



# Grain, Forage, and Cover Crop Guide for Kentucky

*Carrie Knott, Erin Haramoto, Jimmy Henning, Chad Lee, S. Ray Smith*

---

Websites for more information: <http://kygrains.info>; [www.uky.edu/Ag/Forage](http://www.uky.edu/Ag/Forage); <http://southerncovercrops.org/>

**The booklet-sized document on the following pages is also available as a 25 x 38 inch poster (AGR-18P).**

<b>Species</b> <i>Scientific Name</i>	<b>Uses<sup>1</sup></b>	<b>Common Units</b>	<b>Desired Plant Density</b>	<b>Seeding Rate</b> <b>Pure Live Seed/ac</b>	<b>Seeding Depth</b> <b>(inches)</b>	<b>Main Cover Crop Benefit</b>
<b>Alfalfa</b> <i>Medicago sativa</i>	hay, silage, pasture	60 lb/bu 227,000 seeds/lb	25 to 40/sq ft (in seeding year)	15 to 20 lb	1/4 to 1/2	
<b>Barley</b> <i>Hordeum vulgare</i>	grain, hay, silage	48 lb/bu 14,000 seeds/lb	35/sq ft	1,500,000 to 2,000,000 seeds 2 to 3 bu	1 to 2	
<b>Bermudagrass, Seeded</b> <i>Cynodon dactylon</i>	hay, pasture	40 lb/bu 2,071,000 seeds/lb		5 to 8 lb (hulled seed) 10 to 12 lb (coated seed)	1/4 (hulled seed)	
<b>Bermudagrass, Sprigged</b> <i>Cynodon dactylon</i>	hay, pasture			15 to 20 bu of sprigs/ac	1 to 3	
<b>Birdsfoot Trefoil</b> <i>Lotus corniculatus</i>	pasture	60 lb/bu 370,000 seeds/lb		6 to 12 lb	1/4 to 1/2	
<b>Bluestem, Big</b> <i>Andropogon gerardii</i>	hay, pasture, wildlife	165,000 seeds/lb		9 to 11 lb	1/4 to 1/2	
<b>Bluestem, Little</b> <i>Schizachyrium scoparium</i>	pasture, wildlife	260,000 seeds/lb		7 to 9 lb	1/4	
<b>Bromegrass, Smooth</b> <i>Bromus inermis</i>	hay, pasture	14 lb/bu 135,000 seeds/lb		15 to 20 lb	1/4 to 1/2	
<b>Buckwheat</b> <i>Fagopyrum spp.</i>	summer cover crop			30 lb (drilled) 50 lb (broadcast) <sup>3</sup>	1	rapid biomass production, pollinator resource (see comments)
<b>Canola</b> <i>Brassica napus</i>	grain	50 lb/bu	5 to 7/sq ft	6 to 9 seed/sq ft 261,000 to 392,000 seeds	1/2 to 1	
<b>Clover, Alsike</b> <i>Trifolium hybridum</i>	hay, pasture	60 lb/bu 728,000 seeds/lb		4 to 6 lb	1/4	
<b>Clover, Crimson</b> <i>Trifolium incarnatum</i>	hay, pasture	60 lb/bu 150,000 seeds/lb		20 to 30 lb	1/4 to 1/2	nitrogen fixation
	winter cover crop			20 lb (drilled) 30 to 40 lb (broadcast) <sup>3</sup> 10 to 15 lb (in mixtures with winter annual grasses)	<1/2	
<b>Clover, Red</b> <i>Trifolium pratense</i>	hay, pasture	60 lb/bu 272,000 seeds/lb		8 to 12 lb	1/4 to 1/2	nitrogen fixation
	winter cover crop					

