

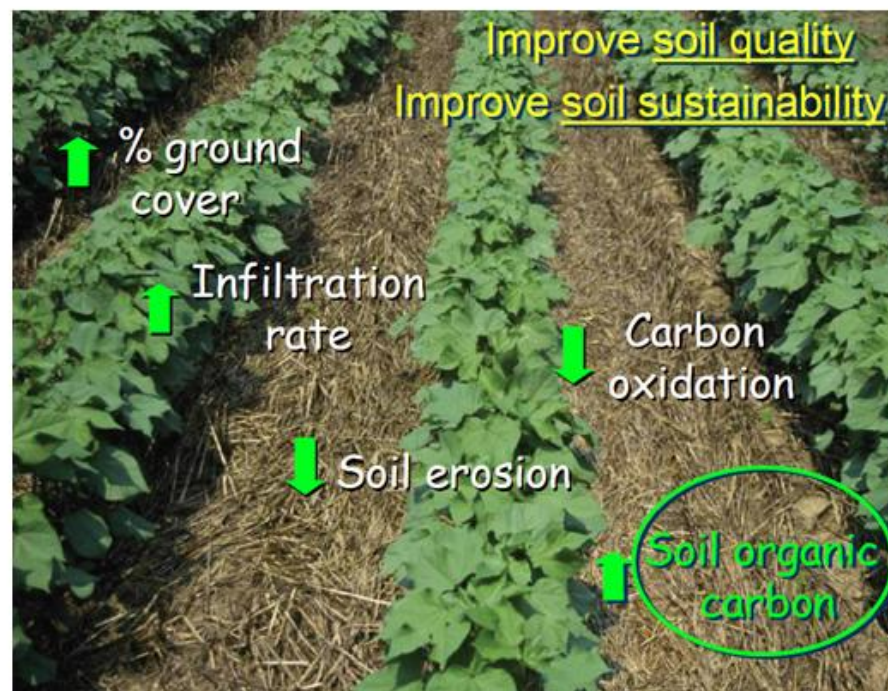
Cover Crop Roller Crimper

Definition:

Cover crop rolling is an advanced no-till technique. Typically, it involves flattening a high-biomass cover crop to produce a thick, uniform mat of mulch. A cash crop is then notilled into the mulch. The rolling process itself will kill the cover crop. This means burndown herbicides can be reduced or eliminated.

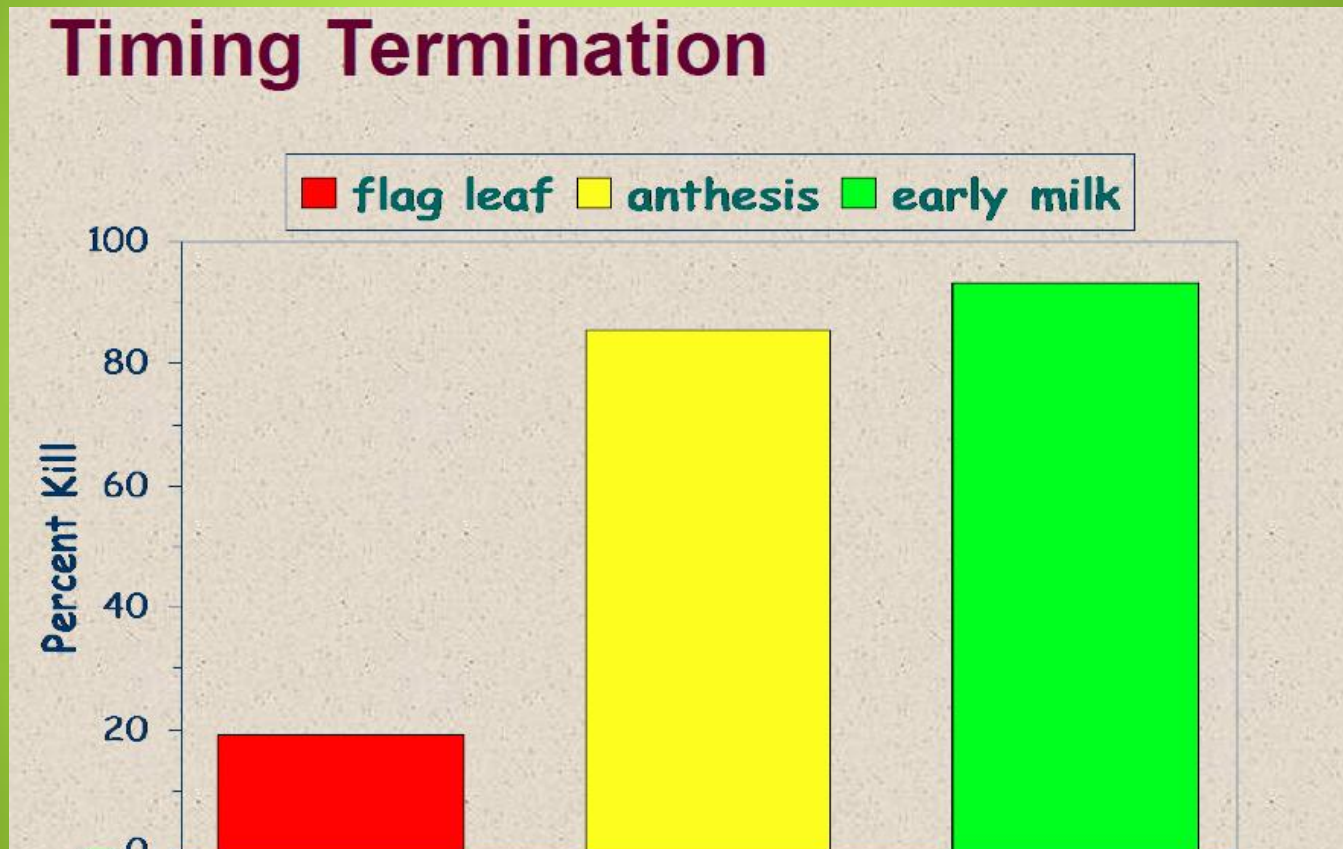
Cover crop rolling has been used for decades on Millions of cropland acres in South America. It has also been used successfully by individual farmers and researchers in Iowa and the Midwest, but has yet to see widespread adoption in the U.S.

