NEW AND EXPERIMENTAL COVER CROPPING SYSTEMS IN WISCONSIN
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/wQQ0t
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
Referred to as:
- Oilseed radish
- Forage radish
- Tillage radish

Primary benefits:
- Bio-tillage
- N scavenger
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

Recently mowed rye  red clover  tillage radish
2010 DEMONSTRATION PLOTS

Established quickly, providing good ground cover
Planted at 10 lb/ac
Large tap roots
## 2010 Demonstration Plots

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

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

Columbia County
November 11th, 2010
Planting date: Sept. 20th, 2010
Tillage radish did not establish with the late planting date (Sept. 20th)
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
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

<table>
<thead>
<tr>
<th></th>
<th>June 10</th>
<th>June 25</th>
<th>July 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickling Vetch</td>
<td>10</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>Crimson Clover</td>
<td>11</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>Berseem Clover</td>
<td>13</td>
<td>21</td>
<td>22</td>
</tr>
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</table>
SPRING-SEEDED LEGUMES

July 7\textsuperscript{th}, 2009

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

Spring after silage harvest
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%
**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
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 year's sweet corn crop
IN-SEASON SEEDING

Plant seed between row
Non-clover: applied 170 lb ac\(^{-1}\) of N
Clover: applied 115 lb ac\(^{-1}\) of N

<table>
<thead>
<tr>
<th></th>
<th>Acres</th>
<th>Total Lbs.</th>
<th>Lbs./Acre</th>
<th>Tons/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Clover</td>
<td>1.13</td>
<td>18560</td>
<td>16424.78</td>
<td>8.21</td>
</tr>
<tr>
<td>Clover</td>
<td>1.1</td>
<td>17980</td>
<td>16345.45</td>
<td>8.17</td>
</tr>
<tr>
<td>Non-Clover</td>
<td>1.1</td>
<td>17000</td>
<td>15454.55</td>
<td>7.73</td>
</tr>
<tr>
<td>Clover</td>
<td>1</td>
<td>16400</td>
<td>16400.00</td>
<td>8.20</td>
</tr>
<tr>
<td>Non-Clover</td>
<td>1</td>
<td>14580</td>
<td>14580.00</td>
<td>7.29</td>
</tr>
<tr>
<td>Clover</td>
<td>0.9</td>
<td>14000</td>
<td>15555.56</td>
<td>7.78</td>
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<tr>
<td>Non-Clover</td>
<td>0.7</td>
<td>11620</td>
<td>16600.00</td>
<td>8.30</td>
</tr>
</tbody>
</table>

**Average Non-Clover** 7.88
**Average Clover** 8.05
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.
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.