

“Reduced Tillage in Organic Systems Field Day”

Cornell Willsboro Farm, July 31, 2018

Notes from Aaron Gabriel, CCE

The printed resource materials associated with this field day can be found at:
https://enych.cce.cornell.edu/submission.php?id=600&crumb=soil_health|soil_health

Crimping Rye (to plant directly into a mulch weed barrier)

- Rye needs to be planted into weed-free ground
- Need 4 tons/ac rye biomass for it to suppress weeds after crimping
- Crimp before the pollen flies, so that seed is not set
- Hairy vetch matures later than rye and is indeterminate in flowering (flowers over an extended period of time), so it is not a good companion for rye. Wheat and triticale mature later and are better companions for hairy vetch.
- Once crimped do all other field operations in the same direction as the grain is crimped
- You really need to use a crimper. Rolling does not work. No short-cuts to the crimping tool
- You can zone-till into crimped rye (three coulters up front) & trash cleaner
- You need a smooth surface to properly crimp.
- Legumes are not effectively terminated by a crimper

Machinery

- A Landoll with concave discs can rip up a sod with 2 passes, maybe 3.
- Row crop planters need to manage residue up front so that the gauge wheels have a smooth path. This prevents bouncing of the planter and poor planter performance.
- Flail mowers can be used to manage cover crops before planting.
 - Use a flail that runs on the side of the tractor - so the tractor does not flatten what needs to be flailed - and leaves an even mat of residue
 - Flail >zone-builder>Lilliston cultivator is a good system
 - With a flail, legumes can be added to a cover crop mix, since the flail will effectively terminate them.
 - There is less residue when a cover crop is flailed.

- Lemken has a one pass tillage tool, <https://lemken.com/en-us/strategic-tillage/>. Can be used to rip up a sod.
- UVM is examining “under-cutters” to remove a sod. They are used in the Dakotas. Stones are a problem. Timing is critical to not get regrowth.

Cultivation

- Weeds in the row, need to be cultivated before they reach an inch tall
- You need 1” or more of soil to effectively bury small weeds
- Keys to cultivation: weed size; right tool; machinery adjustment
- Cultivation machinery can cut, bury, or pull weeds
 - You can put 3 or more cultivation tools on a tool bar
- The Lilliston hill cultivator works in high residue. The gangs are cleaned from residue as they roll
- For effective cultivation, the crop has to be bigger than the weeds. Banded starter fertilizer may help to give crops an advantage
- Plant row crops deep to allow for pre-emergent cultivations and early cultivations.
- It takes 5 years of a sod to get reduced annual weeds in the crop after sod. Found that 3 years is insufficient.



Roller-crimper: The flutes are a must to be effective; rolling alone will not work. The drum can be filled with water for weight.



Crimp right before pollen is shed. This rye is old and was left for demonstration only.



A flail can also be used to terminate cover crops. It works well on legumes (crimpers do not). There is less residue with a flail, which may be better for some planting and cultivation systems. Flails towed to the side are better, because the tractor has not matted down what it needs to cut.

This tow-behind flail mower tends to windrow the chopped material. Laying it out in an even mat is preferred.



High-clearance inter-seeder. Two rows of cover crops seeded between crop rows.



This power seeder has a rotating cutter to make a slot for seeding. This is an old machine that worked well, but threw rocks.



A Yeomans plow with three shanks for subsoiling. The foot is shaped to disturb the soil. A “finisher can be towed behind it for one-pass tillage. I do not know what the plywood is for.



Zone-builder with trash and hilling attachments. Going slowly will pull up less rocks. The machine will shift sideways to the side of large rocks. Some soils are too rocky for this tool (like Bernardston gravelly silt loam in Arygle, NY)



Planter with three wavy coulters up front for zone-tillage. All the components of a planter, from front to back, must work together.



There are four cultivator tools in line for each row to cut, pull, and bury weeds.



An operator on the cultivator helps guide it. I wonder how many hours you can do that before your eyes blur and your brain melts. Fortunately there are camera guidance systems.