



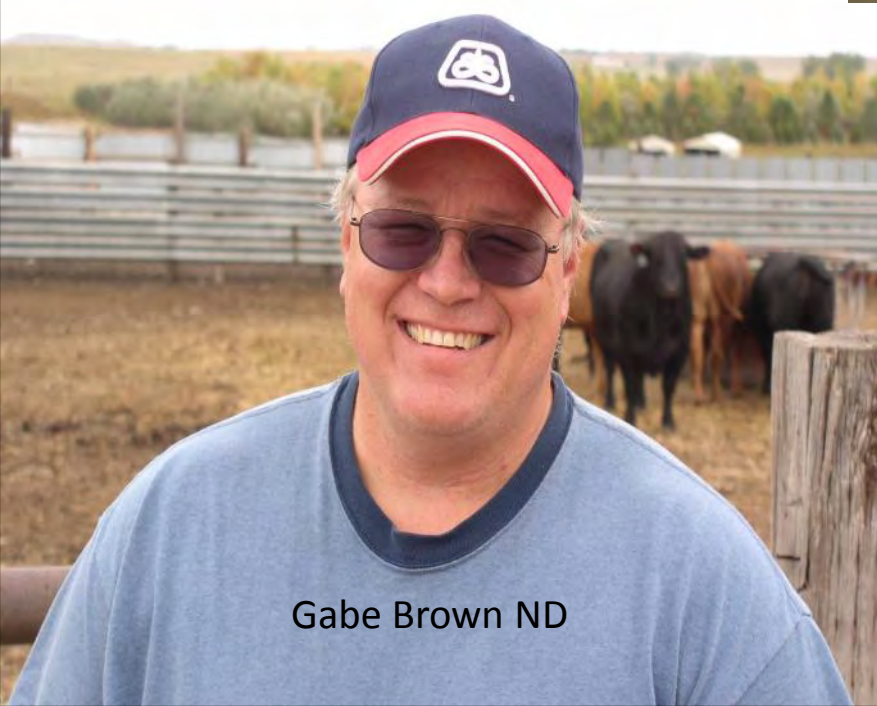
Ray Styer NC



Dave Brandt OH



Steve Groff PA



Gabe Brown ND



Ray McCormick IN

<http://vimeo.com/channels/raythesoilguy>



Burleigh County  
Soil Conservation District

**ADVANCING SOIL HEALTH**

—Menoken Farm—

[www.bcscd.com](http://www.bcscd.com)

Established 2009

### Technical Resources

- ▶ Contacts for Programs and Technical Resources
- ▶ Common Resource Areas
- ▶ Conservation Planning Forms, Assessments and Quality Criteria
- ▶ Ecological Sciences/ Technical Resources
  - Agronomy
  - Air Quality
  - Biology
  - Cultural Resources
  - Economics
  - Energy
  - Engineering
  - Environmental Compliance
  - Forestry
  - Nutrient Management
  - Pest Management
  - Plant Materials
  - Range & Pasture
  - Snow Survey
  - Soil Survey
  - Water Forecasting
  - Water Quality
  - Water Resources
- ▶ Electronic Field Office Technical Guide (eFOTG)
- ▶ Electronic Government
- ▶ FedBizOpps
- ▶ Geographic Information Systems (GIS)
- ▶ Idaho Practice Standards
- ▶ Idaho Maps



Managing for soil health is one of the easiest and most effective ways for farmers to increase their [productive soil health checklist for growers](#) (PDF; 935 KB) and learn what might be a p

### Idaho Soil Health YouTube

- [Soil Health: evaluating aggregate strength](#)

Idaho NRCS agronomist Marlon Winger describing the soil aggregate test that helps define soil health.

### Idaho Soil Health PowerPoint Presentations

- [Beyond the Beginning](#) (PDF; 3.16 MB) **New 1-30-13**
- [The Biology of Soil Compaction](#) (PDF; 728 KB)
- [Cover Crop Periodic Table](#)
- [Farming in the 21st Century](#) (PDF; 962 KB)
- [Soil Chemistry by Rick Haney](#) (PDF; 5.6 MB)
- [Cover Crops for Soil Health by Marlon Winger](#) (PDF; 12 MB)
- [General Soil Biology by Ray Archuleta](#) (PDF; 30.4 MB)

### Idaho Soil Health References



Auburn Alabama, Corn planted into crimson clover cover crop





Auburn, Alabama 2007

Cotton planted in rye cover crop

## Common Resource Concerns

- Adequate soil armor
- Expanding crop diversity
- Enhancing soil organic matter
- Improving infiltration
- Increasing nutrient cycling





Why wind breaks?







