

Winter Cover Crop Species Adapted to North-Central West Texas and Southwestern Oklahoma

Plant Materials Technical Note



Background:

Protecting our soils has been a goal of the NRCS for many years, but recently, improving the overall health of soils has become a central component of that goal. Cover crops have long been used between cash crops to prevent soil erosion from wind and water. We now know about soil health studies that prove cover crops can also improve the health and productivity of soils. Summer and winter cover cropping systems provide many advantages when implemented into farming and ranching operations. Some of these advantages include:

- Added Organic Matter
- Reduce soil erosion
- Provide nitrogen
- Provide weed control
- Reduce disease inoculums (Roozeboom)
- Improve soil structure (Aggregation, Infiltration, Available Water Capacity)
- Manage nutrients
- Furnish moisture conserving mulch and lower soil temperature
- Provide habitat for beneficial organisms (Clark, 2007)

These benefits will only be achieved if the selected cover crop species are adapted to the environmental conditions in the areas where they are used (Bodner et al., 2009). Growing conditions differ from one region to another and plant species will not perform the same under every environmental condition. For instance, species that require large amounts of water will not thrive in arid, dry regions. A basic understanding of the area's growing condition is critical when choosing cover crops. Producers must also understand how to manage a cover crop in order to reap the full benefits. There are potential drawbacks to cover crop mixtures that need to be managed. These are:

- Heavy residue may accrue which can delay drying for planting
- Nitrogen may be tied up and unavailable for crop plants
- Cover crop may become weeds
- Disease inoculums may be increased (Roozeboom)
- Planting dates between cash crop harvest and cover crop establishment may be difficult to manage

Sullivan (2003) states that, "Cover crops could be considered the backbone of any annual cropping system that seeks to be sustainable". Taking advantage of cover crops may provide producers the opportunity to continue to produce food and fiber for a growing population while reducing input costs and maximizing precipitation while protecting our valuable soil resources.

Purpose:

The purpose of this technical note is to provide information on commercially available cover crop species evaluated at the James E. "Bud" Smith Plant Materials Center, Knox City, Texas for soil health improvement in North central Texas and southwestern Oklahoma. Plant attributes, compatibility and cultural information are provided for each cover crop to assist producers and NRCS field office personnel with making decisions on which cover crop species are suitable to meet the objective of the cover crop planting (e.g. soil structure improvement, soil fertility, nutrient management, and weed suppression). Compatibility information was taken from "A Comprehensive Guide to Cover Crop Species Used in the Northeast United States" accessed on-line at: <http://www.plantmaterials.nrcs.usda.gov/pub/nypmcpu10645.pdf>.

The technical note covers planting depth, days to 75% emergence, plant height, percent ground cover, biomass yields, and photos of each cover crop species at different growth stages to help producers and conservationists with plant identification.

Grasses

Common Name: Cereal Rye

Scientific Name: *Secale cereal*

Planting Depth: ¾ to 2 inches

Planting Rate: 60 lbs/ac

Seed per Pound: 21,596

Plant Height: 40-42 inches

Residue Persistence: Excellent

Biomass Potential: 7,000-8,000 lbs/ac

Facts: prevents soil erosion, quick forage for grazing, improve soil structure and drainage, scavenge nutrients, adds organic matter, and suppresses weeds

Mix with: legumes, other grasses, vetches, and brassica



Common Name: Barley

Scientific Name: *Hordeum vulgare*

Planting Depth: ¾ to 2 inches

Planting Rate: 50 lbs/ac

Seed per Pound: 13,107

Plant Height: 24-26 inches

Residue Persistence: Excellent

Biomass Potential: 6,000-8,000 lbs/ac

Facts: soil erosion prevention, weed suppression, tolerates moderate alkaline conditions, scavenge nutrients

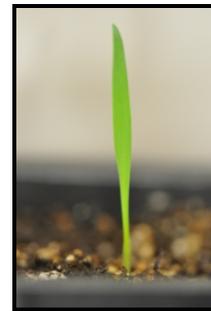
Mix with: annual legumes and other small grains



Common Name: Black Oats
Scientific Name: *Avena strigosa*
Planting Depth: 1 to 2 inches
Planting Rate: 70 lbs/ac
Seed per Pound: 26,436
Plant Height: 28-30 inches
Residue Persistence: Fair
Biomass Potential: 7,000-8,000 lbs/ac

