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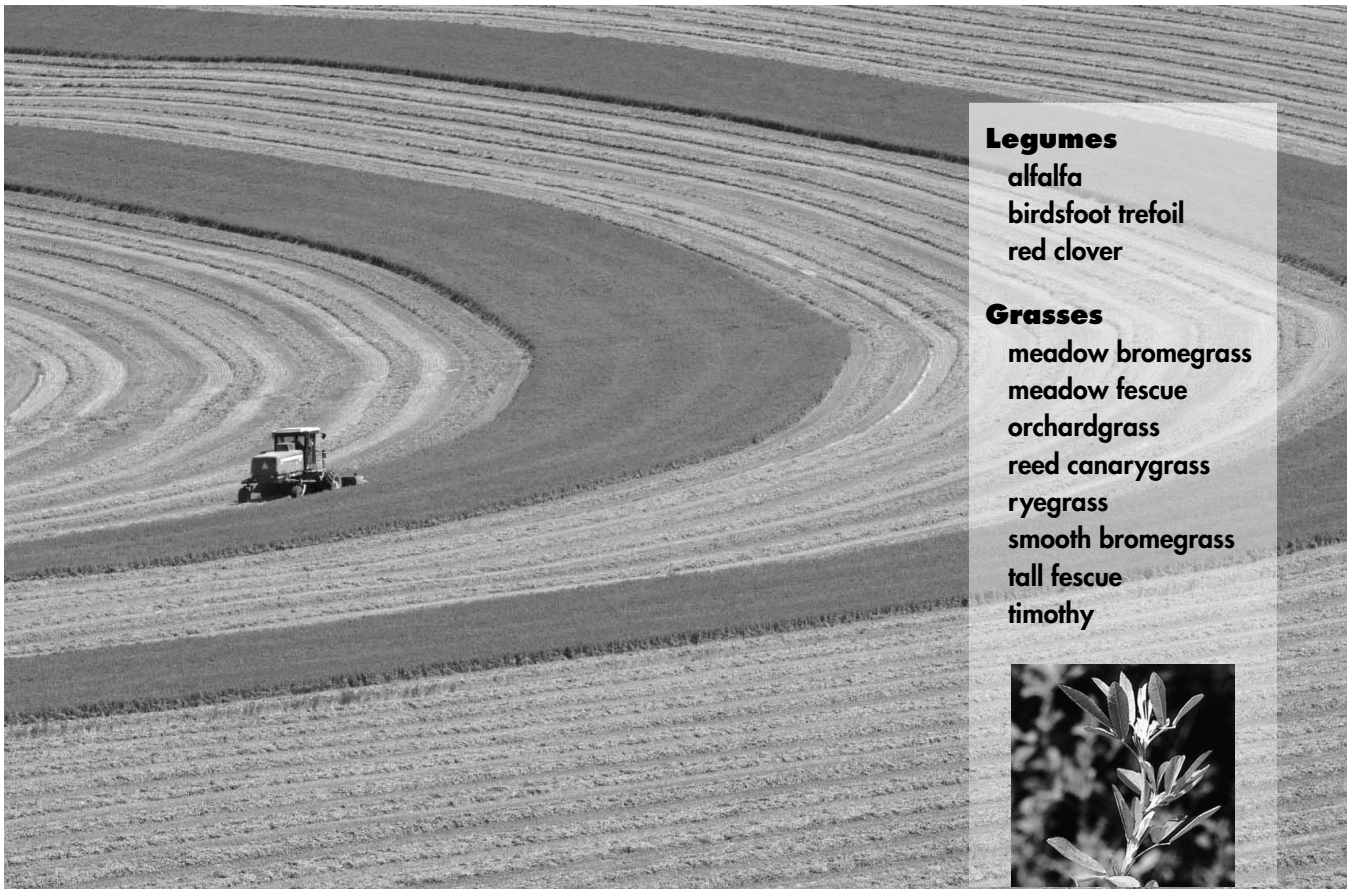
FORAGE VARIETY UPDATE
for Wisconsin



2008 TRIAL RESULTS

UW Extension

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This publication and other forage information can be found on the forage web site at **www.uwex.edu/ces/forage**.

To print or order other publications from the University of Wisconsin-Extension, visit **learningstore.uwex.edu**.

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INTRODUCTION

Wisconsin's 4.2 million acres of hay and silage contribute greatly to the state's high crop production rating. Because 85% of this production is fed to livestock, farmers receive returns from their crops by selling livestock and livestock products. Hay also is gaining importance as a cash crop.

Farmers generally minimize feed costs by producing high yields of high quality forage. Many farmers strive for long stand life, but short rotations with forage can also be very profitable due to rotational effects and benefits of residual nitrogen from the forage legume. All farmers can benefit from planting newer varieties which, while more costly, will return many times the added cost in increased yield and stand life.

Legumes are preferred in most situations for hay and silage crops because they offer better forage quality at harvest and require no nitrogen fertilization. While grasses provide the base for most pastures, legumes will increase forage quality of pastures, reduce nitrogen fertilization needs, and provide for better seasonal distribution of forage production.

This bulletin summarizes the performance of forage varieties in Wisconsin. The performance data was collected from trials conducted by the University of Wisconsin at UW Agricultural Research Stations, and in farmer fields.

2008 IN REVIEW

This year has been an unusual year for production of forage. Low hay carryover, reduced forage acreage and difficult forage production in many regions of Wisconsin have presented challenges.

Growing conditions. Hay and haylage production was difficult at times in many parts of Wisconsin this year. The spring began with significant winterkill in SW Wisconsin. Southern Grant and Lafayette counties lost most of their alfalfa and, in some cases, grass stands. Spotty alfalfa winterkill occurred north into Vernon County. Flooding during June across portions of southern Wisconsin, northern Illinois and northeastern Iowa caused loss of crop and crop acreage. Through July and August much of central western Wisconsin had significant drought. The impact of the drought depended on soil depth, with fields on shallow soils suffering significant yield loss. Average yields of variety trial plots compared to historic average (see graphs) give an indication of the season in different regions of the state. There is not graph for Lancaster since the study was lost with other winterkill occurring in the region.

Production trends and demand. High grain prices have resulted in reduced acreage of alfalfa and other forages. Nationally, harvested forage acres for 2008 are expected to be about 60.4 million acres, down from 61.6 million (1.9%) last year; alfalfa acreage declined from 21.6 million to 20.7 million acres. Wisconsin harvested about 1.95 million alfalfa acres, down from 2.02 million (3.5%) last year and about half what alfalfa acres were at their peak a decade ago.

