Field Crop Planting Guide

KIND OF SEED	LBS./BU	BROADCAST LBS./ACRE	DRILLED LBS./ACRE	ROW LBS./A	TIME TO SEED	DEPTH SEEDED IN INCHES
Alfalfa	60	25-30	15-20	N/A	Spring and early fall	1/4-1/2
Barley	48	96-120	72-96	N/A	September 1 - October 10	1-2
Birdsfoot Trefoil	60	10-16	5-8	N/A	Fall and spring	1/4 - 1/2
Bluegrass	14	20-30	15-20	N/A	Early spring - early September	1/4 - 1/2
Bluestem, Big	8-10	N/A	8-10*	N/A	April - May	1/4 - 1/2
Bluestem, Caucasian	N/A	N/A	2*	N/A	April - early May	1-4
Bluestem, Little	N/A	N/A	6-8*	N/A	April - May	1/4 - 1/2
Bromegrass	14	10-20	8-10	N/A	Spring or fall	1-2
Buckwheat	52	60-80	50-60	N/A	Late Spring	1 - 11/2
Canola	50	8-10	5-7	N/A	September	1/4 - 1/2
Clover, Alsike	60	8-10	4-6	N/A	Winter - April	1/4 - 1/2
Clover, Berseem	60	20	10-15	N/A	Spring	1/4 - 1/2
Clover, Crimson	60	15-30	10-15	N/A	Winter - April	1-2
Clover, Ladino	60	2-4	1-2	N/A	Spring or fall	1/4 - 1/2
Clover, Mammoth, Altawede	60	12-16	8-10	N/A	Winter - early April	1-2
Clover, Red	60	12-15	6-8	N/A	Winter - early April	1-2
Clover, Sweet	60	25-30	15-20	N/A	Mid-winter - early spring	1-2
Clover, White Dutch	60	3-6	1-2	N/A	August - October and spring	1-2
Corn, Field	56	N/A	N/A	10-15	Spring	1-2
Corn, Pop	60	N/A	N/A	3-6	Spring	1 - 11/2
Corn, Silage	56	N/A	N/A	10-15	Spring	1-2
Crownvetch	60	15-30	5-15	N/A	Spring or fall	1-2
Fescue	25	20-30	10-20	N/A	Early spring or early fall	1-2
Gamagrass, Eastern	N/A	N/A	N/A	8*	Spring soil temp. above 65° F	3/4-1
Indiangrass	8-10	N/A	8-10*	N/A	April - May	1/4 - 1/2
Lespedeza	25-60	20-40	15-30	N/A	Mid-winter - early spring	1-2
Millet	50	30-40	20-25	N/A	Late May - early July	1/4 - 1/2
Oats	32	96-120	48-96	N/A	January 20 - March 20	1/2-2
Orchardgrass	14	20-40	10-20	N/A	Early spring or early fall	1-2
Peanuts	22	N/A	N/A	35-40	May or June	1/2-2
Rape	60	10-16	5-8	N/A	Early May - late July	1/2 - 11/2
Redtop	14	8-10	4-6	N/A	August 15 - October 30 or spring	1/4 - 1/2
Reed Canarygrass	44	10-20	6-8	N/A	August 15 - September 20	1/4 - 1/2
Rice, Rough	44	120-160	80-120	N/A	March - May	1-2
Rye, Winter	56	112-168	74-112	N/A	September - October	1-2
Sorghum, Forage	56	10-15	4-6	N/A	May - June 20	1/2-1
Sorghum, Grain	56	16-20	10-12	5-7	May - June	1/2-1
Sorghum-Sudan	56	35-50	25-35	N/A	Late May - early July	1/2-1
Soybeans	60	90-120	60-90	35-50	Late April - early July	1 - 11/2
Sudan	28	30-45	20-30	N/A	Late May - early July	1/2-1
Switchgrass	60	N/A	5-6*	N/A	April - May	1/4 - 1/2
Timothy	45	12-16	8-10	N/A	August 15 - October 20	1-2
Vetch, Winter Hairy	60	30-40	20-30	N/A	September 1 - October 1	1/2-2
Wheat	60	120-180	90-115	N/A	September - November	1-2

**Pure live seed*

MorCorn Seed Comparison Chart

	VALUE ADDED TRAITS	MATURITY DAYS	EMERGENCE	EARLY VIGOR	ROOT STRENGTH	STAYGREEN	TEST WEIGHT	DRY DOWN	PLANT HEIGHT	LEAF TYPE	KERNEL ROWS	EAR TYPE	POPULATION	NO-TILL ADAPTABILITY	CORN ON CORN	DROUGHT TOLERANCE
MC3597	VT3	105	8	9	8	9	7	9	M	Semi-Up	16-18	Determinate	28-30	8	8	8
MC4007	VT3	110	9	9	8	8	8	8	MT	Semi-Up	16-20	Semi-flex	26-30	9	9	8
MC4071	RR2	110	9	9	8	8	8	8	MT	Semi-Up	16-20	Semi-flex	26-30	9	9	8
MC4083	RR2/CB	110	9	9	8	8	8	8	MT	Semi-Up	16-20	Semi-flex	26-30	9	9	8
MC4107	VT3	111	8	8	8	7	7	7	M	Semi-Up	16-18	Semi-flex	26-30	8	7	7
MC4177	VT3	111	7	8	7	8	7	9	M	Semi-Up	14-16	Semi-flex	26-30	7	7	8
MC4180	Conv.	111	7	8	7	8	7	9	M	Semi-Up	14-16	Semi-flex	26-30	7	7	8
MC4183	RR2/CB	111	7	8	8	8	7	9	M	Semi-Up	16-20	Semi-flex	26-30	8	8	8
MC4197	VT3	111	8	8	8	8	7	9	T	Semi-Up	16-20	Semi-flex	25-28	8	8	8
MC4207	VT3	112	8	8	7	8	7	8	M	Semi-Up	16-18	Semi-flex	26-30	8	9	8
MC4283	RR2/CB	112	8	8	7	8	8	7	MT	Semi-Up	18-22	Semi-flex	26-30	8	8	8
MC4297	VT3	112	8	8	7	8	8	7	MT	Semi-Up	18-22	Semi-flex	26-30	8	8	8
MC4391	RR2	113	9	8	8	9	9	7	MT	Semi-Up	14-16	Semi-Det.	28-30	9	8	9
MC4474	RR2, CB	114	7	7	7	9	6	7	T	Conv.	16-18	Flex	22-28	7	8	8
MC4507	VT3	115	8	8	8	7	7	7	m	Semi-Up	16-18	Semi-flex	26-30	8	7	7
MC4587	VT3	115	7	8	7	7	6	8	MT	Conv.	16-20	Flex	25-30	7	8	7

ADDED TRAITS:
RR2 = Roundup Ready Corn 2
RR2/CB = Roundup Ready Corn 2/Yield Gard Corn Borer
CB = YieldGard Corn Borer
CB/CRW = YieldGard Corn Borer/YieldGard Corn Rootworm
Conv. = Conventional
RR2/CB/CRW = Roundup Ready Corn 2/YieldGard Corn Borer/YieldGard Corn Rootworm
VT3 = YieldGard VT Triple

RATINGS:
1 = Poor
5 = Average
9 = Excellent

M = Medium
ML = Medium Low
MH = Medium High
MT = Medium Tall

MORCORN

Seed at the Speed of Market

The market for seed is fast paced. New traits and technology arrive every year. The MorCorn solution is to find genetics from the best sources and deliver the most up-to-date seed technology, like YieldGaurd VT Triple, directly to the MFA customer.

Our unique understanding of regional agronomic conditions and growing practices plus a fine-tuned system of local trials and comparisons keeps our team focused on what you need. Our seed-corn expertise means we can deliver.

CHECK OUT MORCORN 4007VT3

This 110-day relative maturity gives you excellent yield potential in high-yield environments. Use it on your most productive soils. It delivers yield stability even under stress conditions. Plant at mid-higher populations for best performance. MC4007 has very good stalk and root to provide solid standability throughout entire season and strong late-season intactness. It has exceptional emergence and early season growth—a good hybrid for early planting.

A smart way to grow your money

For more information, contact your nearby MFA Agri Services Center or call 1-800-335-7333. Or visit us at www.mfa-inc.com.

MFA INCORPORATED

Seed Corn Comparison Chart

DEKALB BRAND

	VALUE ADDED TRAITS	RELATIVE MATURITY	GDU'S TO BLACK LAYER	EMERGENCE	SEEDING GROWTH	ROOT STRENGTH	STALK STRENGTH	DROUGHT TOLERANCE	PLANT HEIGHT	DRYDOWN	TEST WEIGHT
DKC50-44	VT3	100	2530	2	3	3	3	2	M	4	3
DKC52-59	VT3	102	2540	3	2	2	4	2	M	1	4
DKC57-66	VT3	107	2705	3	3	3	3	2	M	3	3
DKC60-51	VT3	110	2760	3	3	3	3	3	M	3	3
DKC61-33	VT3	111	2726	3	3	2	3	2	M	3	4
DKC61-69	VT3	111	2760	3	3	4	4	3	M	3	3
DKC62-54	VT3	112	2780	3	3	2	2	4	M	3	2
DKC62-99	RR2/YGCB	112	2755	2	2	2	3	2	M-S	3	3
DKC63-42	VT3	113	2800	2	3	3	3	3	M	4	4
RX785VT3	VT3	113	2790	3	3	4	4	4	M-T	3	4
DKC64-24	VT3	114	2780	3	2	3	2	2	M	4	3
DKC65-63	VT3	115	2810	2	3	3	3	3	M	4	4

RATING SCALE:

1-2 = Excellent
3-4 = Very Good
5-6 = Good
7-8 = Fair
9 = Poor

TECHNOLOGIES:

RR2/YGCB = Roundup Ready with YieldGard Corn Borer
VT3 = YieldGard VT Triple

CODES:

M = Medium
M-H = Medium-High
M-T = Medium-Tall
-- = Not Available

Year after year, after year, after year, after year, after year, after year, after year, after year, **Asgrow® delivers.**

Year after year, a lot changes in farming. But one thing's for sure: Seed that earns your trust gets planted every spring. Asgrow® soybeans consistently deliver high yields and the innovation you need. When your livelihood depends on the choices you make,
Asgrow delivers.

