Introduction to Cover Crops for Vegetables

Practical Farmers of Iowa Annual Conference

January 21, 2017
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Scattergood Friends School
farm@scattergood.org
Scattergood Friends School and Farm

Nurturing Mind, Body, Community and Soil
The neighbor’s land

Scattergood Farm
Group together: Brass/Cuc/Corn/Herbs:
Legumes/Roots/Allia/Salad/Cilantro::: Nightshades/Potatoes/Sweet
Potatoes:::approximately 1/4-1/3 of the gardens will be in covercrops
Resources:
• Why?
• What?
  • Fallow Year
  • Cash Crop Year
• How/When?
• Resources
• Why?
  • What?
    • Fallow Year
    • Cash Crop Year
• How?
• Resources
Important considerations:

Know why you’re using cover crops.

Don’t treat cover crops as an afterthought. Treat them as you do your cash crops:

  Schedule plantings. Map your fields. Group together plantings with similar terminal dates. Order your seeds.

Know how you’re going to terminate cover crops.

  Mowing with a bush hog and tilling works for us.

Be aware of allelopathic and disease host issues.
Why does Scattergood use cover crops?

• Add Organic Matter and fix Nitrogen
• Protect the soil from erosion
• Encourage pollinators and beneficials
• Weed control
• Forage for sheep/pigs/turkeys
SARE’s Benefits of Cover Crops:

• **Cut fertilizer costs** (fix N + scavenge nutrients)
• **Reduce the need for herbicides/pesticides** (weed suppression + natural herbicidal effects + host beneficial microbial life)
• **Improve yields by enhancing soil health** (OM, compaction)
• **Prevent soil erosion** (surface protection, better infiltration)
• **Conserve soil moisture** (increased infiltration, less evaporation)
• **Protect water quality** (less erosion, sequestering nutrients)
• **Help safeguard personal health** (use fewer chemical inputs)
• Why?
• What?
  • Fallow Year
  • Cash Crop Year
• How?
• Resources
Cover Crops Scattergood Currently Uses

Spring: Chickling Vetch/Oats (March-April)

Summer: Field Peas/Oats
  Buckwheat
  Sorghum Sudangrass (late May)

Fall: Hairy Vetch/Oats (before Sept 20)
  Field Peas/Oats
  Oats
Other Cover Crop species that we have tried:

- Tillage Radish
- Oilseed Radish
- Japanese Millet
- Berseem Clover
- Sweet Clover
- Crimson Clover
- Red Clover
- Sunn Hemp
- Cereal Rye
- Cow Peas
• Why?
• What?
• Fallow Year
• Cash Crop Year
• How?
• Resources
Group together: Brass/Cuc/Corn/Herbs::: Legumes/Roots/Allia/Salad/Cilantro::: Nightshades/Potatoes/Sweet Potatoes:::approximately 1/4-1/3 of the gardens will be in covercrops
Fallow Year Cover Cropping

Fall Prior (September): sow hairy vetch/oats mix where possible (sometimes cash crops are in the way).

March/April: sow chickling vetch or field peas/oats in places with no hairy vetch.

Mid May: mow and till; sow sorghum sudangrass.

Summer: graze/mow up to 3 times.

Fall: mow in September, till strips for early spring planting. Drill hairy vetch/oats where later crops are going (corn, pumpkins and late brassicas).
### SARE-Sponsored Green/Brown Manure Trial 2011-2015

#### 2012

<table>
<thead>
<tr>
<th>TIME</th>
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<th>BED 2</th>
<th>BED 3</th>
<th>BED 4</th>
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<td>April-July</td>
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<td>Broccoli</td>
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<tr>
<td>July-Aug</td>
<td>Chickens</td>
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<td></td>
<td>None</td>
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<tr>
<td>Aug-April</td>
<td>Oats/field peas grazed by sheep then hogs</td>
<td>None</td>
<td>(CONTROL)</td>
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#### 2013

<table>
<thead>
<tr>
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<th>BED 4</th>
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</thead>
<tbody>
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<td>May-August</td>
<td>Zucchini</td>
<td>Beets</td>
<td>Broccoli</td>
<td>Broccoli</td>
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<tr>
<td>August-Sept</td>
<td>Turkeys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept-May</td>
<td>Hairy Vetch/Oats + 1-2 loads of composted manure</td>
<td>None</td>
<td>(CONTROL)</td>
<td></td>
</tr>
</tbody>
</table>

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For North:

<table>
<thead>
<tr>
<th>TIME</th>
<th>BED 1</th>
<th>BED 2</th>
<th>BED 3</th>
<th>BED 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-August</td>
<td>Zucchini</td>
<td>Beets</td>
<td>Broccoli</td>
<td>Broccoli</td>
</tr>
<tr>
<td>August-Sept</td>
<td>None</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sept-May</td>
<td>Hairy Vetch/Oats</td>
<td>None</td>
<td></td>
<td></td>
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</table>
Green Manure vs. Brown Manure in an Organic Vegetable System

Final Report

Summary

PROJECT DESCRIPTION AND RESULTS
Project Duration: This is an on-going experiment, though for purposes of the grant, it will conclude on March 15, 2012

Background and description of previous sustainable agriculture activities: I have been the Farm Manager at Scattergood Friends School since 2003. We raise 10
• Why?