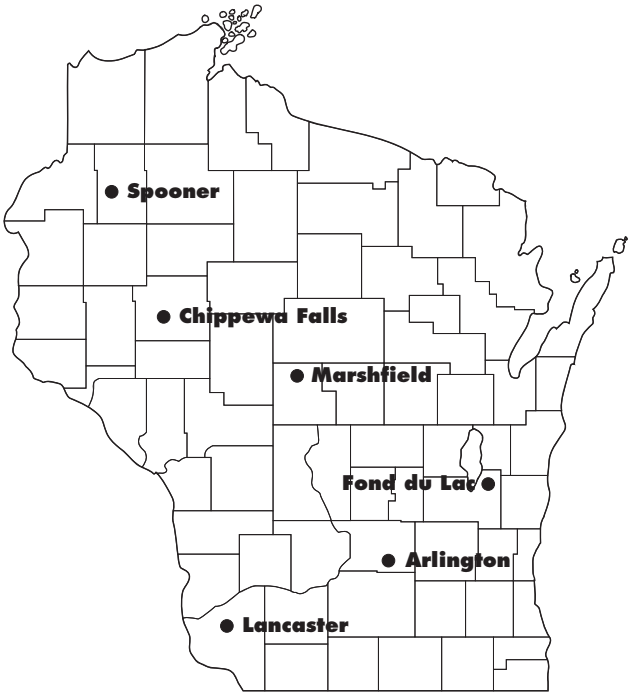

Figure 1. Variety trial test sites

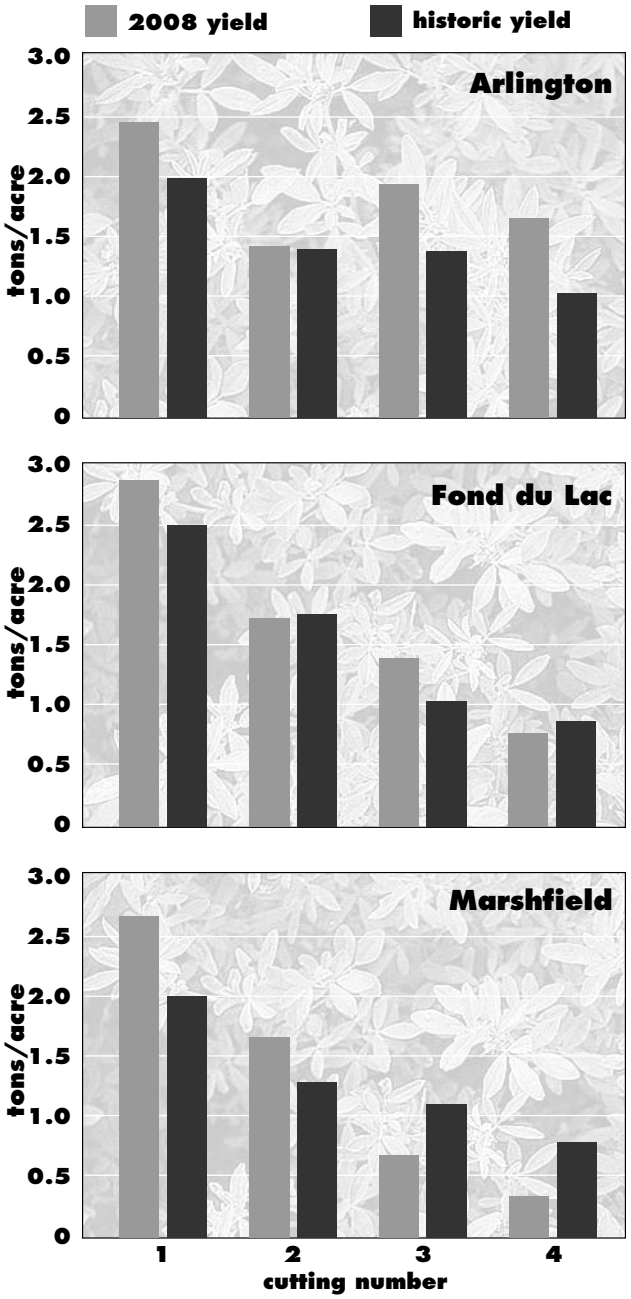

Figure 2. Comparison of 2008 yields and historic averages, Wisconsin

Nationally, USDA reports the production of alfalfa and alfalfa mixtures at 70.9 million tons, a 2% drop from the 72.5 million tons produced in 2007. Lowered acreage in 2007 and the multistate drought in 2007 resulted in the lowest hay carryover in 30 years. While the national yield increased slightly in 2008 compared to 2007, the decline in acres has resulted in less alfalfa production. While all but northwest Wisconsin was able to grow adequate hay/haylage, all factors have combined to make a tight hay supply.

It appears that dairy cow numbers have increased slightly while other categories are down slightly. Thus, overall demand for hay will continue similar to 2007 and 2008.

Hay prices. The short hay supply has kept hay prices high. They have ranged from $150 to $240/ton plus delivery for dairy quality hay all year. Due to the short supply, we expect prices to remain in that range for at least the next year. While forage planting intentions are up slightly, new seedings of forage will not have great impact on supply. The high value of hay has made it economically competitive with most grain crops. To check current hay prices in the Midwest, go to the Weekly Hay Market Demand and Price Report for the Upper Midwest by Ken Barnett, UW-Extension, at www.uwex.edu/ces/forage/pubs/hay_market_report.htm.

Additional data online. Note that you can get all grass variety data from all years summarized together at www.uwex.edu/ces/forage. You can also do a side-by-side comparison of any two alfalfa varieties planted anywhere in the Midwest at www.uwex.edu/ces/ag/alfalfa/index.cfm.

NEW FORAGE QUALITY ANALYSIS METHOD

We have found that measuring digestible fiber (NDFD) is a much better estimate of animal performance on forage than acid detergent fiber which we have historically used. ADF is not well correlated with digestible fiber among the alfalfa varieties that were measured for forage quality. All of the forage quality results have been recalculated using Milk2006, an indexing tool that adjusts intake and energy content for digestible fiber.

LEGUMES

This publication reports varietal characteristics and performance data collected from trials conducted in Wisconsin and gives criteria for selecting varieties. The University of Wisconsin forage variety testing program tests alfalfa at five sites representing the major soil type and climatic conditions of the state (see table 1). Red clover and birdsfoot trefoil are tested at Arlington and Marshfield. Grasses are tested at Lancaster and Spooner. All plots are established in conventionally prepared seedbeds with a post-emergent herbicide. All seed is inoculated and alfalfa is treated with metalaxyl (Apron) fungicide prior to planting.

