Integrating Cover Crops into the Northern Corn Silage System

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Cover Crops

Plants seeded into agricultural fields, whether within or outside of the regular growing season with the primary purpose of improving or maintaining ecosystem quality.

Older definitions stated cover crops of no economic value!

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Crop Rotation

A common farming practice where different series of crops are planted in the same area each sequential season.

Today may also include crops grown in the off-season (cover crops).

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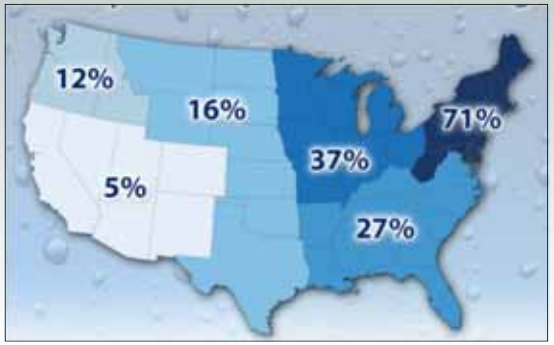
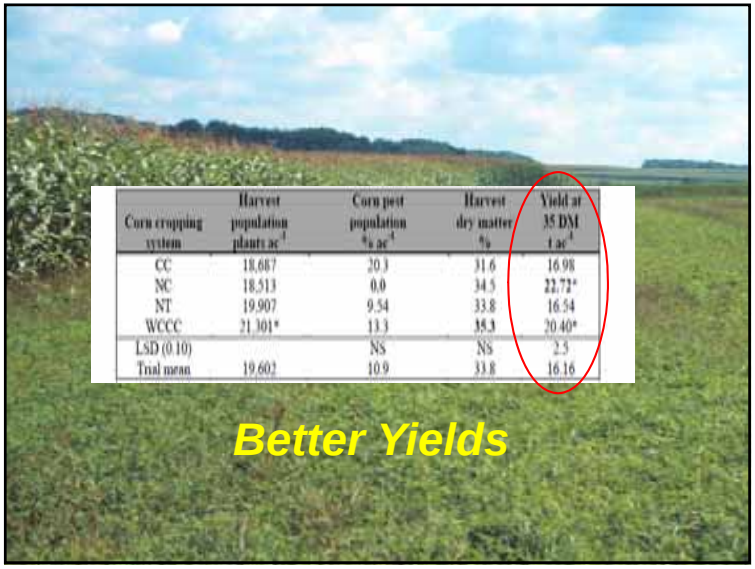
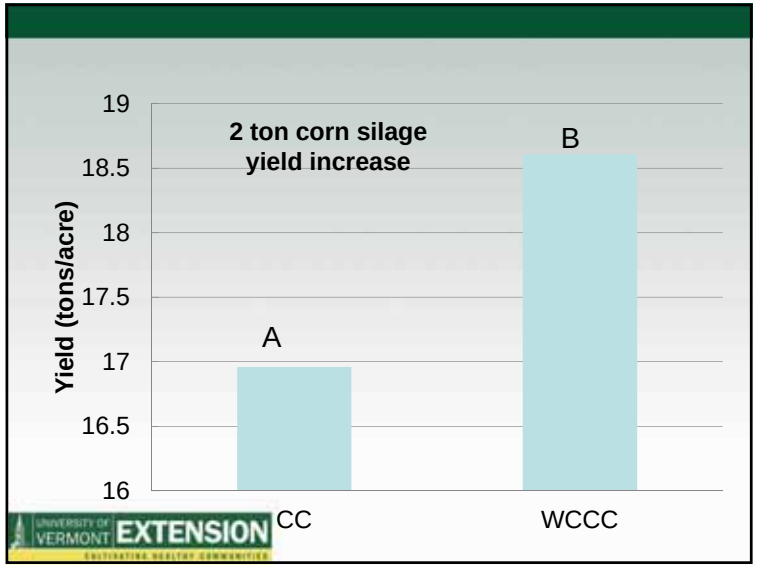
Trends in Extreme Precipitation



Increase in the number of 2" rainfalls per year from 1958 to 2011



Corn cropping system	Harvest population plants ac^{-1}	Corn pest population % ac^{-1}	Harvest dry matter %	Yield at 35 DM t ac^{-1}
CC	18,687	20.3	31.6	16.98
NC	18,513	0.0	34.5	22.72*
NT	19,907	9.54	33.8	16.54
WCCC	21,301*	13.3	35.3	20.40*
LSD (0.10)		NS	NS	2.5
Trial mean	19,602	10.9	33.8	16.16



What is the value of Your topsoil?

