Cover Crop Basics for Missouri

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Soil Health Initiative

Soil Health Awareness

Unlock the Secrets in the Soil

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Soil is a living and life-giving natural resource.

As world population and food production demands rise, keeping our soil healthy and productive is of paramount importance. So much so that we believe improving the heal of our Nation’s soil is one of the most important conservation endeavors of our time.

The resources on this soil health section of our site are designed to help visitors understand the basics and benefits of soil health—and to learn about Soil Health Management Systems from farmers who are using those systems.

Soil Health Across the Nation
Cover Crop Basics

• Cover Crop Benefits
  • Controlling Erosion
    – Reduce soil erosion by buffering the impact of raindrops and holding the soil in place.
    – HEL Compliance
Cover Crop Basics

• Cover Crop Benefits
  • Improving Soil Health
    – Build OM holding soil particles together, increasing water holding capacity, increases nutrient cycling, and provides food for microbes.
    – Improve physical properties that bind soil
    – Break through hard layers in soil
    – Stimulate soil biological activity, roots providing food for micro organism
    – Conserve moisture
Cover Crop Basics

• Cover Crop Benefits

  • Suppressing Weeds
    – Shade from dense cover
    – Chemicals give off Allelopathic effect
Cover Crop Basics

• Cover Crop Benefits

• Improving Fertility
  – Legumes capture atmospheric nitrogen. When legume is terminated and decomposes, N is released for use by cash crop
  – Trap nitrogen, phosphorous, and potassium. N and nutrient scavenging
Cover Crop Basics

• Cover Crop Benefits
  
  • Enhancing Wildlife Habitat and Beneficial Insect Populations.
    – Attract beneficial-lady beetles and ground beetles
    – Provide cover and food for wildlife
Cover Crop Basics

• Things to Consider when selecting species
  – Crop Rotation and Tillage System
    • Harvest dates impact Planting dates
      – You can aerial seed as long as seed can get 50% sunlight.
    • Cereal Rye before Corn can effect Germination
      – Allelopathic effect
  – Climate
    affects the growing season
  – Soil Types
    • Some cover crops tolerate wet or droughty conditions.

– Single species vs. species mix
  • Easier to manage single cover crop, but a mix provides multiple benefits.
Cover Crop Basics

• Cover Crop Seeding Tips
  – Seed as soon as possible in the fall
    • No-till drill, best but added expense
    • Aerial/Broadcast, Corn, yellow-brown, Soybeans leaves falling, needs 50% sunlight on the ground
  – Plant seed early and shallow
    • ¼ to ½ inch
  – Use short season crop to maximize benefits
    • 110-112 days
  – Leave residue on fields to preserve moisture to help germination
  – Avoid VNS “Variety Not Stated” can make termination hard
  – Be aware the residual herbicide can inhibit establishment.
    • Overlap and dry years
Cover Crop Basics

- Terminating Cover Crops
  - Planting winter kill species
    - Will die at 15-25 degree temperature
  - Tilling
    - Tillage kills nutrients. Reduces the benefits of the cover crops, also increases erosion and reduces OM-tillage
  - Mowing or Roller Crimmer
    - Can be used successfully at flowering or heading stage
- Applying Herbicides
  - Timing to terminated is very important
Cover Crop Basics for Southeast Missouri

Covering challenges caused by poor fertility, low organic matter, poor infiltration, soil erosion, weeds and competition are actually indicators of poor soil health. Tillage is often used to treat these issues, but tillage is detrimental to soil health. On the other hand, cover crops scavenge nitrogen, increase organic matter, improve infiltration, reduce erosion and prevent weeds.

