

FACT SHEET
Cover Crop (340)
Tennessee



Benefits of Planting a Cover Crop

- ◆ Increase Options
- ◆ Reduce Erosion
- ◆ Increase Soil Organic Matter
- ◆ Manage Nutrients
- ◆ Nitrogen Fixation
- ◆ Biodiversity
- ◆ Weed Suppression
- ◆ Supplemental Forage

SELECTING SPECIES OF COVER CROP

The species to plant depends on desired results. The growing season for cool season annuals can extend from August through June. The growing season for warm season annuals can extend from mid-April through October. Cool season legumes generally produce 75 percent or more of their production in the spring. Therefore, small grains are often seeded in a mixture with cool season annual legumes such as crimson clover or hairy vetch. In the case of mixtures, management is required to assure the legume component is not shaded out.

Planting annuals in a mixture with perennials as a “nurse crop” typically causes competition for moisture, light, and/or nutrients. Late seeding may benefit from a low seeding rate of annuals (20-25 percent of normal seeding rate); however, the mixture should be managed so the perennial species is not shaded out.

Following a high residue crop, such as corn, with late seeded winter cover may increase soil erosion, unless the cover crop is sown using a no-till planting method.

If cover crops are to be used for hay, harvest grasses in the boot stage and legumes in the early bloom stage. Terminating the cover crop at a height of 8 in. or taller improves weed control, moisture retention and improves soil quality.

Cover crop plants that typically re-seed well include ryegrass, crimson clover, arrowleaf clover, and hairy vetch. If the land use changes, ryegrass and hairy vetch can be a weed.

CHARACTERISTICS OF DIFFERENT SPECIES

Small Grains, Cool Season:

Barley – Barley is not as winter hardy as rye or wheat so it needs to be seeded in mid-September and not grazed close prior to winter therefore its use for grazing is limited.

Oats – Oats provide early fall growth, ability to germinate in limited moisture, excellent tilling, high forage quality, and is excellent hay. Oats maintain higher forage quality with maturity than other small grains. Oats seeded at a four-six bushel rate can provide the earliest fall production of any of the small grains. Cold tolerance is a problem; therefore, oats are often seeded in a mixture with other small grains or ryegrass to reduce this risk.

Rye – Cereal rye is the most drought resistant and cold tolerant cool season annual grass. It has an extensive root system and makes rapid growth in the fall. Rye is the easiest cool season annual to establish in thick residue. It provides the most winter production and biomass. Rye becomes unpalatable at the boot stage. Often rye and ryegrass are mixed in equal proportions to provide growth over a longer period of time.

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Ryegrass – Annual ryegrass is the easiest winter annual to establish. It does not need to be planted in the soil as small grains do; however, production is earlier and greater when drilled. Ryegrass is high quality forage. It has low winter production, but has the highest spring production. Ryegrass is the only cool season annual adapted to poorly drained sites. Overlapping growth periods of ryegrass and warm season plants can reduce vigor and yield of the warm season plants.

Wheat – Wheat can be used for forage and grain production. It has good cold and drought tolerance, providing both autumn and winter production. Typically, wheat is the least expensive winter annual. Wheat has a low disease tolerance.

Table 1 – Comparison of Maturity and Cold Tolerance of Small Grains and Annual Ryegrass

Species	Maturity	Cold Tolerance
Rye	1 (Earliest)	1 (Highest)
Wheat	2	2
Barley	3	3
Oats	4	5 (Least)
Ryegrass	5 (Latest)	4

Small Grains, Warm Season:

Millets (foxtail, pearl, browntop, proso and barnyardgrass) – Millets are the most drought tolerant of the summer annuals. Millets are established for a variety of purposes, including forage, bird food, and/or temporary cover. Millet will germinate when very little moisture is available. Foxtail is the lightest stemmed millet, producing less tonnage than proso and pearl. Foxtail millet is an excellent plant for temporary cover of disturbed sites that will be reshaped in the near future. In approximately 60 days, foxtail millet will reach the heading stage. Pearlmillet makes the most regrowth after cutting. Browntop and proso are typically used for wildlife. A pH of 5.6 or higher is recommended for millets. Foxtail millet is not recommended for horses, since it acts as a laxative. Nitrate poisoning of livestock can occur from millets.