<b>Species</b> (continued) <i>Scientific Name</i>	<b>Seeding Date</b>	<b>Harvest/ Termination Timing</b>	<b>Approx. Annual Yield/ac [tons (T) or bushels (bu)]<sup>2</sup></b>	<b>Comments</b>
<b>Alfalfa</b> <i>Medicago sativa</i>	Mar 15 to May 1 Aug 1 to Sep 15	May 1 to Sep 15	3 to 6 T	Correct soil acidity before seeding. Inoculate seed. Monitor for alfalfa weevil and leafhopper and spray as recommended. Spring seeding: seed after risk of hard freeze (26°F). Fall seeding: seed early to reduce risk of <i>Sclerotinia</i> .
<b>Barley</b> <i>Hordeum vulgare</i>	Oct 1 to 15 Sep 15 to 30	Jun 5 to 15 Apr 25 to May 15	40 to 80 bu 5 to 8 T (65% moisture)	Most varieties in KY are 6-row barley for grain. There are some 2-row malting type barleys being developed in the region. Control loose smut with proper seed treatment. Earliest small grain for double cropping. Very sensitive to acid soils. Not as winter hardy as wheat. Best adapted to fertile, well-drained soil with a pH above 6.0.
<b>Bermudagrass, Seeded</b> <i>Cynodon dactylon</i>	May 15 to Jun 15	May 15 to Sep 15	2 to 6 T	Warm season perennial. Harvest 5 times per season for hay. Seed when the soil temperature has reached 60 to 65°F and there is no risk of frost. Ensure seeded variety is winter-hardy in KY. Increase seeding rate when using coated seed.
<b>Bermudagrass, Sprigged</b> <i>Cynodon dactylon</i>	May 15 to Jun 15	May 15 to Sep 15	3 to 7 T	Very high yielding during summer with adequate nitrogen. Due to high yields, nutrient removal can be high when hayed. Can provide good summer pasture.
<b>Birdsfoot Trefoil</b> <i>Lotus corniculatus</i>	Mar 1 to Apr 15	May 1 to Sep 15	1 to 3 T	Special type inoculum. Permits natural reseeding. Marginally adapted to KY.
<b>Bluestem, Big</b> <i>Andropogon gerardii</i>	Apr 15 to Jun 1	Jun 15 to Jul 15	2-1/2 to 3-1/2 T	Light, fluffy seed. Sensitive to overgrazing. Slow to establish. Seed after risk of frost in the spring.
<b>Bluestem, Little</b> <i>Schizachyrium scoparium</i>	Apr 15 to Jun 1	Jun 15 to Sep 15	1-1/2 to 2 T	Primarily used in native grass mixtures at rates of 1 to 2 lb per acre. Sensitive to overgrazing. Upright, bunchgrass similar in appearance to broomsedge ( <i>Andropogon virginicus</i> ). Slow to establish.
<b>Bromegrass, Smooth</b> <i>Bromus inermis</i>	Primary: Aug 20 to Sep 20 Secondary: Feb 15 to Apr 1	May 5 to 25	1-1/2 to 3-1/2 T	Slow regrowth after first hay harvest. Sensitive to overgrazing. Drought tolerant. Slow to establish, but good longevity once established.
<b>Buckwheat</b> <i>Fagopyrum spp.</i>	Jun to Jul	see comment		Residue will not persist long. Must terminate at the first sign of flowers or viable seed can be produced. Excellent quick growing summer cover crop.
<b>Canola</b> <i>Brassica napus</i>	Sep 15 to Oct 1	May 25 to Jun 15	40 to 80 bu	Primarily used for vegetable oil. Canola refers to low glucosinolate, low erusic acid rapeseed.
<b>Clover, Alsike</b> <i>Trifolium hybridum</i>	Feb 1 to Apr 15 Aug 1 to Sep 10	Jun 1 to Sep 15	1 to 2 T	Inoculate. Better adapted to poorly drained soils than red clover. Little advantage over white clover in KY. Can cause photosensitization in horses.
<b>Clover, Crimson</b> <i>Trifolium incarnatum</i>	Aug 1 to Oct 15	May 1 to 15	1 to 2-1/2 T	Inoculate. Annual clover. Fall planted for spring forage production or as a plow down crop.
	Western KY: Sep 1 to Oct 15 Central KY: Sep 1 to Sep 30	Apr 15 to May 10	1 to 2 T	Most biomass is produced in the spring. Can mix with small grains and annual ryegrass. Use a higher seeding rate in mixtures to minimize competition. More flexible planting dates than for other legumes. Kentucky Pride variety has more reliable over-wintering, but other southern varieties may produce more biomass earlier in the season.
<b>Clover, Red</b> <i>Trifolium pratense</i>	Primary: Feb 1 to Apr 15 Secondary: Aug 1 to Sep 10	May 1 to Sep 15	2 to 5 T	Inoculate. Don't graze or clip after Sep 15 until after freeze. Use improved varieties for 2 to 3 year stands. Frost seed 6 to 8 lb per acre + 1 to 2 lb per acre ladino clover ( <i>Trifolium repens</i> ) in February.
	before Sep 15	Apr 15 to May 10		

<b>Species</b> <i>Scientific Name</i>	<b>Uses<sup>1</sup></b>	<b>Common Units</b>	<b>Desired Plant Density</b>	<b>Seeding Rate Pure Live Seed/ac</b>	<b>Seeding Depth (inches)</b>	<b>Main Cover Crop Benefit</b>
<b>Clover, Sweet</b> <i>Melilotus</i> spp.	summer cover crop	60 lb/bu 259,000 seeds/lb		10 to 15 lb	1/4 to 1/2	nitrogen fixation
<b>Clover, White (Ladino and Dutch or Common types)</b> <i>Trifolium repens</i>	pasture	60 lb/bu 768,000 seeds/lb		1 to 3 lb (in mixtures)	1/4	
<b>Corn</b> <i>Zea mays</i>	grain	56 lb/bu	24,000 to 42,000/ac	24,000 to 36,000 seeds (non-irrigated) 32,000 to 42,000 seeds (irrigated grain)	1-1/2 to 3	
	silage, stockpile grazing			24,000 to 36,000 seeds (non-irrigated) 32,000 to 42,000 (irrigated silage)	1-1/2 to 3	
<b>Cowpeas</b> <i>Vigna unguiculata</i>	hay	60 lb/bu 4,000 seeds/lb		1 to 2 bu	1 to 3	
	summer cover crop			60 lb (drilled) 100 lb (broadcast) <sup>3</sup>	1	
<b>Crabgrass</b> <i>Digitaria</i> spp.	grazing, hay	25 lb/bu 825,000 seeds/lb		3 to 6 lb	1/8 to 1/4	
<b>Crownvetch</b> <i>Coronilla varia</i>	summer cover crop	55 lb/bu		20 lb	1/2	nitrogen fixation
<b>Eastern Gamagrass</b> <i>Tripsacum dactyloides</i>	grazing, hay			10 to 12 lb	1/2 to 1	
<b>Fescue, Tall</b> <i>Festuca arundinacea</i>	hay, pasture	22 lb/bu 227,000 seeds/lb		15 to 25 lb	1/4 to 1/2	
<b>Gramma, Side Oats</b> <i>Bouteloua curtipendula</i>	pasture, wildlife	190,000 seeds/lb		8 to 10 lb	1/4 to 1/2	
<b>Indiangrass</b> <i>Sorghastrum nutans</i>	hay, pasture, wildlife	175,000 seeds/lb		8 to 10 lb	1/4 to 1/2	
<b>Kentucky Bluegrass</b> <i>Poa pratensis</i>	pasture	14 lb/bu 1,400,000 seeds/lb		10 to 15 lb (alone) 4 to 6 lb (in mixtures)	1/4	
<b>Lespedeza, Annual</b> <i>Kummerowia stipulacea</i> (Korean; <i>K. striata</i> - Kobe or Striate types)	hay, pasture	30 lb/bu 240,000 seeds/lb		20 to 25 lb (alone) 10 to 15 lb (in mixtures)	1/4	
<b>Lespedeza, Perennial (Sericea)</b> <i>Lespedeza cuneata</i>	hay, pasture	60 lb/bu 372,000 hulled seed/lb		20 lb	1/4	