Facts: soil builder, weed suppression, prevent erosion, quick growth

Mix with: small grains, legumes, brassicas



Common Name: Oats
Scientific Name: *Avena sativa*
Planting Depth: 0.5-2 inches
Planting Rate: 80 lbs/ac
Seed per Pound: 13,071
Plant Height: 20-24 inches
Residue Persistence: Fair
Biomass Potential: 6,000-8,000 lbs/ac

Facts: rapid growth gives quick cover and good weed suppression. Can also be used for erosion control

Mix with: clover, pea, vetch, brassicas, or small grains



Common Name: Triticale
Scientific Name: *x Triticoseclae*
Planting Depth: 0.5-1.5 inches
Planting Rate: 60 lbs/ac
Seed per Pound: 15,691
Plant Height: 38-40 inches
Residue Persistence: Very good
Biomass Potential: 6,000-7,000 lbs/ac

Facts: rapid growth provides excellent organic matter and weed suppression, can be used as potential feed grain or forage, also used to prevent erosion

Mix with: annual legumes, ryegrass or other small grains



Common Name: Wheat
Scientific Name: *Triticum aestivum*
Planting Depth: 1-2 inches
Planting Rate: 60 lbs/ac
Seed per Pound: 15,239
Plant Height: 24-26 inches
Residue Persistence: Very Good
Biomass Potential: 5,000-6,000 lbs/ac

Facts: rapid growth provides excellent organic matter and weed suppression, can be used as potential feed grain or forage, also used to prevent erosion

Mix with: annual legumes, ryegrass or other small grains



Legumes

Common Name: Arrowleaf Clover

Scientific Name: *Trifolium vesiculosum*

Planting Depth: ¼ to ½

Planting Rate: 8-10 lbs/ac

Seed per Pound: 317,563

Plant Height: 12-14 inches

Residue Persistence: Good

Biomass Potential: 5,000-6,000 lbs/ac

Facts: erosion control, weed suppression, grazing, and soil builder

Mix with: small grains, annual ryegrass



Common Name: Berseem Clover

Scientific Name: *Trifolium alexandrinum*

Planting Depth: ¼ to ½ inch

Planting Rate: 8 lbs/ac

Seed per Pound: 132,974

Plant Height: 10-12 inches

Residue Persistence: Good

Biomass Potential: 4,000-5,000 lbs/ac

Facts: weed suppression, soil erosion prevention, chopped forage and grazing

Mix with: ryegrass, small grains, other legumes



Common Name: Crimson Clover
Scientific Name: *Trifolium incarnatum*
Planting Depth: ¼ to ½ inch
Planting Rate: 10-12 lbs/ac
Seed per Pound: 79,744
Plant Height: 16-18 inches
Residue Persistence: Fair
Biomass Potential: 6,000-7,000 lbs/ac

Facts: nitrogen source, weed suppression, erosion prevention, forage, and soil builder

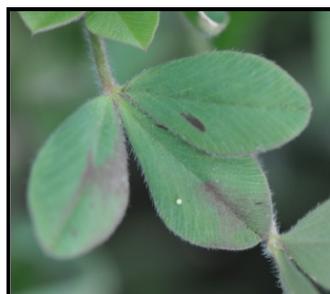
Mix with: cereals, vetches, annual ryegrass, subclover, red clover, black medic



Common Name: Rose Clover
Scientific Name: *Trifolium hirtum*
Planting Depth: ¼ to ½
Planting Rate: 8-10 lbs/ac
Seed per Pound: 120,660
Plant Height: 10-12 inches
Residue Persistence: Fair
Biomass Potential: 7,000-8,000 lbs/ac

Facts: erosion prevention, weed suppression, grazing, soil builder, nitrogen source

Mix with: other legumes, small grains



Common Name: White Clover
Scientific Name: *Trifolium repens*
Planting Depth: 1/4 to 1/2 inch
Planting Rate: 8 lbs/ac
Seed per Pound: 234,486
Plant Height: 20-22 inches
Residue Persistence: Excellent
Biomass Potential: 5,000-6,000 lbs/ac
Facts: weed suppression, erosion control
Mix with: grasses or red clover



