Session 2

Cover Crop Selection

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RESEARCH & EXTENSION
University of Arkansas System
Outline

– Cover crop groups
  • *Legume*
  • *Grass*
  • *Brassicas*

– Cover crop selection
– Winter/summer
– Seeding rate selection
– Planting date selection
Cover Crops

Instead of harvesting as a cash crop, cover crops are grown for the benefits they have on the soil or on subsequent crops.

Grasses

- Produce Biomass!
- Increase Soil
- Organic Matter

Legumes

- Provide N to the following crop when tilled into the soil

Brassicas

- Disease Suppression
Cover Crops

Instead of harvesting as a cash crop, cover crops are grown for the benefits they have on the soil or on subsequent crops.

Interplant Mixes

Grasses

Produce Biomass!
Increase Soil Organic Matter

Legumes

Provide N to the following crop when tilled into the soil

Brassicas

Disease Suppression
Cover Crop Selection

1. What is the goal?
   - Winter, spring, fall, or summer
   - Days to maturity

2. Season and Timing
   - Cold tolerance
   - Not in the same plant family

3. Compliment the next cash crop
   - Requires herbicide to terminate
   - Requires flail mower

4. Variety Selection
   - Frost prone
   - Wet or dry soil
   - Non-host to disease or nematode
   - Different nutrient use patterns

5. Site Location or Available Equipment
   - Avoid cover crops that may become weeds
Cover Crop Goal: Weed control

- Grasses produce the most **biomass** and create the most effective weed mat
  - Increase seeding rates and plant on-time to ensure a good cover crop stand
  - Long-vined legume varieties are preferred over short-vined for weed control
Cover Crop Goal: Nitrogen

- Legumes fix nitrogen
  - Termination timing and crop stand influence nitrogen credits.
  - Consider seed costs and potential lbs. N/acre fixed.

- Legumes tend to be poor competitors against weeds
Cover Crop Goal: Pest Control

• Nematodes
  – Pearl Millet *Poor or non-host to root knot and lesion nematodes*
  – Cereal Rye *Poor or Non-host to root knot, lesion and dagger nematodes*
  – Cowpea ‘Iron Clay’ *Poor or Non-host to root knot nematode*

• Diseases
  – Mustard and brassica cover crops have *glucosinolate* compounds in their leaves. After mowing and soil incorporation these compounds breakdown and release *isothiocyanates* (biological fumigant)
Cover Crop Goal: Easing Soil Compaction

- Oilseed or daikon radish types
  - *Ex. GroundHog radish™, Nitro radish, Sodbuster, and Bio-till radish*
- May winter kill
- Soil texture will impact rooting depth
- Good at taking up and rapidly releasing nutrients as biomass decomposes
# Cover Crop Chart

## Growth Cycle

- **A**: Annual
- **B**: Biennial
- **P**: Perennial

## Plant Architecture

- **γ**: Upright
- **γ**: Upright-Spreading
- **γ**: Prostrate

## Relative Water Use

- ****: Low
- ****: Medium
- ****: High

<table>
<thead>
<tr>
<th>Cool Grass</th>
<th>Broadleaf</th>
<th>Warm Grass</th>
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</thead>
<tbody>
<tr>
<td><strong>ANNUAL FESCUE</strong> (γ)</td>
<td><strong>CAMELINA</strong> (γ)</td>
<td><strong>BROWNTOP MILLET</strong> (γ)</td>
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<tr>
<td><strong>BARLEY</strong> (γ)</td>
<td><strong>MUSTARD</strong> (γ)</td>
<td><strong>AMARANTH</strong> (γ)</td>
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<tr>
<td><strong>OAT</strong> (γ)</td>
<td><strong>BERSEEM CLOVER</strong> (γ)</td>
<td><strong>FOXTAIL MILLET</strong> (γ)</td>
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<td><strong>SPELT</strong> (γ)</td>
<td><strong>CANOLA</strong> (γ)</td>
<td><strong>PEARL MILLET</strong> (γ)</td>
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<tr>
<td><strong>WHEAT</strong> (γ)</td>
<td><strong>RADISH</strong> (γ)</td>
<td><strong>BUCKWHEAT</strong> (γ)</td>
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<tr>
<td><strong>RYE</strong> (γ)</td>
<td><strong>CRIMSON CLOVER</strong> (γ)</td>
<td><strong>PEARL MILLET</strong> (γ)</td>
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<tr>
<td><strong>KALE</strong> (γ)</td>
<td><strong>LENTIL</strong> (γ)</td>
<td><strong>PROSO MILLET</strong> (γ)</td>
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<tr>
<td><strong>TURNIP</strong> (γ)</td>
<td><strong>LUPIN</strong> (γ)</td>
<td><strong>GRAIN SORGHUM</strong> (γ)</td>
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<tr>
<td><strong>SPINACH</strong> (γ)</td>
<td><strong>FABA BEAN</strong> (γ)</td>
<td><strong>SUDAN GRASS</strong> (γ)</td>
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<tr>
<td><strong>BEET</strong> (γ)</td>
<td><strong>FENUGREEK</strong> (γ)</td>
<td><strong>CUCURBITA</strong> (γ)</td>
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<tr>
<td><strong>WHITE CLOVER</strong> (γ)</td>
<td><strong>SWEET CLOVER</strong> (γ)</td>
<td><strong>CUCURBITA</strong> (γ)</td>
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<tr>
<td><strong>BIRDSFOOT TREVOLI</strong> (γ)</td>
<td><strong>PARTRIDGE PEA</strong> (γ)</td>
<td><strong>SAFFLOWER</strong> (γ)</td>
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<tr>
<td><strong>ALFALFA</strong> (γ)</td>
<td><strong>SOY BEAN</strong> (γ)</td>
<td><strong>TEFF</strong> (γ)</td>
</tr>
</tbody>
</table>

