Module 6
Cover Crop Management
Soil Health and Sustainability for Field Employees
Soil Health Principles To Support High Functioning Soils

- Feed diverse, continuous inputs (C sources, energy)
- Maximize living roots
- Minimize disturbance
- Maximize diversity
- Maximize cover
- Protect habitat (aggregates and organic matter)
Cover Crops  
Designing for what you don’t have!

Identify Resource Concerns/Objectives
- Provide crop diversity (habitat)
- Provide soil surface armor (erosion)
- Build stable soil aggregates
- Improve the water cycle/ availability
- Integrated Pest Management
- Build/improve soil organic matter
- Nutrient cycling/ efficiency
- Air Quality
- Enhance pollinator/predator habitat
- Adjust carbon/nitrogen ratios
- Wildlife winter food & shelter
- Livestock integration
- Nitrogen fixation
What is your resource concern?

“And then, this morning, I suddenly noticed she didn’t look so good.”
Cover Crop (340)

Shows the importance of conservation planning and how standards relate to the planning process.

**Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content**

Cover crop species will be selected on the basis of producing higher volumes of organic material and root mass to maintain or increase soil organic matter.

The planned crop rotation including the cover crop and associated management activities will score a Soil Conditioning Index (SCI) value > 0, as determined using the current approved NRCS Soil Conditioning Index (SCI) procedure with appropriate adjustments for additions to, and or subtractions from, plant biomass.

The cover crop shall be planted as early as possible and be terminated as late as practical for the producer's cropping system to maximize plant biomass production, considering crop insurance criteria, the time needed to prepare the field for planting the next crop and soil moisture depletion.
Agronomy Technical Note 33

Natural Resources Conservation Service
Minnesota Agronomy Technical Note 33
Cover Crop Seeding Guide

Table 1: Common Cover Crops Recommended for Planting in Minnesota

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>FULL SEEDING RATES</th>
<th>PLANTING DEPTH (inches)</th>
<th>SEEDING DATES NORTH OF INTERSTATE 94</th>
<th>SEEDING DATES SOUTH OF INTERSTATE 94</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRASES</td>
<td>Minimum Seeding Rate in lbs/acre PLS (Incorporated Seed)</td>
<td>Minimum Seeding Rate in lbs/acre PLS (Non-Incorporated Seed)</td>
<td>GRASS</td>
<td>CYCLOPS</td>
</tr>
<tr>
<td>SPRING BARLEY</td>
<td>50 lbs/acre PLS</td>
<td>75 lbs/acre PLS</td>
<td>0.75-1.5</td>
<td>CG</td>
</tr>
<tr>
<td>WINTER BARLEY</td>
<td>50 lbs/acre PLS</td>
<td>75 lbs/acre PLS</td>
<td>0.75-1.5</td>
<td>CG</td>
</tr>
<tr>
<td>CULTIVAR CYCLOPS</td>
<td>50 lbs/acre PLS</td>
<td>75 lbs/acre PLS</td>
<td>0.5-1</td>
<td>CG</td>
</tr>
<tr>
<td>ANNUAL RYEGRASS</td>
<td>15 lbs/acre PLS</td>
<td>23 lbs/acre PLS</td>
<td>0.05</td>
<td>CG</td>
</tr>
<tr>
<td>WINTER CEREAL PYE</td>
<td>35 lbs/acre PLS</td>
<td>63 lbs/acre PLS</td>
<td>0.75-1.5</td>
<td>CG</td>
</tr>
<tr>
<td>WINTER TRITICALE</td>
<td>50 lbs/acre PLS</td>
<td>75 lbs/acre PLS</td>
<td>0.75-1.5</td>
<td>CG</td>
</tr>
<tr>
<td>SPRING WHEAT*</td>
<td>50 lbs/acre PLS</td>
<td>75 lbs/acre PLS</td>
<td>0.75-1.5</td>
<td>CG</td>
</tr>
<tr>
<td>WINTER WHEAT*</td>
<td>50 lbs/acre PLS</td>
<td>75 lbs/acre PLS</td>
<td>0.75-1.5</td>
<td>CG</td>
</tr>
<tr>
<td>FONTOIL MILLET*</td>
<td>20 lbs/acre PLS</td>
<td>30 lbs/acre PLS</td>
<td>0.5-1</td>
<td>WP</td>
</tr>
<tr>
<td>JAPANESE MILLET*</td>
<td>20 lbs/acre PLS</td>
<td>30 lbs/acre PLS</td>
<td>0.54-1.5</td>
<td>WP</td>
</tr>
<tr>
<td>PEARL MILLET*</td>
<td>20 lbs/acre PLS</td>
<td>30 lbs/acre PLS</td>
<td>0.5-1</td>
<td>WP</td>
</tr>
<tr>
<td>PROSO MILLET*</td>
<td>20 lbs/acre PLS</td>
<td>30 lbs/acre PLS</td>
<td>0.5-1</td>
<td>WP</td>
</tr>
<tr>
<td>SORGHUM-SUDANGRASS*</td>
<td>25 lbs/acre PLS</td>
<td>38 lbs/acre PLS</td>
<td>0.5-1</td>
<td>WP</td>
</tr>
<tr>
<td>SUDANGRASS*</td>
<td>25 lbs/acre PLS</td>
<td>38 lbs/acre PLS</td>
<td>0.5-1</td>
<td>WP</td>
</tr>
</tbody>
</table>
Considerations for successful cover crop planning