- High yield potential with consistent performance across the corn belt
- Resistant to race 3 soybean cyst nematode
- Multi-race Phytophthora protection with the Rps1[k] gene as well as good field tolerance
- Excellent brown stem rot resistance

- Resistant to race 3 soybean cyst nematode
- STS[M] technology provides tolerance to carryover from A.L.S. herbicides applied in previous crops
- Widely adapted to many different soil types and soybean growing areas

- Medium height with a bushy plant type carries a good pod load for high yield potential
- Very good resistance to Southern stem canker and good Phytophthora field tolerance
- Moderate resistance to Soybean cyst nematode

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Seed Corn Comparison Chart

SYNGENTA/NK BRAND

	ADDED TRAITS	RELATIVE MATURITY	CB/LL	GT/CB/LL	CB/LL/RW	GT/CB/LL/RW	SEEDLING GROWTH	STALK STRENGTH	ROOT STRENGTH	STAYGREEN	DRYDOWN	TEST WEIGHT	DROUGHT TOLERANCE	RESPONSE TO LOW DENSITY	RESPONSE TO HIGH DENSITY	PLANT HEIGHT	EAR TYPE	SOUTHERN CORN LEAF BLIGHT	GRAY LEAF SPOT
N40-T	CB,GT,LL,RW	99	N36-T3	N40T-GT/CB/LL	N40T-GT/CB/RW	N40T-3000GT	3	4	2	3	2	3	2	2	2	MT	F	P	G
N45-A5	CB,GT,LL	101	N45-A6	N45A-GT/CB/LL	N45-A5	-	2	3	3	2	2	3	4	5	1	MT	MF	G	F
N53-W3	CL,GT,LL	105	-	-	-	-	3	2	4	2	2	4	4	4	2	T	MF	-	G
N58L	GT,LL	106	-	N58L-GT/CB/LL	-	-	2	4	3	4	2	2	2	3	3	MT	F	E	P
N60-G7	CB,GT,LL,RW	108	-	N60G-GT/CB/LL	N60-G7	-	4	3	3	4	4	6	2	2	3	MT	F	E	P
N68B	CB,GT,LL,RW	110	N68-B8	-	N68B-CB/LL.RW	-	3	3	3	4	3	5	2	2	3	M	SF	G*	P*
N71L	CB,GT,LL,RW	112	N71-L7	N71-GT/CB/LL	N72-L2	N71L-3000GT	3	2	3	1	4	5	3	4	2	MT	SD	G	E
N71M	CB,GT,LL,RW	112	-	N71M-GT/CB/LL	-	N71M-300GT	1	3	1	3	3	5	4	4	2	M	SD	G	F
N72Q	CB,GT,LL,RW	112	N72-Q6	-	N72Q-CB/LL/RW	-	3	4	5	3	3	6	4	2	5	M	F	E	E
N73N	CB,CL,GT,LL,RW	113	-	N73N-GT/CB/LL	-	-	3	3	3	4	4	5	3	3	3	MT	F	-	-
N76-D8	CB,GT,LL,RW	114	N76-D3	N76D-GT/CB/LL	N76-D8	-	3	3	5	3	4	5	5	2	5	M	F	E	F
N77P	CB,GT,LL,RW	114	N77-P5	-	N77P-CB/LL/RW	N77P-3000GT	3	2	5	3	4	6	3	2	5	M	HF	E	F

RATING SCALE:
1-2 = Excellent
3-4 = Very Good
5-6 = Good
7-8 = Fair
9 = Poor

ADDED TRAITS:
YG = YieldGard® insect protection
LL = Liberty Link® hybrid
CL = CLEARFIELD Production System
GT = Glyphosate tolerant
RW = Root worm

PLANT HEIGHT:
T = Tall
M = Medium
S = Short
MT = Medium Tall

EAR TYPE:
F = Flex (indeterminate ear size)
SF = Semi-Flex
MF = Medium Flex
SD - Semi Determinate

Sorghum Seed Comparison

HYBRID GRAIN SORGHUM

RP = Residue Proven

	SELECTION	MATURITY GROUP	DAYS TO FLOWER	GRAIN COLOR	PLANT PIGMENTATION	PANICLE TYPE	PANICLE EXERTION	SEEDS PER LB	TEST WEIGHT	SEEDLING VIGOR	HEIGHT
A571		Med/full	70-74	Bronze	Purple	Open	4	12-14K	5	3	46-50
PULSAR		Med/early	65-70	Bronze	Purple	Semi-open	2	14-15K	4	2	35-43
Reward		Early	52-62	Bronze	Purple	Semi-compact	3	13-15K	4	2	32-45
DK36-16		Med/early	63	Bronze	Purple	Semi-open	4	14-16K	3	3	35-42
DK37-07		Med/early	62	Bronze	Purple	Semi-open	3	14-16K	2	3	40-49
DK39Y		Med/early	59-69	Yellow	Purple	Semi-open	2	13-15K	5	4	34-44
DK44		Medium	65-72	Bronze	Purple	Semi-open	2	18-20K	5	3	35-50
DK52		Medium	65-76	Bronze	Purple	Semi-open	2	14-16K	3	2	40-52
DK44-20		Medium	67	Bronze	Purple	Semi-open	4	14-15K	2	2	42-52
DKS42-20		Medium	63-68	Bronze	Purple	Semi-open	2	14-16K	2	2	42-54
DKS44-41		Medium	63-73	Yellow	Tan	Semi-compact	3	16-18K	4	3	38-50
DKS54-00	RP	Med/late	66-78	Bronze	Purple	Semi-compact	1	15-16K	3	2	42-54
DK54-03		Med/full	74	Bronze	Purple	Semi-open	4	13-15K	4	3	42-53
GS10		Med/full	66-70	Bronze	Hetro-yw	Semi-open	3	13K	4	4	Medium

Sorghum Planting Guide

NUMBER OF SORGHUM SEEDS PER ACRE FOR VARIOUS ROW WIDTHS AND PLANT SPACINGS

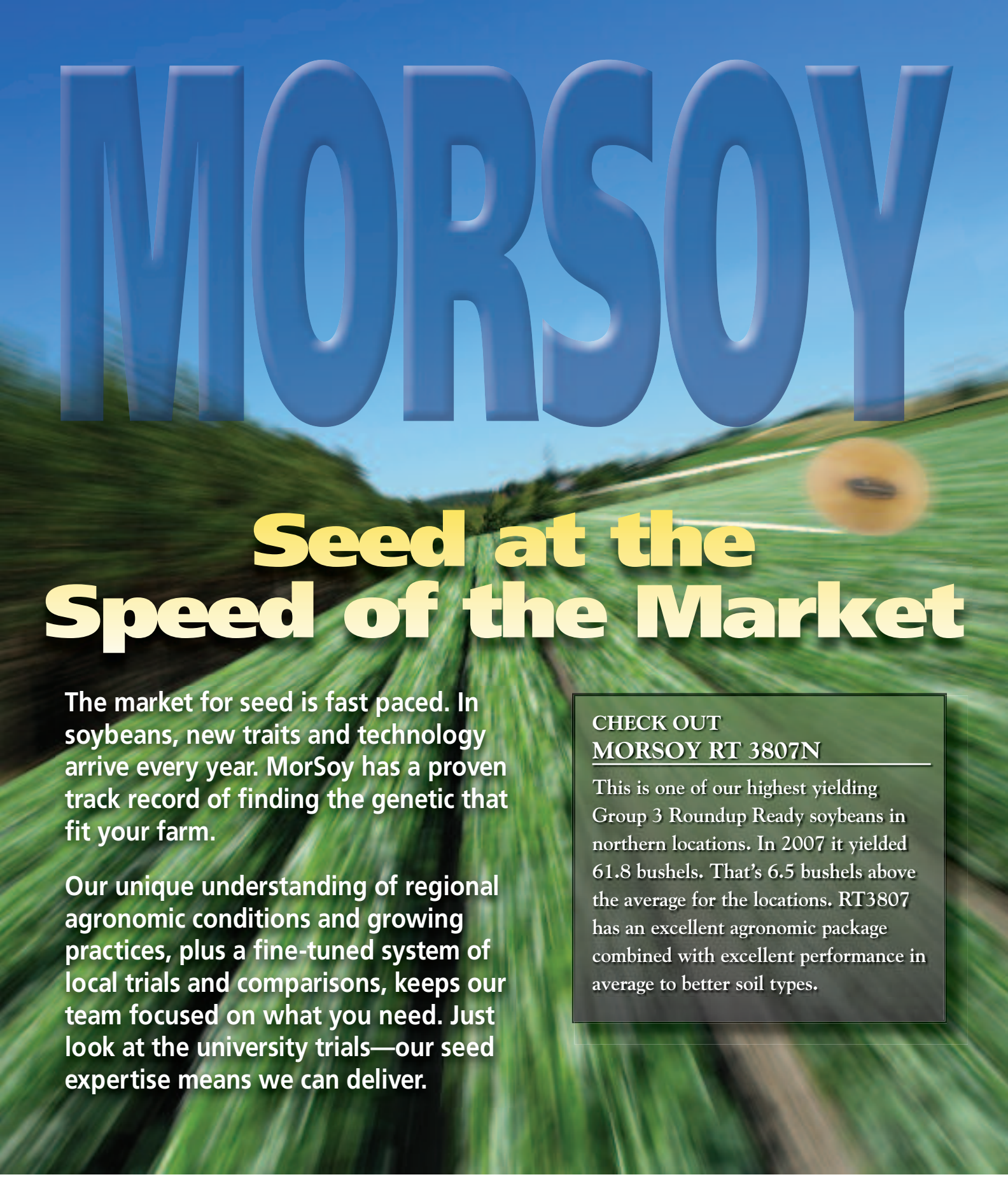
Row Width	Number of inches between seeds											
	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
40″	156,816	78,408	52,272	39,204	31,363	26,136	22,402	19,602	17,424	15,681	14,256	13,068
38″	165,069	82,534	55,023	41,267	33,013	27,511	23,581	20,633	18,341	16,506	15,006	13,755
36″	174,240	87,120	58,080	43,560	34,848	29,040	24,891	21,780	19,360	17,424	15,840	14,520
32″	196,020	98,010	65,340	49,005	39,204	32,670	28,002	24,502	21,780	19,602	17,820	16,335
30″	209,088	104,544	69,696	52,272	41,817	34,848	29,869	26,136	23,232	20,908	19,008	17,424
28″	224,022	112,011	74,674	56,005	44,804	37,337	32,003	28,002	24,891	22,402	20,365	18,668
24″	261,360	130,680	87,120	65,340	52,272	43,560	37,337	32,670	29,040	26,136	23,760	21,780
22″	285,120	142,560	95,040	71,280	57,024	47,520	40,731	35,640	31,680	28,512	25,920	23,760
20″	313,632	156,816	104,544	78,408	62,726	52,272	44,804	39,204	34,848	31,363	28,512	26,136
18″	348,480	174,240	116,160	87,120	69,696	58,080	49,782	43,560	38,720	34,848	31,680	29,040
16″	392,040	196,020	130,680	98,010	78,408	65,340	56,005	49,005	43,560	39,204	35,640	32,670
14″	448,045	224,022	149,348	112,011	89,609	74,674	64,006	56,005	49,782	44,804	40,731	37,337
12″	522,720	261,360	174,240	130,680	104,544	87,120	74,674	65,340	58,080	52,272	47,520	43,560
10″	627,264	313,632	209,088	156,816	125,452	104,544	89,609	78,408	69,696	62,726	57,024	52,272
7.5″	836,352	418,176	278,784	209,088	167,270	139,392	119,478	104,544	92,928	83,635	76,032	69,696

This chart gives you total seeds per acre. One pound of sorghum seed contains 12,000 to 20,000 seeds.