Treat the Symptom or the Problem  
Soil Health is the KEY



- Radish
- Soil OM
- Benchmark 1.7% OM
- Now 3.7 to 4.3 % OM







New Producer: Rancher not a farmer. BM 30 yr conventional crops – 40 yr pasture, needs to renovate . Using full season CC to transition.



Platy soil, from years of conv. tillage

“our tillage is now the radish plant”







Gabe Brown: 13 way cover crop mix,  
Rotation: grain corn, pea, spring wheat /cover crop, soybean, full season cover crop that is grazed in the winter,  
Live plant growing in the field as long as possible.



# Mob grazing







When radish hits a hard spot



Sandy soil (92 % of sand) – Saint Pierre des Corps – France (47° 23' North Latitude)

Conventional Tillage (10 years)

No-tillage (10 years)

Soil temperature

- 4°C = 24 °F

Air Temperature at noon

8°C at noon

Soil temperature

+ 4°C = 39 °F

Air temperature

8°C at noon

Why do we still have a thicker layer of snow on the plot under CT than in NT?

29 1 2006



Jaron, Raybould – St. Anthony ID

Planted 9/7/12

40 DAP = Oct 17





CCPI – St. Anthony field office: 1,000 acres of cover crops

“If you do nothing you still have nothing”

Gabe Brown = 40 cover crops

Sid Hanks = 8 cover crops / 2 mixes



Crimson clover: St. Anthony , 150 lbs /A



A. Peas: St. Anthony 650 lbs /A





Arugula / Turnip  
Planted after potato  
harvest



Sid Hanks: Turnip/ Pea







Peas & Turnips August 10, 2012 St. Anthony ID

) Radish, crimson clover, peas, proso millet – 2013) going to plant potatoes into cover crop residue





319 grant used to buy no till drill in Mahler County, OR

2010: 2,267 acres planted

2011: 1,640 acres planted W Wheat into Alfalfa stubble

2012: 1,100 acres planted



Idaho Falls, bench  
Stripper header





Nezperce, ID  
Multi-species mix



“Every crop has a unique set of organisms associated with it, and the organisms gravitate to that crop”. D. Tanaka, ARS-USDA







Cool Season Early Cover crop	Seed rate PLS/A
Barely	8
Oat	5
Lentil or Vetch	2
Pea	15
Clover, Crimson	1
Radish	2
Canola or Rape	1
Turnip	1
<b>Total</b>	<b>35 Lbs /ac</b>

Warm Season cover Crop	
Pearl Millet	3
Sudangrass	4
Buckwheat	3
Safflower	2
Radish	2
Turnip	1
Canola	1
Spring Lentil	2
Pea	15
Crimson Clover	1
<b>Total</b>	<b>34lbs / ac</b>



Kevin Seitz, Nezperce, Id  
Soil health tour, July 2013





Drew Leitch Nezperce, ID 2013  
3 cover crop mixes and fallow





Wayne Jones, Moscow, Id  
1<sup>st</sup> year multi-species cover crop





Oct 2012 – April 2013  
22 workshops - 1,200 participants

103 EQIP applicants in 2013  
Idaho NRCS EQIP Soil Health Initiative  
1.5 Million \$\$. \$\$





# Cover Crop Periodic Table

Cool Season Plants						Warm Season Plants			
Grass		Broadleaf Plants						Grass	
Barley								Pearl Millet (wk)	
Oat (wk)	Arugula						Amaranth (wk)	Foxtail Millet (wk)	
Ryegrass	Flax (wk)						Buckwheat (wk)	Proso Millet (wk)	
				Legumes					
Wheat	Rape	Turnip (wk)	Field Pea	Chickling vetch (wk)	Medic	Chickpea (wk)	Sunflower (wk)	Sudan grass (wk)	
Cereal rye	Kale	Radish (wk)	Lentil	Red Clover	Ladino clover	Cowpea (wk)	Safflower (wk)	Teff (wk)	
Triticale	Canola	Beet	Spring Pea (wk)	Crimson clover	Bean (wk)	Soybean (wk)	Chicory	Grain Sorghum (wk)	
Annual Fescue (wk)	Mustard	Tyfon (wk)	Vetch	Sweetclover	Alfalfa	Sun Hemp (wk)	Squash	Corn (wk)	

