



Winter Cover Crops for Kentucky Gardens and Fields

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Cover crops have long been used to reduce soil erosion, add organic matter to improve the soil, and provide some winter and early spring grazing. With the development of no-till cropping systems, cover crops were recognized for their ability to provide moisture-conserving residues as well as nitrogen for the succeeding crop. Recent concern for water quality has provided additional reasons to use cover crops. Cover crops take up and hold nutrients, especially nitrogen, that were not used by the previous crop. Because they remove water from the soil, they may reduce the risk of nutrients and pesticides moving through the soil. Cover crops may reduce weed problems and the need for herbicides by competing with them for space and nutrients and by providing a mulch to cover the soil surface. Some also release chemicals that suppress weed growth and may reduce populations of soil-borne plant pathogens.

Many plants have the potential to provide winter cover, but have not been tested in Kentucky to determine their effectiveness and how they should be used. Some may be better for holding nutrients, while others are more effective in suppressing weeds or controlling erosion. However, some have proven effective and should be used until others can be evaluated. The following describes those suitable for use in Kentucky and how they should be managed to provide good winter cover.

Small Grains

Wheat, rye, barley, triticale, and oats are very effective winter cover crops. They also can be harvested as forage, straw, or grain, or left in the field to provide mulch and organic matter. When planted early enough in the fall, they provide good winter cover and take up nutrients left in the soil from the summer crop. Each small grain crop has its advantages and disadvantages.

Rye (*Secale cereale*) is perhaps the best overall small grain cover crop. It can be seeded from August in northern and eastern Kentucky through mid-November in western Kentucky. Extremely winter-hardy varieties, such as Arcostock, should be considered if late planting is necessary. Rye germinates quickly, grows fast, and provides good winter cover if not planted too late. Early planting is important for soil protection and uptake of nutrients left over from the previous crop. Rye is effective in suppressing weeds. It resumes growth early in the spring and may produce too much top growth if not

killed soon enough. For seeding as a cover crop, use two bushels of seed per acre. Up to three bushels of seed per acre should be used if the rye is to be grazed.

Wheat (*Triticum aestivum*) is also an excellent cover crop. It is easier to manage and more versatile than the other small grains. It can be seeded from mid-September to mid-November; however, plantings made after mid-October may not provide good winter cover and weed suppression. If it might be harvested as grain, plant after October 10 to avoid Hessian fly. Earlier planting is necessary when fall grazing, nutrient uptake, or winter cover are the main goals. Use two bushels of seed per acre when planting as a cover crop. With no-till planting, a herbicide may be needed to control weeds. Wheat does not grow as quickly in the spring as rye and is not as likely to cause problems with too much top growth.

Oats (*Avena sativa*) can be used as a winter cover crop, but are not as effective as the other small grains. Overall biomass or mulch produced is generally lower than with rye or wheat. Oats are more subject to winter-kill and start growing later in the spring. If planting in the fall, be sure to use a winter variety. Plant two bushels of seed per acre in early fall. Oats can be used as forage or grain, but yields may be less than with other small grains. Spring oats may be used as a cover crop by planting in early March. They can also be planted in early fall and allowed to grow until killed by cold weather. The residue will continue to protect the soil until spring, but nutrients may be lost and weed suppression will be reduced.

Barley (*Hordeum vulgare*) can be used to provide winter cover and mulch for a succeeding no-till crop; however, it is susceptible to winter injury and barley yellow dwarf disease. Plant 2½ bushels of barley per acre in late September for winter cover and silage production. Barley is the earliest maturing small grain, which is an advantage when double cropping with soybeans or corn silage.

Triticale (*Triticum secale*) has been used mainly for silage in Kentucky and has the potential for high silage yields. Use two bushels per acre and plant in early October.

Seeding and Managing Small Grains

Small grains are usually drilled or broadcast on clean-tilled soil and covered to about one inch. A corrugated roller (cultipacker) or other device can be used to firm the soil and press the seed in. Small grains can be planted without tillage

with a no-till drill or simply broadcast on the soil surface when there is sufficient cover or residue from a previous crop. In gardens or small areas, shallow tillage with a rototiller can be used to cover seed. If intended only for a cover crop, do not add nitrogen fertilizer. If it is to be used as a forage or grain, nitrogen can be applied in late winter. A rye cover crop should be killed by a herbicide or tillage by mid-April to prevent excessive top growth. If small grains grow too tall in the spring, it may be helpful to mow them before tilling or no-till planting.