Soybean Planting Guide

POUNDS OF SOYBEAN SEEDS PER ACRE FOR VARIOUS ROW WIDTHS AND PLANT SPACINGS

ROW WIDTH	SEEDS PER FT OF ROW	SEEDS PER ACRE	NUMBER OF SEEDS PER POUND															
			2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600
38	6	82,535	39.3	37.5	35.9	34.4	33	31.7	30.6	29.5	28.5	27.5	26.6	25.8	25	24.3	23.6	22.9
38	8	110,046	52.4	50	47.8	45.9	44	42.3	40.8	39.3	37.9	36.7	35.5	34.4	33.3	32.4	31.4	30.6
38	10	137,558	65.5	62.5	59.8	57.3	55	52.9	50.9	49.1	47.4	45.9	44.4	43	41.7	40.5	39.3	38.2
38	12	165,069	78.6	75	71.8	68.8	66	63.5	61.1	59	56.9	55	53.2	51.6	50	48.5	47.2	45.9
36	6	87,120	41.5	39.6	37.9	36.3	34.8	33.5	32.3	31.1	30	29	28.1	27.2	26.4	25.6	24.9	24.2
36	8	116,160	55.3	52.8	50.5	48.4	46.5	44.7	43	41.5	40.1	38.7	37.5	36.3	35.2	34.2	33.2	32.3
36	10	145,200	69.1	66	63.1	60.5	58.1	55.8	53.8	51.9	50.1	48.4	46.8	45.4	44	42.7	41.5	40.3
36	12	174,240	83	79.2	75.8	72.6	69.7	67	64.5	62.2	60.1	58.1	56.2	54.5	52.8	51.2	49.8	48.4
30	4	69,696	33.2	31.7	30.3	29	27.9	26.8	25.8	24.9	24	23.2	22.5	21.8	21.1	20.5	19.9	19.4
30	6	104,544	49.8	47.5	45.5	43.6	41.8	40.2	38.7	37.3	36	34.8	33.7	32.7	31.7	30.7	29.9	29
30	8	139,392	66.4	63.4	60.6	58.1	55.8	53.6	51.6	49.8	48.1	46.5	45	43.6	42.2	41	39.8	38.7
30	9	156,816	74.7	71.3	68.2	65.3	62.7	60.3	58.1	56	54.1	52.3	50.6	49	47.5	46.1	44.8	43.6
30	10	174,240	83	79.2	75.8	72.6	69.7	67	64.5	62.2	60.1	58.1	56.2	54.5	52.8	51.2	49.8	48.4
30	11	191,664	91.3	87.1	83.3	79.9	76.7	73.7	71	68.5	66.1	63.9	61.8	59.9	58.1	56.4	54.8	53.2
30	12	209,088	99.6	95	90.9	87.1	83.6	80.4	77.4	74.7	72.1	69.7	67.4	65.3	63.4	61.5	59.7	58.1
20	4	104,544	49.8	47.5	45.5	43.6	41.8	40.2	38.7	37.3	36	34.8	33.7	32.7	31.7	30.7	29.9	29
20	6	156,816	74.7	71.3	68.2	65.3	62.7	60.3	58.1	56	54.1	52.3	50.6	49	47.5	46.1	44.8	43.6
20	8	209,088	99.6	95	90.9	87.1	83.6	80.4	77.4	74.7	72.1	69.7	67.4	65.3	63.4	61.5	59.7	58.1
15	2	69,696	33.2	31.7	30.3	29	27.9	26.8	25.8	24.9	24	23.2	22.5	21.8	21.1	20.5	19.9	19.4
15	3	104,544	49.8	47.5	45.5	43.6	41.8	40.2	38.7	37.3	36	34.8	33.7	32.7	31.7	30.7	29.9	29
15	4	139,392	66.4	63.4	60.6	58.1	55.8	53.6	51.6	49.8	48.1	46.5	45	43.6	42.2	41	39.8	38.7
15	5	174,240	83	79.2	75.8	72.6	69.7	67	64.5	62.2	60.1	58.1	56.2	54.5	52.8	51.2	49.8	48.4
15	6	209,088	99.6	95	90.9	87.1	83.6	80.4	77.4	74.7	72.1	69.7	67.4	65.3	63.4	61.5	59.7	58.1
10	2	104,544	49.8	47.5	45.5	43.6	41.8	40.2	38.7	37.3	36	34.8	33.7	32.7	31.7	30.7	29.9	29
10	3	156,816	74.7	71.3	68.2	65.3	62.7	60.3	58.1	56	54.1	52.3	50.6	49	47.5	46.1	44.8	43.6
10	4	209,088	99.6	95	90.9	87.1	83.6	80.4	77.4	74.7	72.1	69.7	67.4	65.3	63.4	61.5	59.7	58.1
7.5	1	69,696	33.2	31.7	30.3	29	27.9	26.8	25.8	24.9	24	23.2	22.5	21.8	21.1	20.5	19.9	19.4
7.5	1.5	104,544	49.8	47.5	45.5	43.6	41.8	40.2	38.7	37.3	36	34.8	33.7	32.7	31.7	30.7	29.9	29
7.5	2	139,392	66.4	63.4	60.6	58.1	55.8	53.6	51.6	49.8	48.1	46.5	45	43.6	42.2	41	39.8	38.7
7.5	2.5	174,240	83	79.2	75.8	72.6	69.7	67	64.5	62.2	60.1	58.1	56.2	54.5	52.8	51.2	49.8	48.4
7.5	3	209,088	99.6	95	90.9	87.1	83.6	80.4	77.4	74.7	72.1	69.7	67.4	65.3	63.4	61.5	59.7	58.1
7.5	3.5	243,936	116.2	110.9	106.1	101.6	97.6	93.8	90.3	87.1	84.1	81.3	78.7	76.2	73.9	71.7	69.7	67.8



Seed at the Speed of the Market

The market for seed is fast paced. In soybeans, new traits and technology arrive every year. MorSoy has a proven track record of finding the genetic that fit your farm.

Our unique understanding of regional agronomic conditions and growing practices, plus a fine-tuned system of local trials and comparisons, keeps our team focused on what you need. Just look at the university trials—our seed expertise means we can deliver.

CHECK OUT
MORSOY RT 3807N

This is one of our highest yielding Group 3 Roundup Ready soybeans in northern locations. In 2007 it yielded 61.8 bushels. That's 6.5 bushels above the average for the locations. RT3807 has an excellent agronomic package combined with excellent performance in average to better soil types.

A smart way to grow your money

For more information, contact your nearby MFA Agri Services Center or call 1-800-335-7333. Or visit us at www.mfa-inc.com.

MFA INCORPORATED

Soybean Seed Comparison

MFA MORSOY SOYBEANS

MorSoy	Growth Characteristics												Field Tolerance				
	Herbicide Tolerant Trait	Maturity group	Emergence	Standability	Shatter resistance	Canopy type	Growth habit	Plant height	Pod color	Flower color	Pubescence	Seed hilum	Aerial Leaf Blight	Brown Stem Rot	Cercospora Leaf Blight	Charcoal Rot	Chloride Sensitivity
4426 SCN	CNV	4.4	9	9	9	MB	Ind	MT	Tn	W	Br	Bk	—	—	—	8	—
RT 3644N	RR	3.6	8	8	8	MB	Ind	MT	Br	P	G	IBk	—	7.5	—	8	—
RT 3777N	RR	3.7	8.5	7.5	8.5	FB	Ind	T	Br	P	G	IBk	—	7.5	—	8	—
RT 3804N	RR	3.8	8.5	8.5	8.5	MB	Ind	M	Br	W	G	Bf	—	8	—	7.5	—
RT 3807N	RR	3.8	8.5	8.5	8.5	FB	Ind	MT	Tn	P	G	IBk	—	9	—	7	—
RT 3887N	RR	3.8	8.5	8	8.5	MB	Ind	MT	Br	P	Tw	Bk	—	7.5	—	8	—
RT 3936N	RR	3.9	8	7	7.5	MB	Ind	T	Br	P	G	IBk	—	7.5	—	7	—
RT 4057N	RR	4.0	8	8.5	8	MB	Ind	MT	Br	P	Tw	Bk	—	7.5	—	7	E
RT 4107N	RR	4.1	8.5	8.5	8.5	MB	Ind	M	Tn	P	Tw	Bk	—	7.5	—	8	—
RT 4126N	RR	4.1	8.5	8	7.5	MB	Ind	MT	Br	W	LtT	Bk	—	7.5	—	7.5	—
RT 4327N	RR	4.3	7.5	8.5	7.5	MB	Ind	M	Tn	P	LtT	Bk	—	7.5	—	7	—
RT 4457N	RR	4.4	8	8.5	8	MB	Ind	MT	Br	P	LtT	Bk	—	9	—	7	—
RT 4485N	RR	4.4	8	7.5	8.5	MB	Ind	T	Br	P	LtT	Br	—	7.5	—	7	—
RT 4707N	RR	4.7	8.5	8	8	MB	Ind	T	Br	P	Tw	Bk	—	7.5	—	7.5	—
RTS 4824	RR/STS	4.8	8	8	8	FB	Ind	MT	Br	P	LtT	Bk	—	7.5	—	7.5	—
RT 5154N	RR	5.1	8	7.5	8	MB	Ind	T	Br	P	G	IBk	—	7.5	—	7.5	—
RT 4480N	RR	4.4	8	7.5	7.5	MB	Ind	T	Br	P	LtT	Bk	5	—	—	7.5	I
RTS 4556N	RR/STS	4.6	7.5	8	7.5	MB	Ind	M	Br	P	LtT	Bk	—	—	—	—	—
RTS 4706N	RR/STS	4.7	8	8	8.5	B	Ind	MT	Tn	P	G	IBk	—	—	—	—	—
RT 4707N	RR	4.7	8	7.5	8	MB	Ind	T	Br	P	Tw	Bk	6	—	—	—	E
RT 4802N	RR	4.8	8.5	7	7	MB	Det	M	Tn	P	Tw	Bk	—	—	—	8.5	I
RT 4806N	RR	4.8	9	6.5	7	MB	Ind	MT	Tn	P	LtT	Bk	—	—	—	—	—
RT 4914N	RR	4.9	7.5	7.5	7	MB	Ind	T	Br	P	LtT	Bk	—	—	—	—	—
RT 4955N	RR/STS	4.9	7.5	7	7.5	MB	Ind	MT	Tn	P	G	IBk	—	—	7	—	—
RT 5306N	RR	5.3	8	7	8.5	MB	Det	MT	Br	P	Tw	IBk	—	—	—	—	—
RT 5407N	RR	5.4	7.5	8	8	MB	Det	M	Tn	P	G	IBk	—	—	6	—	—
RT 5506N	RR	5.5	8	8.5	8	MB	Det	M	Tn	W	G	Bf	—	—	—	—	E
RT 5906N	RR	5.9	8.5	7.5	7.5	MB	Det	MT	TN	W	G	Bf	6.5	—	6.5	8	MI

RT =Roundup Ready® Tolerant
SCN or N =Soybean Cyst Nematode resistant
RTS = Stacked Roundup Ready® Tolerant & STS®

Herbicide Tolerant Traits:
CNV = Conventional
RR =Roundup Ready®
RR/STS = Roundup Ready® Synchrony®

Rating Scale:
9-10 = Excellent
8-8.9 = Very Good
7-7.9 = Good
6-6.9 = Fair
below 6 = Poor

