Cover Crop Seed, Selection, Mixtures and Establishment

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Placed 450+ Cover Crop Plots in 6 states in 2009-2014
All Cover Crops are better than no cover crops!
Goals will dictate Cover Crop choices

- Produce Nitrogen?
- Scavenge Nitrogen?
- Both?
- Reduce compaction?
- Reduce Erosion?
- Other?
Many, Many Opportunities

- After Cereal Grains
- Into Corn and Soybeans (Applied during growing season)
- After Corn Silage and Seed Corn
- Before and After Vegetable Crops
- Late-season Grazing
After Cereal Grains and some Vegetables

- Sudangrass
- Legumes
- Radish
- Brassicas
- Cereal Grains
- Annual Ryegrass
- **Mixes**

The “tool box” is wide open!
After Corn and Soybeans (and late Vegetables)

- Cereal Rye
- Annual Ryegrass (?)
- Radishes and Brassicas (?)
- Crimson Clover (?)
- Mixes

Limited options – Aerial application or Inter-seeding likely necessary
After Corn Silage, Seed Corn (and Aug– Sept. harvested Vegetables)

- Cereal Grains
- Annual Ryegrass (?+)
- Radishes and Brassicas (?+)
- Crimson Clover (?+)
- Mixes

Aerial application or Inter–seeding may be necessary
After Wheat with Manure Applied

Annual Ryegrass + Forage Turnip
2012 yield + 70 bu/a compared to no cover crop (severe drought year)
Should we plant mixes??

- Usually
- How many species?
- What are benefits?
<table>
<thead>
<tr>
<th>Best used in Mix</th>
<th>Best used mono–culture</th>
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<tbody>
<tr>
<td>Crimson Clover</td>
<td>Sudangrass</td>
</tr>
<tr>
<td>Radishes</td>
<td>Sorghum x Sudangrass</td>
</tr>
<tr>
<td>Winter Peas</td>
<td>Buckwheat</td>
</tr>
<tr>
<td>Spring Peas</td>
<td>Medium Red Clover</td>
</tr>
<tr>
<td>Cereal Grains</td>
<td>Winter Cereal Rye (late)</td>
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<tr>
<td>Sunn Hemp</td>
<td></td>
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<tr>
<td>Hairy Vetch</td>
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<td>Chickpea</td>
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<td>Cowpea</td>
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<tr>
<td>Phacelia</td>
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</tbody>
</table>
Benefits of Mixes

- Bio-diversity
- Different rooting structures
- Different exudates from different species
- Can have increased earthworm activity
- Possibly produce and scavenge Nitrogen
- Can better reduce erosion
- Greater *Flexibility* for producer
- No – one species is “perfect”
  - neither is any mix “perfect” 😊
How many species in a Mix?

2? Common Mixes:
- Oats + Radish; CC + Radish; Peas + Radish; Vetch + CR

3? Common Mixes:
- CR + CC + Radish; Oats + CR + Turnips; ARg + CC + Rad; CR + HV + Brassica

4? Common Mixes:
- 2 cereals + Rad + Turnips; CR + legume + Rad + Turnips;

5+ Common Mixes:
- Whatever! Add Sunn Hemp, Sudangrass, Cowpea, SxS, Phacelia, Mustards, etc…
It depends!

- Most beginners want to keep it simple (Oats + Radish)
- If you graze and plant in July/August then 5+ can be great!
- If planting after grain corn or soybeans maybe just plant 1 species (Cereal Rye).
Do you have to have and “exotic” mixture to have “success”?

- NO
- NO
- NO
- NO

4 way mix of 2 cereals and 2 brassicas—following wheat—before corn
Benefits of *less exotic* mixes

- Generally easier to plant
- Generally less expensive
- Generally meet specific goals
Risk of *less exotic* mixes or using straight species

- Less bio-diversity
- May potentially get lesser stand in problematic areas if wrong species used

Straight Phacelia planted into soybeans
Benefits of more exotic mixes

- Greater bio-diversity
- May be more beneficial for grazing
- Provides better and more diverse coverage over whole field
Risks of *more exotic* mixes

- Greater Cost
- More difficult to plant
- Shorter window to plant where all may be "effective" enough to cover extra cost
- Greater Cost
USA – Midwestern Mixture Research

- Indiana 2012
- Minnesota 2014 (2 locations)
Cover Crops Can Reduce Compaction – No-till corn

Measuring Soil Compaction After Different Cover Crops
Robison Farms, Greenwood Indiana
Higher Numbers = Greater Depth in Inches = Less Compaction

2.24" of rain from May 1-July 31
Same soil type, same field.
Maximum depth of 10 tests measured. Entire Area was disturbed greatly in 2010 for installation of a water main
Check Plot included area in main part of the field w/o
Cover Crop Plots Compared to Check Plots in 2012 Drought