All sites are managed for maximum yield. Fields have a soil pH of 6.8 or higher and are fertilized according to UW soil tests. Weeds and insects are controlled as necessary. Alfalfa is harvested at the mid to late bud stage and red clover and birdsfoot trefoil are harvested at 25 to 50% bloom. All yields are reported on a dry matter basis.

Research has shown that rankings for forage quality are relatively stable across many environments. Therefore the results are directly applicable to the entire state and surrounding areas. Milk per ton is an excellent measure for ranking varieties for forage quality since fiber, not protein, is the first limiting factor in high performance rations. However, sacrificing yield to improve forage quality results in reduced profitability. Therefore, when considering forage quality, varieties should be evaluated on the basis of milk per acre which combines yield and quality into a single term. Milk per acre was calculated using forage quality weighted by yield of each cutting.

Table 1. Soil types and number of cuts of alfalfa variety trial sites

Site	Soil type	Number of cuts	Date of last cut
Arlington	Plano silt loam	4	9/17
Chippewa Falls	Sattre loam	3	8/27
Fond du Lac	Kewaunee red clay	4	9/10
Marshfield	Withee silt loam	4	10/17
Spooner	Antigo silt loam	4	10/15

ALFALFA

Alfalfa and alfalfa-grass mixtures are grown for hay or silage on over 3 million acres in Wisconsin. Alfalfa is the foundation of successful feeding programs for Wisconsin's dairy cattle, replacement heifers, beef cattle, sheep, and horses. For more information on growing alfalfa, see Extension publication *Alfalfa Management Guide* (NCR547).

Selecting alfalfa varieties

Experience emphasizes the need to select high-yielding alfalfa varieties with adequate winter survival and disease resistance. Use the following steps to help select the best varieties for your location.

1. Select a group of top-yielding varieties using the average yield (shaded column of table 2). Yield is the major factor in determining profitability of an alfalfa stand. Look for varieties with high average yields across sites and years (the number of site-years is in brackets). All varieties tend to yield most the year after seeding. Therefore, compare only varieties with more than three site-years to ensure that data from more than the first year is included in the mean. Higher site-year averages indicate greater confidence. This is important because of variations in weather from one year to the next, in soil type, etc. Thus, a variety with yield stability over a

broad range of conditions will most likely perform well regardless of soil type and growing condition differences.

2. Check the yield at the variety trial site most like your conditions to make sure that the variety also did well under conditions most like those on your farm.

3. Compare disease resistance and stand persistence using data from table 4. Stand persistence is an estimate of the stand remaining after two or more winters. These ratings consider all factors relating to stand survival and are the best estimates of stand life. Persistence ratings may not be available for varieties that are too new to have been grown in the trials for at least 2 years. Frequently, the most persistent varieties are not the highest yielding and tradeoffs must be made.

Aphanomyces occurred primarily in the western portion of the state where many growers had yellowing in fields, even where resistant varieties had been planted. This likely indicates infection by aphanomyces race 2–resistant varieties.

4. Check the selected varieties for winter survival (tables 2 and 3). A number of alfalfa varieties are being released with improved winter survival. These varieties will survive more difficult winters and tolerate October harvest with less yield reduction the following spring.

Your location in the state plays an important role in the needed winter survival rating. Generally, in central Wisconsin, especially where snow cover is not dependable, varieties with very good to superior winter survival should be grown. In northern Wisconsin, which has better snow cover, and in southern Wisconsin, varieties with adequate to good winter survival may be grown.

More intensive cutting schedules may increase the need for varieties with more winter survival. If you harvest in the fall, we strongly suggest using alfalfa varieties with superior winter survival.

Where direct measurements of winter survival are lacking, fall dormancy may be used to estimate winter survival. Lower fall dormancy numbers generally indicate greater winter survival. However, some varieties may have better winter survival than the fall dormancy would indicate.

5. Compare forage quality of varieties. Use milk per acre to select the variety that best combines traits of high yield and high forage quality. Also, consider planting some fields to high quality varieties and some to standard varieties to spread the harvest window in the spring. The standard varieties will be ready to harvest first and the high quality varieties may be harvested later.

Blends

Many companies sell blends at a reduced price from named varieties. A blend is a mixture of two or more varieties. Blends may do as well as the best varieties or very poorly. Since these blends may have been derived in various ways, their performance depends on the skill and integrity of the seed company. Disease resistance, winter survival, and other characteristics may change within a blend from lot to lot or year to year.

Using *certified* seed of adapted, high-yielding varieties best assures trueness to name.

Table 2. Yield as a percent of check averages, winter survival, and fall dormancy of alfalfa varieties (established stands)

Variety	WS	FD[a]	Average [site-years][b]	——Arlington—— '05[c]	'06	'07	——Marshfield—— '05	'06	'07	FON '05	SPO '05	CHP '07
VARIETIES TESTED FOR WINTER SURVIVAL (sorted by average yield within each category)												
Very good winter survival												
GENOA	2.0	4	111 [25]	119*	.	.	.	111*	.	124*	.	97*
6415	2.0	4	110 [42]	117*	126	122	113	111*	98	122*	.	99*
WL 357 HQ	2.0	5	110 [15]	.	.	.	111	.	.	120*	.	.
GH 717	2.0	4	106 [9]	112	.	.	117*	.	.	.	112*	.
FSG 406	2.0	4	105 [12]	.	.	124*	.	.	.	.	.	96*
WL 319 HQ	2.0	3	104 [23]	.	116	.	.	.	.	.	.	109*
6200HT	2.0	3	103 [17]	.	.	.	102	100	.	106	.	.
VERNAL	2.0	2	97 [224]	96	95	94	91	96	98	94	91	101*
Good to very good winter survival												
4A421	2.5	4	116 [20]	118*	.	.	.	118*	.	.	.	.
SOMERSET	2.5	3	110 [30]	.	.	.	115*	.	.	123*	106	.
53Q30	2.5	3	108 [17]	114	118	.	112	110*	.	118*	113*	.
WL 348 AP	2.5	4	105 [27]	111	.	.	.	.	.	111	109*	.
INTEGRITY	2.5	4	104 [9]	107	.	.	105	.	.	.	99	.
6400HT	2.5	4	103 [26]	102	.	.	101	104	.	.	.	.
Good winter survival												
FSG 505	3.0	5	114 [11]	.	.	120	.	.	.	.	.	.
MAGNUM V	3.0	4	112 [52]	104	.	.	.	.	.	113	110*	.
4S419	3.0	4	109 [12]	118*	.	.	125*	.	.	114	.	.
54V46	3.0	4	107 [42]	111	114	.	109	111*	.	119*	116*	.
5312	3.0	3	105 [100]	106	106	109	106	103	100*	107	104	98*
Adequate winter survival												
4R429	4.0	4	105 [12]	.	.	.	104	.	.	116	.	.
VARIETIES NOT TESTED FOR WINTER SURVIVAL (sorted by average yield)												
GH 727	.	4	124 [2]	.	135*	.	.	.	.	.	.	.
FOREMOST II	.	4	117 [4]	.	.	126*	.	.	.	.	.	.
BOBWHITE	.	3	115 [8]	.	115	.	.	.	.	.	.	.
ADRENALIN	.	4	114 [5]	.	.	.	.	115*	.	.	.	106*
TS-4027	.	.	114 [2]	.	.	121	.	.	108*	.	.	.
4G418RR[d]	.	4	113 [5]	.	126	.	.	116*	.	.	.	.
DKA43-13	.	4	113 [3]	.	.	128*	.	118*	.	.	.	.
VELOCITY	.	4	113 [3]	.	.	123*	.	.	107*	.	.	105*
MEADOWLARK	.	4	113 [2]	.	110	.	.	.	.	.	.	.
HAYMAKER II SUPREME	.	3	113 [12]	102	.	.	107	.	.	.	.	.