Canopy Type:
N = Narrow
MTB = Medium Thin Bush
MB = Medium Bush
FB = Full Bush

Growth Habit:
Det = Determinate
Ind = Indeterminate

Plant Height:
M = Medium
MT = Medium-Tall
T = Tall

Pod Color:
Br = Brown
Tn = Tan

Flower Color:
P = Purple
W = White

Pubescence Color:
Br = Brown
G = Gray
Tw = Tawny
LtT = Light Tawny

Root Knot Nematode:
R = Resistant
S = Susceptible

Seed Hilum Color:
Bf = Buff
Br = Brown
IBk = Imp Black
Bk = Black

Chloride Sensitivity:
I = More Sensitive
E = Tolerance
ME = Moderate Excluder
MI = Moderate Includer

Soybean Seed Comparison

MFA MORSOY SOYBEANS

Field Tolerance, continued									Cultural Practices							
Frogeye Leaf Spot	Iron Chlorosis	Phytophthora Root Rot	PRR Resistance	Root Knot Nematode	SCN	Stem Canker	Sudden Death Syndrome	White Mold	Approximate seeds per lb.	Narrow or wide rows	No-till or conventional	38-inch row plant pop	30-inch row plant pop	15-inch row plant pop	7.5-inch row plant pop	MorSoy
6	—	7	—	—	9	9	6.5	—	2800	Either	Either	135K	145K	155K	190K	**4426 SCN**
9	7	8	Rps1c	—	7	8	7.5	7.5.	3200	Either	Either	130K	140K	150K	180K	**RT 3644N**
8	7.5	7.5	Rps1c	—	8	—	8	8	2900	Either	Either	130K	140K	150K	180K	**RT 3777N**
8	7.5	8	Rps1c	—	8	8.5	8	7	3100	Either	Either	135K	145K	155K	190K	**RT 3804N**
8	7	7.5	Rps1c	—	8	8	8.5	8	3000	Either	Either	135K	145K	155K	185K	**RT 3807N**
7.5	7	8.5	Rps1c	—	8	8	8	8	2700	Either	Either	130K	140K	150K	180K	**RT 3887N**
7.5	7.5	8.5	Rps1c	—	8	8	8	8	3200	Either	Either	130K	140K	150K	180K	**RT 3936N**
8	7	7.5	Rps1c	—	7	—	7	8	3000	Either	Either	130K	140K	150K	180K	**RT 4057N**
8	7.5	8	—	—	8	8	8	8	2900	Either	Either	135K	145K	155K	185K	**RT 4107N**
9	8	8	—	S	8	9	8	8	3000	Either	Either	130K	140K	150K	180K	**RT 4126N**
9	7	8	—	—	8	8	8	8	2600	Either	Either	135K	145K	155K	185K	**RT 4327N**
8	7	8.5	—	—	7	—	8	8	3000	Either	Either	135K	145K	155K	180K	**RT 4457N**
8	7	7.5	—	S	8	8	7.5	8	3000	Either	Either	130K	140K	150K	180K	**RT 4485N**
9	7	8	Rps1c	—	8	8.5	8.5	8	3100	Either	Either	130K	140K	155K	185K	**RT 4707N**
8	7	8	Rps1a	S	—	8	8.5	8	3000	Either	Either	135K	145K	155K	180K	**RTS 4824**
7	7	8	—	—	8	9	8.5	8	3400	Either	Either	130K	140K	150K	180K	**RT 5154N**
7	7.5	7.5	Rps1a	—	8	8	7	8	3000	Either	Either	135K	145K	155K	180K	**RT 4480N**
6	—	—	—	—	8	7.5	6.5	—	2900	Either	Either	130K	140K	150K	180K	**RTS 4556N**
8	—	8	—	—	8	8	8	—	2700	Either	Either	130K	140K	150K	180K	**RTS 4706N**
7.5	—	8	—	—	7	8	6.5	—	3100	Narrow	Either	135K	145K	155K	175K	**RT 4707N**
9	—	8	—	—	7	8	7	—	3100	Either	Either	130K	140K	150K	170K	**RT 4802N**
8	—	8	—	—	8	8	7	—	3200	Either	Either	130K	140K	150K	170K	**RT 4806N**
—	6	8	Rps1xgil	—	7	—	8.5	8	3100	Either	Either	130K	140K	150K	180K	**RT 4914N**
5	—	8	—	—	8	8.5	8	—	2900	Either	Either	130K	140K	150K	180K	**RT 4955N**
8	—	8	—	—	7	8	8	—	3300	Either	Either	135K	145K	155K	180K	**RT 5306N**
8.5	—	7	—	—	8	8	7.5	—	3100	Either	Either	135K	145K	155K	180K	**RT 5407N**
8.5	—	8.5	Rps1c	—	7	8.5	8.5	—	3500	Either	Either	135K	145K	155K	180K	**RT 5506N**
8	—	7.5	—	—	8	8	7.5	—	3000	Either	No-Till	135K	145K	155K	190K	**RT 5906N**

Phytophthora Field Tolerance:
Field tolerance is rated as a combination of final stand and visual appearance of remaining plants. Resistance is not expressed in early stages of plant development. Proper seed treatment is required for protection in the early stages of plant development.

PRR Resistance:
Rps1a denotes resistance to races 1, 2, 10, 11, 13, 14, 15, 16, 17, 18, 24, 26, 27, 31, 32, 36
Rps1c denotes resistance to races 1, 2, 3, 6, 7, 8, 9, 10, 11, 13, 15, 17, 21, 23, 24, 26, 28, 29, 30, 32, 34, 36

Rps1k denotes resistance to races 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 21, 22, 23, 24, 26, 36, 37

Ratings are collected from field observations and research performed by MFA Seed Division across varying soil and climate. Due to variable growing conditions, seed size and plant height may vary from information listed.

Roundup Ready® is a registered trademark of Monsanto Company

STS® is a registered trademark of DuPont.

Soybean Seed Comparison Chart

ASGROW SOYBEAN SEED

Characteristics	AG3205	AG3504	AG3602	AG3603	AG3705	AG3803
Relative Maturity	3.2	3.5	3.6	3.6	3.7	3.8
Herbicide Tolerant Trait	RR	RR/STS	RR	RR	RR	RR
Plant type	M	M	B	M	M	TH
Flower Color	P	P	P	9	P	P
Pubescence Color	G	G	G	T	T	G
Hilum Color	IB	IB	IB	BL	BL	IB
Pod Wall Color	BR	BR	BR	BR	BR	BR
Plant Height (in.)	40	43	37	40	41	41
Approx. Size (Seeds/Lb.)	3100	3000	3100	2900	2900	3200
Emergence	2	2	2	2	2	2
Standability	2	3	3	2	2	2
Soybean Cyst Nematode	MR3	MR3	R3	MR3	R3	R3
PRR Field Tolerance	RPS1C	RPS1C	RPS1C	RPS1C	RPS1C	RPS1C
White Mold	5*	6*	7	5*	6	5*
Brown Stem Rot	2	2	2	2	2	1
Sudden Death Syndrome	4*	4*	4	4*	5*	5*
Frogeye Leaf Spot	-	-	3*	-	4*	-

RATING SCALE:
1 = Excellent
9 = Poor
NA = Not Available
– = Not Available
* = Preliminary Screening

HERBICIDE TOLERANT TRAIT
RR = Roundup Ready
STS = Tolerant to sulfonylurea herbicides
Blank = Conventional
RR/STS = Stacked Roundup Ready and STS

SELECTION:
RP = Residue Proven
SCN = Soybean Cyst Nematode Resistant

SOYBEAN CYST NEMATODE:
S = Susceptible
MR = Moderate Resistance
R = Resistance
# = Race, i.e., 3, 4, 9, or 14

PHYTOPHTHORA GENE SPECIFIC RESISTANCE:
Susc. = Susceptible
Rps1a - *denotes resistance to Races 1, 2, 10, 11, 13, 14, 15, 16, 17, 18, 24, 26, 27, 31, 32, 36 & 38*
Rps1c - *denotes resistance to Races 1, 2, 3, 6, 7, 8, 9, 10, 11, 13, 15, 17, 18, 21, 23, 24, 26, 28, 29, 30, 32, 34, 36 & 38*
Rps1l - *denotes resistance to Races 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 21, 22, 23, 24, 26, 28, 29, 30, 32, 34, 36 & 38*

PHYTOPHTHORA FIELD TOLERANCES:
Reaction to Phytophthora sojae race 25, for which currently used commerical genes Rps1a, Rps1c and Rps1k do not confer resistance.
Southern Root Rot:
R = Resistance
MR = Moderate Resistance
MS = Moderate Susceptibility

HEIGHT:
= Height in inches

FLOWER COLOR:
P = Purple
W = White
M = Mixed

PUBESCENCE:
G = Gray
T = Tawny
LT = Light Tawny

HILUM COLOR:
BF = Buff
BR = Brown
IB = Imperfect Black
Y = Yellow
BL = Black

POD WALL COLOR:
BR = Brown
TN = Tan

PLANT TYPE:
Th = Thin
M = Medium
MB = Medium Bushy
B = Bushy

Soybean Seed Comparison Chart

ASGROW SOYBEAN SEED

Characteristics	AG3905	DK42-51	AG 4403	AG4404	DKB46-51	AG4703	AG4903
Relative Maturity	3.9	4.2	4.4	4.4	4.6	4.7	4.9
Herbicide Tolerant Trait	RR	RR	RR	RR/STS	RR	RR	RR/STS
Plant type	M	M	TH	TH	M	B	M
Flower Color	P	P	P	W	W	P	P
Pubescence Color	T	G	LT	T	T	LT	LT
Hilum Color	BL	IB	BL	BL	BL	BL	BL
Pod Wall Color	TN	BR	TN	TN	TN	TN	TN
Plant Height (in.)	37	37	41	40	39	37	39
Approx. Size (Seeds/Lb.)	3000	3400	3500	3000	3000	3000*	2900
Emergence	3	3	2	2	2	2	2
Standability	2	2	3	3	3	2	2
Soybean Cyst Nematode	R3	MR3*	MR3	MR3,14	R3, MR14	S	S
PRR Field Tolerance	RPS1c	RPS1c	RPS1A	RPS1A	S	5*	8*
White Mold	7	-	-	-	-	-	-
Brown Stem Rot	1	-	-	-	-	-	-
Sudden Death Syndrome	3	3	3	5	5	4	2*
Frogeye Leaf Spot	2	5	4	3	3	6	3*

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Rps1c - *denotes resistance to Races 1, 2, 3, 6, 7, 8, 9, 10, 11, 13, 15, 17, 18, 21, 23, 24, 26, 28, 29, 30, 32, 34, 36 & 38*
Rps1l - *denotes resistance to Races 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 21, 22, 23, 24, 26, 28, 29, 30, 32, 34, 36 & 38*

PHYTOPHTHORA FIELD TOLERANCES:
Reaction to Phytophthora sojae race 25, for which currently used commerical genes Rps1a, Rps1c and Rps1k do not confer resistance.
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Y = Yellow
BL = Black

