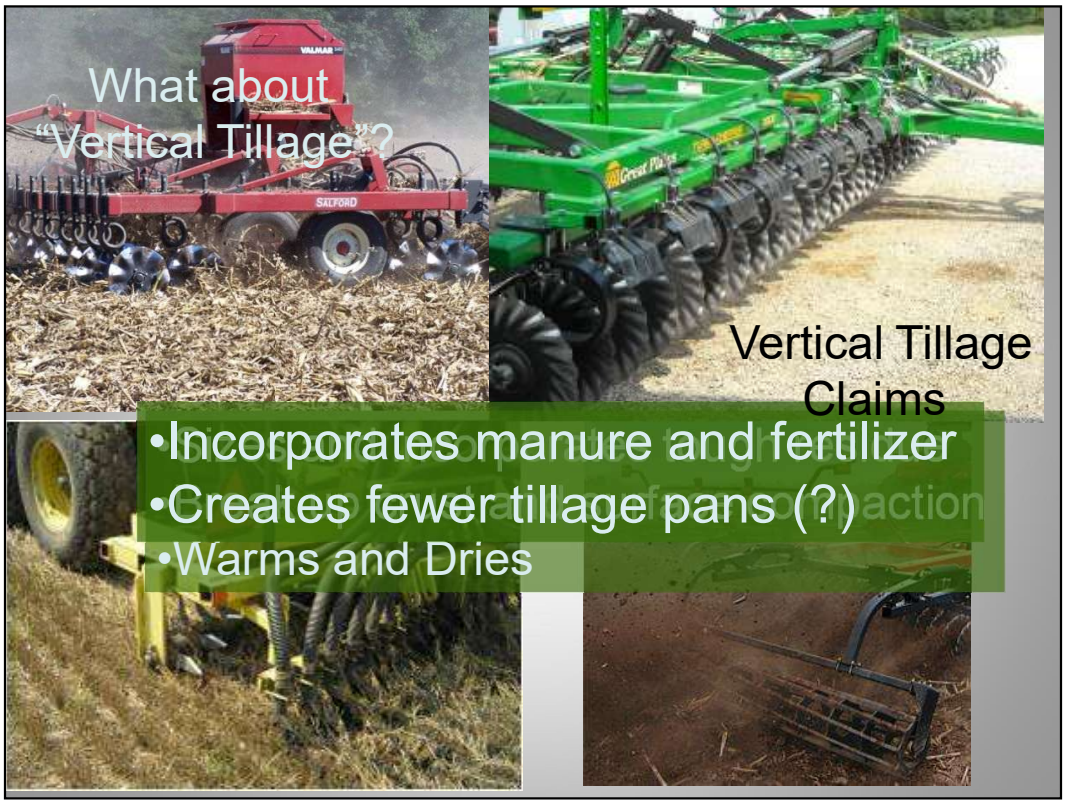
Should you crimp?



Whether to crimp or not depends on the crop, your goals and time of planting. E.g.- corn late planted into cereal rye- yes. Soybeans planted mid may and terminated chemically at planting- not as important



Evaluate the biomass, maturity of CC and weather forecast…if the odds of cover crop causing prolonged shading affect and harvest issues then rolled down might be you best bet.

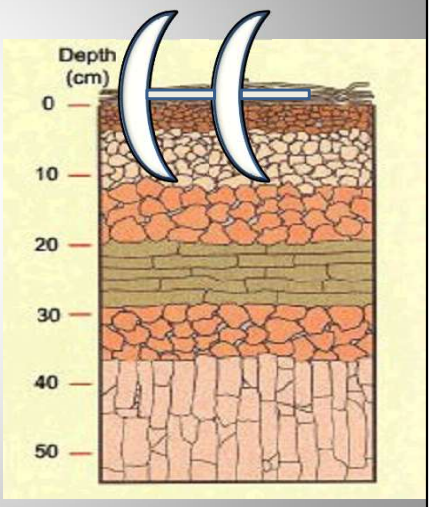


Vertical tillage has recently received much press and promotion, but are all vertical tillage tools created equally and will all deliver the benefits and claims?

Could this be your vertical tillage?