Sorghum and Sudangrass – Warm season annual grass is deep rooted, fairly drought tolerant, frost sensitive, large biomass producer, and suppresses weeds. Sorghums are not as drought tolerant as millets. When stressed, sorghums can cause prussic acid poisoning in livestock, typically occurring after a frost. Sudangrass can have prussic acid, but is not as likely to as other sorghums. Prussic acid poisoning is typically not a threat after about seven days following frost. Nitrate poisoning of livestock can also occur from sorghums, typically occurring during a drought. Nitrates remain in harvested forage and are a threat to livestock. Sting nematodes may increase following sorghums; therefore, sorghums are not recommended preceding cool season vegetables.

Legumes:

(Inoculate legumes with appropriate inoculant.)

Crimson Clover – Crimson Clover is a versatile plant used as forage for soil conservation as a cover crop, as a source of pollen for bees, and for land beautification. It is one of the most dependable, best yielding, and earliest maturing winter annual legumes. Crimson clover will produce more forage at low temperatures than other clovers. It is fairly tolerant of soil acidity, but does best when the soil pH is within the range of 5.8 to 6.5. Ideally, crimson clover should not be grazed until the plants are four to six inches tall and should not be grazed closer than three inches. Management for reseeding requires either that livestock be totally removed or that the stocking rate be greatly reduced during the seed production period. Reduce or eliminate grazing pressure after the clover begins to bloom (usually early April). Crimson clover seed mature within about 30 days of pollination. If reseeding is desired once seed mature, the field can be grazed, cut for hay, or no tilled. If mechanical harvest is planned, a cereal grain planted in a mixture with crimson clover is recommended. Re-growth after mechanical harvest is usually poor, so only one harvest can be expected to contain significant quantities of clover.

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Hairy Vetch – Hairy Vetch is a climbing, prostrate, or trailing annual. It is relatively large seeded and able to establish even in heavy leaf deposition. Hairy vetch is more cold tolerant than crimson clover. During the winter, it produces little above ground growth, but its root development continues, accounting for its drought resistance. It tolerates pH as low as 4.9, but does best when the soil pH is within the range of 6.0-7.0. Hairy vetch can grow on acid soils that will not sustain clover. Hairy vetch is shade tolerant and can be overseeded in standing corn or as an understory cover crop in orchards. Hairy vetch fed in high proportions may be toxic to livestock. Root knot nematode and Reniform nematodes may increase successional vetch, so cereal rye is recommended prior to susceptible crops such as soybeans or cotton. It can be a pest in fence rows or nursery crops.

Arrowleaf Clover – Arrowleaf clover is the latest maturing annual clover with good cold and drought tolerance, good reseeding ability, and low bloat potential. Scarification is required for satisfactory germination. One seed crop can produce enough seed to reseed for up to three years.

Other:

Buckwheat – Buckwheat is a fast growing, frost sensitive plant used as summer cover. It is the only plant recommended as a summer planting after July 15. Buckwheat is not a good erosion control plant, and pure stands are not recommended on slopes exceeding 5 percent. Buckwheat is a quick maturing crop producing mature seed in 50 days, although some flowering can continue for an additional 70 days. Buckwheat produces much less biomass than do other summer cover crops. It can be used to improve soil structure, and has been documented as providing some weed control for successional crops. It is also known to attract beneficial insects. Buckwheat tolerates a wide range of pH, and is intolerant to shade.