-USDA Natural Resource Conservation Service



Rye

Timing Termination



R.L. Raper, National No-Till Conference, 2009.

Chain Rolling in Brazil



The Cover Crop Roller Crimper



Erin Silva, University of Wisconsin Madison

What is Roller-crimping?
Why is it relevant?



Jeff Moyer, Rodale Institute

A little Perspective to Start

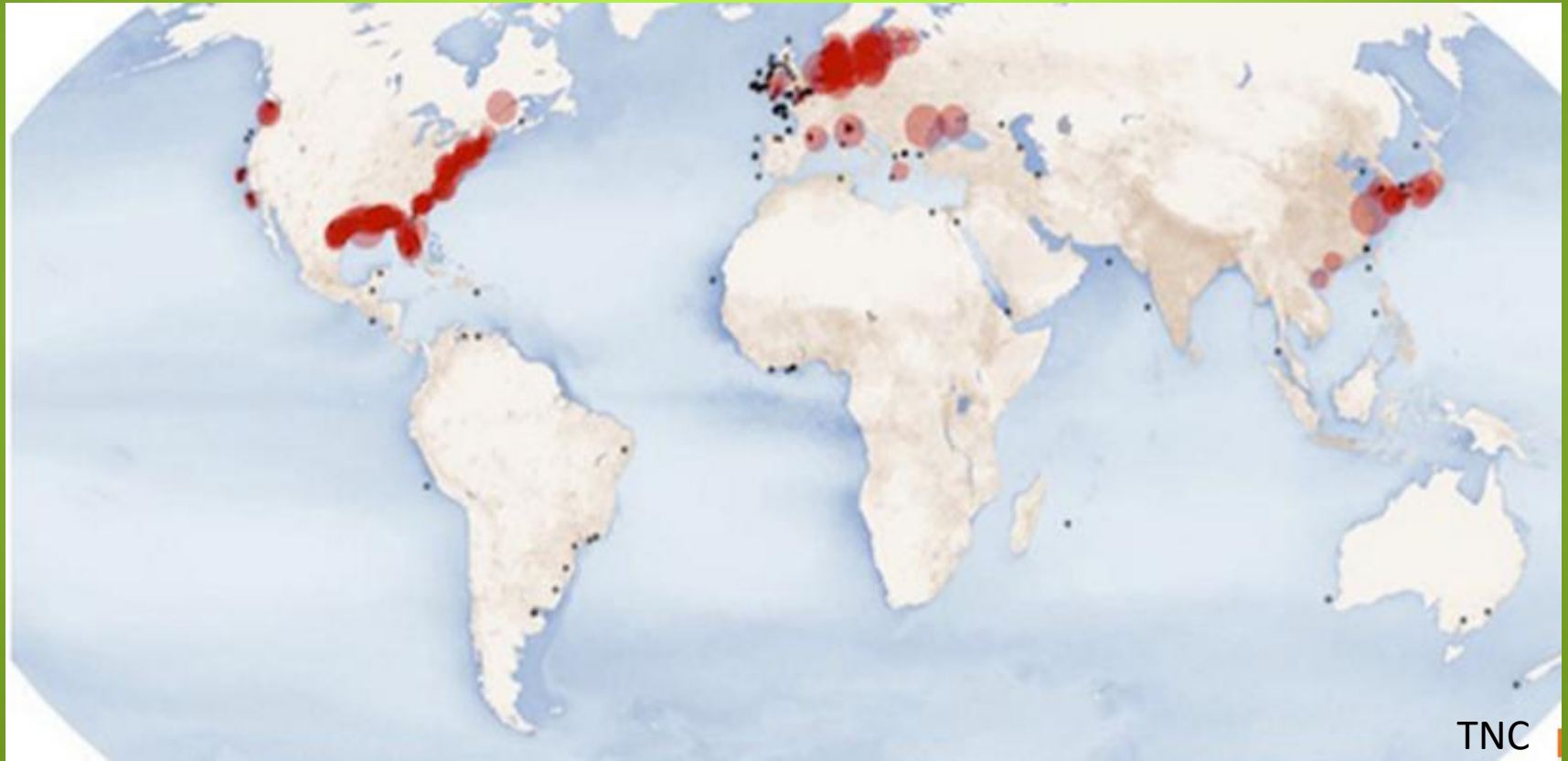


1983 row cultivation of corn

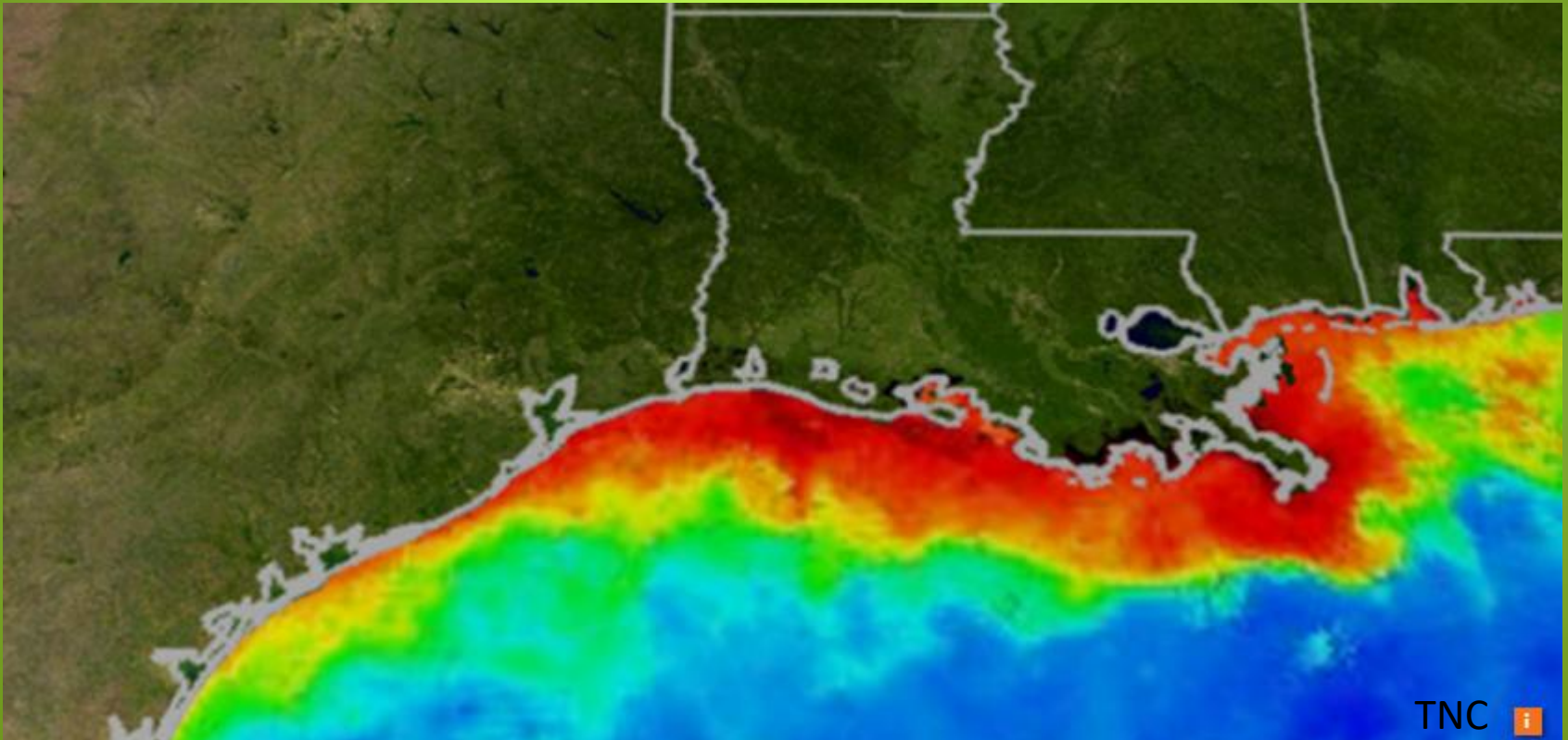


1993 No-till corn into alfalfa

The World's Dead Zones



The Second Largest Dead Zone



The Mississippi Drains 41% of the US



TNC

How much responsibility falls on Ag?