Common Name: Yellow Clover
Scientific Name: *Trifolium aureum*
Planting Depth: 1/4 to 1/2
Planting Rate: 12 lbs/ac
Seed per Pound: 227,116
Plant Height: 4-6 inches
Residue Persistence: Very Good
Biomass Potential: 2,000-3,000 lbs/ac
Facts: drought, flood and salt tolerant, weed suppression,
good cover for wildlife, erosion control
Mix with: small grains, red clover



Common Name: Cahaba Vetch
Scientific Name: *Vicia* spp.
Planting Depth: ½ to 1½
Planting Rate: 20-40 lbs/ac
Seed per Pound: 8,706
Plant Height: 10-12 inches
Residue Persistence: Fair
Biomass Potential: 5,000-6,000 lbs/ac
Facts: nitrogen source, weed suppression, soil builder, erosion prevention
Mix with: peas, cereals



Common Name: Chickling Vetch
Scientific Name: *Lathyrus sativus*
Planting Depth: ½ to 1 inche
Planting Rate: 40 lbs/ac
Seed per Pound: 2,717
Plant Height: 10-12 inches
Residue Persistence: Fair
Biomass Potential: 3,000-4,000 lbs/ac
Facts: soil builder, erosion prevention, nitrogen source, weed suppression
Mix with: small grains, other legumes



Common Name: Common Vetch

Scientific Name: *Vicia sativa*

Planting Depth: 1-2 inches

Planting Rate: 20-40 lbs/ac

Seed per Pound: 7,030

Plant Height: 8-10 inches

Residue Persistence: Fair

Biomass Potential: 5,000-6,000 lbs/ac

Facts: weed suppression, soil builder, erosion prevention, nitrogen source

Mix with: oats, hairy vetch, field pea



Common Name: Hairy Vetch

Scientific Name: *Vicia villosa*

Planting Depth: ½ to 1½ inch

Planting Rate: 15 lbs/ac

Seed per Pound: 17,126

Plant Height: 14-16 inches

Residue Persistence: Fair

Biomass Potential: 5,000-6,000 lbs/ac

Facts: soil erosion prevention, weed suppression

Mix with: cereal grains, grasses, brassicas (Clark S.)



Common Name: Common Alfalfa

Scientific Name: *Medicago sativa*

Planting Depth: ¼ to ½

Planting Rate: 15-20 lbs/ac

Seed per Pound: 230,211

Plant Height: 4-6 inches

Residue Persistence: Fair

Biomass Potential: 500-600 lbs/ac

Facts: nitrogen source, good nutrient scavenger, soil builder, weed suppression, soil erosion prevention, hay

Mix with: cereals, clovers



Common Name: Fiba Bean

Scientific Name: *Vicia faba*

Planting Depth: 1-2 inches

Planting Rate: 100-125 lbs/ac

Seed per Pound: N/A

Plant Height: 12-14 inches

Residue Persistence: Fair

Biomass Potential: 3,000-4,000 lbs/ac

Facts: weed suppression, erosion prevention, soil builder

Mix with: small grains, brassicas, other legumes



Common Name: Field Peas
Scientific Name: *Pisum sativum*

Planting Depth: 1-2 inches

Planting Rate: 35 lbs/ac

Seed per Pound: 4,167

Plant Height: 12-14 inches

Residue Persistence: Fair

Biomass Potential: 4,000-5,000 lbs/ac

Facts: forage source, weed suppression, biomass breaks down quickly

Mix with: cereals, brassicas, and other legumes



Common Name: Sainfoin
Scientific Name: *Onobrychis viciifolia*

Planting Depth: ¼ to ¾

Planting Rate: 35 lbs/ac

Seed per Pound: 21,180

Plant Height: 10-12 inches

Residue Persistence: Fair

Biomass Potential: 3,000-4,000 lbs/ac

Facts: grazing, hay, erosion prevention, suppress weeds, nitrogen source, soil builder, pollinator

Mix with: other legumes, cereals, brassicas



Common Name: Flax

Scientific Name: *Linum* spp.