Brassica Crops (Turnip, Swede, Rape, and Kale) – These crops are highly productive and digestible annual crops that produce good biomass in 80 to 150 days. Brassicas can be spring seeded for production in August and September or summer seeded for production in November and December. Brassicas require good soil drainage and a soil pH between 5.3 and 6.8 for optimum production. Introduce grazing animals to brassica pastures slowly. Brassicas should not constitute more than 75 percent of the animal's diet.

SEEDING METHODS

Cover crops can be tilled and drilled, no-till drilled, or tilled and broadcast seeded and followed with a cultipacker. Typically, cool season annual grass production is earliest on a prepared seedbed followed by no-till plantings into crop residue, and the latest growth is winter annuals overseeded into summer grass. Overseeding winter annuals into cool season perennial grasses is typically not recommended due to competition. No-till seedings are most soil conserving, provide the firmest surface for livestock, and increase organic matter.

For most purposes, acceptable benefits are usually accomplished when the plant density is at least 25 stems per foot, the combined canopy and surface cover is at least 60 percent, and the above ground (dry weight) biomass production is at least 2,700 lbs./acre.

Seed one-fourth to one-half inch deep depending on seed size and texture, and firm seedbed with press wheels or cultipacker.

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¹Recommended Seeding Rates and Dates for Cover Crops

Crop	Varieties	Rates per Acre	Seeding Dates
Annual Lespedeza	Kobe Korean	20-30 lbs. 20 lbs.	Feb. 15-April 15
Arrowleaf Clover	Meechee, Yuchi	5-8 lbs. (scarified)	Aug. 15-Oct. 1
Barley	Starling	For winter cover, grain, or spring grazing 1.0-1.5 bushels ----- Fall grazing 3-4 bushels	Sept. 15-Nov. 1 No-till drilled Sept. 15-Oct. 20 ----- Conventional or broadcast Sept. 1-Oct. 1
Buckwheat	Common Gray, Silver Hull, Japanese	35-50 lbs.	June 1-Aug. 1
Cowpeas	Whipporwill, Brabham, Clay	1.5-2 bushels Broadcast 0.5 bu. in rows	May 20-June 20
Crimson Clover	Dixie, Chief, Tibbee	15 lbs. winter cover 20 lbs. Forage	Aug. 1-Oct. 15
Millet, Browntop		25-40 lbs.	May 1-July 1
Millet, Foxtail	German	20 lbs. or 15 lbs. + 1 bu. Soybeans	May 1-July 1
Oats: Fall Seeded ----- Spring Seeded	FFR Southern States 76-30 ----- Don, Ogle, Larry	2 bushels for grain 4-6 bushels for fall pasture ----- 2-3 bushels	Sept. 1-Oct. 1 ----- Feb. 20-March 15
Pearlmillet	Millex 24, Millex 32	10-15 lbs. Drilled 20 lbs. broadcast	May 1-July 15
Rape (Forage)	Dwarf Essex	6-8 lbs.	Feb.-March; Aug.-Sept.
Rapeseed (Oil)		5-6 lbs.	Sept. 1-Oct. 10
Red Clover	Cinnamon, Reddy, Redman, Redland III	8-12 lbs.	Aug. 15-Oct. 1 Feb. 15-April 1
Rye	Wheeler, FFR 20/20, Vitagraze Winter Magic, Rebel, Volunteer Magic	Winter cover, spring grazing 1.0-1.5 bu. ----- Fall grazing 2-3 bushels	Sept. 15-Nov. 20 no-till drilled Sept. 15-Nov. 10 Overseeded ----- Aug. 15-Oct. 15
Ryegrass, Annual	Marshall, Surrey	20-30 lbs.	Aug. 15-Oct. 10
Sudangrass	Trudan 8	30-48 lbs. Broadcast 20-30 lbs. Drilled	April 20-July 1
Vetch	Hairy	20 lbs. Winter cover 30 lbs. Forage	Aug. 15-Oct. 15
Wheat (Expected damage from Hessian Fly and/or barley yellow dwarf prevents planting earlier than Oct. 15 for grain production.) Wheat (also barley or rye)	See current U.T. publication for Field Crop Varieties.	For grain or spring grazing 1-1.5 bushels ----- 1-1.5 bushels ----- 1.5-2.0 bushels ----- For winter cover 1-1.5 bushels ----- 1-1.5 bushels ----- 1-1.5 bushels ----- For fall grazing 2-3 bushels ----- For cover, wildlife enhancement, or fall grazing: 1.5-3 bushels Increase seeding rate 50% if using combine-run seed.	Oct. 15-Nov. 10 No-till drilled ----- Oct. 15-Nov. 1 Tilled ----- Oct. 15-Nov. 1 Overseeded no till ----- Sept. 15-Nov. 10 No-till drilled ----- Sept. 15-Nov. 1 Overseed no till ----- Sept. 15-Oct. 20 Tilled ----- Sept. 1-Oct. 1 ----- Aug. 15-Oct. 15
Wildrye, Virginia	Omaha	15-20 PLS lbs.	Aug. 15-Oct. 15
Winter Peas	Austrian	45-60 lbs.	Aug.-Oct. 1