<b>Species</b> (continued) <i>Scientific Name</i>	<b>Seeding Date</b>	<b>Harvest/ Termination Timing</b>	<b>Approx. Annual Yield/ac [tons (T) or bushels (bu)]<sup>2</sup></b>	<b>Comments</b>
<b>Clover, Sweet</b> <i>Melilotus</i> spp.	Feb 1 to Apr 1			Inoculate. Used mainly as a plow down crop. Use only low coumarin varieties. Can be mowed before flowering to encourage biomass production. Other summer cover crops, such as sunn hemp ( <i>Crotalaria juncea</i> ), may be a better option, since sweet clover can become a weed if allowed to seed.
<b>Clover, White (Ladino and Dutch or Common types)</b> <i>Trifolium repens</i>	Feb 1 to Apr 15	Jun 1 to Sep 10	1 to 3 T	Inoculate. Good for all permanent pasture mixtures. Use ladino type for higher forage yield. Intermediate types have been selected for grazing tolerance.
<b>Corn</b> <i>Zea mays</i>	Apr 1 to May 30	Sep 15 to Oct 30	140 to 280 bu 15 to 25 T (65% moisture)	Populations vary according to soil depth and water holding capacity. Lower seed rates for drought-prone soils. Higher seed rates for deep soils and irrigated fields.
		Aug 15 to Sep 15		Ensilage when moisture is: Horizontal bunker silos, 65 to 70%; Bag Silos, 60 to 68%; Tower Silos, 62 to 67%. Can be grazed as needed during the growing season or saved for winter grazing.
<b>Cowpeas</b> <i>Vigna unguiculata</i>	May 15 to Jul 1	Aug 1 to Oct 1	2 T 1-1/2 to 2-1/2 T	Inoculate. Short term summer legume. Sometimes mixed with warm season annual, like sorghum x sudangrass hybrids.
	Jun to Jul	see comment		A small fraction of seeds will have a hard seed coat and will germinate in subsequent years.
<b>Crabgrass</b> <i>Digitaria</i> spp.	May 1 to Jul 1	Jun 15 to Sep 30	2 to 4 T	Double seeding rate for coated seed. Uncoated seed should be mixed with a carrier such as fertilizer or pelleted lime. Seed when soil temperatures exceed 60°F.
<b>Crownvetch</b> <i>Coronilla varia</i>	Apr 1 to May 15			Inoculate. Used mainly for roadbanks.
<b>Eastern Gamagrass</b> <i>Tripsacum dactyloides</i>	Apr 15 to Jun 15	Jun 1	4 to 6 T	Highest quality native warm season perennial. High levels of seed dormancy. Use cold or chemically stratified seed. Slow to establish.
<b>Fescue, Tall</b> <i>Festuca arundinacea</i>	Primary: Aug 20 to Oct 1 Secondary: Feb 15 to Apr 15	May 1 to May 20	2 to 4 T	KY31 variety contains fungal endophyte that causes toxicity in livestock. Toxins accumulate in seedheads so clipping can help mitigate toxicity. Add clover to increase animal performance and mitigate toxicity. Use low endophyte or novel endophyte varieties.
<b>Gramma, Side Oats</b> <i>Bouteloua curtipendula</i>	Apr 15 to Jun 1	Jun 15 to Sep 15	1-1/2 to 2 T	Primarily used in mixtures at 1 to 2 lb per acre. Sensitive to overgrazing. Slow to establish.
<b>Indiangrass</b> <i>Sorghastrum nutans</i>	Apr 15 to Jun 1	Jul 15 to Sep 15	2 to 4 T	Light, fluffy seed. Needs special drills for no-till seeding. Can be mixed with a carrier to enhance flow in drill or seeder. Latest maturity of native grasses. Sensitive to overgrazing and slow to establish.
<b>Kentucky Bluegrass</b> <i>Poa pratensis</i>	Primary: Aug 15 to Sep 15 Secondary: Feb 15 to Apr 15	May 1 to 15	1 to 3 T	Tolerant to close grazing. Lower forage yield than other cool season grasses. Goes dormant during the hot summers. Normally planted as part of a mixture.
<b>Lespedeza, Annual</b> <i>Kummerowia stipulacea</i> (Korean; <i>K. striata</i> - Kobe or Striate types)	Feb 15 to Apr 1	Aug 15	1 to 2-1/2 T	Inoculate. Annual warm season legume. Can be frost seeded with red and white clover. Tolerant to low pH and low P.
<b>Lespedeza, Perennial (Sericea)</b> <i>Lespedeza cuneata</i>	May 1 to Jun 1	May 15 to Sep 15 (hay)	1 to 3 T	Inoculate. Used mainly for soil conservation purposes. Harvest or graze at an immature stage of growth to maintain quality (12 – 14" high).