POD WALL COLOR:
BR = Brown
TN = Tan

PLANT TYPE:
Th = Thin
M = Medium
MB = Medium Bushy
B = Bushy

Soybean Seed Comparison Chart

SYNGENTA/NK SOYBEAN SEED

Characteristics	S29-J6	S30-D4	S32-E2	S32-G5	S33-A8	S36-C7	S36-B6	S37-P5	S37-F7
Added Traits	RR	RR	RR	RR	RR	RR	RR	RR	RR
Extra EdgeTM	-	-	HO	-	-	HP	-	HP	HP
Relative Maturity	2.9	3	3.2	3.2	3.3	3.6	3.6	3.7	3.7
Seed Size (X100)	29-33	28-32	27-31	29-33	25-29	25-29	27-31	27-31	27-31
Flower Color	W	W	W	P	W	P	P	W	W
Hilum Color	Blk	Blk	Brn	ImBlk	Blk	Brn	Blk	Blk	Blk
Pubescence Color	T	LT	LT	G	LT	LT	LT	LT	LT
Protein %	34.8	34.5	34.5	34.3	34	35.8	34.2	35.3	35.4
Oil%	18.4	18.8	19.1	18.4	18.9	18.2	18.6	18	17.6
Emergence Score	2	3	3	1	3	2	3	2	3
Plant Height	MT	M	MT	M	MT	MS	MT	M	M
Standability	4	3	4	4	5	2	3	5	4
Canopy	M	MB	MT	M	MB	MB	MB	MB	M
Narrow Rows	2	1	3	3	3	1	3	3	3
Wide Rows	1	2	1	1	1	4	2	1	2
Stress Tolerance	2	3	2	3	1	4	2	3	3
Green Stem Rating	-	4	5	5	5	5	5	5	5
Shatter Resistance	3	2	3	3	2	2	2	4	3
Iron Deficiency Chlorosis	5	6	6	3	6	6	4	5	6
PRR Resistance	R(Rps1a)	R(Rps1a)	R(Rps1a)	R(Rps1c)	S	R(Rps1c)	R(Rps1a)	S	S
Phytophthora Field Resistance	4	4	4	3	4	3	3	2	3
Brown Stem Rot	6	5	3	4	-	-	6	6	6
SCN	R3, MR14	S	R3, MR14	S	R3, MR14	R3, MR14	R3, MR14	R3,14	R3,14
Sudden Death Syndrome	2	5	4	5	4	4	3	3	3

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STS = Tolerant to sulfonylurea herbicides
RR/STS = Stacked Roundup Ready and STS

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W = White

HILUM COLOR
Blk = Black
Brn = Brown
ImBlk = Imperfect Black

EXTRA EDGE™
HP = High Protein
HO = High Oil

PUBESCENCE COLOR
G = Gray
T = Tawny
LT = Light Tawny

POD COLOR
Brn = Brown

RATING SCALE
1 = Excellent
9 = Very Poor

PHYTOPHTHORA FIELD RESISTANCE
R = Resistant
R* = Segregating for Rps1a and Rps1k
S = Susceptible.
Resistant soybeans carry the major gene reported to be resistant to these races:
Rps1a 1, 2, 10, 11, 13, 15-18, 24, 26, 27
Rps1c 1-3, 6-11, 13, 15, 17, 21, 23, 24, 26
Rps1k 1-11, 13-15, 17, 18, 21, 22, 24, 26

SOYBEAN CYST NEMATODE
1, 3, 9 and/or 14 = specific race of SCN
R = Resistant
MR = Moderately Resistant
T = Tolerant
MS = Moderately Susceptible
S = Susceptible

Soybean Seed Comparison Chart

SYNGENTA/NK SOYBEAN SEED

Characteristics	S38-D5	S39-A3	S41-M5	S43-B1	S45-E5	S46-U6	S49-Q9	S49-H7	S53-A1
Added Traits	RR	RR	RR/STS	RR	RR	RR	RR	RR	RR
Extra Edge™	HP	-	-	-	-	-	-	-	-
Relative Maturity	3.8	3.9	4.1	4.3	4.5	4.6	4.9	4.9	5.3
Seed Size (X100)	28-32	28-32	31-35	28-32	30-34	27-31	35-39	29-33	28-32
Flower Color	W	W	P	P	W	W	P	W	P
Hilum Color	Brn	Blk	ImBlk	Brn	Blk	Blk	ImBlk	Blk	Blk
Pubescence Color	LT	LT	G	T	T	LT	G	LT	T
Protein %	35.3	35	32.5	35.2	35.9	34.9	37.2	36.1	37.5
Oil%	18	17.6	19.3	17.9	17.8	17.5	17.8	18.5	18.5
Emergence Score	3	2	2	1	3	3	2	2	3
Plant Height	M	MT	M	M	T	T	T	T	M
Standability	3	4	4	4	5	4	1	2	2
Canopy	M	MB	M	M	MB	M	T	M	M
Narrow Rows	1	2	3	3	3	2	1	1	2
Wide Rows	3	2	2	2	2	2	2	3	3
Stress Tolerance	3	2	2	2	3	2	3	2	3
Green Stem Rating	3	5	4	5	4	5	2	3	1
Shatter Resistance	3	2	2	1	2	2	3	2	2
Iron Deficiency Chlorosis	6	6	5	4	4	7	4	5	6
PRR Resistance	R(Rps1c)	S	S	R(Rps1c)	R(Rps1k)	R(Rps1c)	R(Rps1c)	S	S
Phytophthora Field Resistance	5	3	5	3	5	5	3	3	4
Brown Stem Rot	2	5	-	6	-	-	-	-	-
SCN	R3,14	R3,14	S	R3, MR15	R3,14	R3,14	R(3,9) MR1,14	R(3)Mr(1)	R3, MR1
Sudden Death Syndrome	4	2	5	3	5	7	5	5	4

HERBICIDE TOLERANT TRAIT
RR = Roundup Ready
STS = Tolerant to sulfonylurea herbicides
RR/STS = Stacked Roundup Ready and STS

FLOWER COLOR
P = Purple
W = White

HILUM COLOR
Blk = Black
Brn = Brown
ImBlk = Imperfect Black

EXTRA EDGE™
HP = High Protein
HO = High Oil

PUBESCENCE COLOR
G = Gray
T = Tawny
LT = Light Tawny

POD COLOR
Brn = Brown

RATING SCALE
1 = Excellent
9 = Very Poor

PHYTOPHTHORA FIELD RESISTANCE
R = Resistant
R* = Segregating for Rps1a and Rps1k
S = Susceptible.
Resistant soybeans carry the major gene reported to be resistant to these races:
Rps1a 1, 2, 10, 11, 13, 15-18, 24, 26, 27
Rps1c 1-3, 6-11, 13, 15, 17, 21, 23, 24, 26
Rps1k 1-11, 13-15, 17, 18, 21, 22, 24, 26

SOYBEAN CYST NEMATODE
1, 3, 9 and/or 14 = specific race of SCN
R = Resistant
MR = Moderately Resistant
T = Tolerant
MS = Moderately Susceptible
S = Susceptible

Hard Red Winter Wheat Seed

PUBLIC VARIETIES

KARL 92
- Awned
- Early maturity variety
- Resistant to soil-borne mosaic virus and spindle streak virus
- Good tolerance to leaf rust, powdery mildew, tan spot, septoria and stem rust
- Good straw strength
- Excellent winter hardiness
- Susceptible to Hessian fly
- Protected variety

JAGGER
- Awned
- Early maturity
- Resistant to soil-borne mosaic virus and spindle streak virus
- Excellent tolerance to leaf rust and stem rust
- Good tolerance to leaf blotch, tan spot and wheat streak mosaic
- Good straw strength
- Susceptible to Hessian fly
- Protected variety

Soft Red Winter Wheat Seed

MFA BRAND

MFA 766
- Early season maturity
- Dark green plant
- Medium plant height
- Awnletted head-type
- Very good test weight
- Very good winter hardiness
- Very good tillering ability
- Very good lodging resistance
- Very good resistance to Leaf Rust
- Good resistance to Barley Yellow Dwarf
- Good resistance to Septoria
- Excellent resistance to Powdery Mildew
- Good resistance to Glum Blotch
- Good resistance to Wheat Spindle Virus
- Recommended seeding rate: 1.2-1.5 million seeds per acre

MFA 2318
- Mid-season maturity
- Dark green plant
- Medium-tall plant height
- Awnletted head-type
- Excellent shatter resistance
- Very good test weight
- Very good winter hardiness
- Very good tillering ability
- Very good lodging resistance
- Good resistance to Leaf Rust
- Very good resistance to Septoria
- Very good resistance to Powdery mildew
- Good resistance to Soil Borne Mosaic
- Good resistance to Barley Yellow Dwarf
- Good resistance to Wheat Spindle Virus
- Good resistance to Glum Blotch

MFA 2320
- Mid-Season maturity
- Dark green plant
- Medium-tall plant height
- Awnletted plant height
- Excellent shatter resistance
- Very good test weight
- Very good winter hardiness
- Very good tillering ability
- Very good lodging resistance
- Good resistance to Leaf Rust
- Good resistance to Barley Yellow Dwarf
- Very good resistance to Septoria
- Very good resistance to Stem Rust
- Very good resistance to Powdery mildew
- Good resistance to Soil Borne Mosaic
- Very good resistance to Hessian Fly
- Recommended seeding rate •1.2-1.5 million seeds per acre

Soft Red Winter Wheat Seed

PUBLIC VARIETIES

BESS
- Awnletted cultivar
- Early to medium maturity
- Medium plant height

ROANE
- Awnletted
- Full season
- High yielding
- High test weight
- Some resistance to barley yellow dwarf virus

TRUMAN
- Awnletted cultivator
- Full season
- Resistance to Scab
- Resistance to Stripe Rust
- Tall plant height

Legume Seed Comparisons

ALSIKE CLOVER
- Short-lived perennial adapted to cool climate
- More tolerant to wet, seepy soil than red clover
- Withstands acid soils much better than alfalfa, red clover or sweet clover
- Seed is smaller than red clover and greenish in color mixed with yellow
- Inoculation is a recommended
- When sown several years in rotation, it often appears as a volunteer crop for several years

LADINO CLOVER
- Giant form of white dutch clover
- Establishes dense growth under favorable conditions
- Considered to be a competitive legume and should be sown with vigorous growing grasses
- In combination with grasses, it makes an excellent pasture
- Develops a good root system, although not as deep rooted or drought tolerant as alfalfa
- Requires a soil well supplied with phosphorus
- Inoculate before planting

KENLAND RED CLOVER
- Superior yielding ability and has a longer stand life than common red clovers
- Higher root rot resistance than seed originating from the northern states
- Good resistance to southern anthracnose which is destructive to red clover in the southern corn belt

SWEET CLOVER
- Primarily grown as a green manure crop before corn, and some pasture
- Varieties include: Madrid, Hubam and Common Yellow Blossom
- The biennial strains are sown in Midwest. Annuals like Hubam, has limited use except for bee producers
- Has no particular soil requirements except it must have a good supply of lime
- Inoculation is highly recommended

WHITE DUTCH CLOVER
- Used in lawn mixtures and some pasture
- Perennial plant with shallow roots
- Grows well in shady areas
- Responds well to phosphate

CROWN VETCH
- Cool-season, hardy, perennial legume
- Not a true vetch although it resembles common and hairy vetch
- Spreads from rhizomes and seeds and will form a dense cover
- Used for soil stabilization and as an ornamental
- Considered as a forage source for livestock.
- Not well suited to wet, seepy soils
- Inoculation is essential