Chlorophyll Units and Height in Inches June 20-July 26

% of Check Plot Values

- Check = 100%

- Chlorophyll
- Inches Height

- Fall 2011 Cover Crop
- ARg + CC + Radish Mix
- Austrian Winter Peas + Radish Mix
- Crimson Clover + Radish Mix
- Oats/Radish Mix
- Oats + Rye + Appin Turnip Mix
- Cereal Rye Graze King 90
- Annual Ryegrass Blend
- Check Plot
- 7XCC Mix
- Annual Ryegrass + Crimson Clover
- ARg + CC + Radish Mix 1 Year
- ARg + CC + Radish Mix 2 Consecutive Years
2012 comparison (averages)–IN

<table>
<thead>
<tr>
<th>Cover Crop</th>
<th>Average Yield</th>
<th>% over no cover crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Cover Crop</td>
<td>105.24</td>
<td>100%</td>
</tr>
<tr>
<td>Straight Species (2)</td>
<td>130.57</td>
<td>124%</td>
</tr>
<tr>
<td>Mixes (6)</td>
<td>146.44</td>
<td>139%</td>
</tr>
</tbody>
</table>
Minnesota corn after cover crops

- Following Prevent Plant 2014 data
- Cover Crops planted in July or August 2013
- Cover Crops died over winter
- Excellent stands and growth
Prevent Planting – MN
Hagan Farms – 33 days
Minnesota Corn Yield data 2014 – after prevent plant (Ellendale, MN)

- 3 way (no legume) 214.1 bu/ac.
- 2 way (cc+Rad) 210.7 bu/ac.
- 4 way (cc+Rad+Turnip+ARg) 208.8 bu/ac.
- 3 way (cc+ARg+Rad) 206.8 bu/ac.
- 3 way (CR+cc+Rad) 204.8 bu/ac.
- 3 way (Oat+brassica+clover) 200.4 bu/ac.
- 2 way (Pea+Rad) 199.7 bu/ac.

- All species died over winter
- Cover crop planted ~8/1/13
- Field average 208.50 +20bu/acre vs no cover crop fields
Minnesota Corn Yield data 2014 – after prevent plant (Plainview, MN)

- Check strips – Italian Ryegrass 191.17 Ave.
- Straight Legume (3 plots) 183.15 Ave.
- Mixes 183.42 Ave.
  - (6 plots – various mixes 2–4 species)

- All species died over winter
- Cover crop planted 7/23/13
Ontario testimonial 2014

- Blake Vince +40 bu/acre with 10 way mix vs. straight cover crop Radish
  - Wayne DeBoer General Seed
Let’s talk about Grazing…

- Best value in cover cropping is with animal production
  - Sequester Nutrients
  - Recycle Nutrients
  - Excellent Rate of Gain potential (can have up to 3.5#/head/day in winter with grazing cover crops after wheat)
  - Reduces compaction
  - Increases yield the following year
Major Benefit of Grazing Cover Crops

- Extend the Grazing Season
- Less compaction than grazing stalks w/o cover crops
  - Virtually NO compaction
Grazing Radishes and Turnips
Northern Indiana December
Value of Grazing Cover Crops/acre

- Approximate cost/acre
  - Seed + application: $100

- Potential Yield x forage value
  - (3T DM/Ac. x $100): $300

- Cattle weight gain
  - (1–3.5#/head/day 120 days, 1.5hd/ac)

- Savings on Hay cost...
  - PRICELESS!
9-way Mix planted May 1, 2014

Chris Hollen – Indiana
Chris Hollen—IN—grazing annual cover crop forages prepping land for permanent pasture

- cowpea, non-gmo soybean, sunflowers, German millet, proso millet, pearl millet, 2 types of sorghum-sudangrass and grazing corn

This IS NOT for every farm...but it can be awesome for some
When and How to Apply Cover Crops
What Cover Crops to use with aerial application

- Annual Ryegrass
- All Cereal Grains
- Radishes
- Turnips
- Crimson Clover – into corn
- Hairy or Common Vetch
- Phacelia
- Sunflower
- Mixes of the above
What Cover Crops to avoid when using aerial application

- Peas
- Beans
- Sunn Hemp
- Crimson Clover – into soybeans
- Cowpea
- Chickpea
This is the proper time to apply cover crops into corn
This is WAY too early!
(unless it is bone dry with no rain in sight)!
Flown into Silage Corn – Waupun, WI area 22” rows (2 weeks before harvest)
The proper time to fly into Soybeans (30’s and 15’s)
- 7 ½ ’s need to be more mature
Sunlight makes a BIG difference

30’s
7 1/2’s
30” corn
Entrepreneurs can start a “new business” of applying cover crops into standing corn and soybeans!

Apply into smaller fields than plane can, very good stands achieved, cost effective per acre.
Mixes—What should you do now?

- Know producer’s goals
- Know producer’s management style/ability
- Know CHEMICAL PROGRAM
- Know what crop is coming next
- Know producer can apply
- Know the season and opportunity
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