Grasses

Annual ryegrass (*Lolium multiflorum*) can be used as a winter cover crop in Kentucky, although it may winter-kill in some years. When planted in August or September, it usually produces good top growth before cold weather. This will help it survive better, but even if it does winter-kill, it will still protect the soil. Annual ryegrass has the advantage of a dense, leafy growth that provides good cover which can be tilled easily if not allowed to mature in the spring. It is also effective in suppressing weeds. Plant in mid-August through September, use 20 to 25 pounds of seed per acre, and cover the seed about ½-inch deep. Ryegrass germinates quickly and will provide good cover before winter. It can be grazed or cut for hay in late April or early May. If given time, it will produce seed and can volunteer the following fall. This trait causes it to become a weed problem in some cropping systems, especially those including wheat.

Perennial ryegrass (*Lolium perenne*) is very effective in suppressing weeds and can also be used as a winter cover crop. It can survive over winter and will need to be killed in the spring. Use about the same seeding rate as annual ryegrass.

Tall fescue (*Festuca arundinacea*) can be used as a winter cover crop even though it is not an annual grass. It can be seeded mid-August through September and can provide a good ground cover before winter. Broadcast 20 to 30 pounds of seed per acre on clean-tilled soil. Use a corrugated roller (cultipacker) to firm the soil and press in the seed. The seed should be covered no more than ½-inch deep. Fescue can be grazed or cut for hay in early May. If it is to be used for hay or grazing, 50 to 80 pounds of nitrogen should be applied in February or early March to increase yield and quality. It can be killed with a herbicide or tillage in the spring before planting a summer crop.

Legumes

Legumes, such as clovers and vetches, have the added advantage of being able to use or "fix" nitrogen from the air for themselves and following crops. They are able to do this because of nitrogen-fixing bacteria that live in nodules (knots) on the plant roots. The plant provides food and shelter for the bacteria that supply nitrogen for the plant. When the roots die, nitrogen is released and becomes available to other plants. Legume seed should be inoculated with the proper nitrogen-fixing bacteria. If nitrogen is available in the soil, legumes will take it up rather than fixing their own; thus, they are best when used on soils low in nitrogen.

Hairy vetch (*Vicia villosa*) is probably the most reliable and most productive winter legume cover crop adapted to Kentucky. It is easy to establish and is winter hardy throughout the state. It has the disadvantage of producing a significant percentage of hard seed that do not germinate the first year, but will often germinate later. This can create problems

Small grain and grass winter cover crops for Kentucky.

Crop	Seeding Rates		Seeding Dates	Seed Depth	Best for Gardens	Comments
	Per Acre	Per 1000 Sq Ft				
Rye	2-3 bu	3-4 lbs	Sept.-Nov.	1"-2"	X	Excellent cover, early spring growth
Wheat	2 bu	3 lbs	Sept.-Nov.	1"-2"	X	Plant early for cover crop
Winter Oats	2½ bu	2 lbs	Sept.-Oct.	1"-2"		Subject to winter injury
Spring Oats	2½ bu	2 lbs	Sept. or early March	1"-2"		Will winter-kill, but residue protects soil
Barley	2½ bu	3 lbs	Sept.	1"-2"		Subject to barley yellow dwarf disease
Triticale	2 bu	3 lbs	Early Oct.	1"-2"		Used mostly for silage
Annual Ryegrass	25 lb	1 lb	Aug.-Sept.	¼" - ½"	X	May winter-kill
Perennial Ryegrass	25 lb	1 lb	Aug.-Sept.	¼" - ½"		Winter hardy
Tall Fescue	20-30 lb	1 lb	Aug.-Sept.	¼" - ½"		Perennial grass

with hairy vetch volunteering into future crops. Also, to provide good winter cover, plant hairy vetch in late August or early September, use 20 to 30 pounds of seed per acre, and cover about 1-inch deep. Hairy vetch can be aerially seeded into a standing crop, but chances of success are reduced. Seeding just before leaf drop in soybeans is one way it has been used. Hairy vetch should be allowed to grow until May to obtain optimum nitrogen fixation. Killing the plant before seed matures reduces the chance of problems with volunteer plants. It can be killed by tillage or herbicides for no-till planting. Hairy vetch can be difficult to kill early in the spring, although glyphosate or gramoxone with a small amount of dicamba can be effective. Check current herbicide labels before use. Hairy vetch has been used for no-till planting of fresh market tomatoes with excellent results.

Bigflower vetch (*Vicia grandiflora*) is very similar in growth habit and management to hairy vetch. It also has the same potential of hard seed volunteering into later crops. It has the advantage of earlier spring growth so the summer crop can be planted earlier. However, total growth and nitrogen fixation are less than with hairy vetch. Bigflower vetch seed may not be available in some areas.