Cover Crop Usage Tips:
- Develop a three-year plan that identifies cash crops and cover crops.
- Plant early and avoid cover crop seedlings for planting in the fall.
- Use shorter-season varieties of corn (110-112 days) or soybeans to maximize cover crop benefits.
- Leave crop residue on fields to preserve moisture.
- Select cover crop varieties that are well suited for your area, avoid "Variety Not Stated" (VNS) seed.
- Plant cover crops seed early and shallow (1/4 to 1/2 inch).
- Apply 20 pounds of nitrogen, per acre, at planting to boost cover crop establishment.
- When planting, apply starter fertilizer in rows with starter.

Cover Crop Termination Tips:
- Be able to terminate cover crops in the spring, even if by ATV sprayer.
- For best results, spray herbicides on sunny days when temperatures are above 90 degrees.
- If spraying when temperatures are in the 40s, spray in the early morning versus afternoon to allow for better herbicide translocation. If night temperatures fall below 30 degrees, wait three days after spraying before applying herbicides.
- Soil temperature should be above 45 degrees.
- Fill sprayer tanks with water, add ammonium sulfate (AMS) and surfactant, and agitate three to five minutes before adding the herbicides.
- Consider using non-glyphosate herbicides to reduce the risk of plants developing herbicide resistance.
- When planning herbicide control for cover crop mixtures, consider all species in the mixture.
- Vegetative stage is easier to control.
- Match herbicides to the cover crops.
- Use a good herbicide initially and know the legumes to be more strong, remove the legumes later.
- Residual herbicide from the previous crop can inhibit cover crop establishment. This is especially noticeable in early areas, during dry years, and during late-planted years.
- Terminate all cover crops before they make a seed head.

Cover Crops Need to Complement the Cash Crop!
For a corn soybean rotation, follow these steps to improve soil health:
1. No-till corn soybean into corn stover. You can drill late (October into November) and will be successful with establishing the cereal rye.
2. No-till soybean into the terminated cereal rye. Plant an earlier group soybean to harvest earlier.
3. No-till a low carbon intensity cover crop that winter kills, such as spring radish and oilseed radish.
4. No-till corn into the winter killed radish and radish.

Annual Ryegrass
- Preferred varieties: Italian Ryegrass, Winter Rye, or Italian Ryegrass.
- Drilled Rate: 12 pounds per acre
- Breeding Rate: 20 pounds per acre
- Seed Cost: $410 per ton
- Seeding Period: Late November to early December
- Best use: Establish early to control weeds, improve soil structure, and add organic matter.

Cereal Rye
- Preferred varieties: Longevity, Winter Rye, or Italian Ryegrass.
- Drilled Rate: 12 pounds per acre
- Breeding Rate: 15 pounds per acre
- Seed Cost: $310 per ton
- Seeding Period: Late November to early December
- Best use: Establish early to control weeds, improve soil structure, and add organic matter.

Crimson Clover
- Preferred varieties: Crimson, Red Clover, or White Clover.
- Drilled Rate: 12 pounds per acre
- Breeding Rate: 15 pounds per acre
- Seed Cost: $420 per ton
- Seeding Period: Late November to early December
- Best use: Establish early to control weeds, improve soil structure, and add organic matter.

Hairy Vetch
- Preferred varieties: Spring Vetch, Winter Vetch, or Lens Vetch.
- Drilled Rate: 12 pounds per acre
- Breeding Rate: 20 pounds per acre
- Seed Cost: $3 per pound
- Seeding Period: Late November to early December
- Best use: Establish early to control weeds, improve soil structure, and add organic matter.

Spring or Winter Crots
- Preferred varieties: Winter Vetch, Spring Vetch, or Lens Vetch.
- Drilled Rate: 12 pounds per acre
- Breeding Rate: 20 pounds per acre
- Seed Cost: $3 per pound
- Seeding Period: Late November to early December
- Best use: Establish early to control weeds, improve soil structure, and add organic matter.

Oats
- Preferred varieties: Winter Oats, Spring Oats, or Winter Radish.
- Drilled Rate: 12 pounds per acre
- Breeding Rate: 15 pounds per acre
- Seed Cost: $3 per pound
- Seeding Period: Late November to early December
- Best use: Establish early to control weeds, improve soil structure, and add organic matter.