HAIRY VETCH
- Winter annual legume.
- Long branches with numerous leaves and purple blossoms.
- Seed is round and almost the size of a soybean.
- Can tolerate soils with a pH range of 5.0 to 8.0 (prefers 6.0-7.0)
- Prefers moist but not flooded soils.
- Used primarily as a cover crop
- Can be broadcast seeded into corn and soybeans
- May be sown with ryegrain to add biomass to the soil
- Can be drilled at 25-30 lbs. per acre or broadcast at 35-40 lbs. per acre. In a seed mixture, reduce vetch rate by 25-50%.
- If broadcasting seed, a good seedbed is important
- Requires a lot of phosphorous and potassium
- Planting is 40-60 days prior to a killing frost

LESPEDEZA
- Korean, Summit, Marion and Kobe are most popularly varieties grown in the midwest
- May be used for hay or pasture and will grow well on most soils, except where drainage is a problem
- Forage production may range from 3 to 3.5 tons and seed production from 200 to 600 pounds per acre

BIRDSFOOT TREFOIL
- Georgia I, Norcen and Empire are grown in midwest. Empire is the least desirable, but is the most widely grown due to its lower price
- Long-lived hardy perennial legume that lives well with bluegrass, timothy and orchardgrass
- Similar to alfalfa but is inclined to low spreading growth
- Slow starter, but once established will do well in permanent pastures
- Sod-forming grasses such as Bromegrass and Fescues tend to crowd trefoil out in 4-5 years

ALTASWEDE MAMMOTH RED CLOVER
- Not considered an excellent hay variety. The stems are larger, coarser, and more hairy, and the plants may be woody if not cut at the proper time. Should be cut in early bloom.
- Does not recover quickly after cutting for hay. Two cuttings per year are uncommon.
- On low fertility soils, it is a good seed-producing crop and an excellent legume for use in crop rotation and soil improvement.
- Will grow on acid soils better than medium red clover and produces a fair quality hay on light soils.
- Used in mixes with Alsike Clover for plow down.

Alfalfa Seed Comparison Chart

1 = Inferior
5 = Moderate
10 = Excellent
HR = High Resistance
MR = Moderate Resistance
R = Resistant

	WL326 GZ	WL319 HQ	WL357 HQ	WL345 LH	WL348 AP	WL343 HQ	WL363 HQ	WL342
GROWTH PROPERTIES								
Maturity	Early	Medium	Early	Early	Early	Early	Early	Early
Fall dormancy	3.8	2.8	4.7	3.8	3.5	3.9	4.9	4.1
Disease Resistance Index	30/30	30/30	30/30	30/30	35/35	30/30	30/30	30/30
Winter hardiness	8	10	10	9	10	10	1.6	1.7
Forage quality	8	10	10	9	10	10	10	9
Forage yield	8	10	10	10	9	9	10	9
Standability	8	8	8	9	9	9	9	9
Color	Dark	Dark	Dark	Dark	Dark	Dark	Dark	Dark
FIELD TOLERANCE								
Bacterial Wilt	HR	HR	HR	HR	HR	HR	HR	HR
Fusarium	HR	HR	HR	HR	HR	HR	HR	HR
Anthracnose	HR	HR	HR	HR	HR	HR	HR	HR
Phytophthora Root Rot	HR	HR	HR	HR	HR	HR	HR	HR
Aphanomyces Root Rot	HR	HR	HR	HR	HR	HR	HR	HR
Verticillium Root Rot	HR	HR	HR	HR	HR	HR	HR	HR
Leaf Disease	MR	R	R	MR	R	R	R	R
Potato Leaf Hopper	MR	N/A	N/A	HR	N/A	NA	N/A	N/A
Aphids	R	R	R	R	R	HR	HR	R
Nematodes	MR	MR	R	MR	R	R	HR	R
CULTURAL PRACTICES								
Well-drained soils	10	10	10	10	10	10	10	10
Occasionally wet soil	9	10	10	8	10	9	9	8
Three-cut system	9	8	8	9	9	9	8	9
Four-cut system	7	10	10	9	10	9	10	9
Haylage	9	9	9	9	9	9	10	9
Grazing tolerance	10	6	6	7	7	7	7	8
Planting (lbs./acre drilled)	15-20	15-20	15-20	15-20	15-20	15-20	15-20	15-20

Alfalfa Management Tips

- Soil test and adjust the pH and fertility to optimum levels six months before seeding.
- Prepare a firm weed-free seedbed.
- Choose a disease-resistant, high-yielding variety that is suited for your area and intended use.
- Sow 15 to 20 lbs of inoculated seed in late summer or early spring. Coated seed with inoculant and fungicide improves seedling stands.
- Apply soil insecticide at planting, especially when drilling into crop residues with no-till drill.
- Seeding depth should be 1/4 to 1/2 inch. Rolling after seeding will often improve germination.
- Control weed and insects as necessary.
- Harvest at the late bud to first bloom stage. Repeat every 28-32 days. Last cutting should be five to six weeks before first killing frost.
- Apply 15 lbs. of phosphate and 60 lbs. of potash per acre for each ton of forage removed. Half should be applied after first cutting and half after third cutting. Include 1 to 1.5 pounds of boron with first fertilizer application each year.
- Soil test about every three years.
- Magnesium and sulfur are removed at the rate of about five pounds per ton of forage.
- Alfalfa weevil and the potato leafhopper control is a must for successful production.
- The use of a hay preservative may enhance hay quality when harvesting conditions are adverse.

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Pasture Seed Comparisons

BEEF BANK HIGH SUGAR GRASS PASTURE MIX FOR BEEF

- *25% Aber Dart HSG Perennial Ryegrass
- *25% Aber Avon HSG Perennial Ryegrass
- *10% Aber Echo HSG Intermediate Ryegrass
- 20% QuickDraw Orchardgrass
- 5% Ladino Clover
- 5% Medium Red Clover
- 10% Bandito Intermediate Ryegrass
- Up to 20% higher daily live weight gain
- Up to 4.42 lbs more dry matter intake per head per day
- Up to 3% improved digestibility
- 24% less feed nitrogen lost in urine and feces
- Available in 25 lb bags
- Seeding rate is 25 lbs per acre

* High Sugar Grass Varieties contain higher levels of sugar offering a number of agricultural, agronomic, and environmental advantages

BENCHMARK PLUS ORCHARDGRASS

- Selected for persistence under heavy grazing
- Excellent plant vigor
- Early maturity
- Superior forage yield
- Great palatability
- Ideal for pastures or hay
- Drought tolerant
- Stem rust resistance
- Seed 15 to 20 lbs/acre in a pure stand
- 4 to 6 lbs, acre in a mixture no deeper than ½ inch

BOOST PERENNIAL RYEGRASS

- Superior yields of high-quality forage
- Forage is highly palatable, digestible and nutrients for all livestock
- Extremely high animal performance from pasture or silage
- Vigorous, dark green plants with high disease resistance
- Excellent seedling vigor for fast establishment of dense stands
- Endophyte free
- Seeding rate of 20 to 25 lbs per acre

CASH COW HIGH SUGAR GRASS MIX FOR DAIRY

- *25% Aber Dart HSG Perennial Ryegrass
- *25% Aber Avon HSG Perennial Ryegrass
- *10% Aber Echo HSG Intermediate Ryegrass
- 20% Perfect Alfalfa
- 10% Bandito Tetraploid Intermediate Ryegrass
- 15% Kootenai Timothy
- 5% Ladino Clover
- 6% more milk per cow over grazing season
- 4.4 lbs increase in dry matter intake
- Up to 3% improved digestibility
- 24% less feed nitrogen lost in urine and feces
- Available in 25 lb bags
- Seeding rate is 25 lbs per acre

* High Sugar Grass Varieties contain higher levels of sugar offering a number of agricultural, agronomic, and environmental advantages

DESSIE TEFF (Summer lovegrass)

- High yielding warm season annual forage grass variety
- Excellent palatability and forage quality
- Ideal for horses and other livestock
- Good for interseeding thin alfalfa stands in final year of production
- Excellent rotational crop when replacing alfalfa or perennial grass stands
- Plant 8-12 lbs per acre of coated seed after risk of frost has passed, late May through July

DURANA WHITE CLOVER

- Durable, all purpose white clover
- Aggressively persists under continuous grazing pressure
- Low maintenance
- Quality, high protein clover for pastures and food plot enrichment
- Use in pastures such as fescue, bermudagrass and all food plots
- Seeding rate is 3 lbs/acre, notill, or broadcast into established pastures no deeper than 1/8 inch
- 5 lbs/acre for pure stands for wildlife plots
- Available in 25 lb bags

EXTEND ORCHARDGRASS

- A new “late maturity” superior yielding orchardgrass variety
- Yields equal to better than Haymate with same maturity
- Exhibits improved stem rust resistance
- A drought tolerant variety with excellent plant vigor
- When rotationally grazed Extend has great palatability
- Perfect fit for alfalfa or clover mixes
- Planting rate for a pure stand is 10-20 lbs./acre
- Planting rate with alfalfa 4-6 lbs./acre
- Planting rate with clovers 10 lbs./acre

FORAGE MASTER PLUS RYE GRAIN

- High yielding rye grain cross that is grazing tolerant
- Very good hardiness with superior palatability
- Can grow up to 4 feet tall with deep green color
- Tremendous tillering potential for forage production with good straw strength
- Vigorous early growth that persists through mid-season grazing
- Great for hay or greenchop in the spring
- Matures in late May to early July, boot stage is in April
- Graze December through May to 6 inches of height
- Sow 80 to 100 lbs no deeper than 1 to 2 inches
- Fertilize in accordance with soil test, in absence of a soil test, apply 100-150 lbs of N at planting and 50-80lbs of N per acre at 60 -90 days

Pasture Seed Comparisons

FORAGE MASTER RED CLOVER

- A unique blend of elite double-cut red clover varieties bred persistence (up to 3 years)
- Higher yielding varieties than Kenland with increased disease resistance
- Replaces Renegade red clover in Forage Master line-up
- Excellent seedling vigor makes it ideal for mixtures and pasture renovation
- Top choice for diluting endophyte infected tall fescue
- Will tolerate lower pH soils with poor fertility, and wetter conditions than alfalfa
- Well suited for livestock or wildlife use
- Seeding rate: 6 to 8 lbs. drilled, or 12 to 15 broadcast

FORAGE MASTER II WHEAT

- Forage Master II Wheat is a tall wheat that is an excellent choice for grazing or greenchop
- Tall wheat with excellent leaves and standability
- Excellent early season growth with vigorous regrowth
- Medium – late maturity
- Very good resistance to leaf rust and stripe rust along with excellent resistance to powdery mildew
- No resistance to Hessian fly
- Drill 90-110 lbs no deeper than .5 to 2 inches
- Broadcast 110 to 130 lbs./acre
- Graze in fall and winter or cut for hay or silage in the boot stage for maximum feed value

GREAT GAINS HIGH SUGAR GRASS MIX FOR SHEEP AND GOATS

- *25% Aber Dart HSG Perennial Ryegrass
- *25% Aber Avon HSG Perennial Ryegrass
- *20% Aber Echo HSG Intermediate Ryegrass
- 15% Banito Tetraploid Intermediate Ryegrass
- 10% Kootenai Timothy
- 5% Ladino Clover
- Up to 20% higher stocking rates
- Up to 38% more dry matter intake per head per day
- Up to 3% improved digestibility
- Animals are naturally attracted to high sugar grasses
- Available in 25 lb bags
- Seeding rate is 25lbs per acre

