COVER CROPS RESEARCH UPDATE

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NEW WEB RESOURCE FOR COVER CROPS IN WI

UW-Soil Science

- www.soils.wisc.edu/extension/covercrop.php

University of Wisconsin-Extension

- YouTube Channel: goo.gl/zO91A
- Wisconsin Crop Manager: goo.gl/wQQot

OUTLINE

- Tillage radish
  - The new cover crop on the block
- Spring-seeded legumes
  - A valuable cover crop for fresh market vegetable growers
- Living mulch systems
  - A unique system that maintains ground cover during corn production and allows for production of corn silage in an established pasture.
- In-season cover crop planting
  - Plant legume cover crop into standing cash crop

TILLAGE RADISH

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Referred to as:

- Oilseed radish
- Forage radish
- Tillage radish

Primary benefits:

- Bio-tillage
- N scavenger

USES IN WI

- Following winter wheat harvest
  - No-till systems
- Following early season vegetable harvest
- Interseeded with legume (winter pea)


Tillage radish inter-seeded
with Austrian winter pea

2010 DEMONSTRATION PLOTS

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Established quickly, providing good ground cover
Planted at 10 lb/ac

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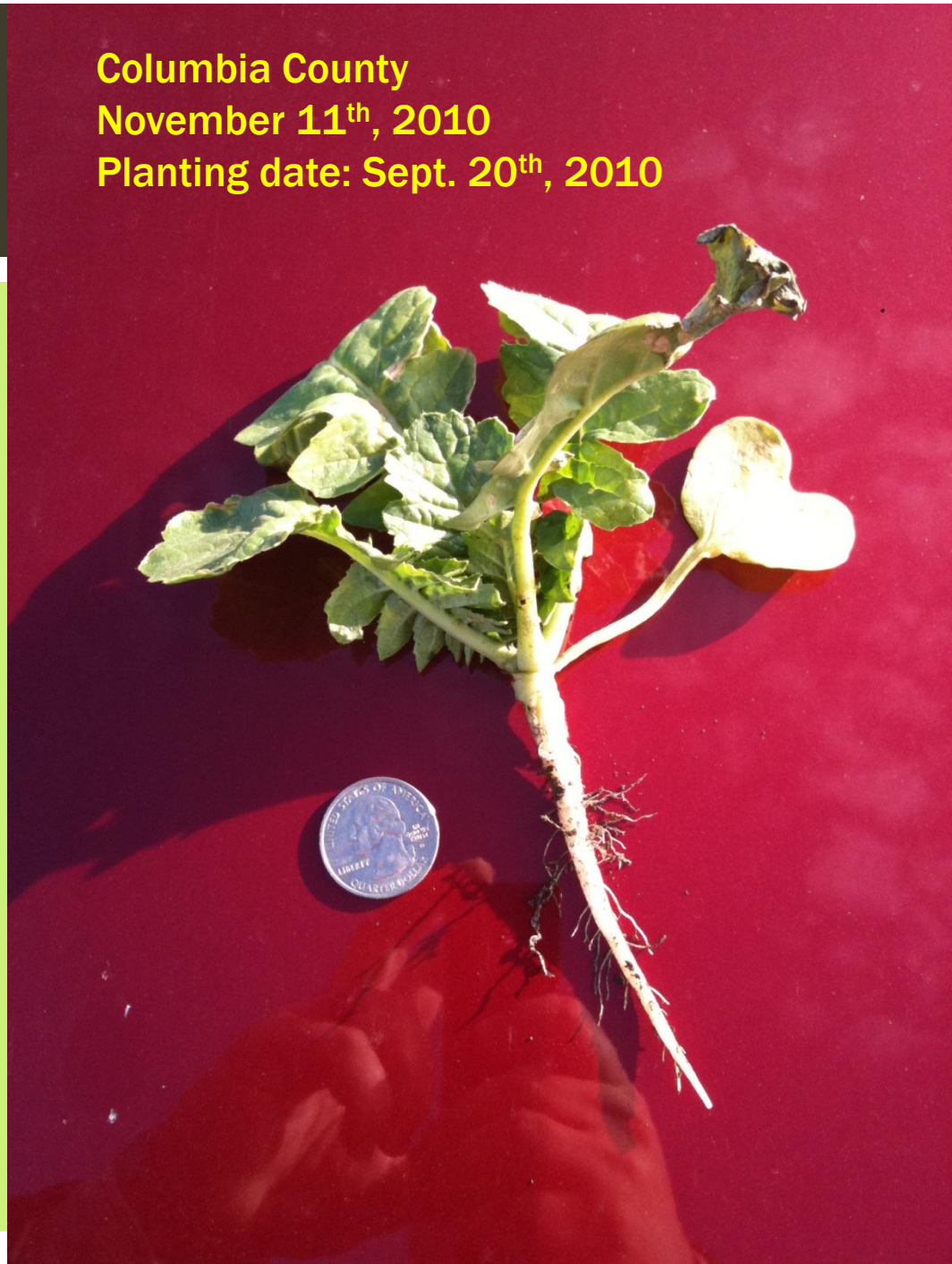
Crop	Height (in)	Total N uptake (lb ac^{-1})	C:N
Berseem clover & weeds	20	46	14
Berseem clover (no weeds or oats)	24.5	37	12
Berseem (w/ oats)	20	23	25
Rye (tall)	17	28	19
Rye (short)	6	16	20
Tillage radish	20	57	19

Tillage radish has a favorable C:N ratio. This would indicate tillage radish would not promote net immobilization and may lead to net mineralization. However, it is unknown if the N would be released in sync with subsequent crop uptake (and provide a nitrogen credit).