What to Use as a Winter Cover Crop
- Winter peas and beans are not winter hardy. Temporarily are better for growing than a cover crop.
- Try using mixes of cover crop blends with winter radish.
- For more information, contact your local extension agent or visit the Cover Crop Basics for Southeast Missouri website.

Try These Cover Crop Mixes:
- Use a mix of cover crops with winter radish for better establishment and growth.
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Annual Ryegrass

- **Advantages**-
  - Best Scavenge for Nitrogen
  - Deep rooted-pulls nutrients depths cash crop roots can’t reach
  - Best species at pulling nutrients to the surface
  - Graze
  - Suppresses for Soybean Cyst Nematodes
  - Likes wet soil

- **Time seeding/Methods**
  - Best Sept-Oct
  - Drilling-Reliable, more time
  - Aerial-Inconsistent

- **Varieties**
  - VNS important
  - More cold tolerant
    - King, Bounty, Jackson, Marshall not Gulf
    - Westerwold types, not Italian, not VNS

- **Termination**
  - 7-12 inches vegetative, easy control
  - Hard to kill at boot stage, don’t want nodes, jointing, flowering
  - Can have second regrowth-not best with Wheat
Cover Crop species

Cereal rye

Annual ryegrass
Cereal Rye/Winter Rye

• Advantages-
  – Scavenge for Nitrogen following Corn and Wheat
  – Widest planting window-cold tolerant
  – Fastest spring regrowth
  – Good control of Marestail, Ragweed, Pigweed
  – Dries out soil, roots to 18 inches

Time seeding/Methods
  – Long window September-November
  – Germinates at soil temp. 38 degrees
  – Drilling-Reliable, more time
  – Aerial- reliable, even dry

• Varieties
  – Not as important- Aroostook, Cowpro

• Termination
  – 2 weeks before Corn alleopathic effect on germinating corn seedlings. Cereal rye needs to be dead (brown) at corn planting or sprayed just before corn planter.
Crimson Clover

• Advantages-
  – Good seedling vigor quick to establish
  – Fixes Nitrogen
  – Pre-bud to bloom most 100# N
  – Can be grazed with cereal rye, etc.

Time seeding/ Methods
  – August -September
  – Drilling-Reliable, more time

• Varieties
  - Au Robin, AU Sunrise are 2 weeks earlier than Dixie.

• Termination
  – pre bud to bloom
  – Simple tap root easy to terminate

  – Note: Not good in wet ares
Hairy Vetch

Advantages:
- Fixes Nitrogen
  - correct inoculum when treat
  - Or purchase pretreated
- Maximum N at bloom
- Pre-bud to bloom most 75-200# N
- Excellent weed suppression and moisture retainer.

Time seeding/ Methods
- August - September
- Drilling- Reliable, more time

• Varieties
  - Purple Bounty earlier to bloom, don’t purchase VNS.

• Termination
  - pre bud to bloom
  - Glyphosate will not terminate, easy to terminate with 2,4-D; check label before Corn.
  - Plant before termination or dead material ball up on planter.

  - Note: Not Purple Vetch or Common Vetch
Oilseed Radish

Advantages-
- Scavenger for Nitrogen
- Winter Kills easy to manage
- Increases earthworms
- Increases infiltration

Time seeding/ Methods
- August - September
- Drilling-Reliable, more time

- Varieties
  - Enricher, Groundhog, Nitro,Tillage

- Termination
  - Winter Kills at 15* or 25* for several days
Corn-Soybean Rotation, follow these steps

• No-till cereal rye into corn stalks. You can drill late (Oct-Nov) and still be successful with establishing the cereal rye.