- Site preparation/Early weed control is essential
- Herbicide carryover and label restrictions
- Timing and species (adequate growing season)
- Crop rotation/diversity
- Seeding method seed-soil contact (broadcast vs. drilling, adequate equipment)
- Seed size/seeding depth
- Seed quality (bin run, PLS, certified)
- Legume inoculation
- Site and moisture conditions
Considerations for successful cover crop planning (cont.)

- Residue management (cash crop) before and after cover crop emergence
- Moisture management (cover benefits, water use)
- Nutrient cycling considerations (C:N ratio, residual nitrogen, living root)
- Weed, insect and disease management
- Termination method/timing — know before you plant how your are going to terminate
- Establishment of next cash crop
- Economics (yield impacts, cost of establishment, soil improvement,)
  • (“can we afford not to use a cover crop” J. Fuhrer, 2016)
Cover Crop Herbicide Restrictions

• Forage and grain (food chain)
  • Herbicide must be labeled for all crops
  • Rotation/plant back restrictions
  • Forage restrictions (grazing, haying)

• Cover only (soil building or erosion)
  • At your own risk (some labels lack info)
  • Review labels/experience
  • Climate & soils (biological activity)
Herbicide Persistence

- Carryover potential
  - Challenging to predict potential carryover of herbicides to cover crops with exhaustive variables.
  - Careful planning can help increase confidence.
  - When in doubt, perform a bioassay.

- Resources:
  - PSU – Bill Curran and Dwight Lingenfelter
    https://extension.psu.edu/the-penn-state-agronomy-guide
  - Univ. of Missouri – Kevin Bradley
    (http://weedscience.missouri.edu/extension/pdf/cover%20crop%20carryover.pdf)
  - Purdue University- Brian Young- Good summary of Literature and input from CC Experts.
Important information: Common name/active ingredient, half-lives, cash crop restrictions, modes of degradation and potential to injure fall cover crops.