USES IN WI

- After corn silage harvest
- Slurry seed with manure
- …seeding date is important



NOVEMBER 11TH, 2010

Tillage radish did not establish with the late planting date (Sept. 20th)

FUTURE RESEARCH

- Quantify/verify a nitrogen credit for tillage radish
  - Alone or interseeded with legume
- Evaluate the "other" benefits
  - Reduction in compaction, reduction in N leaching
- What environments are not ideal for radish growth (cropping systems, residual N, planting date)?

SPRING-SEEDED LEGUMES

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- Green manure for late-planted, short-season vegetable crops (organic vegetable growers, CSA farms, fresh market growers)
- Plant cover crops as soon as you can in the spring (early to mid April)
- Plow under in mid June to early July

	June 10	June 25	July 9
	---------- in of growth----------		
Chickling Vetch	10	24	32
Crimson Clover	11	23	28
Berseem Clover	13	21	22

SPRING-SEEDED LEGUMES

July 7th, 2009

Well established plots – would expect a nitrogen credit above 40 lb/ac of N

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Well established plots – would expect a nitrogen credit above 40 lb/ac of N
However, on organic certified land, spring-seed legumes can have large weed growth

June 17th, 2010

DEVELOPMENT OF DATA SET

- Spring-seeded cover crops
  - Planting date
  - Species
  - Plant height & AGB prior to plow-under
  - Plow-under date
- Development of management recommendations for spring-seeded legumes as a green manure
- This work is in-progress

LIVING MULCH

KURA CLOVER LIVING MULCH

- Kura clover had been established 2 years previously
- Suppress kura clover in spring (3 to 4 in tall)
  - Glyphosate and dicamba
- Killing kura clover in 7.5 in widths, plant into these rows
- Suppress again with glyphosate at 5 weeks after planting

ESTABLISHED KURA CLOVER, CHEMICALLY KILL IN STRIPS

PLANT THE CORN INTO STRIPS, CHEMICALLY "SET-BACK" CLOVER

KURA CLOVER GROWS IN UNDERSTORY

CLOVER AND CORN AT HARVEST

THE NEXT SPRING

KURA CLOVER LIVING MULCH

ADVANTAGES

- Can grow a corn silage crop without plowing under an entire clover stand
- Provides nearly all of the N for the corn crop
- Reduces soil erosion by 90% compared to conventional tillage
- Reduces nitrate leaching by 50 to 75%

KURA CLOVER LIVING MULCH

DRAWBACKS

Reduced yields

Compared to corn grown with no living mulch:

- 30% lower yields with KC and no N
- 14% lower yields with KC & 90 lb ac^{-1} N

Water stress

- Lower plant available moisture in June/July
- Likely cause of yield decrease

IN-SEASON LEGUME PLANTING

IN-SEASON PLANTINGS OF LEGUMES

- To get full benefit of legume, need to plant earlier
- Opportunity in irrigated, sandy soil production systems
- Inter-seed red clover into snap bean…
- …and reap benefits in next years sweet corn crop

IN-SEASON SEEDING

LIVING MULCH – SWEET CORN YIELDS

Non-clover: applied170 lb ac^{-1} of N
Clover: applied 115 lb ac^{-1} of N

	Acres	Total Lbs.	Lbs./Acre	Tons/Acre
Non-Clover	1.13	18560	16424.78	8.21
Clover	1.1	17980	16345.45	8.17
Non-Clover	1.1	17000	15454.55	7.73
Clover	1	16400	16400.00	8.20
Non-Clover	1	14580	14580.00	7.29
Clover	0.9	14000	15555.56	7.78
Non-Clover	0.7	11620	16600.00	8.30
			Average Non-Clover	7.88
			Average Clover	8.05

IN-SEASON PLANTINGS OF LEGUMES

- Maintained sweet corn yields with less inorganic nitrogen
  - In this trial, the red clover provided a 55 lb/ac N credit
- No negative impacts to snap bean
- One year of research only!
- More research necessary to evaluate over several growing seasons.

CONCLUSIONS

TAKE HOME MESSAGES

- Tillage radish: it can grow, but little information exists that quantify the benefits
- Spring seeded legumes: great way to provide N, but limited to short-season, late-planted crops
- Living mulch systems: Opportunity to provide ground cover during the growing season. Currently it is an "experimental" system, but could have tremendous benefits.
- In-season planting of legume cover crops: Could have tremendous benefits in the Central Sands.