• No-till soybeans into the terminated cereal rye. (Plant an earlier group soybean)

• No-till a low carbon/nitrogen mixture that winter kills. (Spring oats and oilseed radish)

• No-till corn into the winter killed spring oats and oilseed radish.
Cover Crop Basics

- What is the seeding rate?
  - NRCS Cover Crop

Standard tables for species.
- Species, rates, dates

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<td>CO</td>
<td>VG</td>
<td>G</td>
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<td>10%</td>
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<td>Mustard</td>
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<td>G</td>
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<td>10%</td>
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<td>VG</td>
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<td>Pea</td>
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<td>G</td>
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<td>10%</td>
<td>VG</td>
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<td>G</td>
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### Table 1. Performance and Roles (Continued)

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<th>Species</th>
<th>Planting Depth (Inches)</th>
<th>Drilled (lbs/A)</th>
<th>Broadcast (lbs/A)</th>
<th>Drilled Middles (lbs/A)</th>
<th>Inoculant Type</th>
<th>Reseeds</th>
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<td>Annual Ryegrass</td>
<td>0-½</td>
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<td>Spring or Winter Barley</td>
<td>½-1½</td>
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<td>80</td>
<td>20</td>
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<td>Spring Oats</td>
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<td>50</td>
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<td>Spring or Winter Rye</td>
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<td>50</td>
<td>75</td>
<td>15</td>
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<td>60</td>
<td>80</td>
<td>20</td>
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<tr>
<td>Spring or Winter Triticale</td>
<td>½-1½</td>
<td>50</td>
<td>75</td>
<td>15</td>
<td>NA</td>
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<td>Corn</td>
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<td>30</td>
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<td>34</td>
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<td>Sorghum-Sudangrass</td>
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<td>18</td>
<td>27</td>
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<td>Pearl Millet</td>
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<td>15</td>
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<tr>
<td>Proso Millet</td>
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<td>Usually</td>
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<tr>
<td>Tumip</td>
<td>½-1½</td>
<td>2</td>
<td>3</td>
<td></td>
<td>NA</td>
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<tr>
<td>Oilseed Radish</td>
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<td>8</td>
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<td>Buckwheat</td>
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<td>38</td>
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<td>NA</td>
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<td>60</td>
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<tr>
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<td>18</td>
<td>4</td>
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<td>60</td>
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<tr>
<td>Sunnhemp</td>
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<td>55</td>
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<td>Cowpea</td>
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<tr>
<td>Hairy Vetch</td>
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<td>15</td>
<td>20</td>
<td></td>
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<td>Sometimes</td>
</tr>
<tr>
<td>Alsike Clover</td>
<td>½-½</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>Red Clover, White Clover</td>
<td>Usually</td>
</tr>
<tr>
<td>Red Clover</td>
<td>½-½</td>
<td>9</td>
<td>12</td>
<td>2</td>
<td>Red clover, White clover</td>
<td>Sometimes</td>
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<tr>
<td>Subterranean Clover</td>
<td>½-½</td>
<td>20</td>
<td>30</td>
<td>7</td>
<td>Clovers, sub, rose</td>
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<tr>
<td>Sweetclovers</td>
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<td>9</td>
<td>2</td>
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</tr>
<tr>
<td>White Clover</td>
<td>½-½½</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>Red clover, White Clover</td>
<td>Reliably</td>
</tr>
<tr>
<td>Woollypod Vetch</td>
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<tr>
<td>Field Pea</td>
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<td>70</td>
<td></td>
<td>Pea, Vetch</td>
<td>Usually</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>½-½½</td>
<td>12</td>
<td>18</td>
<td>3</td>
<td>Alfalfa</td>
<td>Sometimes</td>
</tr>
</tbody>
</table>
- Midwest Cover Crop Council
  - www.mwcc.edu
Cost Share available

NRCS

Environmental Quality Incentives Program - EQIP
  Winter Kill $39.10/ac
  Chemical Kill $55.10/ac

Conservation Stewardship Program - CSP

Soil and Water Conservation District
  $30/ac
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