Why are YOU just giving it away?

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GOING RATE: $36 per ton FOR TOP SOIL

- T = 3 TO 5 TONS/ACRE - I ESTIMATE I WAS LOSING 5 TONS MINIMUM ANNUALLY
- 1 TON OF TOPSOIL HAS 2.3 LBS OF NITROGEN AND 1 LB OF PHOSPHOROUS. N=$.63/LB AND P=$.64/LB. FERTILIZER VALUE/TON OF SOIL LOSS IS $2.10/TON
- I WAS LOSING $38.10/TON
- $38.10 X (T IS) 5 = $190.50/ACRE LOSSED
- ON MY 40 ACRE FIELD I WAS LOSING $7,620/YEAR

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Soil Quality

Treatment	Organic Matter	Water stable aggregation	Active carbon	Potentially mineralizable N
	%	%	mg kg^{-1}	ug N g^{-1} d soil
No cover crop	4.46a	22.1b	676b	11.1a
Cover crop	4.42a	39.0a	701a	12.3a

Cropping System Soil Quality

Corn cropping system	Aggregate stability %	Available water capacity (m/m)	Surface hardness psi	Organic matter %
CC	23.9d	0.24a	145b	3.4b
NC	45.7bc	0.25a	153b	4.0b
NT	50.5ab	0.24a	158b	3.7b
WCCC	38.7c	0.21b	123c	3.6b
PF	56.2a	0.25a	196a	4.2a

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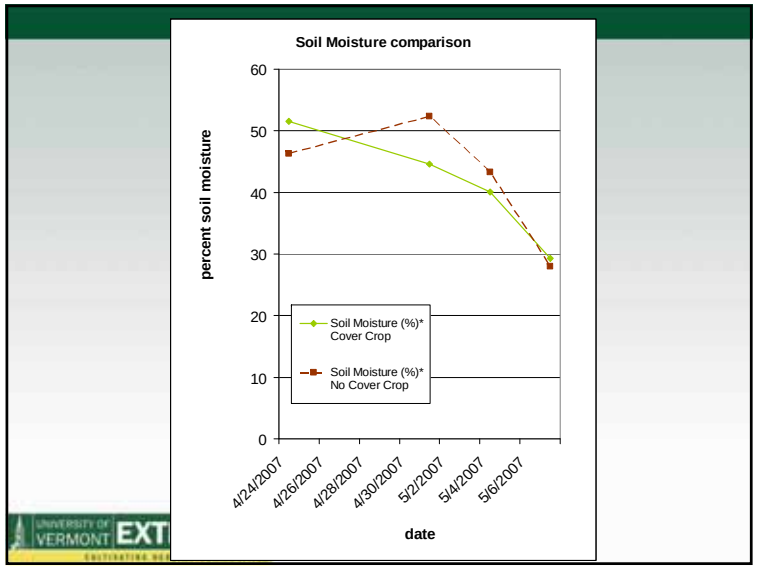
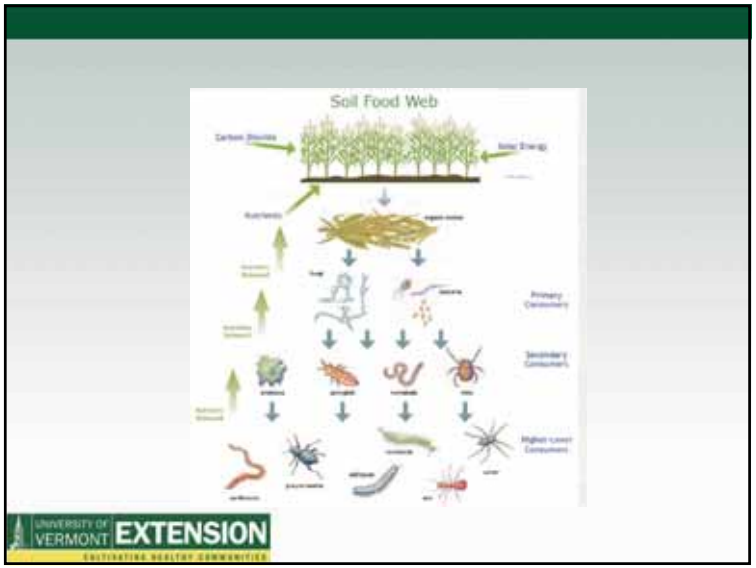
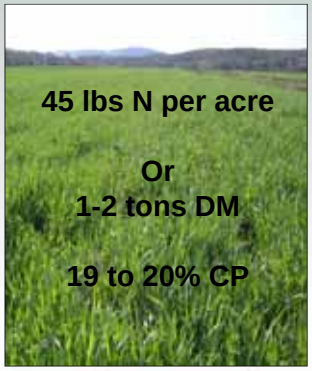
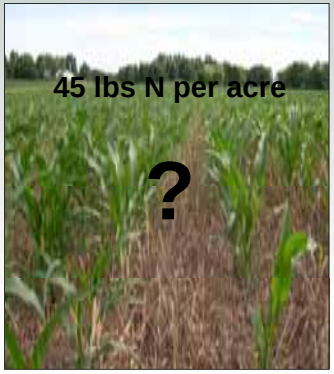