(continued)

ABBREVIATIONS: WS = winter survival; **FD** = fall dormancy; **FON** = Fond du Lac; **SPO** = Spooner; **CHP** = Chippewa

*Varieties not significantly different from highest yield in column.

[a] Fall dormancy scale: 1 = least fall growth; 9 = greatest fall growth.

[b] Average yield as a percent of check varieties including concluded studies not listed. Number in brackets is number of site-years (e.g., 3 years at 2 sites = 6 site-years). Higher site-year values indicate greater confidence.

[c] Years at top of column indicate seeding year.

[d] Roundup Ready varieties under Roundup herbicide management currently are not commercially available at time of publication.

For seasonal distribution of yield results, visit our web site at www.uwex.edu/ces/forage/.

Table 2. Yield in established stands *(continued)*

Variety	WS	FD[a]	Average [site-years][b]	——Arlington—— '05[c]	'06	'07	——Marshfield—— '05	'06	'07	FON '05	SPO '05	CHP '07
MAGNUM VI	.	4	112 [8]	.	117	.	.	107	.	.	.	.
PHABULOUS III	.	4	112 [7]	.	124	120	.	113*	100*	.	.	.
STARBUCK	.	4	112 [24]	113	.	.	105	.	.	.	.	.
LABRADOR	.	4	112 [15]	113	.	.	119*	.	.	.	113*	.
L-447HD	.	4	112 [13]	.	.	.	103	.	.	117	111*	.
AMERISTAND 407TQ	.	4	112 [10]	123*	125	.	117*	110*	.	.	.	.
WL 343 HQ	.	4	111 [7]	.	134*	.	.	108	103*	.	.	107*
MAGNUM VI-WET	.	4	111 [5]	.	117	.	.	113*	.	.	.	.
MARVEL	.	4	111 [5]	120*	.	.	.	.	.	.	.	103*
LIBERATOR RR[d]	.	4	111 [4]	.	130*	.	.	109*	.	.	.	.
425RR[d]	.	4	110 [4]	.	123	.	.	115*	.	.	.	.
WL 355 RR[d]	.	4	110 [4]	.	126	.	.	113*	.	.	.	.
FSG 351	.	3	110 [17]	.	.	112	.	.	94	.	107	.
ASCEND	.	5	110 [14]	106	.	.	112	.	.	.	.	.
MARINER III	.	4	109 [7]	.	117	.	.	.	104*	.	.	104*
DKA41-18RR[d]	.	4	109 [4]	.	124	.	.	106	.	.	.	.
6417	.	4	109 [3]	.	.	124*	.	.	103*	.	.	100*
55V48	.	5	109 [3]	.	.	129*	.	.	111*	.	.	92
SUMMERGOLD	.	4	108 [14]	.	.	111	.	.	109*	.	.	.
FSG 408DP	.	4	108 [11]	.	.	.	.	.	94	.	.	98*
ESCALADE	.	5	107 [9]	.	.	.	.	108	.	.	107	.
PERFORM	.	2	107 [7]	.	121	.	.	112*	.	113	.	.
WITHSTAND	.	4	107 [6]	120*	.	.	.	104	.	.	.	110*
L-333HD	.	3	107 [3]	.	.	118	.	.	104*	.	.	102*
PHABULOUS II	.	4	107 [18]	110	.	.	110	.	.	.	107	.
6443RR[d]	.	.	106 [5]	.	128*	.	.	106	.	.	.	.
DKA33-16	.	3	106 [21]	115	.	.	107	.	.	119*	105	.
SPRINGGOLD	.	5	105 [5]	.	.	125*	.	.	101*	.	.	100*
MILESTONE	.	3	104 [9]	.	.	.	107	.	.	104	.	.
NOVA	.	4	104 [9]	97	.	.	103	.	.	.	.	.
FSG 400LH	.	4	103 [9]	.	.	.	99	.	.	108	.	.
ENFORCER	.	4	102 [5]	95	.	.	.	.	98	.	.	.
ONEIDA VR	.	3	102 [176]	98	99	97	103	101	102*	99	106	100*
Check average[e] (tons/a)				6.29	5.63	7.18	5.52	5.13	4.49	6.21	3.37	3.04

ABBREVIATIONS: WS = winter survival; **FD** = fall dormancy; **FON** = Fond du Lac; **SPO** = Spooner; **CHP** = Chippewa

*Varieties not significantly different from highest yield in column.

[a] Fall dormancy scale: 1 = least fall growth; 9 = greatest fall growth.

[b] Average yield as a percent of check varieties including concluded studies not listed. Number in brackets is number of site-years (e.g., 3 years at 2 sites = 6 site-years). Higher site-year values indicate greater confidence.

[c] Years at top of column indicate seeding year.

[d] Roundup Ready varieties under Roundup herbicide management currently are not commercially available at time of publication.

[e] Check varieties are Vernal, 5312, and Oneida VR.

For seasonal distribution of yield results, visit www.uwex.edu/ces/forage/.