(wk) = winter killed



6 way mix: wheat, turnip. radish,  
soybean, cowpea, sudan grass

Planted: July 25, 2012





Marsing, ID  
Deruyter dairy & McIntyre Farms



















Great Plains

*Precision Seeding System*

DANGER

NT

DANGER



Interseeding cover crop mix (5way) into standing grain corn, Winter grazing









Tex Creek, Wildlife mgt area,  
Idaho Dept of Fish & Game Idaho Falls, Id  
13 way cover crop mix – Great plains no-till drill  
Improve forage diversity for wildlife





# 8 way mix

## PMC Aberdeen, ID<sub>(23 DAP)</sub>



J.C. “Every type of plant exudes substances from its roots that attract specific microorganisms. The more diverse the community, the more extensive will be its services”.

Cover crop	PLS, LBS / ac
Hairy Vetch	5
Austrian Pea	15
Crimson clover	2
Red clover	1
Winter wheat	10
Oats	5
Turnip	1
<u>Radish</u>	<u>2</u>
Total	43 lbs



# 8 way cover crop mix PMC, Aug 22, 2012 (42 DAP)





# Forage Radish yield data

## PMC, Aberdeen, ID 2011

Radish planted 8/17/11

Harvested 11/17/11 (90 days after planting)



90 day yield

**Soil  
Buster**

**Daikon**

leaf

root

leaf

root

#/ac dry #/ac dry

#/ac dry #/ac dry

Pearl Farm	2587	1717	2565	2118
Home Farm	1516	1204	1695	1427
avg	2052	1461	2130	1773





# Cover crops - Price, UT

Planted Sept 9, Harvested May 15 & June 4

<u>Forage Species</u>	<u>Tons /Acre <sub>100% DM</sub></u>
Rape	5.1
Kale	4.5
Cereal Rye	4.3
Triticale	4.0
Austrian W. Peas	3.6
Winter Wheat	3.1
Hairy Vetch	2.3
Italian Ryegrass	2.1





# Legume cover crops

- Biological nitrogen fixation  
 $2,000 \text{ lbs biomass} \times .04\% = 80 \text{ lbs N /A}$



Peas



Crimson clover



Hairy vetch



Specific Rhizobium





2<sup>nd</sup> most important biological process?  
Nitrogen fixation

What is the most important biological process?