¹ See current U.T. publication for Field Crop Varieties. If planting coated seed, use same seeding rate with legumes. With grasses use high side of recommended seeding rate. For Cumberland Plateau and elevations above 1,800 feet, plant ten days earlier than the end or the fall seeding date in this publication. Ref.: University of Tennessee Recommended Field Crops Seeding Guide (PB-378).

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FERTILIZER AND LIME

Apply lime and fertilizer according to University of Tennessee soil test recommendations. Phosphorus and Potassium can be applied to meet the needs of both the cover crop and the subsequent crop. It is also an excellent time to apply lime needed by the primary crop in the rotation. Nitrogen rate, source, and timing will vary depending on the crop, season, and desired biomass production.

NUTRIENT CONTRIBUTION AND REMOVAL

Consider that grasses utilize more soil nitrogen, and legumes utilize both nitrogen and phosphorus. Deep-rooted species provide maximum nutrient recovery (i.e., red clover, brassicas).

Soil microbial activity is much higher on young, relatively lush vegetation. During microbial breakdown, nutrients held within the plant tissues are released and made available to the following crop. Factors that influence the ability of microorganisms to break down organic matter include soil temperature, soil moisture, and carbon to nitrogen (C:N) ratio of plant material. C:N ratios above 25:1 can result in nitrogen being tied up by soil microbes. The lower the C:N ratio, the more nitrogen will be released into the soil for immediate crop use. The higher the C:N ratio, the slower the release of nutrients to successional crops.

Common C:N Ratios of Cover Crops

<u>Organic Material</u>	<u>C:N Ratio</u>
Young Rye Plants	14:1
Rye at Flowering	20:1
Hairy Vetch	10:1 to 15:1
Crimson Clover	15:1
Corn Stalks	60:1
Saw Dust	250:1

Cover crops sequester nutrients, and once their growth is terminated, release them slowly. Legumes can be an excellent source of nitrogen, often providing more than 100 pounds of nitrogen per acre. Reduce N rate by 50 to 70 pounds per acre following a legume cover crop. The maximum quantity of nitrogen is accumulated when legumes are allowed to reach the late bloom stage prior to being killed.

TERMINATION OF COVER CROP

The cover crop should be terminated as late as feasible to maximize plant growth and to prepare for planting of the subsequent crop. Kill the cover crop with a herbicide two or three weeks prior to planting the successional crop to aid in moisture conservation. A second herbicide application may be needed.

Alternatives to terminate the cover crop:

- Mowing at a 1.5-inch height when the cover crop is near maturity may also give good control. Cool season annual weeds (i.e., little barley) can provide benefits of winter cover at reduced cost for seed and burndown herbicide.
- Rolling stalk choppers at the early bloom stage is another option for killing cover crops prior to planting. Planting cover crops known to readily winterkill is another non-chemical means of vegetation management. Spring oats, buckwheat, and sorghum fill this need.