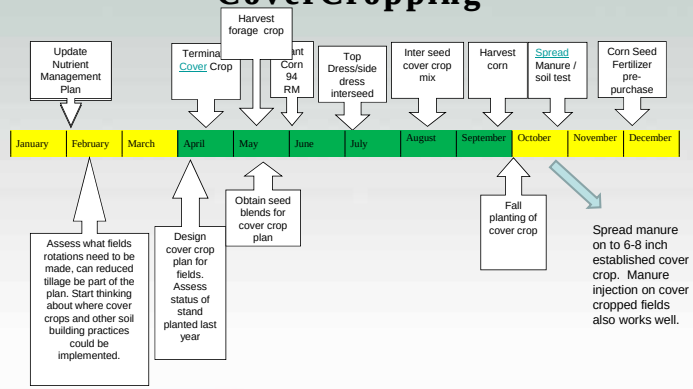


Cover Crop Termination





12 Month Cropping System for CoverCropping



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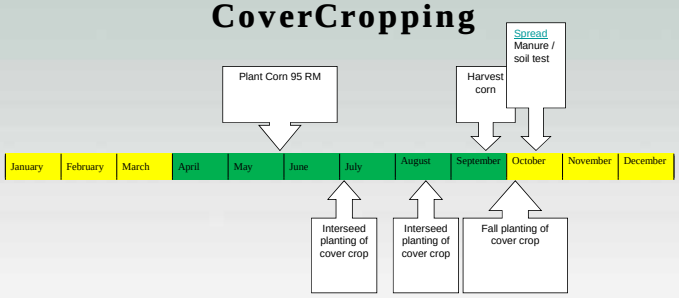

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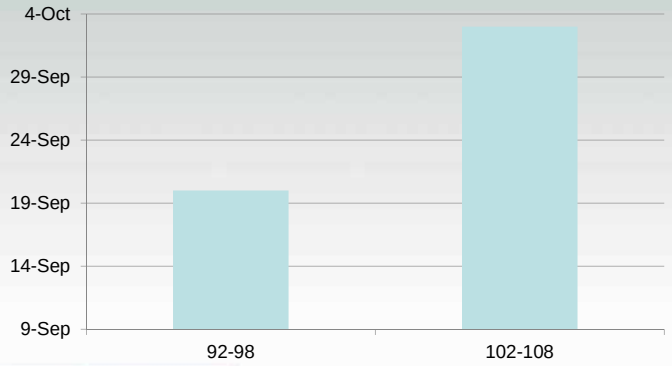
Harvest Dates of Corn