Pea



Vetch



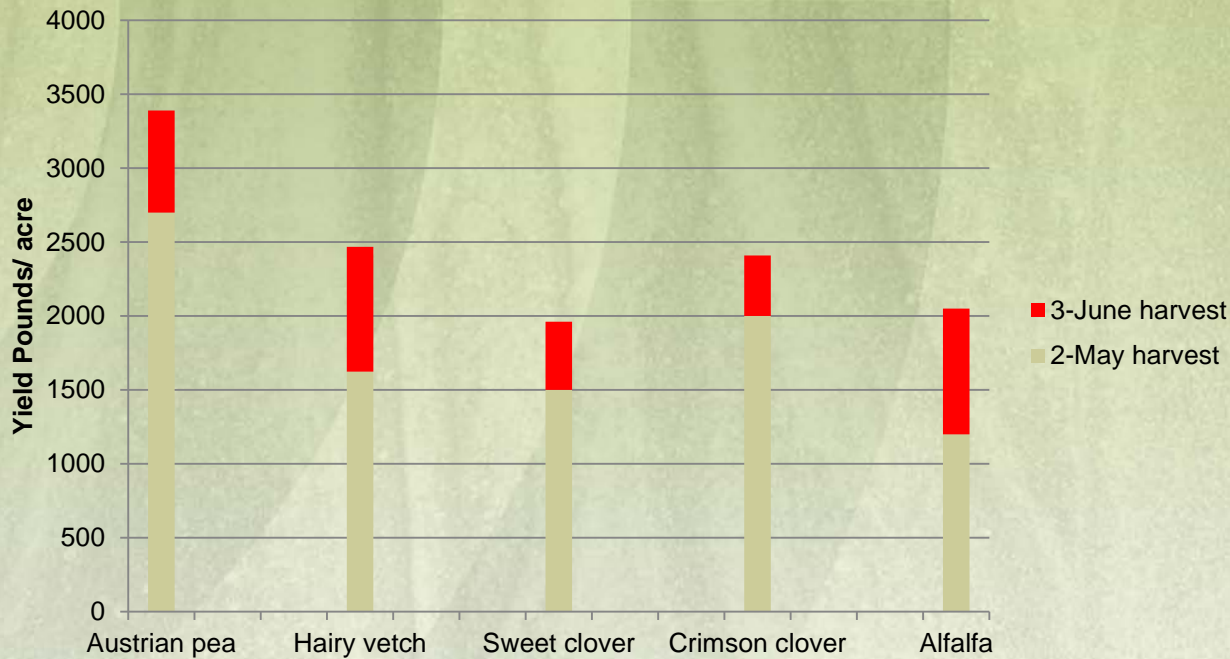


# Cover crops –

PMC Aberdeen, ID



## Cover Crop Trial 2011



Crimson clover



# Cover Crops (irrigated)

Aberdeen, ID PMC 2010-11



Planted Aug 19, 2010

Harvested: Nov 12, 2010

<u>Forage Species</u>	<u>Tons /Acre</u> <small>100% DM</small>
Rape, Sterling	5.3
Forage Radish, Daikon	5.2
Turnip, Purple Top	5.2
Mustard, Pacific Gold	4.9