<b>Species</b> <i>Scientific Name</i>	<b>Uses<sup>1</sup></b>	<b>Common Units</b>	<b>Desired Plant Density</b>	<b>Seeding Rate</b> <b>Pure Live Seed/ac</b>	<b>Seeding Depth</b> <b>(inches)</b>	<b>Main Cover Crop Benefit</b>	
<b>Millet, Foxtail (German)</b> <i>Setaria italicum</i>	hay, pasture	50 lb/bu 215,000 seeds/lb		15 to 20 lb (drilled) 20 to 30 lb (broadcast) <sup>3</sup>	1/4 to 1/2		
<b>Japanese Millet</b> <i>Echinochloa esculenta</i>	summer cover crop			10 lb (drilled) 20 lb (broadcast) <sup>3</sup>	1/4 to 1/2	biomass production, ground cover <sup>4</sup>	
<b>Millet, Pearl</b> <i>Pennisetum glaucum</i>	silage, pasture	50 lb/bu 82,000 seeds/lb		15 to 20 lb (drilled) 25 to 30 lb (broadcast) <sup>3</sup>	1/2 to 1	biomass production, ground cover <sup>4</sup>	
	summer cover crop			10 lb (drilled) 20 lb (broadcast) <sup>3</sup>	1/2		
<b>Oats, Winter and Spring</b> <i>Avena sativa</i>	grain	32 lb/bu 15,000 seeds/lb	20 to 30/sq ft	60 to 90 lbs	1 to 2		
	hay, silage			2-1/2 to 3 bu			
	cover crop			80 lb (drilled) 120 lb (broadcast) <sup>3</sup>			1/2 to 1-1/2
<b>Orchardgrass</b> <i>Dactylis glomerata</i>	hay or pasture	14 lb/bu 416,000 seeds/lb		15 to 20 lb	1/4 to 1/2		
<b>Oilseed Radish</b> <i>Raphanus sativus</i>	winter cover crop			10 lb (drilled) 15-20 lb (broadcast) <sup>3</sup>	1/4 to 3/4	loosening of compacted soils, N scavenging	
<b>Rapeseed, Winter</b> <i>Brassica napus</i>	forage	50 lb/bu 156,000 seeds/lb		4 to 6 lb (drilled) 6 to 9 lb (broadcast)	1/8 to 3/8	loosening of compacted soils, N scavenging	
	winter cover crop			6 lb (drilled) 8 lb (broadcast) <sup>3</sup>	1/4 to 3/4		
<b>Reed Canarygrass</b> <i>Phalaris arundinacea</i>	hay	47 lb/bu 480,000 seeds/lb		8 to 12 lb	1/4 to 1/2		
<b>Rye, Cereal</b> <i>Secale cereale</i>	grain	56 lb/bu 18,000 seeds/lb	16 to 18/sq ft	700,000 to 800,000 seeds	1 to 2		
	silage, pasture			20 to 30/sq ft			90 to 150 lb
	winter cover crop			15 to 30/sq ft			30 to 70 lb (drilled) 100 to 150 lb (broadcast) <sup>3</sup>