Planting Depth: ½ to 1 inch

Planting Rate: 50 lbs/ac

Seed per Pound: 78,680

Plant Height: 18-22 inches

Residue Persistence: Poor

Biomass Potential: 600-700 lbs/ac

Facts: pollinator plant, fair salinity tolerance, soil builder, suppress weeds

Mix with: grasses, legumes, brassicas



Brassicas

Common Name: Radish

Scientific Name: *Raphanus sativus*

Planting Depth: ¼ to ½ inch

Planting Rate: 8 lbs/ac

Seed per Pound: 23,819

Plant Height: 14-16 inches

Residue Persistence: Fair

Biomass Potential: 3,000-4,000 lbs/ac

Facts: prevent erosion, weed suppression, alleviates soil compaction

Mix with: other brassicas, mustards, small grains, or crimson clover



Common Name: Rape

Scientific Name: *Brassica napus*

Planting Depth: ½ to ¾ inch

Planting Rate: 5 lbs/ac

Seed per Pound: 134,500

Plant Height: 26-28 inches

Residue Persistence: Good

Biomass Potential: 4,000-5,000 lbs/ac

Facts: weed suppression, biomass decomposes quickly

Mix with: small grains, other brassicas, mustards, crimson clover



Common Name: Winfred Hybrid

Scientific Name: *Brassica* spp.

Planting Depth: ¼ to ½

Planting Rate: 5 lbs/ac

Seed per Pound: 138,290

Plant Height: 13-15 inches

Residue Persistence: Fair-Good

Biomass Potential: 3,000-4,000 lbs/ac

Facts: weed suppression, scavenge nutrients, alleviate soil compaction, prevent soil erosion

Mix with: other brassicas, mustards, small grains, or crimson clover



Common Name: Ethiopian Cabbage

Scientific Name: *Brassica* spp.

Planting Depth: ¼ to ½

Planting Rate: 5-6 lbs/ac

Seed per Pound: 128,028

Plant Height: 19-21 inches

Residue Persistence: Fair-Good

Biomass Potential: 4,000-5,000 lbs/ac

Facts: prevent erosion, weed suppression, alleviates soil compaction

Mix with: small grains, other brassicas, mustards, crimson clover



Common Name: Forage Collards

Scientific Name: *Brassica oleracea*

Planting Depth: ¼ to ½

Planting Rate: 8 lbs/ac

Seed per Pound: 194,125

Plant Height: 30-32 inches

Residue Persistence: Fair-Good

Biomass Potential: 3,000-4,000 lbs/ac

Facts: prevents erosion, suppress weeds, alleviate soil compaction, scavenge nutrients

