ID-268

University of Kentucky
College of Agriculture,
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Cooperative Extension Service

Kentucky Grain Crop Production at a Glance

Carrie Knott, Carl Bradley, John Grove, Chad Lee, Travis Legleiter, Sam McNeill, Edwin Ritchey, Raul Villanueva, Kiersten Wise

Websites for more information: http://kygrains.info; https://wheatscience.ca.uky.edu/; https://kentuckypestnews.wordpress.com/; https://cropprotectionnetwork.org/

The booklet-sized document on the following pages is also available as a 25 x 38 inch poster (ID-268P).

Crop *Scientific Name*	**Standard**	**Soil Fertility/pH[a]** Mehlich III soil test values at which no additional fertilizer is needed; Target and trigger soil pH values	**Nitrogen Recommendation[a]**	**Desired Plant Density** **Seeding Rate, Pure Live Seed/ac**	**Seeding Depth (inches)**	**Seeding Date**	**Harvest Timing**
Barley *Hordeum vulgare*	Test Weight (lb/bu) 48 Moisture (%) 14.5	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Double cropping with soybean:** Take fertilizer P rate recommendation from small grain (AGR-1, Table 18) and fertilizer K rate recommendation from soybean (AGR-1, Table 15) for the fall application **For silage:** Additional K fertilizer needed until soil test K > 420 lb/ac (AGR-1, Table 21).	**Fall N rate:** Usually 0, but not more than 40 lb N/ac. **Spring N rate:** Between 60 and 120 lb N/ac, depending on tillage system and if single or split N application used. Refer to AGR-1, Table 16 for specific rates.	35 plants/sq ft 1,500,000 to 2,000,000 seeds	1-1/2 to 2	Oct 1 to Oct 15	June 5 to June 15
Canola, Winter *Brassica napus*	Test Weight (lb/bu) 50 Moisture (%) 10.0	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Double cropping with soybean:** Take fertilizer P rate recommendation from canola (AGR-1, Table 24) and fertilizer K rate recommendation from soybean (AGR-1, Table 15) for the fall application.	**Fall N rate:** Usually 0, but not more than 30 lb N/ac. **Spring N rate:** Between 90 and 120 lb N/ac prior to bolting,[b] depending upon previous crop. Refer to AGR-1, page 15 for specific rates.	5 to 7 plants/sq ft 6 to 9 seeds/sq ft 261,000 to 392,000 seeds	1/2 to 1	Sept 15 to Oct 1	May 25 to June 15
Corn, Maize *Zea mays*	Test Weight (lb/bu) Shelled 56 Ear 70 Moisture (%) 15.5	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Corn for silage:** Additional K fertilizer needed until soil test K > 420 lb/ac (AGR-1, Table 21).	**Dryland corn** **N rate:** recommendation ranges from 50 to 200 lb N/ac, depending upon previous crop, tillage system used and soil drainage class. **Irrigated corn:** 175-200 lb N/ac. Refer to AGR-1, Table 12 for specific rates.	24,000 to 36,000 seeds (non-irrigated) 32,000 to 42,000 seeds (irrigated)	1-1/2 to 3	April 1 to May 30	Sept 15 to Oct 30