<table>
<thead>
<tr>
<th>HERBICIDE</th>
<th>Active Ingredient</th>
<th>Normal Rate/acre</th>
<th>Half Life (days)</th>
<th>Cash Crop Restrictions</th>
<th>Fall Cover Crops OK to Plant</th>
<th>Concern for</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D 4S</td>
<td>2,4-D</td>
<td>1-2 pt</td>
<td>7</td>
<td>Plant anything 30 days after application</td>
<td>All grasses</td>
<td>Wait 30 days before planting sensitive broadleaves</td>
<td>Amine formulations more water soluble and can leach into seed zone</td>
</tr>
<tr>
<td>Accent 75DF/Steadfast 75DF</td>
<td>nicosulfuron/nicosulfuron + rimsulfuron</td>
<td>0.66 oz/0.75 oz</td>
<td>21</td>
<td>Sensitive crops have 10–18 month restriction</td>
<td>Fall cereal grains, ryegrass</td>
<td>Small seeded legumes, mustards, sorghum</td>
<td>More persistent in high pH soils (&gt; 7)</td>
</tr>
<tr>
<td>Atrazine 4L</td>
<td>atrazine</td>
<td>1-2 qt</td>
<td>60</td>
<td>Can plant corn, sorghum, and soybean the following year (some products)</td>
<td>Sorghum species</td>
<td>Cereals, ryegrass, legumes and mustards</td>
<td>More persistent in high pH soils (&lt; 7). Rates &lt; 1 lb/acre can allow more flexibility</td>
</tr>
<tr>
<td>Balance Pro 4L</td>
<td>isoxaflutole</td>
<td>2 fl. oz</td>
<td>50-120</td>
<td>Small seeded legumes and vegetables have a 10 to 18 month restriction</td>
<td>Fall cereal grains</td>
<td>Cereals, ryegrass, legumes and mustards</td>
<td>15&quot; of total precipitation required from application to planting rotation crops except soybean, barley, wheat, sorghum, sunflower</td>
</tr>
<tr>
<td>Callisto</td>
<td>mesotrione</td>
<td>3-6 fl. oz</td>
<td>5-32</td>
<td>10 to 18 months for legumes and vegetables</td>
<td>All grasses</td>
<td>Small seeded legumes, mustards</td>
<td>Sequential applications (PRE fb POST) increase the potential for injury</td>
</tr>
<tr>
<td>Clarity/ Banvel 4S</td>
<td>dicamba</td>
<td>16-24 fl. oz</td>
<td>5-14</td>
<td>15 days per 8 fl. oz/acre for small grains</td>
<td>All crops</td>
<td>Only at high rates or less than 120 days after application</td>
<td>Anything can be planted after 120 days with 24 fl oz/acre or less</td>
</tr>
<tr>
<td>Dual II Mag 7.62E/Cinch</td>
<td>metolachlor</td>
<td>1.67 pt</td>
<td>15-50</td>
<td>Labeled for use on many crops</td>
<td>Almost anything</td>
<td>Annual ryegrass or other small seeded grass</td>
<td>Higher rates and later applications more of a potential problem</td>
</tr>
<tr>
<td>Capreno 3.45SC</td>
<td>tembotrione + thiencarbazone</td>
<td>3 fl. oz</td>
<td>50-120</td>
<td>Four months for wheat, 10 months for barley, sorghum, oats and alfalfa</td>
<td>Wheat, triticale, rye</td>
<td>Small seeded legumes, mustards, sorghum</td>
<td>15&quot; of total precipitation required from application to planting rotation crops except wheat</td>
</tr>
<tr>
<td>Corvus 2.63SC</td>
<td>isoxaflutole + thiencarbazone</td>
<td>5.6 fl. oz</td>
<td>50-120</td>
<td>Four mo. for wheat, 9 mo. for barley and 17 mo. for alfalfa, oats, sorghum, and canola</td>
<td>Wheat, triticale, rye</td>
<td>Small seeded legumes, mustards, sorghum</td>
<td>15-30&quot; of total precipitation from application to planting for sensitive crops</td>
</tr>
</tbody>
</table>

Disclaimer: Always follow the label. Some of this information pertains to the eastern US and is an example of an Extension Publication (Penn State)
What is your seeding timeframe?

1. Spring - fallow ground, prevented planting or prior to a summer crop, seed into winter grain

2. Early Summer - After early vegetable harvest, winter grain or forage harvest

3. Late Summer - After grain harvest, Interseeding into corn or soybean, etc.

4. Fall - After fall crop harvest
Cover crops niches for summer annual crops

Current Practices

A
Missed opportunity for ecosystem services
Annual grain crop
No cover crop

B
Limited ecosystem services
Annual grain crop
Post-harvest drill seeded cover crop

Improved Cover Crop Practices

C
Greater ecosystem services
Annual grain crop
Rotational no-till
Post-harvest drill seeded cover crop

