Herbicides and Cover Crops: Problems and Possibilities

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CCA, Certified Crop Advisor
It all starts with Goals

• Water management
• Wind erosion
• Water erosion
• Salinity
• Diversity
Earth Day 2015
May 2017
“Snirt”
Where to find information?

- USDA Cover Crop Periodic table
- Midwest Cover Crop Council selector tool
- NDSU weed guide
  - Other state weed guides
- Use botanical classification
  - (cross reference)
- Use you knowledge of crops, weeds and herbicides
- Experiment
# Cover Crop Chart “Periodic table”

### Cover Crop Chart

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

- **Plant Architecture**
  - U = Upright
  - B = Upright-Spreading
  - P = Prostrate

- **Relative Water Use**
  - ◇ = Low
  - ▲ = Medium
  - ● = High

<table>
<thead>
<tr>
<th>Cool</th>
<th>Broadleaf</th>
<th>Warm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass</td>
<td></td>
<td>Grass</td>
</tr>
</tbody>
</table>

- **Grass**
  - Annual Fescue
  - Barley
  - Oat
  - Spelt
  - Wheat
  - Cereal Rye
  - Triticale
  - Saline Tolerant

- **Broadleaf**
  - Camelina
  - Mustard
  - Bailansa Clover
  - Chickpea
  - Medics
  - Cowpea
  - Cluster Bean
  - Buckwheat
  - Pearl Millet
  - Wheat
  - Flax
  - Radish
  - Crimson Clover
  - Lentil
  - Faba Bean
  - Fenugreek
  - Velvet Bean
  - Chicory
  - Grain Sorghum
  - Kale
  - Turnip
  - Red Clover
  - Lespedeza
  - Sweet Clover
  - Pigeonpea
  - Mung Bean
  - Cucurbita
  - Sudan Grass

- **Legume**
  - Kura Clover
  - Vetch
  - Sainfoin
  - Sunn Hemp
  - Peanut
  - Sunflower

**V 3.0 February 2018**

*Additional Information*
Flax

*(Linum usitatissimum L.)*

- Cool Season, broadleaf
- Annual
- Upright plant architecture
- Medium water use
- Fair salinity tolerance
- Seeding depth: ½ – 1 ½ inch
- Benefits from arbuscular mycorrhizal associations
- Flowers attract pollinators
# Midwest Cover Crop Council

## Midwest Cover Crops Council - Cover Crop Decision Tool

### Minnesota: All Counties Average County Seeding Dates

<table>
<thead>
<tr>
<th>Location Information</th>
<th>Minnesota ▼</th>
<th>All Counties Average ▼</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Crop</td>
<td>None or Prevented Planting ▼</td>
<td>Plant Date:</td>
</tr>
<tr>
<td>Drainage Information</td>
<td>Moderately Well Drained ▼</td>
<td>Flooding: No ▼</td>
</tr>
<tr>
<td>Goal #1</td>
<td>Soil Builder ▼</td>
<td>Goal #2</td>
</tr>
</tbody>
</table>

**Attribute Ratings:** 0: Poor, 1: Fair, 2: Good, 3: Very Good, 4: Excellent

**Reliable Establishment**

**Freeze Risk to Establishment**

**Frost Seeding**

**Cash Crop Growing Period:** Requires Aerial Seeding or Interseeding of Cover Crop

**Nonlegumes**

- Barley, Spring 3 3 3
- Barley, Winter 3 3 4
- Buckwheat 2 3 3
- Millet, Foxtail 3 3 3
- Millet, Japanese 3 3 3
- Millet, Pearl 3 3 3
- Millet, Proso 3 3 3
- Oats 3 3 3
- Rye, Winter Cereal 4 4 4
- Ryegrass, Annual 3 3 3
- Sorghum-sudangrass 4 4 4
- Sudangrass 4 4 4
- Triticale, Winter 3 3 4
• NDSU weed guide: rotation restrictions of 4 months or less = safe

• If you follow these recommendations there will not be much time for covers
Herbicide Information

- Weed guides
- Herbicide Handbook
Herbicide Selection

• Fit herb to weeds

• Fit cover crop to herb

• Do NOT recommend fitting herb to cover crop
Risk Mitigation

- Benefit vs risk
- Need weed control
- Herbs last for 2-4 weeks of control
  - Max 6 weeks
• Will have 90% of information needed
• Can have errors
• Need to connect the dots