* High Sugar Grass Varieties contain higher levels of sugar offering a number of agricultural, agronomic, and environmental advantages

LAREDO BRAND FORAGE BERMUDAGRASS BLEND

- Specially formulated blend of hulled and unhulled, coated proprietary bermudagrass seed
- Highly productive for hay, green chop or pasture
- Excellent Palatability
- Spreads rapidly
- Extremely heat tolerant
- Cold tolerant
- Drought and alkali tolerant once established
- Laredo can be established in spring or summer when soil temperatures are consistently above 65 degrees
- Late summer seedings can be done as long as a minimum of 60 days of good growth occur before a frost.
- Seeding rate is 12 to 15 lbs at a minimum depth of .25 inch
- Laredo can be cut for hay or silage at 16 inches and then every 4-6 weeks thereafter
- The last cutting should be made 8 weeks before the first killing frost
- Start grazing at 4-8 inches and stop at 2 inches of height

MARATHON REED CANARYGRASS

- Leafy, high yielding, perennial forage grass
- Replaces Palaton Reed Canarygrass
- Widely adapted
- Performs well on wet, poorly drained soils and soils with a pH below 6.0
- Very drought tolerant variety that can be used for hay, silage, or pasture
- Marathon has short rhizomes that spread, creating a dense sod
- It has greater winterhardiness and is more resistant to foliar disease than other cool-season grasses
- Lower in alkaloids, which make it preferred by livestock
- Graze no shorter than 3-4 inches and allow for recovery
- Always keep the grass below 12 inches tall during rapid spring growth
- Seed 14lbs/acre alone or 6 to 8lbs when sewn with legumes
- Sow no deeper than .5 inch in a well prepared, firm seedbed in the spring or late summer

MARSHALL RYEGRASS

- Unique, high yielding, cold tolerant, annual ryegrass.
- Marshall is an annual and must be reseeded every year, however, Marshall is a good seed producer and some will come back the next year, reducing the need for full seeding rates.
- Exceptional cattle gains over gulf annual ryegrass and stockpiled fescue
- Fall planting can increase winter carrying capacity.
- Over seeding bermudagrass stands in the fall will provide forage until Bermudagrass starts up again in the spring.
- Planting dates are August to early November.
- Planting rates: Eliminate surface vegetation and prepare a firm seedbed, Drill 25-30lbs./acre 1/4 to 1/2 inches deep, broadcast 30 to 40 lbs./acre.
- Fertility: In absence of a soil test follow these general recommendations: Fall and spring grazing: Apply 60 lbs. of P205, 60 lbs. of N every 45 to 60 days beginning in January. A good rule of thumb is to apply 1 lb. of N for every day of expected grazing.
- Overgrazing in the fall can reduce spring production

MATUA BROMEGRASS (RESCUEGRASS, PRAIRIEGRASS)

- A true perennial offering growth levels normally associated with annual types
- Produces well in light, sandy, well-drained soils
- Seed 25 lbs. alone or slightly less if sown with 4-6 lbs. of alfalfa or red clover
- Needs to be grazed in short rotations, 5-6 days, and then let rest for 25 days
- Needs a 50-day rest period in late summer of the first year for Matua to go to seed to ensure stand

Pasture Seed Comparisons

MAXQ JESUP TALL FESCUE

- Latest technology for providing non-toxic fescue to Midwest producers
- Provides all the benefits of fescue but does not produce the harmful toxins
- Novel or friendly endophyte technology helps fescue plant survive heat, drought, disease and insects, greatly increasing stand persistence
- Improved animal performance over infected KY 31 pastures
- Non-toxic fescue for all classes of livestock
- Periods of highest production are September to December and March through June
- Establish after existing fescue is destroyed using the spray-smother-spray approach
- Seeding rate is 20-25 lbs. per acre

PASTURE SWEET'NER HIGH SUGAR GRASS FOR OVERSEEDING

- *30% AberEcho HSG Tetraploid Intermediate Ryegrass
- *30% AberAvon HSG Perennial Ryegrass
- *30% AberDart HSG Perennial Ryegrass
- 10% Bandito Tetraploid Intermediate Ryegrass
- Available in 50 lb bags
- Seeding rate for pure stands is 25 lbs per acre
- Overseeding rate is 15 lbs per acre

* High Sugar Grass Varieties contain higher levels of sugar offering a number of agricultural, agronomic, and environmental advantages

PROFESSIONAL BEEF PASTURE MIXTURE

- Superior yield
- Excellent palatability
- High protein for maximum daily gain
- Endophyte-free Tall Fescue for maximum performance
- Strong persistence and regrowth that withstands grazing pressure
- Excellent drought tolerance and winter hardiness

Available ingredients

- Endophyte-free Tall Fescue
- Orchardgrasses
- Tetraploid Perennial Ryegrass
- Tetraploid Intermediate Ryegrass
- Timothy
- Ladino Clover
- Red Clover

PROFESSIONAL HORSE PASTURE MIXTURE

- A forage blend specially formulated to meet the nutritional needs of horses, while withstanding their intense grazing pressure
- Professional horse pasture mixture contains:
- Extend Orchardgrass
- Will Ladino Clover
- Polly Plus Intermediate Ryegrass
- Grand Daddy Perennial Ryegrass
- Summit Timothy
- Forage Type Kentucky Bluegrass
- Do not graze until stand is established when plants reach 6-8 inches tall down to 3 inches
- Overgrazing can result in stand loss, approximately one to two acres should be provided for each mature horse if pasture is the majority of the diet.
- Plant 25 lbs./acre for new seeding and 15 lbs./acre if overseeding
- Seeding dates: March 15 to May 15 & September 1 to October 15

RESOLUTE WHITE CLOVER

- Outstanding persistence
- High forage production
- Designed for continuous and rotational grazing systems
- Exhibits aggressive stolen vigor
- Excellent seedling vigor
- Drought tolerant and very winterhardy
- Seeding rate is 2-4 lbs per acre drilled
- Available in 25 lb bags

SELECT TALL FESCUE

- A new Zero endophyte forage tall fescue
- Eliminated concerns of feeding disorder associated with KY 31
- Replaces Stargrazer as an improved persistence variety
- Medium to late maturity with outstanding regrowth
- Excellent hay and pasture variety, either in pure stand or with legumes
- Perfect for winter stockpiling
- Wide area of adaptation, can tolerate pH ranges of 4.7 to 9.5
- Planting rate for a pure stand is 15-20 lbs./acre
- Planting rate in a legume mix is 8-10 lbs./acre

DERBY TIMOTHY

- New early maturing variety
- Excellent winterhardiness and yield potential
- Improved disease resistance
- Selected for improved regrowth after cutting
- Excellent companion to legumes in mixtures
- Seeding rate 6 to 10 lbs./acre, in mixes 2 to 4 lbs.

WILL LADINO CLOVER

- Highly nutritious with superior winterhardiness
- Large leafed with high yield potential, excellent for pastures and hay
- Excellent companion for grass pastures with fast regrowth after grazing
- Developed in the South for persistence in hot humid conditions
- Seeding rate drilled is ½-1 lbs/acre, broadcast 2-4 lbs/acre

Forage Mixes

The species mix is one of the single most important factors in forage production. The legumes, grasses, and other forage species growing on your farm affect not only the feed value of the roughage produced, but also yield and growth distribution during the growing season. Forage plants not adapted to your soil conditions or your specific forage needs ultimately reduce the profitability and overall efficiency of your entire operation.

THE MOST IMPORTANT CRITERIA FOR SELECTING A FORAGE MIX ARE:

- Adaptability of the component species to your soil conditions and local weather patterns.
- Your specific forage needs, whether for pasture, hay, silage, or green chop.
- Your type of livestock operation.
- The volume of forage you need annually to operate.
- The time of year forages are needed.

Reseeding can be done at any time, either at time of establishment or when overseeding old stands.

Grass-legume mixtures are best for pasture or hay under most Midwest growing conditions. Compared to straight grass, they are higher in nutritive value and quality, which reduces feed cost. Grass-legume mixtures are characterized by more uniform growth distribution, particularly during the summer months when cool season grasses tend to go dormant.

Keep legume-grass mixtures simple. Limit seeding mixtures to only one grass and one or two legumes. Grasses and legumes sown in combination should be similar in palatability, maturity, and growing vigor. If not, problems can arise. For example, seeding tall fescue and orchardgrass in the same mixture usually causes spotty grazing and wasted forage due to palatability differences between these species.

SOME SUGGESTED MIXTURES:

Rates are given in pounds of seed per acre. (UMC)

8 lbs. Medium Red Clover
8 lbs. Orchardgrass or 4 lbs. Timothy

Red Clover grows on less productive soils where low pH, poor drainage, and other factors, may reduce alfalfa stand and growth. It behaves as a biennial. After the second year there may be little clover remaining in the stand which should then be fertilized as straight grass. Liberal potash applications can prolong the life of clover and encourage growth and development of volunteer clover if it is allowed to reseed itself. Recommended use: hay or pasture.

12 lbs. Alfalfa
10 lbs. Bromegrass or Endophyte Free Tall Fescue

First choice for high yields on soils suited to alfalfa. Since alfalfa will survive only a few years under grazing, this mixture is recommended for hay only.

15 lbs. Endophyte Free Tall Fescue
8 lbs. Red Clover
.75 lbs. Ladino Clover

Red Clover will dominate this mixture for the first two to three years. Follow the same fertilization guidelines as the previous mixture. Recommended use: hay or pasture.

5 lbs. Birdsfoot Trefoil
2 lbs. Timothy or 3 lbs. Orchardgrass

Best adapted to the northern counties of Missouri. However, it will survive in isolated areas further south if not grazed too closely when producing seed. Recommended use: permanent pasture.

15 lbs. Endophyte Free Tall Fescue or
8 lbs. Orchardgrass
15 lbs. Lespedeza
.5 lbs. Ladino Clover

Best adapted to areas where fertility limits the use of alfalfa and Red Clover. Lespedeza is an annual and must be allowed to produce seed each year for it to remain in the stand. Lespedeza production has been limited in recent years by leaf diseases and insects. Newer varieties are more disease resistant. Recommended use: pasture.

6 lbs. Reed Canarygrass
1 lbs. Ladino Clover
2 lbs. Alsike Clover

Adapted to areas too wet to grow other forage crops. Reed canarygrass will produce high yields, but is less palatable than many other species. Recommended use: pasture.

6 lbs. Reed Canarygrass
10 lbs. Alfalfa or Red Clover

Reed canarygrass is tolerant of drought if there is ample rainfall in the spring. It can grow on upland soils. It should be grazed before it reaches 12 to 15 inches in height to avoid coarseness. Recommended use: pasture.