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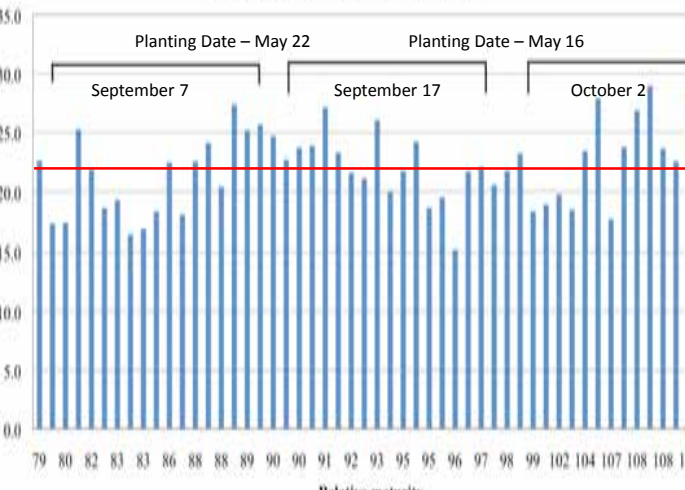
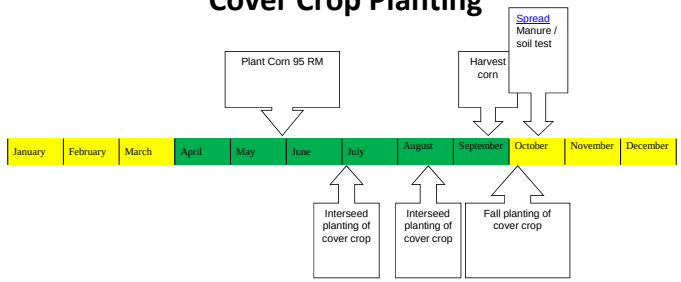
Corn yield by relative maturity, 2012



Cover Crop Planting



Cultivation

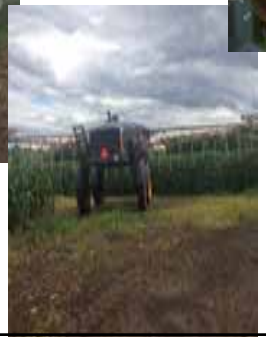
Retooled rotary hoe. Source: https://www.no-tillfarmer.com/articles/5191-retooled-rotary-hoe-interseeds-

Drill Interseeders (V4-V8)

Penn State Interseeder

High Clearance (V4-Harvest)

Cost effective



Seed to soil

Weather

Late Season Interseeding

- https://youtu.be/S2GTPdoGJ4I

Aerial Application

Quick Seed to soil

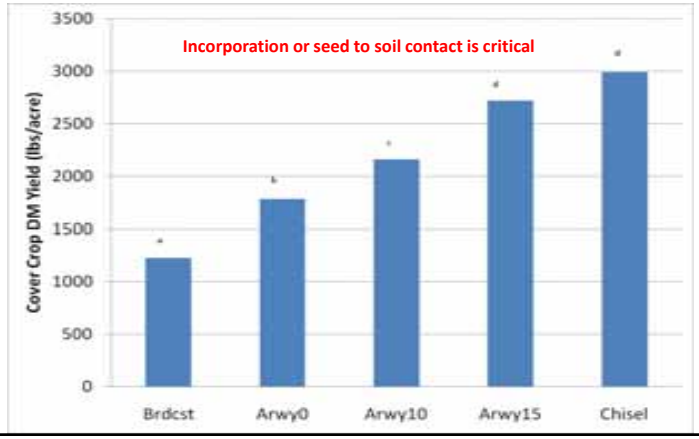
Weather

Drills

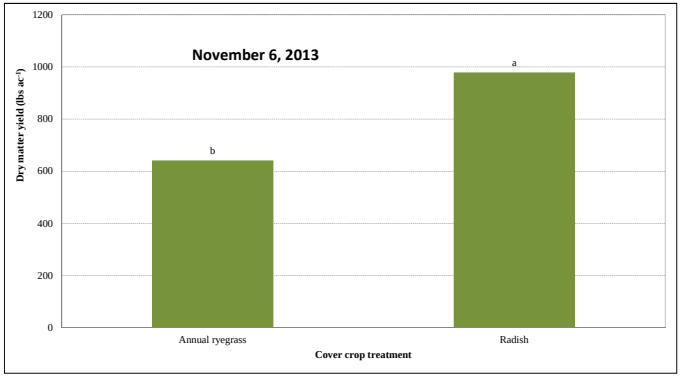
Summary

- Variety of methods available regionally
- Requires proper plans and contingency plans, flexibility in implementation, idea of hitting windows of opportunity
- Need to know why you are doing it to overcome the challenges associated with this agronomic practice.
- Herbicides, corn planting rates and plant architecture important
- Seed to soil contact reduces risk of failure in most cases.