• Page 107 Herbicide Residue and Fall Cover Crop Establishment
<table>
<thead>
<tr>
<th>Crop</th>
<th>Family</th>
<th>Genus</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>Fabaceae</td>
<td><em>Medicago</em></td>
<td>legume</td>
</tr>
<tr>
<td>Barley</td>
<td>Poaceae</td>
<td><em>Hordeum</em></td>
<td>grass</td>
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<tr>
<td>Canola</td>
<td>Brassicaceae</td>
<td><em>Brassica</em></td>
<td>mustard</td>
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<tr>
<td>Corn</td>
<td>Poaceae</td>
<td><em>Zea</em></td>
<td>grass</td>
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<tr>
<td>Dry bean</td>
<td>Fabaceae</td>
<td><em>Phaseolus</em></td>
<td>legume</td>
</tr>
<tr>
<td>Field pea</td>
<td>Fabaceae</td>
<td><em>Pisum</em></td>
<td>legume</td>
</tr>
<tr>
<td>Flax</td>
<td>Linaceae</td>
<td><em>Linium</em></td>
<td>cosmopolitan</td>
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<tr>
<td>Oat</td>
<td>Poaceae</td>
<td><em>Avean</em></td>
<td>grass</td>
</tr>
<tr>
<td>Potato</td>
<td>Solanaceae</td>
<td><em>Solanum</em></td>
<td>nightshade</td>
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<tr>
<td>Safflower</td>
<td>Asteraceae</td>
<td><em>Carthamus</em></td>
<td>composite</td>
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<tr>
<td>Soybean</td>
<td>Fabaceae</td>
<td><em>Glycine</em></td>
<td>legume</td>
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<td>Sugarbeet</td>
<td>Amaranthaceae</td>
<td><em>Beta</em></td>
<td>amaranth</td>
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<tr>
<td>Sunflower</td>
<td>Asteraceae</td>
<td><em>Helianthus</em></td>
<td>composite</td>
</tr>
<tr>
<td>Wheat</td>
<td>Poaceae</td>
<td><em>Triticum</em></td>
<td>grass</td>
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<table>
<thead>
<tr>
<th>Weed</th>
<th>Family</th>
<th>Genus</th>
<th>Common name</th>
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<tbody>
<tr>
<td>A. smartweed</td>
<td>Polygonaceae</td>
<td><em>Polygonum</em></td>
<td>buckwheat</td>
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<td>B. wormwood</td>
<td>Asteraceae</td>
<td><em>Artemisia</em></td>
<td>composite</td>
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<tr>
<td>Barnyardgrass</td>
<td>Poaceae</td>
<td><em>Echinochloa</em></td>
<td>grass</td>
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<tr>
<td>Black medici</td>
<td>Fabaceae</td>
<td><em>Medicago</em></td>
<td>legume</td>
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<tr>
<td>C. cocklebur</td>
<td>Asteraceae</td>
<td><em>Xanthium</em></td>
<td>composite</td>
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<tr>
<td>Description</td>
<td>Page</td>
<td></td>
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<tr>
<td>--------------------------------------------------</td>
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<tr>
<td>Plant back intervals</td>
<td>6</td>
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<tr>
<td>Herbicide site of action</td>
<td>100</td>
<td></td>
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</tr>
<tr>
<td>Herbicide Carryover</td>
<td>102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop rotation restrictions</td>
<td>104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbicide residue and cover crops</td>
<td>107</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grazing restrictions</td>
<td>110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbicide efficacy</td>
<td>113</td>
<td></td>
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<tr>
<td>Herbicide components</td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Topramezone + dimethenamid
• Impact + Outlook
• 3-9 month restriction (sugar beet 18)
• Short residual ~ 3 weeks
  – Grasses, most mustards will be fine
  – Legumes risky
Resicore

• Clorpyralid + acetochlor + mesotrione
• Stinger + Harness + Callisto
• 10.5-18 months
• Long residual 4-6 weeks
  – Rye, Flax
  – Maybe barley, wheat, radish
  – No legumes,
Educated Guess

- Consider weather
- Degradation method
- Estimate injury potential
- Tolerate some injury
5 “Food Groups” Concept

1. Cool season grasses
2. Cool season broadleaves
3. Warm season grasses
4. Warm season broadleaves
5. Legumes
Gateway cover crops

- Cereal Rye
- Radish
- Turnip
- Oats
- Barley
Cereal Rye

- Use to manage excess water
- Good weed control
Radish

- Use to reduce water
- Reduces compaction
- Good frost tolerance
- Deep tap root
- Fast growth
- 1-3#/a
Turnip

- Similar to radish
- Better forage
- May not winter kill
- 1-3#/a

Oats

- Less water usage
- Better for sandy ground
- Good vs wind erosion
- Lower frost tolerance
- Can control volunteer in wheat
- 30-50#/a
Barley

- Saline tolerant
- More frost tolerant than oats
- High herbicide tolerance
- Fast growth
- 30-70#/a
Mixes

• Target goals!
• Keep it simple
• $10-12 for seed
• Know how to kill covers
• 30-70#/a good starting rate
  – 1 bu grass
  – 1 # radish
Drill vs broadcast
Cover crop / Herb plot

- Sprayed July 14
- Broadcast every 7 days
- Not replicated
- Water/soil affected stand
- All pics taken Oct 4
## Covers and Herbicides

### Covers
1. Cereal rye
2. Oats
3. Barley
4. Millet
5. Flax
6. Buckwheat
7. Red clover
8. Crimson clover
9. Dwarf essex
10. Turnip
11. Radish
12. Kale
13. Camelina

### Herbicides
1. Huskie
2. Callisto
3. Resicore
4. Spartan
5. Engenia
6. Armezon Pro
7. Sencor
8. Dual
9. Atrazine
10. Select
11. Check x2
14 Days/July 29
22 Days/Aug 5
14 Days After Treatment
# Covers and Herbicides

<table>
<thead>
<tr>
<th>1. Huskie</th>
<th>1. Cereal rye</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Callisto</td>
<td>2. Oats</td>
</tr>
<tr>
<td>4. Spartan</td>
<td>4. Millet</td>
</tr>
<tr>
<td>5. Engenia</td>
<td>5. Flax</td>
</tr>
<tr>
<td>7. Sencor</td>
<td>7. Red clover</td>
</tr>
<tr>
<td>8. Dual</td>
<td>8. Crimson clover</td>
</tr>
<tr>
<td>10. Select</td>
<td>10. Turnip</td>
</tr>
<tr>
<td>11. Check x2</td>
<td>11. Radish</td>
</tr>
</tbody>
</table>
Observations

• Lot of rain in 2019
• Some injury at 1 day after spraying
  – No grass in Select plot
  – No broadleaves in Armezon Pro or Resicore
• 1-3 species dominated
  – Was diff at each broadcast timing
• Excess water stress more of problem
• Want to test notill vs conv till
Discussion

@Lee_Briese