Table 3. Yield in seeding year as a percent of check averages, winter survival, and fall dormancy of alfalfa varieties

Variety	Winter survival	Fall dormancy[a]	Seeded 2008/Harvested 2008 — Arlington	Marshfield	Fond du Lac	Spooner
VARIETIES TESTED FOR WINTER SURVIVAL (sorted alphabetically within each survival ranking)						
Very good winter survival						
GENOA	2.0	4	.	98	.	94
VERNAL	2.0	2	98	101	102*	100*
Good winter survival						
5312	3.0	3	100	106*	105*	.
VARIETIES NOT TESTED FOR WINTER SURVIVAL (sorted alphabetically)						
6417	.	4	112*	109*	84	88
6431	.	4	110*	118*	110*	105*
55V48	.	5	106*	94	94	99*
AMERISTAND 407TQ	.	4	106*	.	91	86
BOBWHITE	.	3	108*	.	.	.
DKA43-13	.	4	109*	109*	90	91
FOREMOST II	.	4	101	99	.	103*
FSG 400LH	.	4	110*	109*	.	101*
FSG 528SF	.	5	107*	103	.	96
GH 727	.	4	108*	.	.	101*
GH 773 LH	.	4	.	.	.	95
LEGEND EXTRA	.	3	109*	110*	99	.
LIGHTNING IV	.	4	107*	116*	100	93
MEADOWLARK	.	4	104	.	.	.
MOUNTAINEER 2.0	.	5	.	.	.	101*
MUSTANG 420 PLUS	.	4	.	.	.	95
ONEIDA VR	.	3	102	92	93	99*
PGI 459	.	4	.	.	119*	.
POWER 4.2	.	4	98	119*	91	.
REGEN	.	3	.	105*	108*	106*
ROADRUNNER	.	4	95	.	.	.
VELOCITY	.	4	110*	105*	87	88
WL 343 HQ	.	4	107*	.	85	94
WL 363 HQ	.	5	105	97	96	100*
Check average[b] (tons/a)			4.07	1.33	2.25	1.22

* Varieties not significantly different from highest value in column.

[a] Fall dormancy scale: 1 = least fall growth; 9 = greatest fall growth.

[b] Check varieties are Vernal, Oneida VR, and 5312.

For seasonal distribution of yield results, visit www.uwex.edu/ces/forage/.

Table 4. Disease resistance and stand persistence of alfalfa varieties

	—Disease/pest resistance[a]—				Persist.,[d] spring '08 (% of trial ave.)			
		-Aphanomyces-			ARL	ARL	Average	
Variety	DRI[b]	race 1	race 2	PLH[c]	'04[e]	'05	[site-years][f]	Marketer(s)
5312	29	R	.	.	93	105*	102 [42]	Pioneer
6325	30	HR	R	HR	.	.	.	Garst Seed
6415	30	HR	.	.	106*	107*	107 [7]	Garst Seed
6417	30	HR	HR	.	.	.	.	Garst Seed
6431	30	HR	.	.	.	.	.	Garst Seed
372HY	29	R	.	.	.	109*	.	Bio-Plant Research
425RR[g]	30	HR	.	.	.	.	.	La Crosse Forage & Turf Seed Corp.
4A421	30	HR	.	.	106*	101*	107 [6]	Mycogen Seed
4G418RR[g]	30	HR	.	.	.	.	.	Mycogen Seed
4R429^	30	HR	R	.	91	.	.	Mycogen Seed
4S419	29	R	.	.	.	111*	106 [2]	Mycogen Seed
53Q30	30	HR	.	.	.	101*	.	Pioneer
54Q25	29	R	.	.	106*	.	101 [4]	Pioneer
54V46	29	HR	R	.	120*	104*	108 [7]	Pioneer
55V48	29	HR	R	.	.	.	.	Pioneer
6200HT	30	HR	.	.	.	.	98 [2]	Garst Seed
6400HT	30	HR	.	.	106*	110*	104 [4]	Garst Seed
6443RR[g]	30	HR	.	.	.	.	.	Garst Seed
A 30-06	30	HR	R	.	.	.	104 [7]	Producer's Choice
A4330	30	HR	.	.	.	.	.	Producer's Choice
A4440^	30	HR	HR	.	.	.	.	Producer's Choice
A5225	29	R	.	.	.	.	.	Producer's Choice
ADRENALIN	30	HR	.	.	.	.	103 [1]	Brett-Young Seeds
AMERISTAND 407TQ	30	HR	R	.	.	111*	.	America's Alfalfa
ASCEND	30	HR	.	.	.	97	103 [5]	Kussmaul Seeds
ATTENTION II	26	MR	.	.	.	.	.	Ampac Seed
BOBWHITE	27	HR	.	.	113*	.	109 [2]	Blue River Hybrids
CALIBER	30	HR	.	.	.	.	.	Beck's Hybrids
CONSISTENCY 4.10RR[g]	30	HR	.	.	.	.	.	Croplan Genetics
DKA33-16	30	HR	.	.	.	107*	113 [4]	Monsanto/DeKalb
DKA34-17RR[g]	30	HR	.	.	.	.	.	Monsanto/DeKalb
DKA41-18RR[g]	30	HR	.	.	.	.	.	Monsanto/DeKalb
DKA42-15	30	HR	.	.	108*	.	108 [5]	Monsanto/DeKalb
DKA43-13^	30	HR	.	.	.	.	.	Monsanto/DeKalb
ENFORCER	30	HR	.	HR	.	88	.	Albert Lea Seed House
ENHANCER	26	MR	.	.	94	.	102 [25]	Lemke Seed Farms
ESCALADE	26	R	.	.	102*	.	.	Albert Lea Seed House
EXALT	29	R	.	.	.	.	.	AgReliant Genetics
FOREMOST II^	29	R	.	.	.	.	102 [1]	Sansgaard Seed Farms
FSG 351	28	R	.	.	103*	.	106 [4]	La Crosse Forage & Turf Seed Corp.; Farm Science Genetics
FSG 400LH	30	HR	.	HR	81	.	.	La Crosse Forage & Turf Seed Corp.; Farm Science Genetics
FSG 406	30	HR	.	.	.	.	117 [1]	La Crosse Forage & Turf Seed Corp.; Farm Science Genetics
FSG 408DP	28	R	.	.	102*	.	105 [2]	La Crosse Forage & Turf Seed Corp.; Farm Science Genetics

(continued)

Table 4. Disease resistance and stand persistence of alfalfa varieties *(continued)*