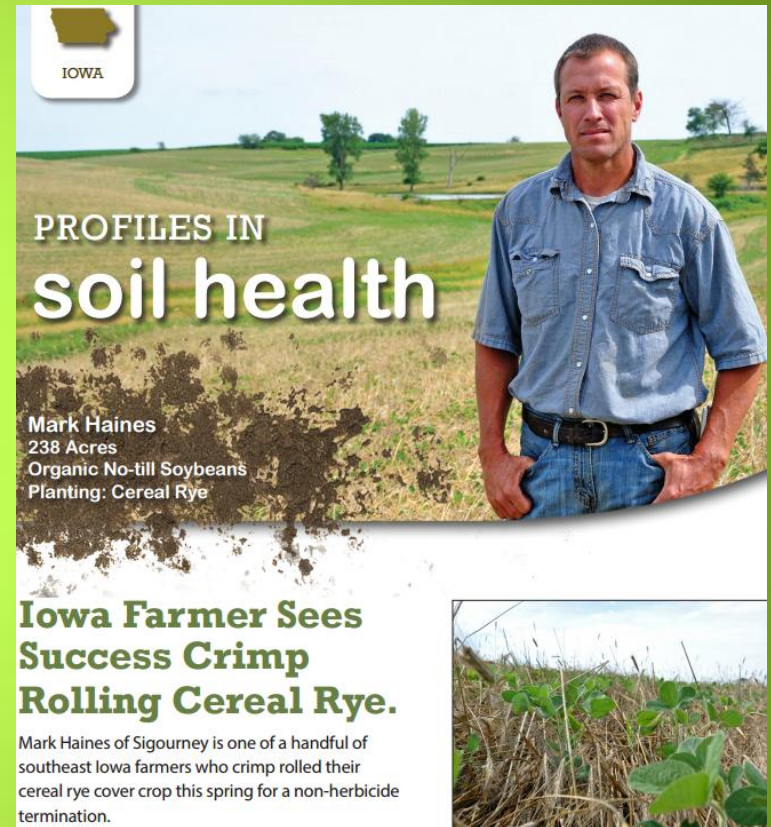


NASA

Benefits

- Improves Soil
- Suppresses weeds
- Improves yields
- Reduces compaction
- Saves water
- **Can make money!**

Iowa Farmer Today



Article by Jason Johnson, USDA-NRCS

Continued...

“The Chevron-pattern on the crimp roller prevents soil disturbance and reduces vibration in the tractor. The blunt edges snap the rye stem without cutting it.”



Photo by Jason Johnson, USDA-NRCS

Continued...

“The group of SE Iowa farmers crimp rolled cereal rye just after, or about 10 days after planting soybeans into the living grass. Many farmers also roll the cover crop and plant simultaneously.”