What Vertical Tillage Should Not Do:

- Create horizontal density layers in the soil
- Side to side soil movement
- Bury surface residue



If any component moves soil from side to side or smears the moist soil then it is likely not achieving improved soil structure. Concaved disks set at an angle will create layers and degrade soil aggregates. If it looks like a disk…acts like a disk then it is a disk.

What Vertical Tillage Should Not Do:

•Reduce aggregate stability and pore space

If any component moves soil from side to side or smears the moist soil then it is likely not achieving improved soil structure. Concaved disks set at an angle will create layers and degrade soil aggregates. If it looks like a disk…acts like a disk then it is a disk.

What Vertical Tillage Should Not Do:

- Cause excessive carbon loss (active carbon)
- Biological disruption.

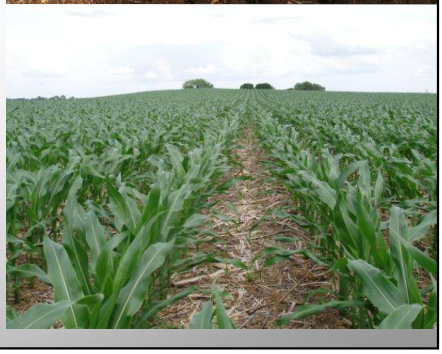
If any component moves soil from side to side or smears the moist soil then it is likely not achieving improved soil structure. Concaved disks set at an angle will create layers and degrade soil aggregates. If it looks like a disk…acts like a disk then it is a disk.

What Should You Expect …if things go right?

- reduced surface compaction
- good surface residue cover/distribution
- vertical soil structure and pores
- minimized carbon loss
- minimized biological disruption.

This should lead to:

- better water and air movement through the soil profile
- Improved nutrient cycling
- Improved productivity and soil function and **yield!**

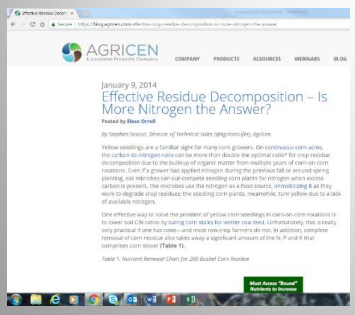


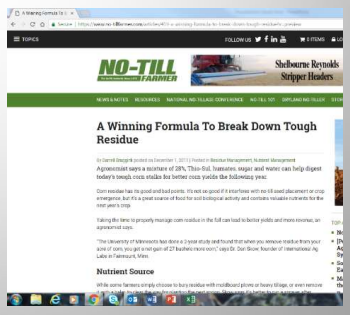
In the end yield should improve with minimal expense in labor, energy, and to the environment.

Improve Your Odds-
Integrate as a Cover Crop Seeder!

Maximum benefit may be as a high speed CC seeder.

What about adding amendments?





Amendment may provide enhanced residue cycling, but not all are created equal. This is an entire session in and of itself.

General preference for veteran NT and CCers is to run the corn head High. Harvest corn plants higher and keep corn stalk standing-allows soil to dry out faster by keeping stalks upright. This leaves a considerable amount of the stalk standing to wick moisture away, let the CC grow and provide habitat for beneficial organisms that cycle crop residues…yes that includes a heard of ruminants.