Turnip



Mustard

Radish



Arena Valley, ID  
cover crop: winter wheat – following potatoes





Strip Till: alfalfa for seed, seeded into WW cover crop, Nampa ID





Strip till; Beans into Wheat stubble, Hazelton, ID





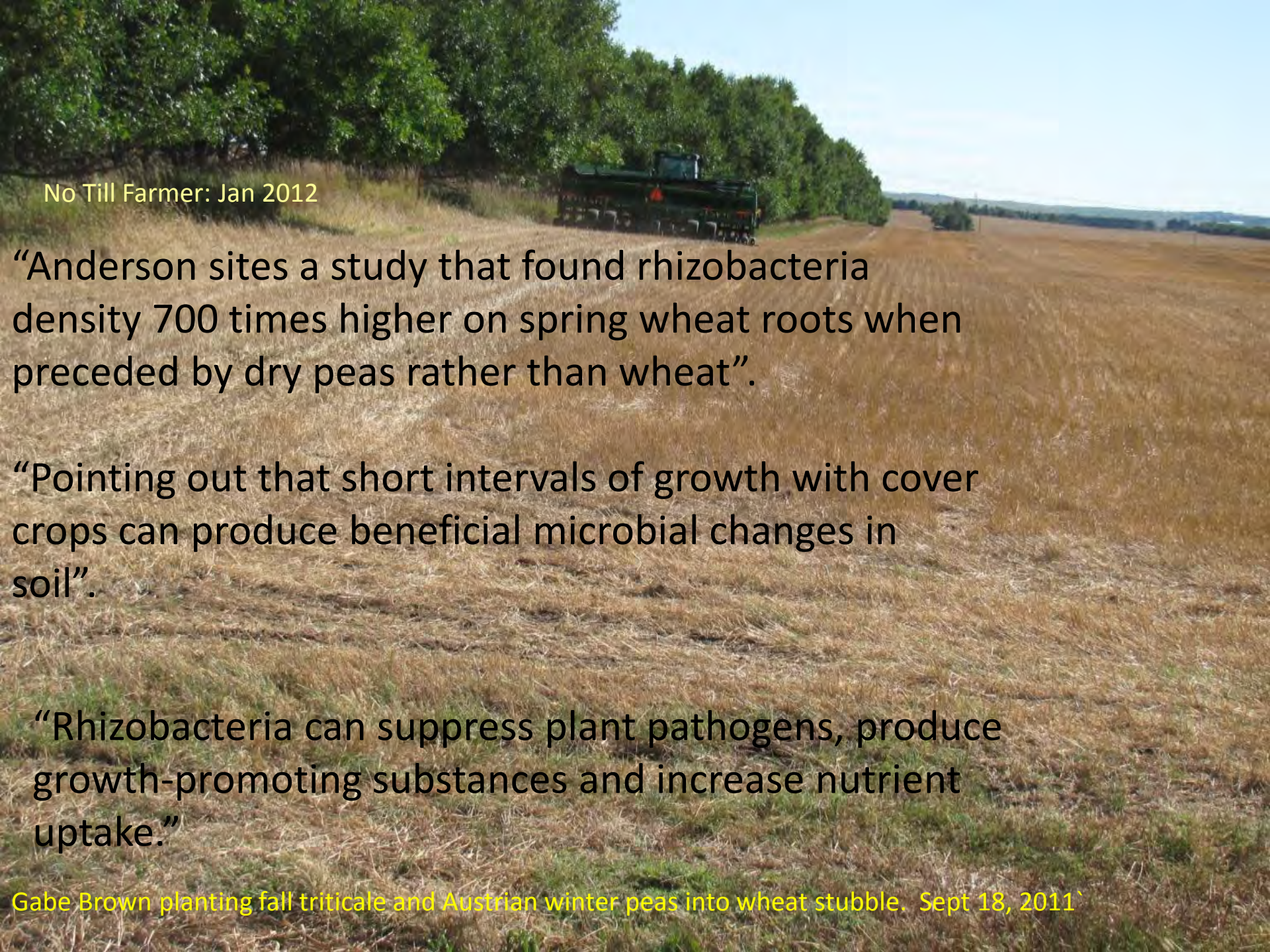
Example : 5 Way cover crop mix

Cover Crop	Seeding Rate
Turnip	1
Radish	2
Austrian Pea	15
Hairy Vetch	5
Small grain	20
Total	43



Emmett, ID  
3 way mix  
Oats, Vetch, Peas





No Till Farmer: Jan 2012

“Anderson sites a study that found rhizobacteria density 700 times higher on spring wheat roots when preceded by dry peas rather than wheat”.

“Pointing out that short intervals of growth with cover crops can produce beneficial microbial changes in soil”.

“Rhizobacteria can suppress plant pathogens, produce growth-promoting substances and increase nutrient uptake.”

Gabe Brown planting fall triticale and Austrian winter peas into wheat stubble. Sept 18, 2011`



Took off the residue managers, no  
coulters





# Strip Till Equipment



Schlagel



Orthman



Campbell Tractor sold  
5, 12 row units in  
2012



Twin Diamond, Strip-Cat



Soil and residue is undisturbed from harvest to planting except for a tilled strip of the crop row.

*2011 sugar beet summer field day in Burley, ID  
8 companies demonstrated strip till machines*





Fremont county, ID



BYU Idaho



Case IH SDX



John Deere 1895 drill



John Deere corn planter



01/01/2004






Ray Styer  
Rockingham County  
North Carolina





 Roll down the cover crop



 Spray Roundup on Cover Crop



Cover crop after: rolling and spraying

 Plant Crop



How Ray Does It!





Ray Styer uses cheap and undependable  
government labor  
to roll down his cover crop