Photo by Jason Johnson, USDA-NRCS

Alternative Termination Methods

- Naturally
- Chemically
- Mechanically



90 lbs. N

0 lbs. N





Thank you

Levi Lyle

Roll-crimp Iowa

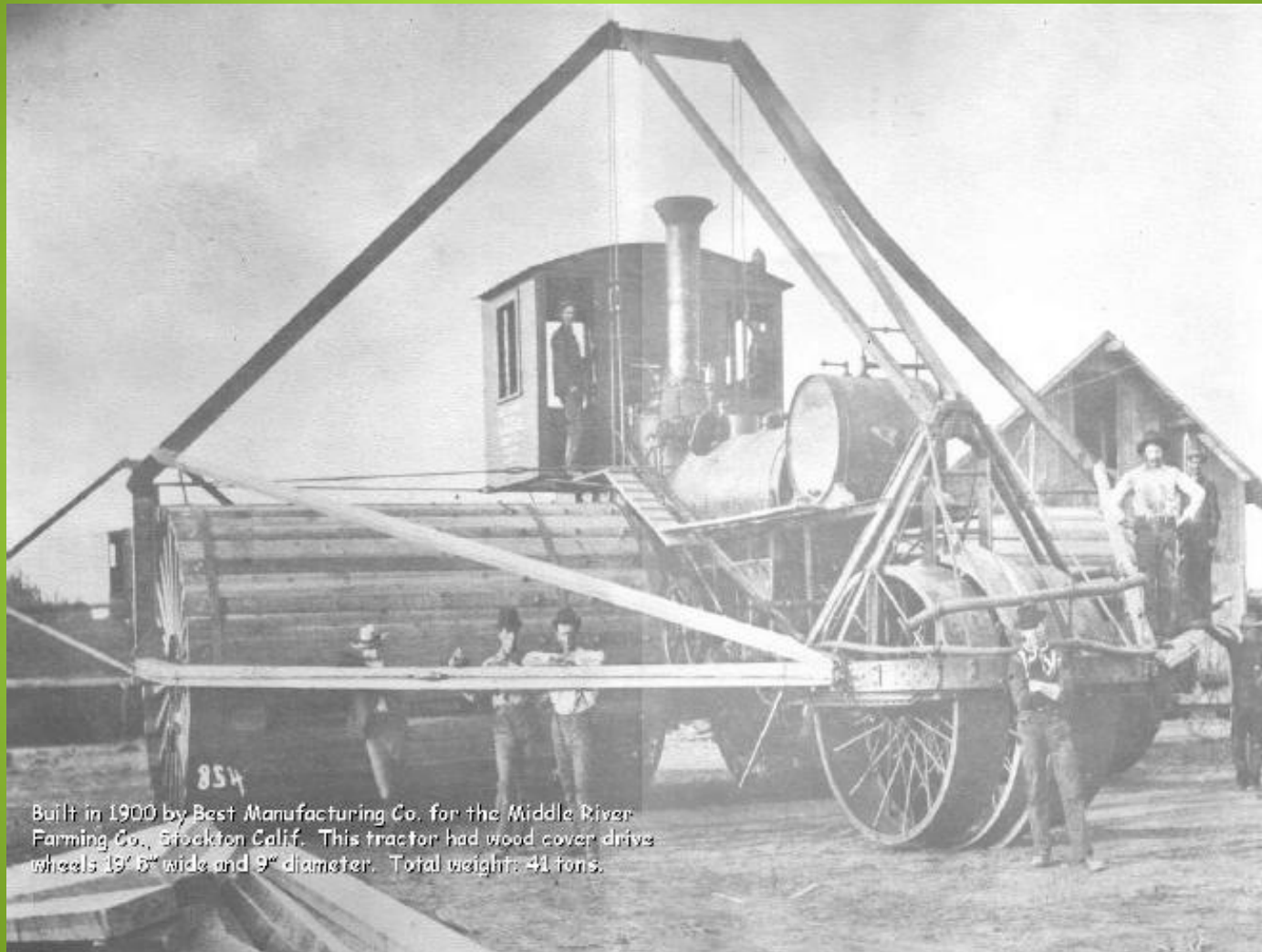
Keota, IA

www.rcimfg.com

Find us on Facebook

and listen to the Roller-crimp song.

The First Roller?



Built in 1900 by Best Manufacturing Co. for the Middle River Farming Co., Stockton Calif. This tractor had wood cover drive wheels 19' 6" wide and 9" diameter. Total weight: 41 tons.

Title

- Developing Sustainable Roller Crimped Cover Crop Systems for No-Till Corn and Soybeans
- Churdan, Greene County, Iowa (15 miles N of Jefferson)
- Two-year Project

Hypotheses

- 1) If cereal rye can develop enough biomass, then after-crimping weed pressure will be minimal in a no-till vs conventional till system before soybeans.
- 2) If a bio-soil enhancer can promote increased microbial activity, then N uptake and nodule development will accelerate canopy formation, facilitate prolonged weed pressure control and improve pest resistance.
- 3) If a bio-soil enhancer can improve fall hairy vetch root formation, then winter hardiness will improve, along with subsequent after-crimping spring N mobilization before corn.