Annual Forage Seed Comparison

1 = Inferior
5 = Moderate
10 = Excellent

	NUTRI+PLUS BMR	Drystalk BMR	FM 120	Red Top Plus BMR	FM III Wheat	FM Plus Rye	FM Oats
GROWTH PROPERTIES							
Forage class	Sorg-Sud	Sorg-Sudan	Sdngrs	C-F-Sorg	Wheat	Rye	Oats
Forage Master	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity	Late	Early	Early	Medium	Late	Medium	Late
Drought resistance	9	9	9	8	8	7	5
Standability	6	7	8	6	8.5	8	8
Regrowth	9	9	7	7	8	8	2
Grain-to-forage ratio	5	5	5	1	9	6	7
Yield potential	9	8	8	9	9	9	8
Plant height in feet	5 to 7	5 to 7	5 to 6	6 to 9	3 to 4	3 to 4	4 to 6
FIELD TOLERANCE							
Leaf Blight	5	7	9	8	8	N/A	
Prussic Acid	9	9	7	9	0	0	0
CULTURAL PRACTICES							
Hay	10	10	10	7	9	8	9
Greenchop	10	9	7	7	3	8	2
Pasture	10	9	10	9	8	8	7
Haylage	8	9	7	8	9	9	8
Approx. seeds per lb.	17,000	16-17,000	30,000	14-15,000	16,000		
Row rate	12	4 to 6		5 to 7			
Drill rate	20-30	10-20	20-30	15 to 20	90-110	50-75	35-45
Broadcast	50-60	20-30	30-45	20+	110-130	70-90	

Annual Forage

MANAGEMENT TIPS

- Have the soil tested to provide a basis for a reliable fertilizer program.
- In general, an annual forage should be fertilized much the same as a corn crop except that multiple nitrogen applications are recommended. Apply 50 to 70 pounds of nitrogen before seeding and after each cutting.
- Choose a forage that fits the need of your particular farm enterprise.
- Plant in a well prepared seed bed 1/2 to 1 inch deep when the soil temperature is above 65F.
- Make several plantings three to four weeks apart or practice rotational grazing by dividing fields into two or more plots.
- Start grazing when plants reach a height of 24 to 30 inches over a period of about seven days. Then rotate to another plot or field.
- Harvest for hay when plants reach a height of 30 to 36 inches using a mower conditioner. Leave eight-inch stubble to enhance regrowth.

PRUSSIC ACID CAUTION

- Heavy nitrogen fertilization, drought stress and frost or freezing temperatures create a favorable environment for prussic acid problems.
- Livestock should be removed from fields that have been frosted for 10 to 14 days before allowing them to graze the sorghum-sudangrass again.
- It is recommended that the livestock be filled with grass hay prior to grazing sorghum forages. They should be observed closely after being turned into sorghum or sudan fields.
- The curing of hay or the ensiling of sorghum will normally reduce the potential of prussic acid poisoning.
- The millets do not have the potential for prussic acid poisoning.

Warm Season Grass Seed

SWITCHGRASS

- A native, perennial, warm season, sod forming tall grass that is winterhardy and drought resistant.
- Will grow under a wide range of soil types, including sand, but prefers lower, moist sites
- Preferred by producers because of its hard seed coat which lets it feed through conventional seeders
- Earliest maturing warm-season grass
- Provides excellent erosion control
- Blackwell, Cave-in-Rock and Trailblazer are the varieties most commonly used in Missouri
- Establishment should start with a firm seed bed.
- Planting rate: 4 to 6 lbs. of pls/acre drilled 10 to 12 lbs. of pls/acre broadcast
- Patience is required as Switchgrass is slow to establish
- Do not graze lower than 6 inches

BIG BLUESTEM

- Provides excellent yield and is dependable
- Grows when cool season grasses start to slow down
- Will grow most anywhere, under any conditions in the tall prairie country
- Varieties: Kaw, Roundtree and native are the most commonly used varieties
- Establish in a well prepared seedbed
- Planting rate: 8 to 10lb of pls/acre drilled 25lbs. of pls/acre broadcast. Avoid planting too deep.
- Beards on the Big Bluestem seed,and most other native grasses, with the exception of Switchgrass, make it difficult to sow with conventional drills. Special native grass drills are needed.

LITTLE BLUESTEM

- A drought resistant perennial warm-season bunchgrass
- Smaller than Big Bluestem and very common, found in almost every state in the U.S.
- Slightly less palatable than Big Bluestem
- Has dense root system
- Aldous, Blase and native varieties are most commonly used in the Midwest
- Planting rate: 6 to 8lbs. of pls/acre drilled, 15lbs. of pls/acre broadcast

INDIANGRASS

- One of the more important native grasses due to its nutritive value and palatability for livestock
- A perennial bunchgrass that spreads by rhizomes and seed and can grow 5 to 7 feet tall.
- Endures a wide range of weather extremes and is easily established from seed
- Cheyenne, Osage and Rumsey are most commonly used
- Planting rate: 8 to 10lbs. of pls/acre drilled, 20-25lbs. of pls/acre broadcast
- Do not graze or hay in the first year

EASTERN GAMMAGRASS

- A native, warm season, perennial bunch grass with short, thick rhizomes
- Grows in clumps from 1 to 4 feet in diameter on stems 3-9 feet tall.
- Can be rotationally grazed from the first of May to the first of September
- Makes excellent hay and should be cut in the boot stage for maximum quality about every six weeks. Do not cut or graze shorter than six inches
- For dormant seeding, plant 8-10 pls lbs./acre of raw seed into a well prepared seedbed or no-till into killed sod from December 1st to March 1st.
- For spring establishment, stratified seed is recommended. Stratification is a process of treating the seed to break its dormancy.
- Planting can be done with a corn planter

SIDEOATS GRAMA

- A bunch forming or sod forming perennial warm-season grass
- Characterized by oat-like seeds that hang down one side of the seed head
- Highly palatable and nutritious grass, readily eaten by all classes of livestock
- Grows on well drained uplands, ridges and rocky areas, but is not suited for wet or sandy soils.
- Readily spreads from seed and rhizomes
- Quick to establish and provides soil erosion control
- Common varieties are El Reno and Native
- Planting rate: 8 to 10lbs. of pls/acre drilled, 20 to 25lbs. of pls/acre broadcast

FORMULA FOR FIGURING PURE LIVE SEED POUNDS (PLS lbs.)

Native warm-season grasses are sold on a Pure Live Seed (PLS) basis, which refers to the amount of live seed in bulk seed. To figure PLS, you take the Percentage of Purity times the Percentage of Total Germination, and divide by 100 to equal PLS.

EXAMPLE:

98% purity x 85% total germination ÷ 100 = .83% pls. (1 bulk lb of seed equals .83 PLS lb. Therefore, it takes 1.2 bulk pounds to equal 1 PLS lb.)

Forage Soil Requirements

SOIL REQUIREMENTS FOR LEGUMES AND GRASSES						
Forage	Desirable pHs Range*	Fertility Requirements	Drainage Requirements	Drought Tolerance	Palatability	Growth Habit
Alfalfa	6.5-7.5	High	High	Very Good	High	Perennial
Bermudagrass	5.5-7.0	High	Medium	Good	High	Perennial
Birdsfoot Trefoil	5.5-7.0	Medium	Medium	Good	High	Perennial
Bluegrass	5.6-7.0	Medium	Medium	Poor	Very High	Perennial
Bluestem, Big	5.5-7.0	Medium	Medium	Good	High	Perennial
Bluestem, Caucasian	5.5-7.0	Medium	High	Good	High	Perennial
Bluestem, Little	5.5-7.0	Medium	Medium	Good	High	Perennial
Bromegrass	5.4-7.0	High	Medium	Fair	Very High	Perennial
Clover, Alsike	6.0-7.0	Medium	Low	Fair	High	Biennial
Clover, Ladino	6.0-7.0	High	Low	Good	Very High	Perennial
Clover, Red	6.0-7.0	Medium	Medium	Fair	High	Biennial
Clover, White Dutch	6.0-7.0	Medium	Medium	Poor	Very High	Perennial
Fescue, Tall	6.0-7.0	Medium	Low	Good	Low-Medium	Perennial
Indiangrass	5.5-7.0	Medium	Medium	Good	Medium	Perennial
Lespedeza	5.5-7.0	Low	Medium	Fair	High	Annual
Orchardgrass	6.0-7.0	Medium	Medium	Good	High	Perennial
Redtop	5.5-7.0	Low	Low	Good	Medium	Perennial
Reed Canarygrass	5.5-7.0	High	Low	Very Good	Medium	Perennial
Switchgrass	5.5-7.0	Medium	Medium	Good	Medium	Perennial
Timothy	5.5-7.0	Medium	Medium	Fair	High	Perennial
	** The salt pH (pHs) used in Missouri is usually 0.3 to 0.5 units lower than water pH (pHs)*					

Forage Growth Characteristics

FORAGE	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV
LEGUMES									
Alfalfa									
Red Clover									
Trefoil									
Alsike Clover									
Ladino and White Clover									
Lespedeza									
COOL SEASON GRASS									
Tall Fescue									
Bromegrass									
Bluegrass									
Orchardgrass									
Redtop									
Reed Canarygrass									
Timothy									
WARM SEASON GRASS									
Switchgrass									
Bluestem									
Indiangrass									

Turf Seed Comparisons

TYPE	DAYS TO GERMINATE	NUMBER SEEDS/LB.	SEED RATE/ 1000² FT.	USUAL LIFE	BLADE TEXTURE	GENERAL UTILITY	SHADY AREAS	HARD WEAR	GENERAL DESIRABILITY
Kentucky Bluegrass	10 to 21	2,000,000	2-3 lbs.	Permanent	Fine	Excellent	Poor	Good	Best for sunny lawns
Improved Kentucky Bluegrass:	10 to 21	2,000,000	2-3 lbs.	Permanent	Fine	Excellent	Fair	Good	Best for sunny and partial shade lawns
Fine Fescue: Chewings Hard, Cr. Red, Koket	7 to 21	500,000	4-6 lbs.	Permanent	Very Fine	Excellent	Very Good	Good Fair	Best for shady and sunny lawns
Tall Fescue: KY 31	7 to 14	200,000	8 lbs.	Permanent	Coarse	Fair	Fair	Very Good	Best for hard use and low maintenance
Turf Type Tall Fescue: AllPro, Rembrandt, Houndog 5, Tempest, Winning colors	7 to 14	230,000	6-8 lbs.	Permanent	Medium	Good	Good	Very Good	Best for lower maintenance turf areas and sunny to partial shade
Perennial Ryegrass: Common Linn	5 to 12	225,000	7-10 lbs.	3 Years	Medium	Fair	Poor	Good	Good cover for low quality turf
Turf Type Perennial Ryegrass: Cabo	5 to 12	290,000	6-10 lbs.	Permanent	Fine	Very Good	Good	Fair	Excellent Quick cover high quality turf
Annual Ryegrass	5 to 10	200,000	8 lbs.	1 Year	Coarse	Poor	Fair	Fair	Quick temporary grass
Shady Mix: 35% Cr. Red Fescue, 30% Koket Chewing Fescue, 25% Pennant Perennial Ryegrass, 10% Ky Bluegrass	7 to 14	396,000	5-7 lbs.	Permanent	Medium	Excellent	Very Good	Fair	Best for areas of low sunlight
Kwik Green: 70% Linn Per. Ryegrass, 20% Cr. Red Fescue, 10% Ky Bluegrass	7 to 14	320,000	3-4 lbs.	Permanent	Medium	Good	Fair	Good	Good economical, low growing turf

** One Acre = 43,560 square feet*