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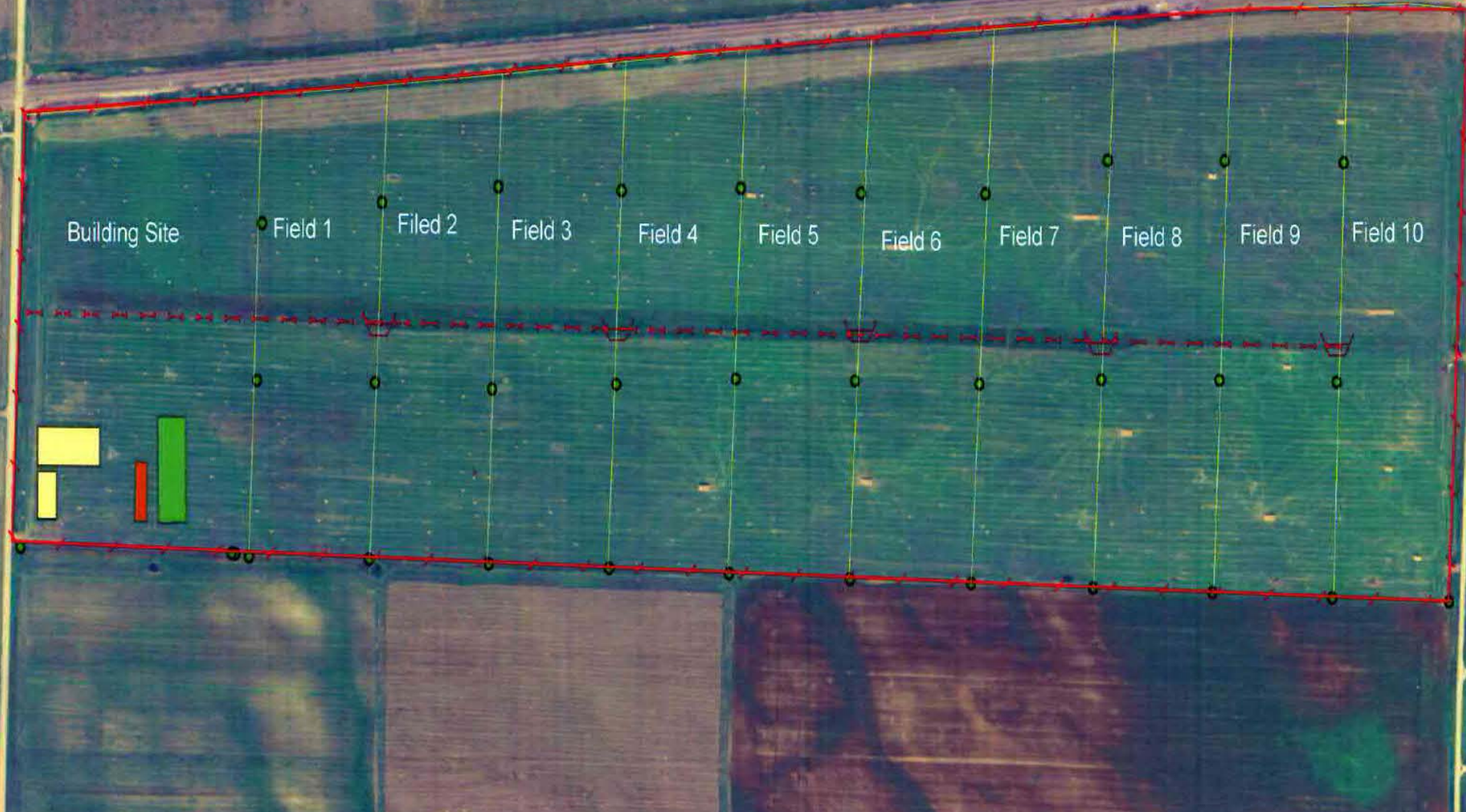
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Established 2009



# Menoken Farm





This picture is of Burleigh District's 127 acre Cover Crop Farm and building. Farm plots are field size.



Cover crop mix







# September 4, 2009

## No Commercial Fertilizer



- Sunflower 1 lb
- Soybean 15 lbs
- Cowpea 10 lbs
- Turnip 1 lb
- Radish 2 lbs
- Proso Millet 4 lbs
- Pearl Millet 4 lbs
- Sweet Clover 1 lb





Planting Corn Into Last Year's Cover Crop Residue  
May 20, 2010







## **West Side**

No Commercial Fertilizer

No Compost

No Compost Tea

122.3 Bushels per Acre

## **East Side**

No Commercial Fertilizer

1-2 Ton of Compost

2 Compost Tea Applications

128.8 Bushels per Acre

# **The Menoken Farm**

**Power of Crop Diversity**

**Both Sides were Planted into Last Year's Cover Crop Residue**

2006 – 2010 Burleigh County FSA Committee Reasonable  
Yield Established by Year = 100 Bushels per Acre