Variety	—Disease/pest resistance[a]— DRI[b]	-Aphanomyces- race 1	race 2	PLH[c]	Persist.,[d] spring '08 (% of trial ave.) ARL '04[e]	ARL '05	Average [site-years][f]	Marketer(s)
FSG 505	30	HR	.	.	.	.	112 [3]	La Crosse Forage & Turf Seed Corp.; Farm Science Genetics
FSG 528SF	28	R	.	.	.	.	.	La Crosse Forage & Turf Seed Corp.; Farm Science Genetics
GENOA	30	HR	.	.	98*	104*	103 [4]	NK Brand Seeds
GH 717	25	MR	.	.	.	113*	.	Golden Harvest Seeds
GH 727	30	HR	HR	.	.	.	.	Golden Harvest Seeds
GH 773 LH	30	HR	.	.	.	.	.	Golden Harvest Seeds
HAYMAKER II SUPREME	30	HR	S	.	.	101*	103 [4]	Kussmaul Seeds
HYBRI+421	28	R	.	.	.	.	101 [2]	NC+ Hybrids
HYBRI+JADE	28	R	.	.	.	111*	.	NC+ Hybrids
HYBRIFORCE-420/WET	27	R	.	.	98*	.	96 [7]	Dairyland Seed Co.
INTEGRA 8400^	30	HR	.	.	.	104*	.	Wilbur-Ellis
INTEGRITY	30	HR	R	.	.	116*	.	Producer's Choice
KEYSTONE	30	HR	.	.	.	.	.	Chemgro Seeds
L-333HD^	30	HR	.	.	.	.	.	Legacy Seeds
L-447HD	29	HR	.	.	79	.	.	Legacy Seeds
LABRADOR	30	HR	.	.	.	85	101 [3]	Seed Consultants
LEGEND EXTRA^	30	HR	.	.	.	.	.	Legend Seeds
LEGENDAIRY 5.0	30	HR	.	.	120*	.	124 [2]	Croplan Genetics
LIBERATOR RR[g]	30	HR	.	.	.	.	.	NK Brand Seeds
LIGHTNING III^	30	HR	.	.	98*	.	108 [2]	Jung Seed Genetics
LIGHTNING IV^	30	HR	.	.	.	.	.	Jung Seed Genetics
MAGNUM III	20	LR	.	.	99*	.	105 [49]	Dairyland Seed Co.
MAGNUM V	26	MR	.	.	.	100	106 [26]	Dairyland Seed Co.
MAGNUM VI	30	HR	.	.	.	.	.	Dairyland Seed Co.
MAGNUM VI-WET^	28	R	.	.	.	.	.	Dairyland Seed Co.
MARINER III	30	HR	R	.	.	.	.	Allied Seed
MARVEL	30	HR	.	.	.	110*	.	Albert Lea Seed House
MEADOWLARK^	24	LR	LR	.	.	.	.	Blue River Hybrids
MENDOTA	30	HR	HR	.	.	.	.	NK Brand Seeds
MILESTONE	27	R	.	.	.	.	96 [2]	Bio-Plant Research
MOUNTAINEER 2.0	28	R	.	.	.	.	.	Croplan Genetics
MUSTANG 420 PLUS	29	HR	.	.	.	.	.	Mustang Seeds
NOVA	26	MR	.	.	98*	82	90 [2]	Northstar Seed
ONEIDA VR	21	S	.	.	92	91	99 [109]	NY AES

^Varieties not reviewed by the National Alfalfa Variety Review Board. Resistance information not verified. *(continued)*

*Stand rating not significantly different from highest rating in column.

[a] Resistance ratings: HR = highly resistant (>50% of plants have resistance); R = resistant (31–50%); MR = moderately resistant (15–30%); LR = low resistance (6–14%); S = susceptible (<6%).

[b] DRI = disease resistance index (30 = highest; 6 = lowest).

[c] PLH = potato leafhopper

[d] Numbers greater than 100 indicate better-than-average stands.

[e] Years refer to seeding years (ARL = Arlington; LAN = Lancaster).

[f] Average [site-years]: The first number is the historical stand average and uses data from all trials, past and present. The number in brackets, site-years, represents the number of times the variety has been entered. For example, 3 years at 2 sites = 6 site-years. Higher site-year values indicate greater confidence in the historical stand average.

[g] RoundUp Ready varieties currently are not commercially available at time of publication.

For more detailed disease resistance levels and stand results, visit www.uwex.edu/ces/forage/.

Table 4. Disease resistance and stand persistence of alfalfa varieties *(continued)*

Variety	—Disease/pest resistance[a]— DRI[b]	-Aphanomyces- race 1	race 2	PLH[c]	Persist.,[d] spring '08 (% of trial ave.) ARL '04[e]	ARL '05	Average [site-years][f]	Marketer(s)
PERFORM	30	HR	.	.	.	.	.	Bio-Plant Research
PGI 437	26	R	.	.	.	.	.	Producer's Choice
PGI 459	29	R	.	.	.	.	.	Producer's Choice
PHABULOUS II	30	HR	HR	.	.	97	107 [4]	Trelay
PHABULOUS III	30	HR	HR	.	.	.	.	Trelay
PHENOMENAL^	30	HR	.	.	.	.	.	Trelay
POLAR GUARD	30	HR	.	.	75	.	.	UAP Great Lakes
POWER 4.2	29	HR	.	.	.	.	105 [3]	Power Seeds
REBOUND 5.0	30	HR	.	.	106*	.	.	Croplan Genetics
REGEN	25	LR	.	.	.	.	.	Allied Seed
ROADRUNNER^	29	HR	.	.	.	.	.	Blue River Hybrids
SHEPHERD	30	HR	.	.	.	97	98 [2]	Dahlco Seeds
SOMERSET	30	HR	.	.	.	.	103 [8]	NK Brand Seeds
SPRINGGOLD	30	HR	.	.	.	.	.	Renk Seed
STARBUCK	29	HR	.	.	.	97	105 [6]	Spangler Seedtech
SUMMERGOLD	30	HR	.	.	99*	.	101 [2]	Renk Seed
TS-4007^	30	HR	.	.	.	.	.	Target Seed
TS-4027^	30	HR	R	.	.	.	.	Target Seed
VALUEPLUS 1	28	R	.	.	98*	.	103 [8]	Brown Seed Farms
VELOCITY^	30	HR	R	.	.	.	.	NuTech Seed
VERNAL	11	S	.	.	78	84	89 [135]	WI AES/USDA
VIKING 357	30	HR	R	.	.	.	74 [1]	Albert Lea Seed House
WINTERGOLD	29	HR	.	.	.	.	99 [6]	Renk Seed
WINTERKING II	30	HR	.	.	.	.	.	Midwestern BioAg
WITHSTAND	30	HR	HR	.	.	107*	.	La Crosse Forage & Turf Seed Corp.
WL 319 HQ	30	HR	.	.	.	.	102 [5]	FS Growmark; Forage First Winfield Solutions
WL 343 HQ	30	HR	LR	.	.	.	.	FS Growmark; Forage First Winfield Solutions
WL 347 LH	30	HR	.	HR	.	.	.	Forage First Winfield Solutions
WL 348 AP	30	HR	HR	LR	.	104*	103 [5]	FS Growmark; Forage First Winfield Solutions
WL 355 RR[g]	30	HR	.	.	.	.	.	FS Growmark; Forage First Winfield Solutions
WL 357 HQ	30	HR	LR	LR	.	.	105 [3]	FS Growmark; Forage First Winfield Solutions
WL 363 HQ	30	HR	LR	.	.	.	.	FS Growmark; Forage First Winfield Solutions

^Varieties not reviewed by the National Alfalfa Variety Review Board. Resistance information not verified.