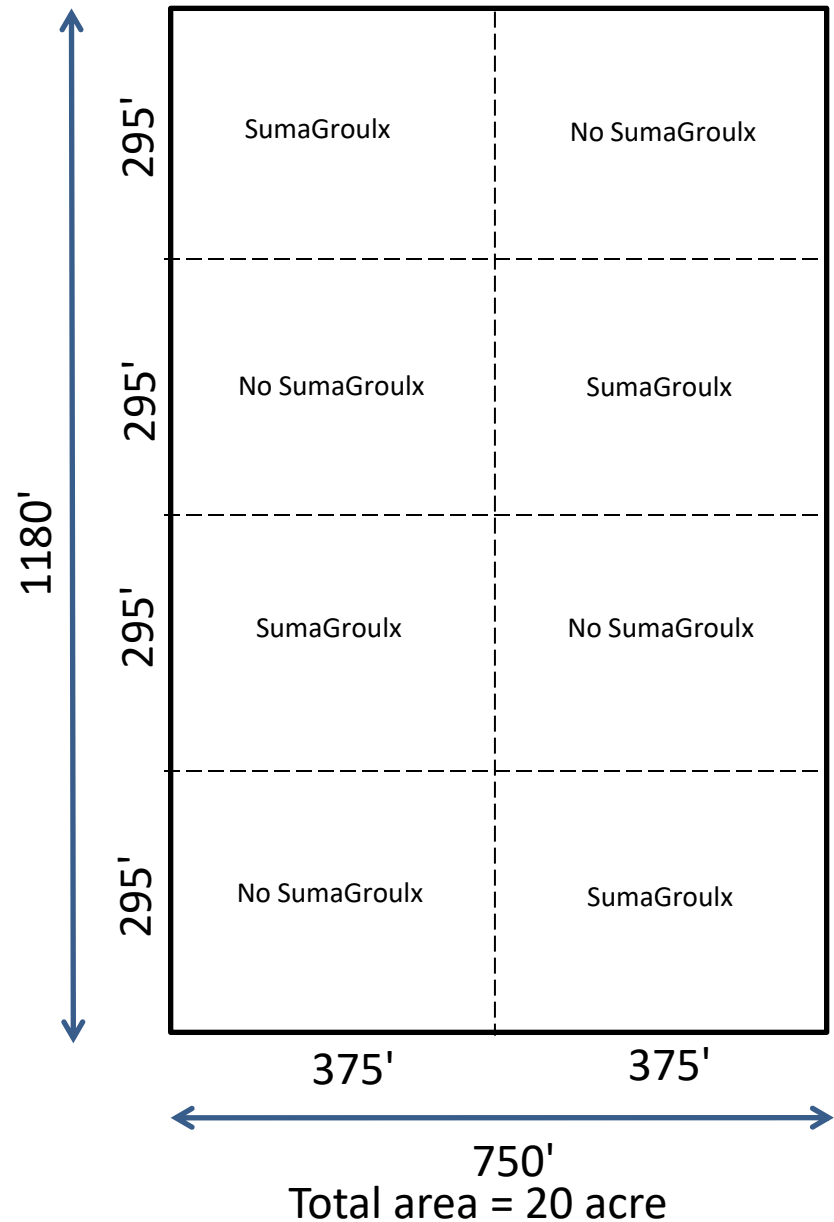
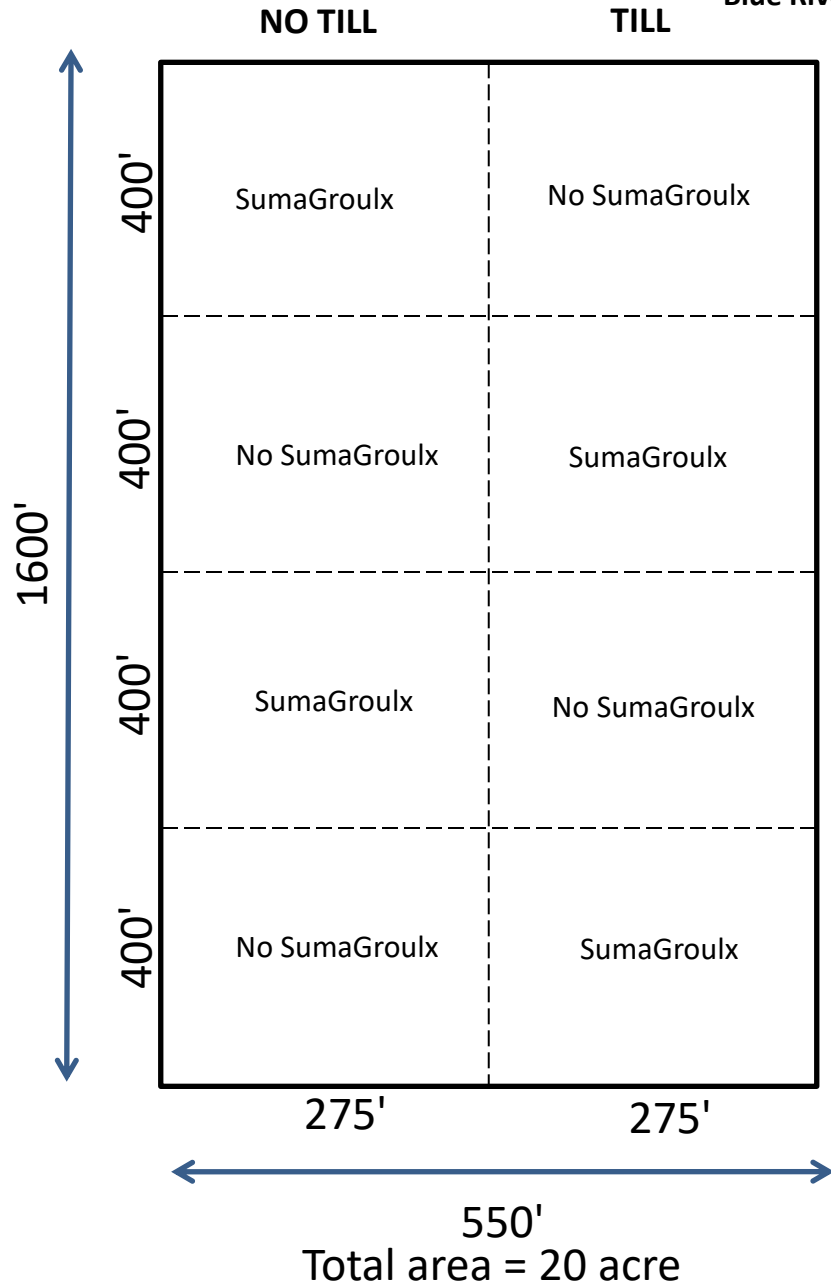
Trial design