Cover Crop Establishment

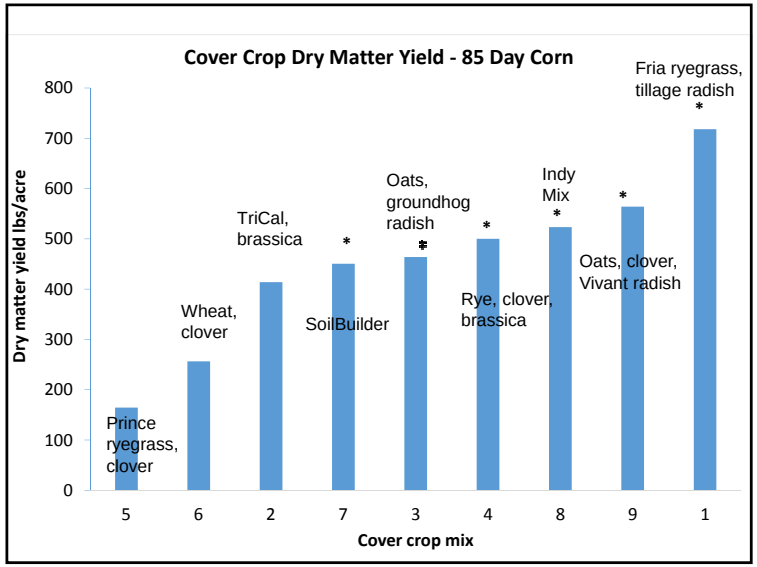


Interseeded Cover crops



Cover Crop Mixes-Planting Dates

Corn varieties, planted 5-May		Yield at 65% mst	Corn harvest	Cover crop planting
Relative maturity	Name	Tons/acre	Date	Date
110 day	Mycogen TMF2R198	30.5	23-Sept	19-June
96 day	Mycogen TMF2Q413	33.9	15-Sept	16-Sept
85 day	Mycogen TMF2H699	35.4	2-Sept	4-Sept



Cover Crop Species Selection

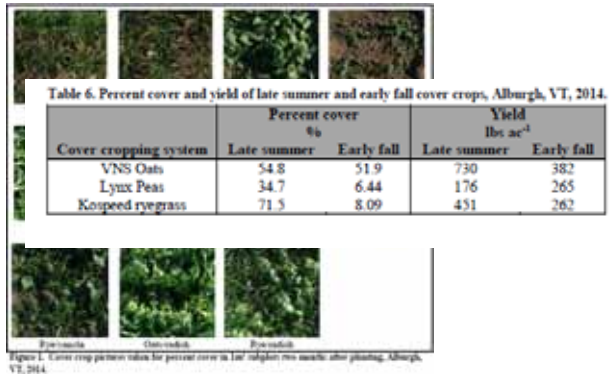


Table 6. Percent cover and yield of late summer and early fall cover crops, Alburgh, VT, 2014.

Cover cropping system	Percent cover % Late summer	Percent cover % Early fall	Yield lbs ac^{-1} Late summer	Yield lbs ac^{-1} Early fall
VNS Oats	54.8	51.9	730	382
Lynx Peas	34.7	6.44	176	265
Kospeed ryegrass	71.5	8.09	451	262

Tillage Radish

Planting date	Soil cover	Leaf biomass	Root biomass	Root length
	%	lbs	lbs	in
18-Aug	93.42	1.68	1.54a	23.9a
25-Aug	98.38	1.89	0.73b	20.7a
2-Sep	95.23	1.76	0.35c	16.9b
10-Sep	94.42	1.45	0.17d	14.7b

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Tillage Radish

Seed rate	Yield ton/acre	Length in	Diameter in	Cover %
3	0.16	19.93	2.37	98.32
6	0.23	20.93	1.73	99.09
8	0.22	18.40	1.72	98.94
12	0.19	16.60	1.57	98.43