continued

Crop (continued) Scientific Name	Common Timings				Acceptable Harvest Losses	Comments
	Fertilizer and Lime	Herbicide	Fungicide	Insecticide		
Barley *Hordeum vulgare*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Fall N not usually needed, but not to exceed 40 lb N/ac if insufficient N carryover. Use split spring N application at Feekes 2-3 followed by Feekes 5 when tillers are too few and when N losses expected.	Feekes 5	Seed Treatment Heading (Feekes 10.5 to 5 days after heading)	Seed Treatment Feekes 5	< 5% of anticipated crop yield 20 kernels/sq ft = 1 bushel of loss/ac	Barley is planted and harvested earlier than wheat. More sensitive to acidic soil than other small grains. Not as winter hardy as wheat. Most barley grown in Kentucky is 6-row and used for animal feed. "Thoroubred" winter 6-row barley is approved by the American Malting Barley Association (AMBA), so farmers often grow it for malting barley (even though it does not always make the cut and is then used as feed barley). Two-row barley, which is grown for malting and distilling, is not as common in Kentucky. In general, a medium maturing cultivar performs best in Kentucky. **Yield Conversions:** bu/ac x 53.80 = kg/ha kg/ha x 0.0186 = bu/ac
Canola, Winter *Brassica napus*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Fall N not usually needed, but not to exceed 30 lb N/ac if insufficient N carryover.	Pre-plant In spring when active growth begins	Seed Treatment Early to mid bloom stage[b]	Seed Treatment Rosette to early bloom[b]	25 to 50 lb of seed/ac Approximately 65 to 130 seeds/sq ft	To maximize success of canola it must be planted prior to October 1. It requires intensive scouting to ensure insect pests and diseases do not become problematic. Primarily used for cooking oil. Canola refers to low glucosinolate, low erucic acid rapeseed. **Yield Conversions:** bu/ac x 56.04 = kg/ha kg/ha x 0.0178 = bu/ac
Corn, Maize *Zea mays*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Band part of P recommendation on low soil test P soils. Split N applications (at-planting; V4-V6) recommended.	Pre-emergence V3 to V5	Seed Treatment VT/R1	Seed Treatment	< 5% of anticipated crop yield 2 kernels/sq ft = 1 bushel of loss/ac Typically, 1 to 3 kernels/sq ft is acceptable	In general, early maturing hybrids are about 108 to 111 day hybrids; medium maturing hybrids are 112 to 115 day hybrids; and late maturing hybrids are 116 to 120 day hybrids. Banded P reduces P fixation and improves P use efficiency. If insecticide seed treatments are used, early-season insects are usually not a problem. Seeding rate can vary according to soil depth and water-holding capacity. Lower seeding rate with shallower topsoil depth and lower water-holding capacity. Split N application reduces likelihood of N losses and improves N use efficiency. A fungicide application may be needed to manage southern rust through R3. Ears with 400 to 600 kernels typically produce the most yield per acre. Larger ears often indicate too low of a plant population. **Yield Conversions:** bu/ac x 62.77 = kg/ha kg/ha x 0.0159 = bu/ac

continued

Crop *Scientific Name*	**Standard**	**Soil Fertility/pH[a]** Mehlich III soil test values at which no additional fertilizer is needed; Target and trigger soil pH values	**Nitrogen Recommendation[a]**	**Desired Plant Density** **Seeding Rate, Pure Live Seed/ac**	**Seeding Depth (inches)**	**Seeding Date**	**Harvest Timing**
Oats, Winter and Spring *Avena sativa*	Test Weight (lb/bu) 32 Moisture (%) 14.0	P: >60 lb/ac K: >300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Double cropping with soybean:** Take fertilizer P rate recommendation from small grain (AGR-1, Table 18) and fertilizer K rate recommendation from soybean (AGR-1, Table 15) for the fall application. **Oats for silage:** Additional K fertilizer needed until soil test K > 420 lb/ac (AGR-1, Table 21).	**Fall N rate:** Usually 0, but not more than 40 lb N/ac. **Spring N rate:** Between 60 and 120 lb N/ac, depending on tillage system and if single or split N application used. Refer to AGR-1, Table 16 for specific rates.	20 to 30 plants/sq ft 870,000 to 1,500,000 seeds	1 to 2	Oct 1 to Oct 15	July 1 to July 10
Cereal Rye, Winter *Secale cereale*	Test Weight (lb/bu) 56 Moisture (%) 14.0	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Double cropping with soybean:** Take fertilizer P rate recommendation from small grain (AGR-1, Table 18) and fertilizer K rate recommendation from soybean (AGR-1, Table 15) for the fall application. **Rye for silage:** Additional K fertilizer needed until soil test K > 420 lb/ac (AGR-1, Table 21).	**Fall N rate:** Usually 0, but not more than 40 lb N/ac. **Spring N rate:** Between 60 and 120 lb N/ac, depending on tillage system and if single or split N application used. Refer to AGR-1, Table 16 for specific rates.	16 to 18 plants/sq ft 700,000 to 800,000 seeds	1 to 2	Oct 1 to Oct 30	June 15 to June 30
Sorghum, Grain (Milo) *Sorghum bicolor*	Test Weight (lb/bu) 56 Moisture (%) 13.0	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2	**N rate recommendation:** ranges from 50 to 125 lb N/ac, depending upon previous crop. Refer to AGR-1, Table 22 for specific rates.	60,000 plants/ac 60,000 to 80,000 seeds	3/4 to 1-1/4	May 1 to June 10	Sept 20 to Oct 20