- Here is the trial design of 8, 2.5ac plots on each farm with 4 replications of with or without the bio-soil enhancer:

GEORGE'S PLOT

Aphid and Cyst Resistant Seed Mix
Blue River Hybrids 19AR1 and 21C6

BILLY'S PLOT: No-Till



Methods

- Apply cereal rye 9/15/15 into standing corn





Two days



Four days



Nine days



15 days



30 Days



38 days...right after harvest on 10/23/15

Early Spring, 2016



March 12, 2016 at Billy's (3bu/ac)



March 12, 2016 at George's (2bu/ac)



April 20, 2016 at Billy's



April 20, 2016 at George's



5/11/16 at Billy's



5/11/16 George's



5/18/16 at Billy's (about 5' average...20% anthesis)



5/18/16 at George's (about 5' average...20% anthesis)

Roller Crimper Manufacturing











Ready for assembly...15'6" roller crimpers



Planting beans (170k/ac), 15" rows and crimping rye on 5/20/16



5/22...6' tall at Billy's first pass



5/22 crimped twice at George's



5/25/16...3 days after crimping twice at Billy's

Initial Biomass Results

Field	Treatment	rye biomass (kg)	in lbs
BS	Suma	3,396	7,471
BS	No suma	2,370	5,213
GN	Suma	3,463	7,618
GN	No suma	3,345	7,360

Bio-soil enhancer had not been applied yet...just the initial biomass



5/25/16 at George's



Soybean emergence 6/01/16
10 days after planting, 67° soil temp



Soybeans 6/04 at Billy's



Soybeans 6/04 at George's



Tilled beans planted 6 days earlier

6/10/16 bio-soil enhancer application



6/11/16 at Billy's



6/11/16 at George's



6/29/16 Rye regrowth about 10%



7/01/16 at Billy's after mowing



7/01/16 at George's after mowing...tilled beans on right were planted 6 days earlier



7/10/16 at Billy's



7/10/16 at George's



7/21/16 at Billy's



7/21/16 at George's



8/07/16 at Billy's



8/07/16 at George's



8/15/16 at Billy's from rear of field looking south



8/15/16 at George's (caught up with tilled field)