D
Greater ecosystem services
Annual grain crop
Inter-seeded cover crop

Planting green

Inter-seeding

Matt Ryan, Cornell University
Cover Crop Plant Character Diversity

- Above ground- (erect, spreading, single/multi-stemmed, height, leaf character)
- Root architecture- (tap, fibrous, rhizomatous, depth)
- Rate of growth- (also differs by growth stage i.e. seedling vigor)
- Chemical composition- (allelopathy C:N ratio, root exudates)
- Tolerance to stress- (drainage, pH, shade, low fertility)
- Time to flowering- (termination or self seeding issue)
- Pest resistance or susceptibility
- Growth Cycle- Perennial, Biennial, Annual?
Bin Run Seed
## Certified or VNS

### What is PLS?

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td><strong>Pure Seed</strong></td>
<td>65.50%</td>
</tr>
<tr>
<td><strong>Other Crop</strong></td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Inert Matter</strong></td>
<td>0.45%</td>
</tr>
<tr>
<td><strong>Weed Seed</strong></td>
<td>0.05%</td>
</tr>
<tr>
<td><strong>Coating Material</strong></td>
<td>34%</td>
</tr>
<tr>
<td><strong>Noxious</strong></td>
<td>None found</td>
</tr>
<tr>
<td><strong>Germination</strong></td>
<td>80%</td>
</tr>
<tr>
<td><strong>Hard Seed</strong></td>
<td>10%</td>
</tr>
<tr>
<td><strong>Origin</strong></td>
<td>WA</td>
</tr>
<tr>
<td><strong>AM#</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Net Weight</strong></td>
<td>50 LBS</td>
</tr>
<tr>
<td><strong>Date Tested</strong></td>
<td>1/2013</td>
</tr>
</tbody>
</table>

*Inoculant used is a organic peat based product*
Each species has multiple cultivars

<table>
<thead>
<tr>
<th>Species</th>
<th>Cultivar 1</th>
<th>Cultivar 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black oats (<em>Avena strigosa</em>) 60 lb/A</td>
<td>SoilSaver</td>
<td></td>
</tr>
<tr>
<td>Black-seeded winter oats (<em>Avena sativa</em>)</td>
<td>Cosaque</td>
<td></td>
</tr>
<tr>
<td>Balansa clover (<em>Trifolium michelianum</em>) 5 lb/A</td>
<td>Fixation</td>
<td>Frontier</td>
</tr>
<tr>
<td>Crimson clover (<em>Trifolium incarnatum</em>) 18 lb/A</td>
<td>AU Robin</td>
<td>Connea</td>
</tr>
<tr>
<td></td>
<td>AU Sunrise</td>
<td>Dixie</td>
</tr>
<tr>
<td></td>
<td>AU Sunup</td>
<td>KY Pride</td>
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<tr>
<td>Field peas (<em>Pisum sativum</em>) 70 lb/A</td>
<td>Arvica</td>
<td>Lynx</td>
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<tr>
<td></td>
<td>Dunn</td>
<td>Maxum</td>
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<tr>
<td></td>
<td>Frostmaster</td>
<td>Survivor-15</td>
</tr>
<tr>
<td></td>
<td>Windham</td>
<td>Whistler</td>
</tr>
<tr>
<td>Red clover (<em>Trifolium pratense</em>) 9 lb/A</td>
<td>Cinnamon Plus</td>
<td>Kenland</td>
</tr>
<tr>
<td></td>
<td>Cyclone II</td>
<td>Mammoth</td>
</tr>
<tr>
<td></td>
<td>Dynamite</td>
<td>Starfire</td>
</tr>
<tr>
<td></td>
<td>Freedom</td>
<td>Wildcat</td>
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<tr>
<td>Hairy vetch (<em>Vicia villosa</em>) 18 lb/A</td>
<td>CCS-Groff</td>
<td>Purple Prosperity</td>
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<tr>
<td></td>
<td>Lana</td>
<td>TNT</td>
</tr>
<tr>
<td></td>
<td>Purple Bounty</td>
<td>Vilana</td>
</tr>
<tr>
<td>Daikon radish (<em>Raphanus sativus</em>) 9 lb/A</td>
<td>Big Dog</td>
<td>Graza</td>
</tr>
<tr>
<td></td>
<td>Concorde</td>
<td>Groundhog</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>Lunch</td>
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<tr>
<td></td>
<td>Defender</td>
<td>Nitro</td>
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<tr>
<td></td>
<td>Driller</td>
<td>Sodbuster</td>
</tr>
<tr>
<td></td>
<td>Eco-till</td>
<td>Tillage</td>
</tr>
<tr>
<td>Cereal rye (<em>Secale cereale</em>) 100 lb/A</td>
<td>Aroostook</td>
<td>Maton II</td>
</tr>
<tr>
<td></td>
<td>Bates</td>
<td>Merced</td>
</tr>
<tr>
<td></td>
<td>Brasetto</td>
<td>Oklon</td>
</tr>
<tr>
<td></td>
<td>Elbon</td>
<td>Rymin</td>
</tr>
<tr>
<td></td>
<td>FL 401</td>
<td>Wheeler</td>
</tr>
<tr>
<td></td>
<td>Guardian</td>
<td>Wintergrazer</td>
</tr>
<tr>
<td></td>
<td>Hazlet</td>
<td>Abruzzi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maton</td>
</tr>
</tbody>
</table>
Cool Season Grasses