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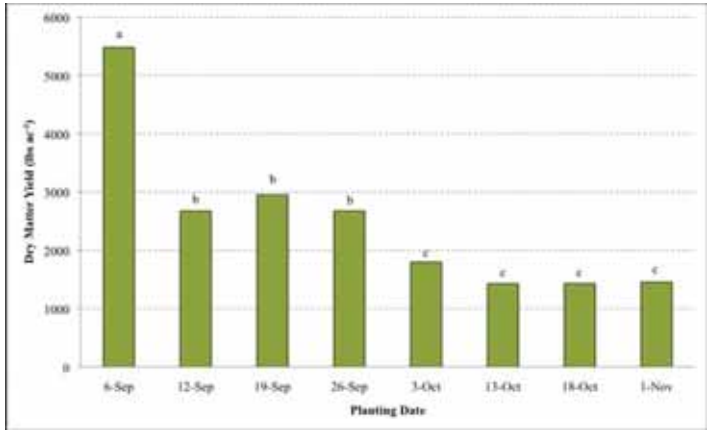
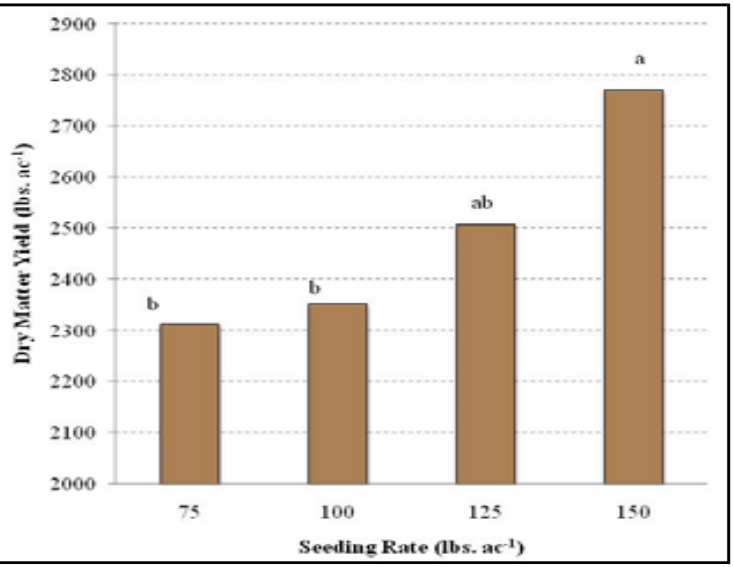
One month delay in planting results in one week delay in heading date (boot stage).



Fall Seeding Strategy



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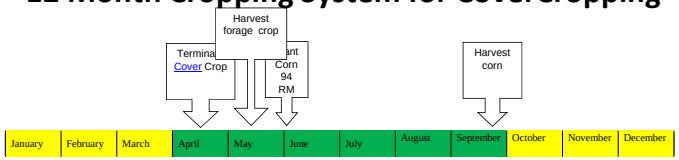