Source: [https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart/](https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart/)

V 3.0 February 2018
Common Summer Cover Crops

- **Cowpea**
  - Biomass, may suppress root-knot nematodes
  - Consistent producer of 100lbs of N per acre, Drought tolerant.

- **Buckwheat**
  - Fast growth, pollinator habitat

- **Sorghum**
  - Biomass

- **Sudangrass**
  - Grows 10-12’ tall in 90-120 days. 4,000-5,000 lbs./acre

- **Pearl Millet**
  - Grows 4-6’ tall in 90-120 days.

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**COVERCROP**
**VEGETABLE PRODUCTION TRAINING**
Common Winter Cover Crops

- **Winter wheat**
  - Fine root system, enhances nutrient cycling, good weed suppression

- **Cereal Rye**
  - Can be planted late in fall, high biomass, high C:N

- **Austrian Pea**
  - Reliable establishment, good amount of N for seed costs

- **Mustard**
  - Plant early to establish, May winter kill

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**COVERCROP**
**VEGETABLE PRODUCTION TRAINING**
Cover Crop Mixes

Cover crop mixes mimic plant diversity found in nature and can maximize the benefits of using cover crops

- Individual species in a mix should complement one another
  - Vines that can use grasses as a ladder
  - Avoid combining species with dense canopies with something low growing
  - Combine a slow growing grass species with a cover known to winter kill
  - Combine a high C:N grass with a legume
  - Chose covers that have similar maturation timelines

- A good mixture has 3-5 species.
- Be aware of differences in seeding depth requirements

Black oats, crimson clover and mustard cover crop
Seeding Rates

Refer to local Extension publication and university research for the production system
Seeding rate will affect stand and characteristics of the crop
(i.e. High grass seeding rate results in thinner stems, lower rates result in thicker stems)

• Examples:
  Standard rate per acre x % of standard rate = Mix rate

• **Austrian pea & Cereal Rye**
  Aust. Peas: 50 lbs. x 0.85 = 42.5 lbs.;
  Cereal Rye: 120 lbs. x 0.50 = 60 lbs.

• **Triticale, Cereal Rye & Crimson Clover**
  *Triticale and cereal rye are redundant (divide by 2)*
  Triticale, 120 lbs. x 0.50 = 60 / 2 = 30 lbs.
  Cereal Rye 120 lbs. x 0.50 = 60 / 2 = 30 lbs.
  Crim. Clover 12 lbs. x 0.90 = 10.8 lbs.

Seeding Rates for Mixes:
• Change seeding rates based on species with competitive growth rates and desired crop mix.
  • Grasses reduce rate 75-50%
  • Legumes reduce rate 25%
  • Brassicas reduce rate 25%
• Functional redundancy
  • divide each seeding rate by number of species that are redundant
Take home message

• Cover crops selection is goal, cropping system and farm specific

• Cover crop mixes are desirable because they mimic nature and combine the benefits of multiple types of cover crops
  – Mixes should be a goal, but not necessarily a starting point
Authors and Acknowledgements

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Resources and Sources

- USDA. The Cover Crop Chart (v. 3.0). [https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart/](https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart/)