*Stand rating not significantly different from highest rating in column.

[a] Resistance ratings: HR = highly resistant (>50% of plants have resistance); R = resistant (31–50%); MR = moderately resistant (15–30%); LR = low resistance (6–14%); S = susceptible (<6%).

[b] DRI = disease resistance index (30 = highest; 6 = lowest).

[c] PLH = potato leafhopper

[d] Numbers greater than 100 indicate better-than-average stands.

[e] Years refer to seeding years (ARL = Arlington; LAN = Lancaster).

[f] Average [site-years]: The first number is the historical stand average and uses data from all trials, past and present. The number in brackets, site-years, represents the number of times the variety has been entered. For example, 3 years at 2 sites = 6 site-years. Higher site-year values indicate greater confidence in the historical stand average.

[g] RoundUp Ready varieties currently are not commercially available at time of publication.

For more detailed disease resistance levels and stand results, visit www.uwex.edu/ces/forage/.

Table 5. Alfalfa yield trial for varieties resistant to potato leafhopper
Trial conducted in South Charleston, OH; seeded 2008.

Variety	Cutting yields (ton/a) 7/2/08	8/11/08	9/8/08	Total yield 2008	Yield improvement Check (%)[a]	Injury[b]	Marketer
53H92	0.27	0.64	0.32	1.21	135*	2.0	Pioneer
EVERGREEN 3	0.14	0.59	0.27	0.98	109*	2.5	NK Brand Seeds
6426	0.10	0.57	0.29	0.97	108*	2.3	Garst
AMERISTAND 404LH	0.03	0.63	0.26	0.87	97	1.8	America's Alfalfa
Susceptible checks[c]	0.11	0.52	0.25	0.90	—	4.5	

* Varieties not significantly different from highest value in column.

[a] Percent improvement over the yield of susceptible check varieties.

[b] Potato leafhopper injury rated from 1 = no visible injury to 5 = most severe injury.

[c] Susceptible check varieties were Vernal, DK 140, and 5454.

For more detailed potato leafhopper results, visit www.uwex.edu/ces/forage/.

Table 6. Alfalfa variety dry matter yield, milk production, and quality, in Rosemount, MN

Variety, listed in descending order of milk production (lb/a)	**DM yield**[a] (ton/a)	**Milk (% of Vernal)**[b] **lb/a**	**lb/ton**	**RFQ index**	**CP** (% DM)	**NDF** (% DM)	**NDFD** (% NDF)	**Marketer(s)**
Seeded 2007, harvested 2008								
SPRINGGOLD	5.70	110	101	203	24.2	33.7	51.2	Renk Seed
TS-4027	5.76	110	100	205	24.9	33.2	51.3	Target Seed
TS-4007	5.65	108	100	206	24.9	33.2	51.6	Target Seed
6417	5.57	106	100	202	24.5	33.5	50.7	Garst Seed
WL 322 HQ	5.46	104	100	204	25.1	33.2	51.1	Check
CIMARRON	5.50	101	96	184	24.1	35.7	50.1	Check
VERNAL	5.27	100	100	201	24.6	34.0	51.9	Check
Vernal, actual values	5.27	17,200	3,270	201	24.6	34.0	51.9	
Mean	5.56	106	100	201	24.6	33.8	51.1	
LSD (0.05)	ns	6	2	11	0.5	1.3	0.9	
Seeded 2008, harvested 2008								
6431	2.71	107	102	204	21.9	33.6	49.1	Garst Seed
VELOCITY	2.55	103	104	214	22.0	32.7	50.3	NuTech Seed
VERNAL	2.61	100	100	192	21.6	34.8	48.4	Check
6415	2.45	99	105	222	22.5	31.7	50.7	Garst Seed
DKA43-13	2.44	99	105	217	22.2	32.2	50.2	Monsanto/ DeKalb
CIMARRON	2.53	97	100	193	21.6	34.7	48.0	Check
6417	2.33	96	107	226	22.3	31.2	51.1	Garst Seed
WL 322 HQ	2.37	96	105	218	23.2	31.7	49.9	Check
Vernal, actual values	2.61	8,400	3,240	192	21.6	34.8	48.4	
Mean	2.50	100	104	211	22.2	32.8	49.7	
LSD (0.05)	ns	3	ns	15	0.6	1.8	1.9	

ABBREVIATIONS: CP = crude protein; **DM** = dry matter; **NDF** = neutral detergent fiber; **NDFD** = neutral detergent fiber digestibility; **RFQ** = relative forage quality

[a] Dry matter yield based on seasonal harvest totals. Harvest dates:
Varieties seeded 2007, harvested 2008: May 28, June 30, July 30, and September 5, 2008.
Varieties seeded 2008, harvested 2008: July 10 and August 22, 2008.

[b] Milk production (pounds milk per acre and per ton) are predicted using the MILK2006 spreadsheet (version milk2006alfalfagrass), a program developed at the University of Wisconsin.

BIRDSFOOT TREFOIL

Birdsfoot trefoil is a deep-rooted, winter-hardy legume that is useful in permanent pastures. It is best used on soils that are marginal for alfalfa production and where drought is not too severe. Seedling establishment is slower than alfalfa and red clover. Birdsfoot trefoil is best grown in mixtures with Kentucky bluegrass or timothy. For more details on growing this legume, see Extension publication *Birdsfoot Trefoil for Grazing and Harvested Forage* (NCR474).

RED CLOVER

Red clover is grown in pastures across the state and for hay and haylage in northern and eastern Wisconsin on soils that are not adequately drained or limed or where soils cannot be practically improved for alfalfa. Red clover is well-suited for short rotation and for plow-down in rotations with potatoes. Although difficult to dry as hay, red clover makes excellent low-moisture silage when properly managed and harvested between late bud and early bloom. Because of its easy and rapid establishment, red clover is an excellent choice for interseeding into sod pastures to improve forage yield and quality.