- Annual Ryegrass
- Cereal Rye
- Barley
- Oats
- Winter Wheat
- Triticale

Photos: Michael Kucera & Jodie Reisner
### Differences in seeds/lb of different cultivars of Cereal Rye

<table>
<thead>
<tr>
<th>variety</th>
<th>seeds/lb</th>
<th>seeds/acre</th>
<th>seeds/sq ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merced</td>
<td>33,022</td>
<td>3,302,200</td>
<td>76</td>
</tr>
<tr>
<td>Elbon</td>
<td>30,609</td>
<td>3,060,900</td>
<td>70</td>
</tr>
<tr>
<td>Aroostook</td>
<td>24,438</td>
<td>2,443,800</td>
<td>56</td>
</tr>
<tr>
<td>Wintergrazer-70</td>
<td>23,759</td>
<td>2,375,900</td>
<td>55</td>
</tr>
<tr>
<td>Maton</td>
<td>21,860</td>
<td>2,186,024</td>
<td>50</td>
</tr>
<tr>
<td>Maton II</td>
<td>21,860</td>
<td>2,186,024</td>
<td>50</td>
</tr>
<tr>
<td>Abruzzi</td>
<td>20,855</td>
<td>2,085,517</td>
<td>48</td>
</tr>
<tr>
<td>Oklon</td>
<td>19,970</td>
<td>1,997,000</td>
<td>46</td>
</tr>
<tr>
<td>Wheeler</td>
<td>14,515</td>
<td>1,451,520</td>
<td>33</td>
</tr>
<tr>
<td>Hazlet</td>
<td>14,088</td>
<td>1,408,800</td>
<td>32</td>
</tr>
<tr>
<td>Prima</td>
<td>12,870</td>
<td>1,287,000</td>
<td>30</td>
</tr>
<tr>
<td>Guardian</td>
<td>12,760</td>
<td>1,276,000</td>
<td>29</td>
</tr>
<tr>
<td>Brasetto</td>
<td>11,413</td>
<td>1,141,300</td>
<td>26</td>
</tr>
</tbody>
</table>

Cereal rye when seeded for example at 100 lb/a, will have different # of seeds per acre or sq ft ranged from 26-76. This is more important at late seeding dates.
Warm Season Grasses

- Pearl Millet
- Sorghum-Sudan grass
- Forage Sorghum

Brown rib sorghum - sudan grass

Pearl Millet

Photos: Michael Kucera & Jodie Reisner
Cool Season Grasses

- Annual Ryegrass
- Cereal Rye
- Barley
- Oats
- Winter Wheat
- Triticale

Photos: Michael Kucera & Jodie Reisner
Cool Season Broadleaf

- Oilseed Radish
- Turnip and Rape
- Kale
- Phacelia

Photos: Michael Kucera & Jodie Reisner
Warm Season Broadleaves

- Buckwheat (NRCS planning restrictions)
- Safflower
- Sunflower
Cool Season Legumes

- Hairy Vetch
- Crimson Clover
- Winter Pea
Warm Season Legumes

- Cowpea
- Soybean
- Sunn hemp
- Chickpea
- Mungbean
• With the help of rhizobia bacteria legume cover crops can supply some or all of the N needed by succeeding crops.