<b>Species</b> (continued) <i>Scientific Name</i>	<b>Seeding Date</b>	<b>Harvest/ Termination Timing</b>	<b>Approx. Annual Yield/ac [tons (T) or bushels (bu)]<sup>2</sup></b>	<b>Comments</b>
<b>Millet, Foxtail (German)</b> <i>Setaria italicum</i>	May 1 to Aug 1	Aug 15 to Oct 1	1 to 3 T	Main use for wildlife feed. Can be used as an emergency hay crop or pasture. Used as a smother crop when reestablishing pasture. Produces single cutting with no regrowth 50 to 60 days after planting.
<b>Japanese Millet</b> <i>Echinochloa esculenta</i>	Jun to Jul	see comment	2-1/2 to 4 T	Avoid late summer plantings as this species will flower and produce seed quickly as day length shortens. May have seeding rate restrictions if fields will be used for dove hunting.
<b>Millet, Pearl</b> <i>Pennisetum glaucum</i>	May 1 to Aug 1	Jun 15 to Oct 15	2 to 4 T	Good for summer pasture. Does not produce prussic acid. Is not a host for sugarcane aphid. Potential for nitrate problems. Refer to ID-217.
	Jun to Jul	see comment	2-1/2 to 5 T	Avoid late summer plantings as this species will flower and produce seed quickly as day length shortens. May have seeding rate restrictions if fields will be used for dove hunting.
<b>Oats, Winter and Spring</b> <i>Avena sativa</i>	Oct 1 to 15	Jul 1 to 10	50 to 80 bu 4 to 8 T (65% moisture)	Spring oats are seeded as a grain crop, or as emergency hay or silage. Winter oats are least winter hardy of small grains. Oats for grain are mostly used on-farm and currently not recommended for commercial production in KY.
	Mar 1 to Apr 1 Sep 15 to 30	May 20 to Jun 10		Preferred companion crop when seeding perennial forages since they are the least competitive small grain. If using for a companion crop, reduce seeding rate by 2/3. Fall planted winter oats will winter kill about one out of two years.
	Mar to Apr OR Aug to Sep	see comment	1-1/2 to 3 T	Can be planted in spring or late summer. In KY, will winter kill in most years.
<b>Orchardgrass</b> <i>Dactylis glomerata</i>	Primary: Aug 20 to Sep 20 Secondary: Feb 15 to Apr 15	May 1 to 20 Jul 1 to 15	2 to 4 T	High quality, high yielding cool season grass. Preferred grass for mixtures with alfalfa. Can become clumpy over time. Do not mow closer than 3 to 4 inches.
<b>Oilseed Radish</b> <i>Raphanus sativus</i>	Before Sep 15	not winter hardy	1/2 to 1-1/2 T	Will winter kill in most KY locations in most years. Decomposes quickly, so scavenged N can be lost readily if not planted in a mixture.
<b>Rapeseed, Winter</b> <i>Brassica napus</i>	Sep 1 to Oct 1	May 25 to Jun 15	20 to 25 bu 1 to 2-1/2 T	Use low glucosinolate varieties for forage. Be cautious when grazing brassicas. Refer to ID-223.
	before Sep 15	Apr 1 to Apr 15		Difficult to terminate chemically. Recommended termination when less than 12" tall.
<b>Reed Canarygrass</b> <i>Phalaris arundinacea</i>	Primary: Aug 20 to Sep 20 Secondary: Feb 15 to Apr 15	May 25 to Jun 10	2 to 4 T	Difficult to establish. Does well in poorly drained areas. Low quality at maturity. Use low alkaloid varieties.
<b>Rye, Cereal</b> <i>Secale cereale</i>	Oct 1 to Oct 30	Jun 15 to 30	30 to 90 bu 4 to 10 T (65% moisture)	Newer hybrid ryes may be an option for grain production. Historically test weight has been quite low for rye grown in KY. Earlier planting appears to be required on rye for grain.
	Aug 15 to Oct 15	Apr 20 + <sup>4</sup>		Cut for hay or silage in boot stage. Excellent for grazing and no-till mulch. Best small grain for fall grazing.
	Sep 1 to Nov 15 <sup>2</sup>	Mar 15 to May 10	1 to 4 T	Considered to have the best winter growth of winter grains. The fibrous root system helps hold soil in place. Excellent cover crop. Good for weed suppression while growing and after terminated. Can grow rapidly in the spring, so termination should be timed to desired amount of residue. Most biomass production occurs in the spring. Can immobilize N after termination.

<b>Species</b> <i>Scientific Name</i>	<b>Uses<sup>1</sup></b>	<b>Common Units</b>	<b>Desired Plant Density</b>	<b>Seeding Rate Pure Live Seed/ac</b>	<b>Seeding Depth (inches)</b>	<b>Main Cover Crop Benefit</b>
<b>Ryegrass, Annual</b> <i>Lolium multiflorum</i>	pasture, silage or hay	24 lb/bu 224,000 seeds/lb		20 to 30 lb	1/4 to 1/2	
	winter cover crop			10 to 20 lb (drilled) 20 to 40 lb (broadcast) <sup>3</sup>	< 1/2	nitrogen scavenging, ground cover
<b>Ryegrass, Perennial</b> <i>Lolium perenne</i>	hay, pasture	24 lb/bu 330,000 seeds/lb		15 to 25 lb	1/4 to 1/2	
<b>Sorghum, Forage</b> <i>Sorghum bicolor</i>	silage	56 lb/bu 13,000 to 20,000 seed/lb		60,000 to 90,000 seeds	1 to 1-1/2	
<b>Sorghum, Grain (Milo)</b> <i>Sorghum bicolor</i>	grain	56 lb/bu 24,000 seeds/lb	60,000/ac	60,000 to 80,000 seeds	3/4 to 1-1/4	
<b>Sorghum, Sweet (Syrup)</b> <i>Sorghum bicolor</i>	food	50 lb/bu 21,000 seeds/lb		2-1/2 to 3 lb 2 to 3 seed/sq ft	1	
<b>Soybean</b> <i>Glycine max</i>	grain	60 lb/bu 2,500 to 3,000 seeds/lb	100,000 harvested plants/ac	120,000 to 175,000 seeds	1 to 2	nitrogen fixation, biomass production
	hay, silage		100,000 to 160,000/ac	1 to 1-1/2 bu		
	summer cover crop			60 lb (drilled) 100 lb (broadcast) <sup>3</sup>		
<b>Sudangrass</b> <i>Sorghum bicolor</i> var. <i>sudanese</i>	hay, silage, pasture	40 to 50 lb/bu 55,000 seed/lb		20 to 30 lb (drilled) 20 to 30 lb (broadcast) <sup>3</sup>	1/2 to 1	
<b>Sorghum x Sudangrass Hybrids</b> <i>Sorghum bicolor</i> x <i>S. bicolor</i> var. <i>sudanese</i>	hay, silage, pasture	40 to 50 lb/bu 20,000 seeds/lb		20 to 30 lb (drilled) 30 to 40 lb (broadcast) <sup>3</sup>	1/2 to 1	rapid biomass production, weed suppression, ground cover <sup>4</sup>
	summer cover crop			15 lb (drilled) 30 lb (broadcast) <sup>3</sup>	1/2 to 1-1/2	
<b>Sunflowers</b> <i>Helianthus annuus</i>	bird feed	30 lb/bu	17,000 to 20,000/ac	18,000 to 22,000 seeds	1 to 2	biomass production
	summer cover crop			20 lb (drilled)	1	
<b>Sunn Hemp</b> <i>Crotalaria juncea</i>	summer cover crop			30 lb (drilled) 50 lb (broadcast) <sup>3</sup>	1/2 to 1	rapid biomass production, N fixation
<b>Switchgrass</b> <i>Panicum virgatum</i>	hay, pasture, wildlife	389,000 seeds/lb		8 to 10 lb (alone) 4 to 6 lb (in mixtures)	1/4 to 1/2	