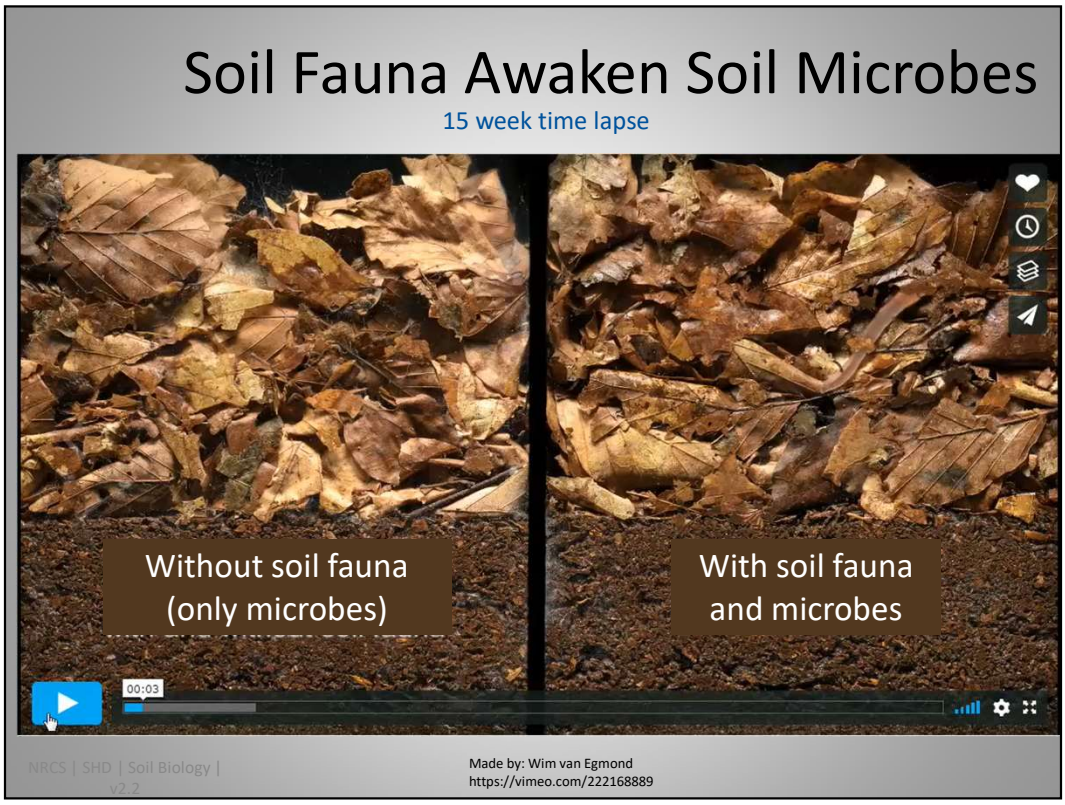
More stalks attached and standing reduces washing and blowing potential as well as less likely to smother the CC.

Always Practice Integrated Pest Management

REMEMBER-

- Scout for beneficials as well as pests
- Preventative treatments will have unintended consequences
- Treat insects and fungi only when an economic threshold is reached
- Macro invertebrates (bugs) and fungi are important residue shredders and digesters
- Healthy biology will do more than steel to cycle crop residues.

Many beneficial organisms that are key to processing residues will exist in a healthy ecosystem. So always practice IPM



The critical role all soil organisms play. Monitoring decomposition over time. Decomposition is much quicker with redistribution of organic matter. Macrorganisms shred and chop away at the material. This same process happens with all residue. When we have a diverse and complex web of soil organisms, we are going to accelerate the decomposition process and bring materials below ground where they can be more utilized by the microbes.

Show the importance of all organisms. Unfortunately it is the larger organisms that are the most sensitive and are impacted by some of the management practices that we do. Such as preventative application of broad spectrum pesticides, intensive tillage, low residue crops and low diversity of crops over time.

****Visualize the importance of aboveground contributions to increasing SOM!!!!**

"Bioturbation is the mixing of (plant) residues into soils and sediments by biotic activity. It is one of the fundamental processes in ecology, as it stimulates decomposition, creates habitats for other (micro)fauna and

increases gas- and water flow through the soil. Here you can see a system without (left) and with (right) soil fauna such as earthworms, potworms, collembola, mites and isopods over a 15 weeks period. During this period, whereas only small fungal activity can be seen on the left side, the layer of leaves on the right side is almost completely incorporated in the soil due to the interaction between microbes, microfauna and mesofauna.

This video is part of the Soil Life in Action project. The movie can be used for education. For other use please contact us.”

Excellent Residue Management Result… Enjoy Great production potential from achieving 4Ss planting goals. With this step in approach soil functions and aggregate stability from the extra biology greatly adds to better water management and reduces the odds of a yield drag…in fact we may (likely) have an improved yield potential with a well planned system!


All Genetic and Tech Advancements are Greatest When Soil Health is Maximized
unlock the
SECRETS
IN THE
SOIL


Questions?
Barry Fisher
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unlock the
SECRETS
IN THE
SOIL