Objectives

Student will learn...

- advantages and uses of cover crops in organic and permaculture farming
- how to choose best cover crops to use in different applications
- different application methods
- different methods of incorporation
Definitions

- **Cover Crop**: any crop seeded primarily for the purpose of improving or holding soil

- **Cash crop**: a crop seeded primarily for sale

- **Top Soil**: the top layer of soil, usually containing the highest proportion of organic matter and nutrients

- **Organic matter**: nutrient-rich, biologically-derived soil ingredient
Advantages and uses of cover crops

Cover crops are an excellent way to hold and stabilize topsoil when land is not in use.
advantages...

- Cover crops with deep roots are frequently used to loosen hard soils
advantages...

- legume-family cover crops can “fix” nitrogen, i.e. make soil-bound nitrogen more available to plants
advantages...

- Once tilled-in, cover crops add organic matter and build soil fertility
advantages...

- Cover crops are sometimes used as a weed barrier between rows of crops
Advantages...

- Some cover crops can attract beneficial insects
Select cover crops’ uses

**Cover Crop Chart**

<table>
<thead>
<tr>
<th>Species</th>
<th>When To Plant</th>
<th>Min Gern Temp</th>
<th>Seeding Depth Inches</th>
<th>Seed Per 1000 sq ft</th>
<th>Pounds Of Seed Per Acre</th>
<th>Hardiness To Zone</th>
<th>Legume A Source</th>
<th>Nitrogen Recycler</th>
<th>Chokes Out Weeds</th>
<th>Pounds Organic Matter Per Acre</th>
<th>Key to Symbols</th>
<th>Erosion Control</th>
<th>Nematode/Symptomatic Control</th>
<th>Soil Builder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Alfalfa</td>
<td>Late Summer</td>
<td>45°F</td>
<td>1¼-½</td>
<td>½ lb</td>
<td>12-15</td>
<td>5</td>
<td>Excellent</td>
<td>Very Good</td>
<td>Good</td>
<td>2000-4000</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hairy Vetch</td>
<td>Early Autumn, Spring, Summer</td>
<td>55°F</td>
<td>1½-2½</td>
<td>1 lb</td>
<td>25-40</td>
<td>4</td>
<td>Very Good</td>
<td>Good</td>
<td>Fair</td>
<td>2300-5000</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Vetch</td>
<td>Early Autumn, Spring, Summer</td>
<td>55°F</td>
<td>1½-2½</td>
<td>1 lb</td>
<td>25-40</td>
<td>4</td>
<td>Good</td>
<td>Fair</td>
<td>Fair</td>
<td>2300-5000</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austrian Field Peas</td>
<td>Autumn</td>
<td>40°F</td>
<td>1-3</td>
<td>2 lb</td>
<td>75</td>
<td>7</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>4000-5000</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crimson Clover</td>
<td>Anytime</td>
<td>45°F</td>
<td>1¼-½</td>
<td>1 lb</td>
<td>30-40</td>
<td>7</td>
<td>Excellent</td>
<td>Very Good</td>
<td>Excellent</td>
<td>3500-5000</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mammoth Red Clover</td>
<td>Early Autumn</td>
<td>40°F</td>
<td>1¼-½</td>
<td>½ lb</td>
<td>20</td>
<td>4</td>
<td>Excellent</td>
<td>Good</td>
<td>Fair</td>
<td>4000-6000</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand White Clover</td>
<td>Spring/Summer</td>
<td>40°F</td>
<td>1¼-½</td>
<td>½ lb</td>
<td>6-10</td>
<td>4</td>
<td>Good</td>
<td>Excellent</td>
<td>Exceeds</td>
<td>2000-6000</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Berseem Clover</td>
<td>Early Autumn</td>
<td>42°F</td>
<td>1¼-½</td>
<td>1 lb</td>
<td>15-20</td>
<td>8</td>
<td>Very Good</td>
<td>Good</td>
<td>Excellent</td>
<td>6000-10000</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medic Mix</td>
<td>Autumn/early Spring</td>
<td>45°F</td>
<td>1¼-½</td>
<td>1 lb</td>
<td>15</td>
<td>8</td>
<td>Good</td>
<td>Fair</td>
<td>Exceeds</td>
<td>1500-4000</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fava Beans</td>
<td>Autumn</td>
<td>55°F</td>
<td>1-3</td>
<td>5 lb</td>
<td>200</td>
<td>7</td>
<td>Excellent</td>
<td>Fair</td>
<td>Exceeds</td>
<td>3500-7000</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td>Early Autumn &amp; Spring</td>
<td>40°F</td>
<td>1¼-¼</td>
<td>½ lb</td>
<td>6-10</td>
<td>7</td>
<td>Excellent</td>
<td>Good</td>
<td>Excellent</td>
<td>5000-12,000</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radish</td>
<td>Autumn</td>
<td>45°F</td>
<td>1¼-½</td>
<td>½ lb</td>
<td>10-12</td>
<td>8</td>
<td>Excellent</td>
<td>Very Good</td>
<td>Good</td>
<td>4000-7000</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnips</td>
<td>Autumn</td>
<td>45°F</td>
<td>1¼-½</td>
<td>½ lb</td>
<td>4-6</td>
<td>6</td>
<td>Fair</td>
<td>Excellent</td>
<td>Poor - 30%</td>
<td>8000-12,000</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Rye Grass</td>
<td>Early Autumn</td>
<td>40°F</td>
<td>0-½</td>
<td>1 lb</td>
<td>20-30</td>
<td>5</td>
<td>Excellent</td>
<td>Good</td>
<td>Excellent</td>
<td>2000-9000</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Rye Grain</td>
<td>Autumn</td>
<td>34°F</td>
<td>½-2</td>
<td>4-5 lbs</td>
<td>50-125</td>
<td>3</td>
<td>Excellent</td>
<td>Very Good</td>
<td>Excellent</td>
<td>3000-1000</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Barley</td>
<td>Late Summer to Autumn</td>
<td>37°F</td>
<td>¼-2</td>
<td>2 lbs</td>
<td>75-125</td>
<td>7</td>
<td>Good</td>
<td>Very Good</td>
<td>Excellent</td>
<td>2000-10,000</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Triticale</td>
<td>Autumn</td>
<td>34°F</td>
<td>1½-2</td>
<td>2 lbs</td>
<td>60-120</td>
<td>6</td>
<td>Good</td>
<td>Excellent</td>
<td>Poor - 15%</td>
<td>6000-8000</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>Autumn</td>
<td>38°F</td>
<td>1½-1½</td>
<td>3 lbs</td>
<td>70-150</td>
<td>4</td>
<td>Good</td>
<td>Fair</td>
<td>Poor - 20%</td>
<td>3000-8000</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Oats</td>
<td>Autumn</td>
<td>38°F</td>
<td>¾-2</td>
<td>1-3 lbs</td>
<td>50</td>
<td>8</td>
<td>Good</td>
<td>Fair</td>
<td>Poor - 20%</td>
<td>2000-10,000</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buckwheat</td>
<td>After last frost</td>
<td>48°F</td>
<td>1½-1½</td>
<td>2-3 lbs</td>
<td>50</td>
<td>Not Frost Tolerant</td>
<td>6</td>
<td>Good</td>
<td>Fair</td>
<td>Excellent</td>
<td>2000-4000</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Territorial Seed Company - 2013
For holding a soil...