<b>Species</b> (continued) <i>Scientific Name</i>	<b>Seeding Date</b>	<b>Harvest/ Termination Timing</b>	<b>Approx. Annual Yield/ac [tons (T) or bushels (bu)]<sup>2</sup></b>	<b>Comments</b>
<b>Ryegrass, Annual</b> <i>Lolium multiflorum</i>	Aug 15 to Oct 1	Mar 15 to May 15	2 to 4 T	Used mainly as cover crop or for grazing. Increased use for round bale silage. Use Italian types for spring seedings. See forage variety reports for winter-hardy varieties.
	Aug 15 to Oct 1	Mar 30 to Apr 30	1 to 2 T	Can be very difficult to terminate with herbicides and is thus only recommended for experienced cover croppers. Wheat growers should avoid this species as it can become a weed and can cross with similar weedy plants.
<b>Ryegrass, Perennial</b> <i>Lolium perenne</i>	Primary: Aug 20 to Oct 1 Secondary: Feb 1 to Apr 15	Apr 20 to May 10	2 to 4 T	Use winter hardy varieties. Average stand length in KY is two years. High fertility soils and/or irrigation can extend stand life.
<b>Sorghum, Forage</b> <i>Sorghum bicolor</i>	May 1 to Jul 1	Aug 15 to Sep 20	15 to 30 T (65% moisture)	Susceptible to sugarcane aphid damage. More drought tolerant than corn.
<b>Sorghum, Grain (Milo)</b> <i>Sorghum bicolor</i>	May 1 to Jun 10	Sep 20 to Oct 20	50 to 110 bu	Plant when soil temperatures are above 60-65°F. Row spacing of 15" or less has less potential for lodging problems than wider row spacings. May need to spray to control sugar cane aphid.
<b>Sorghum, Sweet (Syrup)</b> <i>Sorghum bicolor</i>	May 1 to Jun 10	Sep 1 to Oct 15	150 to 250 gal	Harvest earlier by transplanting using float system. May need to spray to control sugar cane aphid.
<b>Soybean</b> <i>Glycine max</i>	May 1 to Jul 1	Sep 15 to Oct 30	35 to 90 bu	Inoculate with <i>Bradyrhizobium japonicum</i> if field has been out of soybean for 3 to 5 years. Seed size varies by variety. Maturity Groups III to early IV best suited for KY. Higher seed rate for later planting, such as double crop behind wheat, and more challenging environments. Row widths less than 30 inches provide a yield increase.
	May 1 to Jul 1	Aug 1 to Sep 30 (hay)	2 to 4 T	If cutting for a forage, target the R6 (full seed) growth stage and wrap bales or ensile for best quality.
	May to August	see comment	1-1/2 to 4 T	Cannot utilize on prevented plant acres planned for soybean. Watch for herbicide resistant traits when planning termination strategy. Will winter kill if planted later in the season. Watch rotation with soybean harvested for grain.
<b>Sudangrass</b> <i>Sorghum bicolor</i> var. <i>sudanese</i>	May 10 to Aug 1	Jun 10 to Oct 1	2 to 5 T	Excellent warm season annual pasture or silage crop. Smaller stemmed sudangrass preferred for hay production over sorghum x sudangrass hybrid. Potential for prussic acid and nitrate problems. Refer to ID-220 and ID-217.
<b>Sorghum x Sudangrass Hybrids</b> <i>Sorghum bicolor</i> x <i>S. bicolor</i> var. <i>sudanese</i>	May 10 to Aug 1	Jun 15 to Oct 15	2 to 5 T	Excellent warm season annual pasture or silage crop. Potential for prussic acid and nitrate problems. Refer to ID-220 and ID-217.
	Jun to Sep	see comment	4 to 5 T	With other grasses listed, can be mowed and more biomass will be produced. Watch for sugarcane aphids.
<b>Sunflowers</b> <i>Helianthus annuus</i>	Apr 1 to May 10	Sep	0-1/2 to 1 T	Not recommended for oil crop production in KY.
	Jun to Jul	see comment	1 to 2 T	Stems can get woody and take longer to decompose. Residue can be difficult to manage. Check for planting rate restrictions if fields are hunted.
<b>Sunn Hemp</b> <i>Crotalaria juncea</i>	Jun to Jul	see comment	2 to 7-1/2 T	Stems can get woody and take longer to decompose. Residue can be difficult to manage. This species may be limited in some states due to pest issues and toxicity (when consumed in large amounts) to birds.
<b>Switchgrass</b> <i>Panicum virgatum</i>	May 1 to Jun 15	Jun 1 to Sep 15	3 to 5 T	Slick, free-flowing seed. Most tolerant of wet soils of all native grasses. Sensitive to overgrazing. Slow to establish. Upland types suited for pasture. Use lowland types for hay or biomass production.