• What?
  • Fallow Year
  • Cash Crop Year

• How?

• Resources
Cover Crops used after/between cash crops

Chickling Vetch in areas that might have a N deficit--where hairy vetch died or didn’t fit (March-April)

Buckwheat or Field Peas/Oats when spring and summer cash crops come out (June-Aug).

As things wind down late summer/early fall, Hairy Vetch/Oats where the following year allows a later spring sowing, or Field Peas/Oats for an early spring sowing.
Quick Turnaround Cover Crops

2013, 2014

Buckwheat
Japanese Millet
Sorghum Sudangrass
Cowpeas
Sunn Hemp
Chickling Vetch
Oats/Field peas
Quick Turnaround Cover Crops for Horticulture -- Update 2014

Staff Contact:
Liz Kolbe – (515) 232-5661
liz@practicalfarmers.org

Web Link:

In a Nutshell
• Fruit and Vegetable farmers use cover crops to improve nutrient cycling and control weeds for increased production efficiency.
• Summer cover crops can be challenge due to dry conditions.
• Four farms evaluated summer cover crops to determine aboveground biomass production, carbon and nitrogen produced, effects on subsequent cash crop germination and effects on subsequent weed seed germination.

Key findings:
• Summer-seeded cover crops produced between 192 and 14,157 lb of biomass per acre.
• Carbon and nitrogen produced by cover crops varied significantly among the farms.
• Cover crops had varying effects on subsequent cash crop germination.
• Cover crops had varying effects on weed seed germination.

Cooperators:
• Rob and Tammy Faux – Tripoli
• Rick and Stacy Hartmann – Minburn
• Nicholas Leete and Alice McGary – Ames
• Mark Quee – West Branch

Funding By:
The Ceres Foundation
Transplanting into mowed rye: 2015
• Why?
• What?
  • Fallow Year
  • Cash Crop Year

• How/When?
• Resources
Approximate Planting Times
(east-central Iowa, Zone 5a)

Chickling Vetch/Oats: March 1-April 15
Field Peas/Oats: April 15-Sept 15
Buckwheat: May 1-Aug 15
Sorghum Sudangrass: May 15-June 1
Hairy Vetch/Oats: Aug 15-Sept 15
Oats: Sept 15-Oct 15
Important considerations:

Know why you’re using cover crops.

Don’t treat cover crops as an afterthought. Treat them as you do your cash crops:

   Schedule plantings. Map your fields. Group together plantings with similar terminal dates. Order your seeds.

Know how you’re going to terminate cover crops.

   Mowing with a bush hog and tilling works for us.

Be aware of allelopathic and disease host issues.
• Why?
• What?
  • Fallow Year
  • Cash Crop Year
• How?

• Resources
Resources:
(most of our seeds come from Welter Seeds in Onslow, IA)
Research Reports

Read and download reports of novel on-farm research projects designed and led by farmers in field crops, horticulture, livestock, energy and more.

Research reports are written by Practical Farmers staff to ensure consistency and quality, and are available to view or download for free below.

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<th>Title</th>
<th>Date</th>
<th>Member Priorities</th>
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<td>Oat Cover Crop vs. Straw Mulch for Garlic</td>
<td>11/18/16</td>
<td>C C H L S G P G G</td>
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<tr>
<td>Summer Squash Following Winter Rye With Strip</td>
<td>11/30/15</td>
<td>C C H L S G P G G</td>
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<tr>
<td>Quick Turnaround Cover Crops for Horticulture</td>
<td>12/05/14</td>
<td>C C H L S G P G G</td>
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<tr>
<td>Role of Cover Crops in Converting Perennial</td>
<td>01/31/12</td>
<td>C C H L S G P G G</td>
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<td>Assessing Tillage Radish for Weed Control In ...</td>
<td>06/09/11</td>
<td>C C H L S G P G G</td>
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<td>Effectiveness of White Mustard on Spring Weeds</td>
<td>02/07/11</td>
<td>C C H L S G P G G</td>
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<td>Tillage Radish to Control Weeds in Horticulture ...</td>
<td>11/03/10</td>
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On-Farm Research
- Cooperators' Program
- Research Protocols
- Research Reports
- Thompson Agriculture Alternatives
## Chart 2 PERFORMANCE AND ROLES