• You must carefully match the correct bacterial inoculant strain with your legume cover crop species for the most effective N production.

• Most inoculants have very short viability times (days) depending on storage conditions.

• Pre-inoculated seed shipped and stored for extended periods of time has reduced inoculum viability.

• Keep inoculant refrigerated out of direct sunlight and Use prior to expiration date.
### Cover Crop Chart

#### Growth Cycle
- **A** = Annual
- **B** = Biennial
- **P** = Perennial

#### Plant Architecture
- \( \Uparrow \Uparrow \) = Upright
- \( \Uparrow \) = Upright-Spreading
- \( \Uparrow \) = Prostrate

#### Relative Water Use
- ◇ ◇ = Low
- ◇ = Medium
- ◇ ◇ ◇ = High

#### Climate Regions
- **Cool**
- **Warm**
- **Grass**
- **Broadleaf**
- **Legume**

#### Crop Examples
- Oxalis
- Clovers
- Turnips
- Radiata
- Spelt
- Rye
- Oats
- Peas
- Beans
- Wheat

#### Annotations
- V 3.0 February 2018
- Additional Information

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*USDA – ARS Cover Crop Chart*

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*USDA-ARS NGPRL*
Why Diverse Cover Crop Mixes

• **Multiple** uses of cover crops, why not use multiple species for multi-benefits

• Takes advantage of filling **niches** in time and space above and below ground diversity, increase biomass

• **Balance** C:N ratio for potential **synchrony** of N release for next crop

• **Synergy** between species; vetch climbing on cereal, uptake N by cereal and stimulate more N by legume

• **Dilute** monoculture CC problems; allelopathy, pest interactions, reduce amount of spring growth competition
More types of seeds more stable is the mix... less seed separation/ settling
Key points on seeding times and seeding rates

• Earlier seeding results in better seed germination, tillering, growth, survival and more biomass.

• Delaying termination in spring can compensate for delayed planting in the fall (some producers have learned to plant green)

• Be aware of planting dates based on species in the mix (warm / cool season; winter grains / cool season legumes and brassicas)

• Drilling is much more efficient than surface broadcast. Increase seeding rate by 1.5 times when broadcasting.
Interseeding 4 species into corn

Turnip, Rapeseed, Oats drilled after Sweet Corn

Broadcast Cereal Rye

Highboy Cover Crop Mixture late August
Radish 2 lb/ac with wheat 40 lb/ac and red clover 10 lb/ac

Radish at 8 lb/ac
How will you seed it?

Drill it

- Most time consuming
- $13-$24/ac
- Provides row plant spacing
- Consistent results
- Good soil to seed contact
Air Seeder attached to tillage equipment

- Wide swath at 10 mph
- Fast
- $12-26/ac plus
  $8-18/ac broadcasting
- Provides a random plant spacing
- Soil disturbance

How will you seed it?
How will you seed it?

Fly it on

- Most flexible timing
- Fast
- $15-$35/ac
- Provides a random plant spacing
- No seed to soil contact/moisture dependent
- Higher seeding rates may become impractical
How will you seed it?

Fly it on...When?...Who?

- Target the optimum window
- Balance sunlight and moisture
- Some species are more adapted
- Lack of soil to seed contact/Moisture dependent
How will you seed it?

Using Highboy for cover crop establishment into standing corn
How will you seed it?

Precision planting in narrow rows (15” rows)

• Use existing bean planter
• Less seed per acre
• $14.25-$30/ac
• Provides precision row/plant spacing
• Consistent results
• Good soil to seed contact
How will you seed it?