Consider:

How long until you plan to use the soil again for cash crop?

- for short-term (less than 3 months), use buckwheat, oats, tillage radish, sudangrass, turnips, wheat
- for medium-term (3-6 months), use red clover, winter rye, vetch
- for long-term (6 months-several years), use clovers, forage grasses
to loosen hard soils...

- Choose a cover crop with deep tap roots: tillage radish, turnips, clovers

- for permaculture farms, these crops can replace the work of deep tillage machines
To fix nitrogen...

- Choose a cover crop in the legume family: summer alfalfa, clovers, field peas

- Note: these can be used alone or mixed with other crops, for example:
  - mix red clover with winter rye to hold a field over winter
To add organic matter...

- Choose a cover crop with high bio-mass, such as sorghum-sudangrass, winter rye, crimson clover

- Considerations: the larger a crop, the more difficult it is to incorporate
As a weed barrier...

- In open fields... Oats, vetch, clover
- For between rows of crops... undersow with clover, or ryegrass (could require mowing)
To attract beneficial insects

- Choose cover crops with colorful flowers: crimson clover, vetch, turnips
Cover Crop Application... Small Scale

For permaculture and small-scale (less than 1/2 acre) farms, cover crop can be spread easily by hand. Use a quick wrist flick to spread evenly, then rake in...similar to sowing seed for a lawn.

http://youtu.be/uTlhEgUeUK4
Application...medium-size farm

- For larger plots, a hand-held broadcast seed spreader helps spread seed evenly.

- Then cultipack seeds to ensure good soil-to-seed contact.

http://youtu.be/jjqiN2mwchY
Application... larger farms

- Option 1: mount 3-point a drop spreader behind tractor, then cultipack seeds
- Option 2: Purchase or rent a commercial seed drill

http://youtu.be/quEp60g29Dg
How to incorporate your cover crop...small scale

- Option 1: Use a hand scythe to cut the crop. Then use a shovel to “plow” it in.

- Option 2: Use a walk-behind tiller to till in the crop (works best on smaller crops)

http://youtu.be/0mqFl86BOck
How to incorporate cover crop... larger farms

- Option 1: Use a tractor-mounted tiller to till in the cover crop

- Option 2: Use a flair mower to chop the crop into small pieces, then plow under

http://youtu.be/lY7g3CBwnZA
When to plant cover crops... Spring

- Good cover crops for Spring planting...peas, oats, hairy vetch, clover, radish, turnips
When to plant cover crops... Summer

- For summer cover crops... buckwheat, sorghum-sudangrass
When to plant cover crops... Fall/Winter

- Fall/winter cover crops... clovers, winter rye, peas, vetch, radish, turnips
When to incorporate

“2/3 bloom”… for maximum organic matter, incorporate when 2/3 of the flowers have appeared.

Don’t wait too long! the cover crop will develop seeds and become a weed.

Don’t till too soon! the cover will not contribute a maximum amount of organic matter.
Combining cover crops can give farmers the benefit of multiple crops in one season.

Spring crops to combine: field peas, oats, hairy vetch, clovers.
Cover Crop Combinations...Fall

- Crops to combine for a fall sowing: winter rye, field peas, ryegrass, crimson clover, hairy vetch
Self-Review Questions

- What farming objectives can be met with cover crops?
- What cover crops are best for loosening soil?
- What benefits do clover and vetch offer?
Resources

- johnnyseeds.com
- covercropsolutions.com
- www.organicgardening.com/learn-and-grow/cover-crop-basics