Mix with: mustard, other brassicas, small grains, or crimson clover



Common Name: Turnips

Scientific Name: *Brassica rapa*

Planting Depth: ¼ to ¾

Planting Rate: 8 lbs/ac

Seed per Pound: 230,698

Plant Height: 24-26 inches

Residue Persistence: Fair-Good

Biomass Potential: 6,000 lbs/ac

Facts: alleviates soil compaction, weed suppression, erosion control

Mix with: cereals and vetch



Forbs

Common Name: Plantain

Scientific Name: *Musa paradisiaca*

Planting Depth: ¼ to ½ inch

Planting Rate: 10 lbs/ac

Seed per Pound: 243,768

Plant Height: 8-10 inches

Residue Persistence: Fair

Biomass Potential: 1,800 lbs/ac

Facts: soil builder, weed suppression, grazing, scavenge nutrients,

Mix with: grasses, legumes, brassicas



Common Name: Safflower

Scientific Name: *Carthamus tinctorius*

Planting Depth: 1 to 1½

Planting Rate: 30 lbs/ac

Seed per Pound: 18,332

Plant Height: 5-7 inches

Residue Persistence: Poor

Biomass Potential: N/A

Facts: soil builder, suppress weeds, scavenge nutrients, good salinity tolerance

Mix with: grasses and legumes



Plots were planted October 23, 2012

| Common Name | Days to 75% Emergence | Height (in) | | | | | | % Ground Cover | | | | | |
|-------------------|-----------------------|-------------|----------|---------|---------|---------|---------|----------------|----------|---------|---------|---------|---------|
| | | 11/15/12 | 12/17/12 | 1/22/13 | 2/27/13 | 3/26/13 | 4/26/13 | 11/15/12 | 12/17/12 | 1/22/13 | 2/27/13 | 3/26/13 | 4/26/13 |
| Common Alfalfa | 16 | 1 | 1 | 1 | 2 | 2 | 5 | 2 | 5 | 8 | 15 | 38 | 85 |
| Barley | 8 | 6 | 11 | 11 | 9 | 13 | 26 | 5 | 91 | 98 | 100 | 100 | 100 |
| Arrowleaf Clover | 16 | 1 | 1 | 1 | 2 | 4 | 12 | 3 | 9 | 13 | 26 | 73 | 100 |
| Berseem Clover | 16 | 1 | 2 | 2 | 3 | 3 | 10 | 1 | 7 | 9 | 21 | 53 | 76 |
| Crimson Clover | 10 | 1 | 2 | 2 | 2 | 4 | 17 | 2 | 28 | 33 | 48 | 85 | 100 |
| Rose Clover | 16 | 1 | 1 | 1 | 2 | 2 | 11 | 1 | 5 | 5 | 20 | 60 | 100 |
| White Clover | 15 | 1 | 2 | 2 | 3 | 7 | 20 | 1 | 18 | 18 | 40 | 95 | 100 |
| Yellow Clover | 16 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 8 | 9 | 10 | 15 | 59 |
| Forage Collards | 14 | 4 | 7 | 7 | 7 | 9 | 31 | 5 | 90 | 95 | 98 | 98 | 98 |
| Ethiopian Cabbage | 12 | 3 | 7 | 7 | 11 | 15 | 21 | 5 | 93 | 93 | 98 | 100 | 100 |
| Faba Beans | 16 | 2 | 4 | 4 | 7 | 8 | 13 | 5 | 30 | 33 | 50 | 53 | 75 |
| Field Peas | 15 | 2 | 4 | 4 | 5 | 7 | 12 | 6 | 75 | 80 | 86 | 97 | 100 |
| Flax | 10 | 2 | 4 | 4 | 9 | 14 | 20 | 2 | 23 | 25 | 38 | 43 | 43 |
| Black Oats | 14 | 5 | 10 | 10 | 13 | 15 | 30 | 13 | 88 | 90 | 95 | 100 | 100 |
| Oats | 11 | 4 | 6 | 6 | 5 | 9 | 23 | 18 | 61 | 63 | 88 | 100 | 100 |
| Phacelia* | 16 | 3 | 3 | 3 | 3 | | | 4 | 15 | 18 | 20 | | |
| Plantain | 16 | 2 | 2 | 2 | 3 | 5 | 10 | 1 | 13 | 13 | 28 | 63 | 100 |
| Radish | 11 | 3 | 5 | 5 | 6 | 8 | 15 | 4 | 93 | 95 | 91 | 93 | 88 |
| Rape | 10 | 4 | 8 | 8 | 7 | 8 | 27 | 19 | 95 | 100 | 100 | 100 | 100 |
| Annual Rye | 8 | 6 | 8 | 8 | 8 | 19 | 42 | 23 | 95 | 100 | 100 | 100 | 100 |
| Safflower | 12 | 2 | 3 | 3 | 5 | 4 | 7 | 2 | 48 | 53 | 63 | 55 | 50 |
| Sainfoin | 16 | 1 | 2 | 2 | 2 | 5 | 12 | 1 | 18 | 23 | 58 | 98 | 100 |
| Triticale | 10 | 6 | 9 | 9 | 9 | 19 | 40 | 28 | 98 | 100 | 100 | 100 | 100 |
| Turnips | 12 | 3 | 5 | 5 | 7 | 7 | 26 | 21 | 90 | 93 | 95 | 95 | 93 |
| Cahaba Vetch | 14 | 2 | 3 | 3 | 3 | 6 | 11 | 20 | 83 | 90 | 95 | 98 | 100 |
| Chickling Vetch | 15 | 3 | 6 | 6 | 9 | 9 | 10 | 16 | 83 | 88 | 89 | 99 | 93 |
| Common Vetch | 14 | 3 | 4 | 4 | 6 | 6 | 10 | 18 | 73 | 83 | 93 | 100 | 100 |
| Hairy Vetch | 14 | 2 | 3 | 3 | 3 | 10 | 14 | 18 | 55 | 61 | 89 | 100 | 100 |
| Wheat | 11 | 5 | 9 | 9 | 8 | 16 | 26 | 18 | 88 | 94 | 96 | 99 | 100 |
| Winfred Hybrid | 13 | 4 | 7 | 7 | 9 | 10 | 15 | 23 | 93 | 98 | 100 | 100 | 100 |

*Phacelia died out after four months

The data represented in this technical note was collected at the James E. "Bud" Smith Plant Materials Center near Knox City, TX. This data represents one year of data collection with no other special replication other than that within the research plot at the PMC. This information is to be used in general comparisons between species and sites and may not reflect actual results at all locations in Texas.

Bibliography

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