<b>Species</b> <i>Scientific Name</i>	<b>Uses<sup>1</sup></b>	<b>Common Units</b>	<b>Desired Plant Density</b>	<b>Seeding Rate</b> <b>Pure Live Seed/ac</b>	<b>Seeding Depth</b> <b>(inches)</b>	<b>Main Cover Crop Benefit</b>
<b>Timothy</b> <i>Phleum pratense</i>	hay	45 lb/bu 1,152,000 seeds/lb		8 to 10 lb (alone) 4 to 6 lb (in mixtures)	1/4 to 1/2	
<b>Triticale</b> <i>Triticum x Secale</i>	grain	50 lb/bu 15,000 seeds/lb	35/sq ft	1,500,000 to 2,000,000 seeds	1-1/2 to 2	nitrogen scavenging, ground cover
	silage		20 to 30/sq ft	2 to 2-1/2 bu	1 to 2	
	winter cover crop			30 to 70 lb (drilled) <sup>2</sup> 100 to 150 lb (broadcast) <sup>3</sup>	3/4 to 1	
<b>Turnips and related brassicas</b> <i>Brassica</i> spp.	pasture	55 lb/bu		3 to 6 lb	1/4	
<b>Vetch, Big Flower</b> <i>Vicia grandiflora</i>	forage	60 lb/bu 32,000 seeds/lb		20 to 30 lb (alone) 15 to 20 lb (in mixtures)	1 to 2	
<b>Vetch, Hairy</b> <i>Vicia villosa</i>	forage	60 lb/bu 16,000 seeds/lb		20 to 30 lb (alone) 15 to 20 lb (in mixtures)	1 to 2	nitrogen fixation
	winter cover crop			10 lb (drilled) 20 lb (broadcast) <sup>3</sup>	1/2 to 1	
<b>Wheat</b> <i>Triticum aestivum</i>	grain	60 lb/bu 11,000 seeds/lb	30 to 35/sq ft	1,500,000 to 2,000,000 seeds	1-1/2 to 2	nitrogen scavenging, ground cover
	silage		20 to 30/sq ft	2 to 2-1/2 bu		
	winter cover crop			50 to 70 lb (drilled) 100 to 150 lb (broadcast) <sup>3</sup>	3/4 to 1	

1 For cover crops, NRCS requirements for seeding rates, planting dates, termination times should be verified if receiving EQIP funds.

2 Amount of cover crop aboveground biomass is dependent on the termination date.

3 For all larger seeded cover crops, broadcasting is not recommended unless moisture is present or precipitation is imminent.

4 All of these summer annual grass species can accumulate nitrate or prussic acid in droughty conditions; grazing or feeding is not recommended in these situations.

<b>Species</b> (continued) <i>Scientific Name</i>	<b>Seeding Date</b>	<b>Harvest/ Termination Timing</b>	<b>Approx. Annual Yield/ac [tons (T) or bushels (bu)]<sup>2</sup></b>	<b>Comments</b>
<b>Timothy</b> <i>Phleum pratense</i>	Aug 20 to Oct 1	May 20 to Jun 10	1 to 3 T	Timothy is desired by some horse owners. It is essentially a one-cut hay crop in KY. Average stand length is 2 years.
<b>Triticale</b> <i>Triticum x Secale</i>	Oct 1 to 30	Jun 10 to 25	40 to 70 bu	Hybrid between wheat and rye. Use winter varieties. Newer varieties have yields greater than wheat and quality greater than cereal rye.
	Oct 1 to 30	May 10 to Jun 1	4 to 10 T (65% moisture)	Cut for silage in boot (Feekes 10) growth stage.
	Sep 1 to Nov 15	Mar 15 to May 10	1 to 3 T	Produces more biomass than wheat but less than cereal rye and benefits are intermediate between the two.
<b>Turnips and related brassic</b> <i>Brassica</i> spp.	Apr 1 to Jun 1 Aug 1 to Sep 1	Jun 15 to Nov 15	2 to 4 T	Very high quality pasture (85% digestibility). Often dry hay is fed when grazing to add fiber or seeded in mixtures with small grains. Choose grazing types for improved regrowth. Be cautious when grazing brassicas. Refer to ID-223.
<b>Vetch, Big Flower</b> <i>Vicia grandiflora</i>	Aug 1 to Sep 10	Apr to May	1-1/2 to 2-1/2 T 0 to 600 lb seed	Annual.
<b>Vetch, Hairy</b> <i>Vicia villosa</i>	Aug 1 to Sep 10	Jun 20 to Jul 5	400 to 600 lb seed	Annual. Not as palatable as annual clover. Mainly planted as a cover crop.
	Before Sep 15	Apr 15 to May 10	1 to 2-1/2 T	A small fraction of seeds will have a hard seed coat and will germinate in subsequent years. Avoid when wheat is in the rotation.
<b>Wheat</b> <i>Triticum aestivum</i>	Oct 1 to 30	Jun 10 to 25	50 to 110 bu	Excellent grain crop for soil quality when grown in rotation with corn and soybeans. Soft red winter wheat is grown for pastries, cookies, crackers and similar foods. Grain is also used for animal feed.
	Oct 1 to 15	May 10 to Jun 1	6 to 10 T (65% moisture)	Excellent quality silage or feed grain. Cut for silage shortly after heading (Feekes 10.5 growth stage). Seed size varies by variety.
	Oct 1 to Nov 15	Mar 15 to May 10	0-1/2 to 2 T	Fibrous root system and durability over the winter makes wheat an excellent cover crop. Watch Hessian fly free dates. Doesn't produce as much biomass as cereal rye, though can still immobilize N after termination. Generally, not enough biomass for adequate weed suppression after termination.