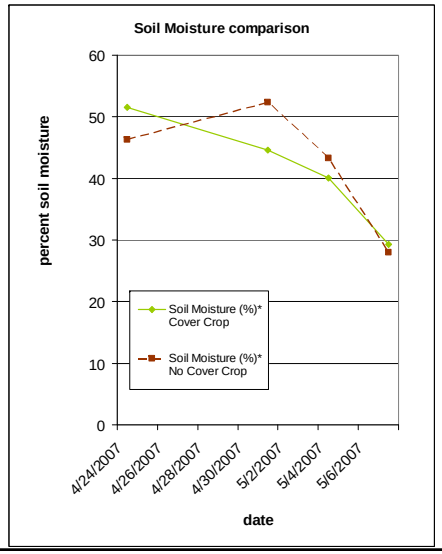

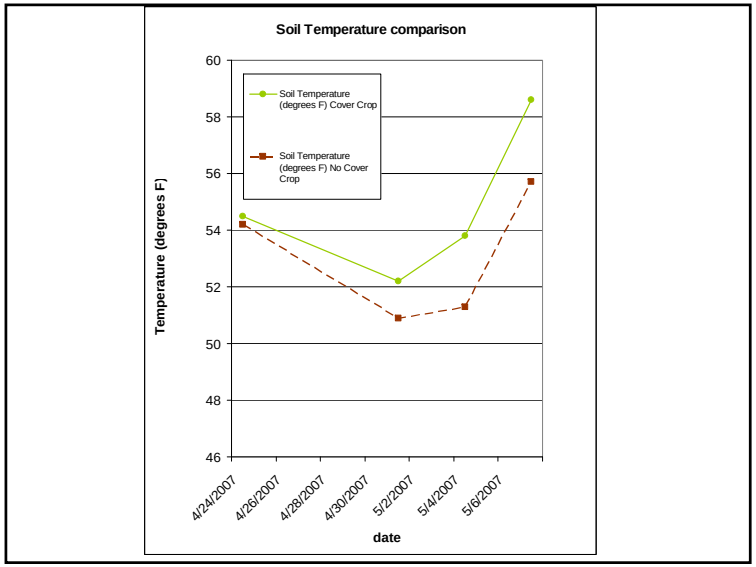

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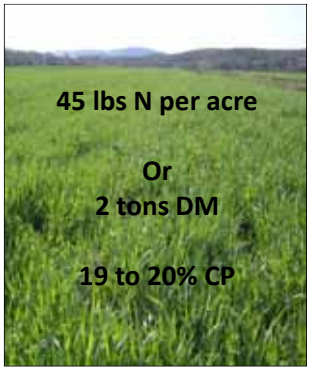
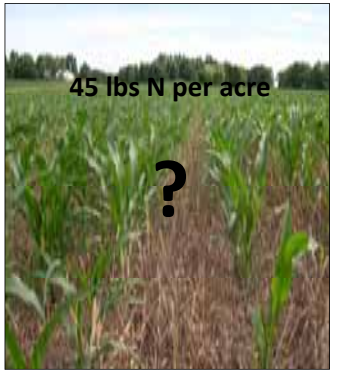
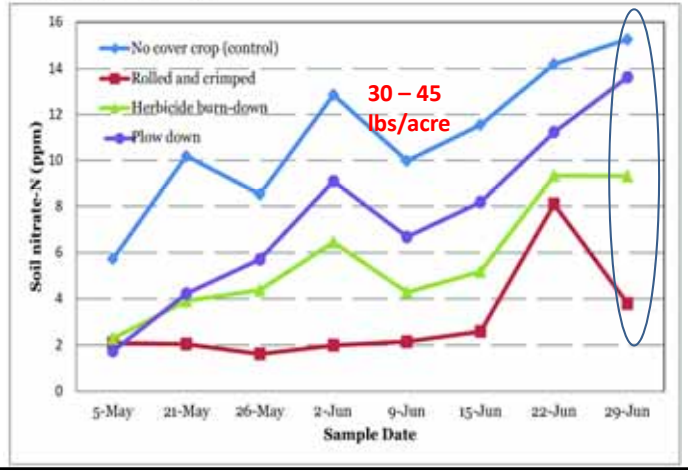




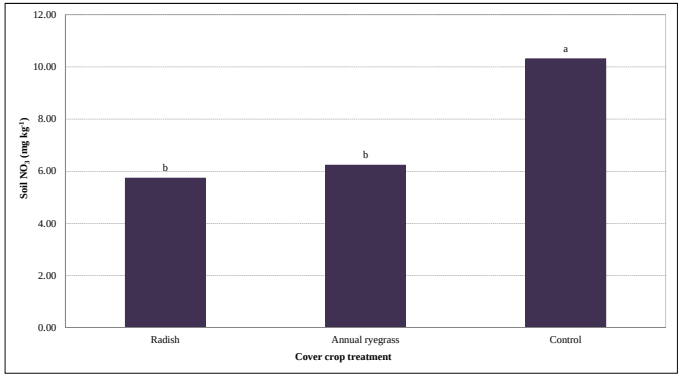
Soil Quality

Treatment	Organic Matter	Water stable aggregation	Active carbon	Potentially mineralizable N
	%	%	mg kg^{-1}	ug N g^{-1} d soil
No cover crop	4.46a	61.4b	676b	11.1a
Cover crop	4.42a	63.2a	701a	12.3a

FIGURE 8. **Nitrogen release from cover crops terminated by plow down, herbicide and roller-crimper, compared to no cover crop.**



Soil Nitrate-N



Cover crop treatment	Soil pH	Available P	K	Mg	Ca	CEC	Zn	Soil Organic Matter
		ppm	ppm	ppm	ppm	meq 100 g^{-1}	ppm	%
Annual ryegrass	**7.23**	44.3	284	193	**3231**	**18.5**	1.33	3.93
Radish	7.10	39.8	253	191	3009	17.3	1.13	4.07
Control	7.20	**57.4**	**322***	**219**	3175	**18.5**	**1.40**	**4.30**
LSD (0.10)	NS	NS	34	NS	NS	NS	NS	NS
Trial mean	7.18	47.2	286	201	3138	18.1	1.29	4.10

Winter Grain Forages, 2014