Underground livestock doing their thing 9/03/16



9/06/16 at Billy's



9/06/16 at George's



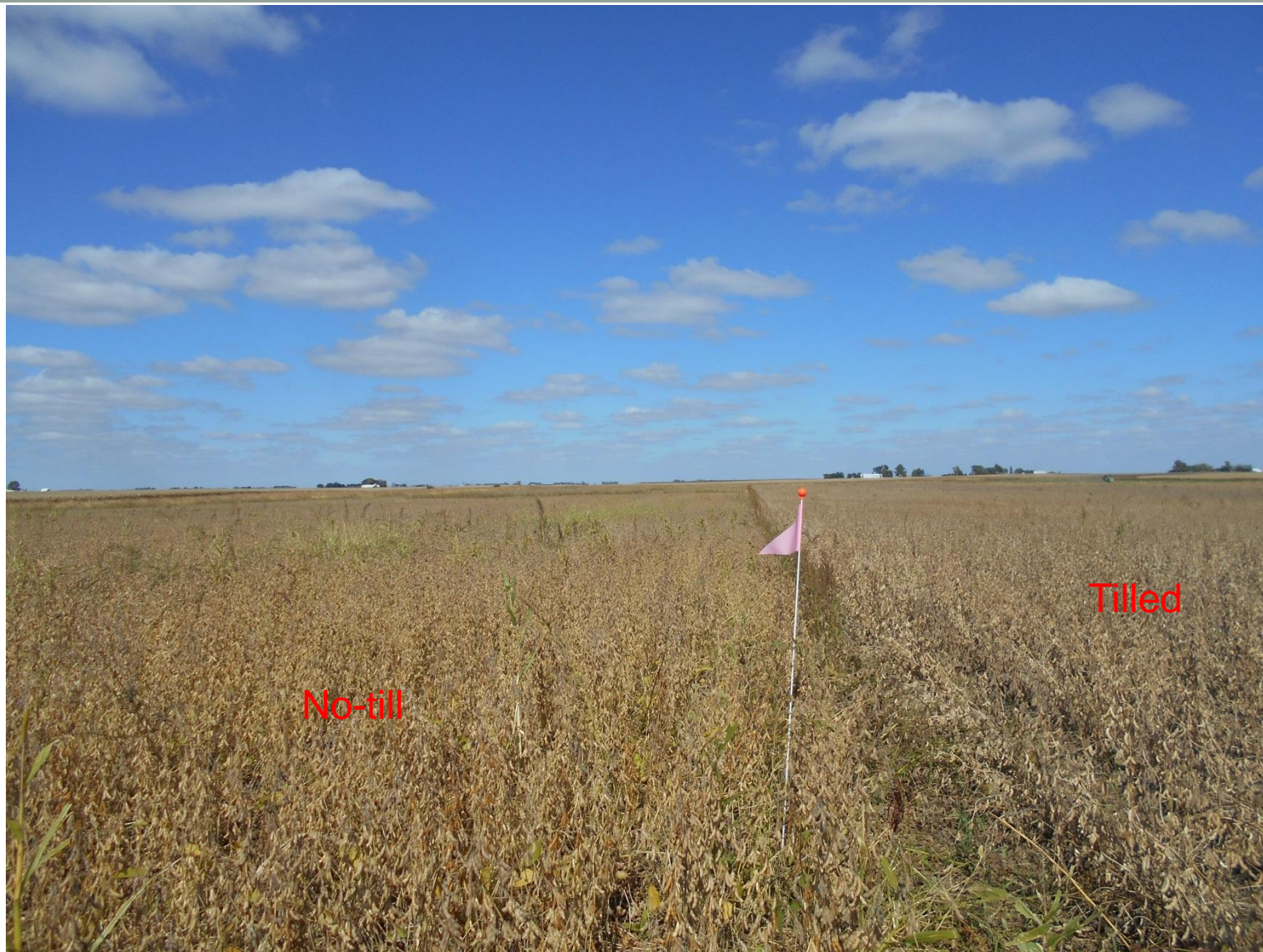
9/20/16 at Billy's



9/20/16 at George's



10/01/16 at Billy's



10/01/16 at George's



9/25/16 Vetch/Oats at Billy's...flown on 9/13/16
31lbs vetch and 2bu oats per acre



9/25/16 another pic of the Vetch/Oats



9/25/16 Vetch/Oats at George's tilled field



9/25/16 at George's...no Vetch/Oats portion of tilled field



10/08/16 weighing plot-yield samples at George's

Original Hypotheses

- 1) If cereal rye can develop enough biomass, then after-crimping weed pressure will be minimal in a no-till vs conventional till system before soybeans. (confirmed)
- 2) If a bio-soil enhancer can promote increased microbial activity, then N uptake and nodule development will accelerate canopy formation, facilitate prolonged weed pressure control and improve pest resistance. (very possible)
- 3) If a bio-soil enhancer can improve fall hairy vetch root formation, then winter hardiness will improve, along with subsequent after-crimping spring N mobilization before corn. (not sure yet)

What we've learned so far

- **Cultivar selection** ...winter hardy *AND* early maturing. We crimped at the 25 - 50% anthesis rate due to incoming storms and the later maturing cultivar (Rymin). Using an earlier maturing cultivar (Aroostook or Elbon) and waiting until a higher rate of anthesis would lessen the need to crimp twice.
- **Planting rye** ...drill vs broadcast. This depends upon harvest date. Broadcast provides better distribution of seed and cover when there is adequate moisture. Drilling provides better assurance of germination in drier conditions, but with gaps, which tend to offer enough light for weed growth.
- **Biomass** ...retains moisture, provides adequate weed suppression and builds organic matter. Three – four bu/ac seems necessary to provide adequate biomass for weed suppression and prolonged allelopathic effects.
- **Anthesis rate at crimping** ...the higher the level, the better initial termination. However, in comparison to some neighbors who crimped at a higher level of anthesis, yields and weed suppression effects did not differ.

Work plan for next year

As a cover crop, we aurally applied a combination of oats and hairy vetch onto each of the soybean fields on 9/13/16. The bio-soil enhancer was ground applied on trial plots 10/17/16.

We want to determine if the bio-soil enhancer helps the hairy vetch to over-winter and the extent to which N mobilization reduces the need for any additional fertilizer.

Growth records and soil-health data collection will follow a similar protocol as in Year 1.



Vetch growth 10/31/16 at Billy's

Take Away

- Roller crimping offered an alternative non-chemical mechanical approach to termination of a rye cover crop
- Density of the rye stand was a primary factor in termination rate
- Thinner stands were more resistant to termination at lower levels of anthesis and provided less weed suppression
- The bio-soil enhancer showed promise to facilitate accelerated nodule development, enhanced root growth, improved overall soil health and higher yields