continued

Crop *(continued)* Scientific Name	Common Timings				Acceptable Harvest Losses	Comments
	Fertilizer and Lime	Herbicide	Fungicide	Insecticide		
Oats, Winter and Spring *Avena sativa*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Fall N not usually needed, but not to exceed 40 lb N/ac if insufficient N carryover. Use split spring N application at Feekes 2-3 followed by Feekes 5 when tillers are too few and when N losses expected.	Winter Oats: 3 leaf stage up to flag leaf Spring Oats: After 2-leaf stage, but prior to jointing	Seed Treatment	Seed Treatment	< 5% of anticipated crop yield 20 kernels/sq ft = 1 bushel of loss/ac	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, because the crop does not always survive the winter. **Yield Conversions:** bu/ac x 35.87 = kg/ha kg/ha x 0.0279 = bu/ac
Cereal Rye, Winter *Secale cereale*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Fall N not usually needed, but not to exceed 40 lb N/ac if insufficient N carryover. Use split spring N application at Feekes 2-3 followed by Feekes 5 when tillers are too few and when N losses expected.	Feekes 5	Seed Treatment Beginning Flowering (Feekes 10.5.1)	Seed Treatment Feekes 5	< 5% of anticipated crop yield 20 kernels/sq ft = 1 bushel of loss/ac	Newer hybrid ryes may be an option for grain production. Historically test weight has been quite low for rye grown in KY. In general, a medium maturing cultivar performs best in Kentucky. Earlier planting appears to be required on rye for grain. Tolerates acidic soil better than other small grains. **Yield Conversions:** bu/ac x 62.77 = kg/ha kg/ha x 0.0159 = bu/ac
Sorghum, Grain (Milo) *Sorghum bicolor*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting.	Safener Seed Treatment (such as Concep® or Screen). Safener is needed for sorghum receiving pre-emergence applications of S-metholacholr, dimethenamid-P or acetocholor Pre-emergence 3 leaf stage to 6 leaf stage	Seed Treatment	Seed Treatment	< 5% of anticipated crop yield 16 to 21 kernels/sq ft = 1 bushel of loss/ac	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. Fungicides are available if needed for foliar disease management **Yield Conversions:** bu/ac x 62.77 = kg/ha kg/ha x 0.0159 = bu/ac

continued

Crop *Scientific Name*	Standard	Soil Fertility/pH[a] Mehlich III soil test values at which no additional fertilizer is needed; Target and trigger soil pH values	Nitrogen Recommendation[a]	Desired Plant Density Seeding Rate, Pure Live Seed/ac	Seeding Depth (inches)	Seeding Date	Harvest Timing
Soybean *Glycine max*	Test Weight (lb/bu) 60 Moisture (%) 13.0	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **If double cropping with small grain:** Take fertilizer P rate recommendation from small grain (AGR-1, Table 18) and fertilizer K rate recommendation from soybean (AGR-1, Table 15).	None	**Full-Season:** 100,000 harvested plants/ac 120,000 to 175,000 seeds **Double-Crop:** 140,000 to 150,000 harvested plants/ac 190,000 to 210,000 seeds	1 to 2	May 1 to July 1	Sept 15 to Oct 30
Triticale, Winter × *Triticosecale*	Test Weight (lb/bu) 48 Moisture (%) 14.0	P: >60 lb/ac K: >300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Double cropping with soybean:** Take fertilizer P rate recommendation from small grain (AGR-1, Table 18) and fertilizer K rate recommendation from soybean (AGR-1, Table 15) for the fall application. **For silage:** Additional K fertilizer needed until soil test K > 420 lb/ac (AGR-1, Table 21).	**Fall N rate:** Usually 0, but not more than 40 lb N/ac. **Spring N rate:** Between 60 and 120 lb N/ac, depending on tillage system and if single or split N application used. Refer to AGR-1, Table 16 for specific rates.	35 plants/sq ft 1,500,000 to 2,000,000 seeds	1-1/2 to 2	Oct 1 to Oct 30	June 10 to June 25
Wheat, Winter *Triticum aestivum*	Test Weight (lb/bu) 60 Moisture (%) 13.5	P: > 60 lb/ac K: > 300 lb/ac **Water pH:** Target: 6.4 Lime if < 6.2 **Double cropping with soybean:** Take fertilizer P rate recommendation from small grain (AGR-1, Table 18) and fertilizer K rate recommendation from soybean (AGR-1, Table 15) for the fall application. **For silage:** Additional K fertilizer needed until soil test K > 420 lb/ac (AGR-1, Table 21).	**Fall N rate:** Usually 0, but not more than 40 lb N/ac. **Spring N rate:** Between 60 and 120 lb N/ac, depending on tillage system and if single or split N application used. Refer to AGR-1, Table 16 for specific rates.	35 plants/sq ft 1,500,000 to 2,000,000 seeds	1-1/2 to 2	Oct 1 to Oct 30	June 10 to June 25