Air Seeder on Combine Head

- Concurrent operation
- Cheap / Fast
- Provides a random plant spacing
- Seed placed beneath the residue
Interseeding possibility

Interseeding into V6 Corn

Crimson clover about 8 weeks after interseeding

Annual Rye Grass, legume mix

Annual ryegrass Oct 30th Central NY
Cover Crop Termination Methods

- Frost termination
- Crimper / Roller (mature enough to kink the stem)
- Herbicide burn down
- Grazing
- Shredding / mowing
- Tillage
- Combination of methods
COVER CROP - Termination When and How?

EXPERTS AGREE

As for How!

IT DEPENDS!
COVER CROP Termination

• Have a good GAME PLAN...
  • What are your goals?
• Be adaptive to the season
  • Wet springs happen!
IT DEPENDS!

Timing of termination decisions

• Herbicide options- Cereal Rye Example
  • Spray 2 weeks before planting, and when cereal rye is 6-12 inches tall
    • Herbicide works effectively on undamaged cereal rye plants
    • Cover is dead and crispy before planting
    • Less residue to plant through
    • If weather is turning dry -preserve moisture (hard to predict)
Timing of termination decisions

**IT DEPENDS!**

- Alternatives under very wet conditions or experienced CC managers- “Planting Green”
  - Spray 1-2 days BEFORE planting
  - Spray AFTER planting (same day or within 1-2 days)
  - Advantages and risks with each option
Annual ryegrass cover crop termination guide sheet

When the annual ryegrass is actively growing for best results (5-7 days).

- Spray with a daytime minimum temperature of 55°F (above 60°F optimum).
- Wait until all the annual ryegrass is actively growing for best results (5-7 days).
- If night temperatures drop below 38°F, wait three days before spraying.
- Soil temperatures should be above 45°F.
- Spray at least 4 hours prior to sunset to allow for maximum translocation of the glyphosate within the plant.

Early termination of the cover crop makes control easier and reduces the amount of residue into which you’ll plant or beans. Early control also facilitates soil dry-down and decomposition of the ryegrass residue.
COVER CROP Termination- Translocating herbicides

- Evening shade reduces photosynthesis and translocation
- Actively growing plants die best
- Use of multiple herbicides
- Best time to apply Herbicides: Sunny day 10 AM to 2 PM.
COVER CROP Termination - Translocating herbicides

- Sprayer Water Quality and Management
  - glyphosate example
    - Use AMS to buffer hard water
    - Consider citric acid -4.5-5.5 pH is optimum
    - Use 8-10 gallons of water or less
    - Medium droplet size (turbo twinjet, Flat Fans)
    - Medium pressure (30-40 psi)
COVER CROP Termination

Roller Crimpers
RMA crop insurance guidelines for cover crop termination

Zone 1 - Terminate cover crop 35 days or earlier before planting, except for the RMA summer fallow practice*
Zone 2 - Terminate cover crop 15 days or earlier before planting, except for the RMA summer fallow practice*
Zone 3 - Terminate cover crop at or before planting, except for the RMA summer fallow practice*
Zone 4 - Terminate cover crop at or within 5 days after planting, but before crop emergence
Cover Crop Planning Tools

• Cover Crop 340 Practice Standard and supporting documents
• Midwest Cover Crop Council
  http://www.mccc.msu.edu/index.htm
• Resources and Publications
• Sustainable Agriculture Research & Education (SARE)
  • Online Book and Topic Room on Cover Crops
• Cover Crops for Sustainable Crop Rotation and Soil Health and the SARE cover crops topic room at http://www.sare.org/Learning-Center/Topic-Rooms/Cover-Crops
• No Till Farmer  Pulses and Minuses
• Various industry cover crop calculators
Let's make a mix for your scenario (Exercise)

• Build your own mix.
• When and how is it planted/when and how is it terminated?
• Where does it fit in the crop rotation?
• What resource concerns does it address?
Incorporated Seed

No-Till Seeding

Vertical tillage and Air Cart

Vertical tillage and Gandy Box

Inter Seeding

15 in corn/Bean Planter
Non-Incorporated Seed

High Boy

Air Flow Seeding

Aerial Seeding

Broadcast Seeding