Crimson clover (*Trifolium incarnatum*) is a winter annual clover often used in the southern United States as a cover crop and forage. Because Kentucky is on the northern fringe of its adaptation, it is subject to winter-kill here; however, it will survive most years in southern and western Kentucky. Growth and nitrogen fixation are less than with the vetches, but crimson clover is less likely to be a weedy volunteer in future crops. It should be planted in late August or early September at a rate of 20 to 25 pounds of seed per acre. Inoculate seed with the proper inoculant, and cover to a depth of ½ inch. Use a grain drill or broadcast the seed, and firm the soil with a corrugated roller (cultipacker). Crimson clover can be grazed or cut for hay at bud-to-early-bloom stage-usually early May. It can be killed with a herbicide or tillage before planting the summer crop.

Austrian Winter Pea (AWP) (*Pisum sativum*) can also be used as a winter cover crop. Southern varieties are subject to winter-kill in Kentucky, so Canadian varieties should be used where possible. If used in highly erodible areas, AWP should be mixed with a small grain or planted early enough to

produce good cover before cold weather. It can be killed or tilled under for planting a summer crop in late April or early May. Plant 30 pounds per acre with small grains, or 50 to 70 pounds alone. AWP should be planted from mid-September to mid-October. Seed should be planted 1-inch deep. Austrian winter pea can be cut for hay or silage when in full bloom or when the small grain is ready.

Mixtures

All legumes can be seeded with a small grain, if desired. This improves the soil cover, which is especially important on highly erodible fields, and improves the chances for winter survival of at least one crop. When using a mixture, reduce the seeding rate of each by one-half. Plant with a drill that has grain and legume boxes, or broadcast and cultipack.

Other Crops

Other crops may be used for winter cover in certain situations and for specific purposes. If cover is needed for more than one season, legumes, such as alfalfa, sweet clover, red clover, sericea lespedeza, and crown vetch, could be used. Canola and winter rape are mustard-type plants that provide good cover and may be suitable in some situations. In addition, many weedy species, such as henbit and chickweed, serve effectively as winter cover in some cropping systems. It is not suggested that these weed species be planted, but when they occur naturally they can be left until time to prepare the land for the next crop.

Sudangrass or sorghum-sudangrass hybrids are warm-season annual crops that can provide effective winter cover if seeded early enough. This generally means seeding no later than early September in Kentucky. They will be killed by the first hard freeze, but the residue should remain all winter. Sorghums are known to suppress weeds, especially small seeded broadleaves and annual grasses. See *Producing Summer Annual Grasses for Emergency or Supplemental Forage* (AGR-88) for more information on these grasses.

Legumes suitable for winter cover crops in Kentucky.

Crop	Seeding Rates		Seeding Dates	Seed Depth	Best for Gardens	Comments
	Per Acre	Per 1000 Sq. Ft.				
Hairy Vetch	20-30 lbs	1 lb	Aug.-Sept.	1"-2"	X	May volunteer where not wanted
Bigflower Vetch	20-30 lbs	1 lb	Aug.-Sept.	1"-2"		May volunteer; matures earlier than hairy vetch
Crimson Clover	20-25 lbs	1 lb	Aug.-Sept.	½"		May winter-kill
Austrian Winter Pea	50-70 lbs	2 lb	Sept.-Oct.	1"		May winter-kill; needs small grain for good cover on sloping ground

Potential Problems Linked to Cover Crops

Plant disease and insect problems can be increased by the use of cover crops. The principle of good rotation in which grasses are alternated with legume crops should help to avoid this problem. For example, corn or wheat should follow legume cover crops, while soybeans are better following small grains.

Some cover crops may have a detrimental effect on following crops through a process called allelopathy. In this process, compounds released by the cover crop act as natural herbicides that can injure the next crop. Small seeded crops are more susceptible to allelopathy. It is seldom a problem with larger seeded field or horticulture crops, or with transplanted vegetables. It can be avoided in gardens by turning under the cover crop well in advance of planting vegetables or by killing it with a herbicide four to six weeks before planting the next crop.

If wet weather delays spring tillage, too much top growth may be produced by the cover crop. This is more likely to be a problem with crops such as rye that tend to start growth

early in the spring and to grow quickly. It may be best to avoid these crops for garden use.

If heavy cover crops are plowed down in cool, wet conditions, they may release toxins or tie up nutrients as they decompose. Under these conditions, more time is needed for decomposition to take place before seeding crops.

Cover crops may become a weed problem by volunteer seeding where or when they are not wanted. The vetches and annual ryegrass have this tendency. It is usually not a serious problem and can be handled through normal weed control practices in most cases.

Always use high quality seed to ensure good stands and reduce the risk of introducing weeds. Check the susceptibility of cover crops to herbicides that may have been used on the preceding crop.

Additional References

Producing Small Grains (AGR-32)

Woodford Bigflower Vetch (AGR-70)

Producing Summer Annual Grasses (AGR-88)