| Species                  | Legume N Source | Total N (lb./A)
<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td></td>
<td>(lb./A/yr.)</td>
<td>Dry Matter</td>
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<tr>
<td>Annual ryegrass p. 74</td>
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<td>2,000–9,000</td>
</tr>
<tr>
<td>Barley p. 77</td>
<td></td>
<td>2,000–10,000</td>
</tr>
<tr>
<td>Oats p. 93</td>
<td></td>
<td>2,000–10,000</td>
</tr>
<tr>
<td>Rye p. 98</td>
<td></td>
<td>3,000–10,000</td>
</tr>
<tr>
<td>Wheat p. 111</td>
<td></td>
<td>3,000–8,000</td>
</tr>
<tr>
<td>Buckwheat p. 90</td>
<td></td>
<td>2,000–4,000</td>
</tr>
<tr>
<td>Sorghum-sudan. p. 106</td>
<td></td>
<td>8,000–10,000</td>
</tr>
<tr>
<td>Mustards p. 81</td>
<td></td>
<td>30–120</td>
</tr>
<tr>
<td>Radish p. 81</td>
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<td>50–200</td>
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**N** = Nonlegumes

**S** = Sicas
### Chart 3A CULTURAL TRAITS

<table>
<thead>
<tr>
<th>Species</th>
<th>Aliases</th>
<th>Type¹</th>
<th>Hardy through Zone²</th>
<th>Tolerances</th>
<th>Habit³</th>
<th>pH (Pref.)</th>
<th>Best Established⁴</th>
<th>Min. Germin. Temp.</th>
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<tbody>
<tr>
<td>Annual ryegrass p. 74</td>
<td>Italian ryegrass</td>
<td>WA</td>
<td>6</td>
<td></td>
<td></td>
<td>6.0–7.0</td>
<td>ESP, LSu, EF, F</td>
<td>40F</td>
</tr>
<tr>
<td>Barley p. 77</td>
<td></td>
<td>WA</td>
<td>7</td>
<td></td>
<td></td>
<td>6.0–8.5</td>
<td>F, W, Sp</td>
<td>38F</td>
</tr>
<tr>
<td>Oats p. 93</td>
<td>spring oats</td>
<td>CSA</td>
<td>8</td>
<td></td>
<td></td>
<td>4.5–7.5</td>
<td>LSu, ESP W in 8+</td>
<td>38F</td>
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<tr>
<td>Rye p. 98</td>
<td>winter, cereal, or grain rye</td>
<td>CSA</td>
<td>3</td>
<td></td>
<td></td>
<td>5.0–7.0</td>
<td>LSu, F</td>
<td>34F</td>
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<tr>
<td>Wheat p. 111</td>
<td></td>
<td>WA</td>
<td>4</td>
<td></td>
<td></td>
<td>6.0–7.5</td>
<td>LSu, F</td>
<td>38F</td>
</tr>
<tr>
<td>Buckwheat p. 90</td>
<td></td>
<td>SA</td>
<td>NFT</td>
<td></td>
<td></td>
<td>5.0–7.0</td>
<td>Sp to LSu</td>
<td>50F</td>
</tr>
<tr>
<td>Sorghum–sudan. p. 106</td>
<td>Sudax</td>
<td>SA</td>
<td>NFT</td>
<td></td>
<td></td>
<td>6.0–7.0</td>
<td>LSp, ES</td>
<td>65F</td>
</tr>
<tr>
<td>Mustards p. 81</td>
<td>brown, oriental white, yellow</td>
<td>WA, CSA</td>
<td>7</td>
<td></td>
<td></td>
<td>5.5–7.5</td>
<td>Sp, LSu</td>
<td>40F</td>
</tr>
</tbody>
</table>

¹ Type: WA = winter annual, CSA = cool-season annual, SA = spring annual
² Hardy through Zone: 1 = none, 2 = some, 3 = moderate, 4 = high
³ Habit: U = upland, P = pasture
⁴ Best Established: ESP = early spring planting, LSu = late spring planting, EF = early fall planting, F = fall planting, W = winter, Sp = spring
## Chart 3B PLANTING