[a]Based upon recommendations provided in AGR-1 Lime and Nutrient Recommendations.
[b]Refer to AGR-227 Identifying Canola Growth Stages.

Crop *(continued)* Scientific Name	Common Timings				Acceptable Harvest Losses	Comments
	Fertilizer and Lime	Herbicide	Fungicide	Insecticide		
Soybean *Glycine max*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting.	Pre-emergence V3 to V6	Seed Treatment Beginning pod development (R3)	Seed Treatment	5 to 10% of anticipated crop yield 4 seeds/sq ft = 1 bushel of loss/ac	Inoculate with *Bradyrhizobium japonicum* if field has been out of soybean for 3 to 5 years. If insecticide seed treatments are used, early-season insects are usually no not a problem. Seed size varies by variety. Relative maturity groups of mid-3 to late-4 are best suited for Kentucky. Some late-2 and early-5 can be produced as long as they are planted as early as possible. Increase seed rate for later planting, such as double crop behind wheat, and more challenging environments. Increase seeding rates with shallower topsoil depth. Row widths less than 30 inches provide a yield increase. **Yield Conversions:** bu/ac x 67.25 = kg/ha kg/ha x 0.0149 = bu/ac
Triticale, Winter × *Triticosecale*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Fall N not usually needed, but not to exceed 40 lb N/ac if insufficient N carryover. Use split spring N application at Feekes 2-3 followed by Feekes 5 when tillers are too few and when N losses expected.	Feekes 5	Seed Treatment	Seed Treatment Feekes 5	< 5% of anticipated crop yield 20 kernels/sq ft = 1 bushel of loss/ac	Hybrid between wheat and rye. Use winter varieties. In general, a medium maturing cultivar performs best in Kentucky. **Yield Conversions:** bu/ac x 53.80 = kg/ha kg/ha x 0.0186 = bu/ac
Wheat, Winter *Triticum aestivum*	Apply lime 6 months prior to seeding. Apply P and K just prior to or at planting. Fall N not usually needed, but not to exceed 40 lb N/ac if insufficient N carryover. Use split spring N application at Feekes 2-3 followed by Feekes 5 when tillers are too few and when N losses expected.	Pre-emergence Feekes 5 or in spring when active growth begins	Seed Treatment Beginning flowering (Feekes 10.51) for management of Fusarium head blight. Earlier applications may be needed in some years to protect against foliar diseases such as stripe rust.	Seed Treatment Feekes 5	< 5% of anticipated crop yield 20 kernels/sq ft = 1 bushel of loss/ac	Winter wheat yields are maximized when row width is around 7". In general, a medium maturing cultivar performs best in Kentucky. Grain can be used for human consumption and animal feed. If insecticide seed treatments are used, early-season insects are usually not a problem. In general, medium maturing cultivars are best suited to maximize profitability of wheat/double crop soybean production system. **Yield Conversions:** bu/ac x 67.25 = kg/ha kg/ha x 0.0149 = bu/ac

Typical First and Last Occurrences of 32° F in Kentucky

	Coordinates (°)		Date of First Fall Frost[1,2]					Date of Last Spring Frost[1,3]				
Location	**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

[1] Temperature data is based on the latest set of climate normals, 30 years of data from 1981-2010.
[2] Early = Earliest date recorded for first frost occurrence; 10%, 50%, 90% = Probablility data of first occurrence or earlier; Last = Latest date recorded for first frost occurrence.
[3] Early = Earliest date recorded for last frost occurrence; 90%, 50%, 10% = Probability date of last occurrence or later; Last = Lastest 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/

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