## Typical First and Last Occurrences of 32° F in Kentucky

Location	Coordinates (°)		Date of First Fall Frost <sup>1,2</sup>					Date of Last Spring Frost <sup>1,3</sup>				
	LAT	LONG	Early	10%	50%	90%	Late	Early	90%	50%	10%	Late
Ashland	38.45	-82.61	8/31	10/6	10/20	11/3	11/3	4/10	4/6	4/24	5/10	6/10
Barbourville	36.88	-83.88	10/3	10/5	10/19	11/2	11/13	3/25	4/7	4/22	5/9	5/22
Bardstown	37.82	-85.38	10/2	10/7	10/23	11/6	11/9	3/27	3/30	4/14	4/29	5/2
Barren River Lake	36.90	-86.12	10/2	10/13	10/29	11/13	11/26	3/27	3/27	4/12	4/28	5/3
Berea	37.57	-84.29	9/24	10/15	10/31	11/17	11/21	3/19	3/24	4/11	4/30	5/20
Bowling Green Warren Co AP	36.96	-86.42	10/6	10/12	10/27	11/9	11/15	3/19	3/25	4/9	4/25	4/22
Bradfordsville	37.50	-85.15	9/24	10/4	10/18	11/2	11/8	4/1	4/7	4/21	5/6	5/22
Cincinnati N Ky Int AP	39.04	-84.67	9/30	10/9	10/24	11/6	11/8	3/29	4/2	4/16	5/2	5/18
Crab Orchard	37.49	-84.44	9/22	10/3	10/19	11/4	11/9	4/5	4/3	4/20	5/6	6/9
Cynthiana	38.38	-84.30	10/2	10/5	10/20	11/3	11/8	3/28	4/3	4/20	5/7	5/9
Dix Dam	37.79	-84.71	10/6	10/9	10/24	11/6	11/21	3/21	4/2	4/16	5/1	5/8
Greensburg	37.26	-85.50	10/2	10/8	10/24	11/6	11/8	3/29	4/1	4/17	5/3	5/12
Henderson	37.76	-87.65	10/4	10/10	10/27	11/11	11/27	3/6	3/24	4/8	4/23	4/22
Hodgenville	37.53	-85.74	10/3	10/8	10/24	11/6	11/9	3/30	3/31	4/16	5/1	5/15
Hopkinsville	36.85	-87.52	9/22	10/13	10/28	11/13	11/25	3/19	3/24	4/10	4/24	4/25
Jackson Julian Carroll AP	37.59	-83.31	10/4	10/14	11/1	11/16	11/25	3/21	3/24	4/9	4/25	5/15
Leitchfield	37.51	-86.29	9/30	9/29	10/11	10/24	11/8	4/1	4/14	4/28	5/15	5/15
Lexington Bluegrass AP	38.04	-84.61	10/4	10/12	10/27	11/9	11/10	3/27	3/29	4/14	4/29	5/18
London Corbin AP	37.09	-84.08	9/24	10/7	10/22	11/5	11/13	3/29	3/31	4/16	5/3	5/15
Louisville Int AP	38.18	-85.74	10/9	10/20	11/4	11/20	11/28	3/14	3/19	4/3	4/19	4/22
Mammoth Cave	37.13	-86.15	9/24	10/11	10/27	11/11	11/26	3/29	3/24	4/10	4/26	5/17
Maysville	38.69	-83.79	10/4	10/10	10/25	11/8	11/11	3/29	4/4	4/18	5/1	5/7
Monticello	36.87	-84.83	10/3	10/6	10/22	11/5	11/13	3/27	4/3	4/20	5/5	5/19
Mount Vernon	37.35	-84.34	10/2	10/7	10/22	11/5	11/9	4/1	4/4	4/20	5/5	5/18
Murray	36.61	-88.31	10/8	10/19	11/3	11/20	11/27	3/6	3/17	4/2	4/18	4/22
Nolin River Lake	37.28	-86.25	9/22	10/7	10/24	11/7	11/6	4/1	4/3	4/20	5/7	5/21
Paducah Barkley Regional AP	37.06	-88.77	10/4	10/11	10/26	11/9	11/12	3/6	3/23	4/8	4/22	4/27
Princeton	37.12	-87.87	10/4	10/6	10/22	11/6	11/12	3/6	3/29	4/13	4/29	5/2
Providence	37.40	-87.76	10/3	10/11	10/26	11/8	11/23	3/7	3/25	4/9	4/22	5/2
Rough River Lake	37.62	-86.50	9/22	10/3	10/18	11/1	11/2	3/31	4/4	4/20	5/7	5/21
Scottsville	36.75	-86.23	10/3	10/8	10/23	11/5	11/23	3/22	3/31	4/16	5/2	5/2
Somerset	37.12	-84.62	9/27	10/4	10/18	11/1	11/9	3/24	4/3	4/20	5/6	5/18

<sup>1</sup> Temperature data is based on the latest set of climate normals, 30 years of data from 1981-2010.

<sup>2</sup> Early = Earliest date recorded for first frost occurrence; 10%, 50%, 90% = Probability data of first occurrence or earlier; Last = Latest date recorded for first frost occurrence.

<sup>3</sup> Early = Earliest date recorded for last frost occurrence; 90%, 50%, 10% = Probability date of last occurrence or later; Last = Latest date recorded for last frost occurrence.

**Sources:** Probability data (10, 50, 90%) - National Centers for Environmental Information, URL: <https://www.ncdc.noaa.gov/cdo-web/search?datasetid=GHCND>; Early and Late - Midwestern Regional Climate Center cli-MATE tool kit, URL: <https://mrcc.illinois.edu/CLIMATE/>