<table>
<thead>
<tr>
<th>Species</th>
<th>Depth</th>
<th>Seeding Rate</th>
<th>Cost (S/lb)</th>
<th>Cost/A (median)</th>
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<td>Broadcast</td>
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<tr>
<td></td>
<td></td>
<td>lb./A bu/A</td>
<td>lb./A bu/A</td>
<td>oz./100 ft²</td>
<td>drilled</td>
<td>broadcast</td>
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<td>0-1/2</td>
<td>10-20 .4-.8</td>
<td>20-30 .8-1.25</td>
<td>1</td>
<td>.70-1.30</td>
<td>12 24</td>
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<tr>
<td>Barley</td>
<td>3/4-2</td>
<td>50-100 1-2</td>
<td>80-125 1.6-2.5</td>
<td>3-5</td>
<td>.17-.37</td>
<td>20 27</td>
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<td>Oats</td>
<td>1/2-1 1/2</td>
<td>80-110 2.5-3.5</td>
<td>110-140 3.5-4.5</td>
<td>4-6</td>
<td>.13-.37</td>
<td>25 33</td>
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<tr>
<td>Rye</td>
<td>3/4-2</td>
<td>60-120 1-2</td>
<td>90-160 1.5-3.0</td>
<td>4-6</td>
<td>.18-.50</td>
<td>25 35</td>
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<td>Wheat</td>
<td>1/2-1 1/2</td>
<td>60-120 1-2</td>
<td>60-150 1-2.5</td>
<td>3-6</td>
<td>.10-.30</td>
<td>18 22</td>
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<td>Buckwheat</td>
<td>1/2-1 1/2</td>
<td>48-70 1-1.4</td>
<td>50-90 1.2-1.5</td>
<td>3-4</td>
<td>.30-.75</td>
<td>32 38</td>
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<td>Sorghum-sudangrass</td>
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<td>35 1</td>
<td>40-50 1-1.25</td>
<td>2</td>
<td>.40-1.00</td>
<td>26 34</td>
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<td>Mustards</td>
<td>1/4-3/4</td>
<td>5-12</td>
<td>10-15 1</td>
<td>1</td>
<td>1.50-3.00</td>
<td>16 24</td>
</tr>
<tr>
<td>Radish</td>
<td>1/4-1 1/2</td>
<td>8-13</td>
<td>10-20 1</td>
<td>1</td>
<td>1.50-2.50</td>
<td>22 32</td>
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<tr>
<td>Rapeseed</td>
<td>1/4-3/4</td>
<td>5-10</td>
<td>8-14 1</td>
<td>1</td>
<td>1.00-2.00</td>
<td>11 16</td>
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</table>
# Chart 4A POTENTIAL ADVANTAGES

<table>
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<tr>
<th>Species</th>
<th>Soil Impact</th>
<th>Soil Ecology</th>
<th>Other</th>
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<td></td>
<td>subsoiler</td>
<td>free P&amp;K</td>
<td>loosen topsoil</td>
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<td>●</td>
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<tr>
<td>Oats p. 93</td>
<td>○</td>
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<tr>
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<tr>
<td>Sorghum-sudangrass p. 106</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
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<td>●</td>
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<tr>
<td>Radish p. 82</td>
<td>○</td>
<td>○</td>
<td>●</td>
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<tr>
<td>Species</td>
<td>Increase Pest Risks</td>
<td>Management Challenges</td>
<td>Comments Pro/Con</td>
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<tr>
<td></td>
<td>weed pre النقد</td>
<td>insect/</td>
<td>crop</td>
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<td>Sorghum-sudangrass</td>
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</tr>
<tr>
<td>Mustards</td>
<td>○</td>
<td>○</td>
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</tbody>
</table>
HAIRY VETCH

Vicia villosa

Type: winter annual or summer annual legume

Roles: N source, weed suppressor, topsoil conditioner, reduce erosion

Mix with: small grains, field peas, bell beans, crimson clover, buckwheat

See charts, p. 66 to 72, for ranking and management summary.

Few legumes match hairy vetch for spring residue production or nitrogen contribution. Widely adapted and winter hardy through Hardiness Zone 4 and into Zone 3 (with snow cover), hairy vetch is a top N provider in temperate and subtropical regions.

The cover grows slowly in fall, but root development continues over winter. Growth quickens in spring, when hairy vetch becomes a sprawling vine up to 12 feet long. Field height rarely exceeds 3 feet unless the vetch is supported by another crop. Its abundant, viney biomass can be a benefit and a challenge. The stand smothers emerging weeds and supports moisture. But if the cover is too heavy, the spring cleanup can be difficult. Hairy vetch is available as a certified seed.

Corn planting date comparison trials with cover crops in Maryland show that planting as late as May 15 (the very end of the month-long local planting period) optimizes corn yield and profit from the system. Spring soil moisture was higher under the vetch or a vetch-rye mixture than under cereal rye or no cover crop. Killed vetch left on the surface conserved summer moisture for improved corn production (80, 82, 84, 85, 173, 243).

Even without crediting its soil-improving benefits, hairy vetch increases N response and produces enough N to cover its own in many systems.
Thank You!

Mark Quee
Farm Manager, Scattergood Friends School
farm@scattergood.org
319 530 3782