Table 7. Birdsfoot trefoil yields, expressed as a percent of Norcen

Variety	Ashland '97/'99[a]	Ashland '97/'98	Marshfield '96/'97-'98	Arlington '95/'96	Ashland '94/'95-'96	Seed source[b]
	% of check variety					
BONNIE	.	.	.	.	85	Deer Creek Seed
BRIGHT	104*	113*	.	.	.	Pickseed Canada
BULL	104*	94	.	.	.	Pickseed Canada
DAWN	92	79	85	90	99*	Deer Creek Seed
EMPIRE	.	.	.	83	.	New York - (Public)
GEORGIA I	.	.	.	.	69	Deer Creek Seed
LEO	91	96	99*	.	95	FarmPure Seeds
NORCEN	100*	100*	100*	100*	100*	North Central States - (Public)
STEADFAST (ARS 2620)	80	57	75	.	.	USDA-ARS, Univ MO
TREVIG	109*	100*	92*	.	.	USDA-WI-(Public-Exp)
UPSTART	96*	89	.	.	.	Pickseed Canada
VIKING	108*	73	78	100*	93	New York - (Public)
WITT	100*	90	93*	104*	94	USDA-WI-(Public-Exp)
NORCEN[c]	2.71	2.76	8.79	2.22	5.65	

* Varieties not significantly different from highest yield in column.

[a] Seeding year/harvest year(s).

[b] Source of seed for testing purposes. Check with seed source supplier or local Extension agent for marketer of seed.

[c] Norcen birdsfoot trefoil cumulative yield in tons dry matter per acre.

Table 8. Red clover yields, expressed as a percent of check varieties

Variety	Marshfield 2006[a]	Marshfield 2008	Average [site-years][b]	Marketer(s)
	—% of check varieties—			
ARLINGTON	100	108*	98 [30]	USDA-WI
BELLE	.	.	99 [3]	Pickseed Canada
BESKYD	.	.	97 [4]	DLF-International Seeds
CARDINAL	.	.	105 [2]	Blue River Hybrids; Forage First Winfield Solutions
CHIPPEWA	.	.	96 [2]	Elk Mound Seed
CINNAMON PLUS	.	.	101 [6]	Allied Seed
COLT (white clover)	57	.	58 [3]	Forage First Winfield Solutions
CRESCENDO (ladino clover)	62	.	64 [3]	Forage First Winfield Solutions
DOLINA	.	.	100 [4]	DLF-International Seeds
DOMINION	109*	.	104 [3]	Forage First Winfield Solutions
DURATION	.	.	105 [15]	La Crosse Forage & Turf Seed
DURATION EXTRA	104*	.	99 [3]	Preferred Seed Company
EMARWAN	.	104*	99 [10]	Rose Agri-Seed
FP345	104*	.	101 [3]	Allied Seed
FREEDOM	.	.	89 [4]	Barenbrug USA
FSG 9601	.	99*	103 [12]	La Crosse Forage & Turf Seed; Farm Science Genetics
IMPACT	.	.	106 [5]	Specialty Seeds
JULIET	.	.	103 [7]	Brett-Young Seeds Ltd.
KENWAY	104*	.	99 [6]	Smith Seed Services
MARATHON	100	92	102 [32]	Allied Seed
PGI 33	104*	.	99 [11]	Producer's Choice
PLUS	.	.	103 [9]	Turner Seed
RAPID	109*	.	101 [3]	Producer's Choice
RED GOLD	92	.	96 [3]	Pro Seeds Marketing
REDSTART	.	.	106 [6]	Syngenta
ROCKET	.	.	100 [4]	Grassland Central
ROYAL RED	.	.	96 [13]	Croplan Genetics
SCARLETT II	106*	.	96 [3]	Dairyland Seed
STARFIRE	.	.	105 [7]	Ampac Seed
STARFIRE II	.	106*	.	Ampac Seed
TEMPUS	.	.	92 [3]	Pickseed Canada
TOMANI	.	.	88 [4]	DLF-International Seeds
TYRANT	.	.	98 [10]	Western Productions
VESNA	.	.	91 [4]	DLF-International Seeds
WILDCAT	.	.	104 [10]	Dairyland Seed
Check yield[c]	3.77	2.49		

* Varieties not significantly different from highest value in column.

[a] Seeding year

[b] Average yield as a percent of check varieties including concluded studies not listed. The first number reports the historical average yield. The number in brackets represents the number of times the variety has been entered (e.g., 3 years at 2 sites = 6 site-years). Higher site-year values indicate greater confidence.

[c] Arlington and Marathon average yield in tons dry matter per acre.

For seasonal distribution of yield results visit www.uwex.edu/ces/forage.

GRASSES

Perennial cool-season grasses have long been an important part of the Wisconsin forage program. Perennial grasses have very diverse uses, ranging from hay, silage, and pasture to sod for roadsides and animal lots. Smooth bromegrass, orchardgrass, timothy, tall fescue, and reed canarygrass fertilized with nitrogen will provide both early season and September grazing for beef, sheep, goats, and horses. While productive in the spring and fall, grasses usually experience a "summer slump" (period of reduced growth) when the weather turns hot and/or dry. Including a legume in mixture with grass tends to improve forage quality and reduce the effects of summer slump. Grasses are used in pure stands, in grass-grass mixtures, and legume-grass mixtures.

Grass species differ in several important characteristics that influence suitability to a particular situation. The most important characteristics are maturity (how quickly the grass produces heads in the spring), winter-hardiness and survival, disease resistance, heat and drought tolerance, and grazing or traffic tolerance. For example, tall fescue is well suited to a high-traffic lot while timothy will not survive under high traffic because its crowns are very sensitive to hoof damage and will not produce new stems. Orchardgrass would be a poor choice for drainage ditches or waterways because it is a bunch-type grass, and, rather than forming a sod, it forms clumps that are interspersed with bare ground or weeds.

Tables 9 and 10 present yield and palatability data for many varieties. Palatability may be more beneficial for lactating dairy cows due to their high level of feed intake than for beef and sheep production. For marketers' addresses and telephone numbers, see the list at the end of this publication.

Wisconsin has many bluegrass pastures and quackgrass hay fields or pastures. However, producers rarely seed these species; both are considered unimproved pasture. Bluegrass productivity is extremely low. Quackgrass can produce good quality and tonnage of hay or pasture.

For each cultivated grass species used in Wisconsin today, many varieties are available with wide ranging characteristics. The most important grasses in Wisconsin today are discussed in more detail below. For color photos of grass seeds, seedlings, and mature plants, as well as additional management information, consult *Identifying Pasture Grasses* (A3637).

MEADOW BROMEGRASS

General characteristics and advantages. Meadow bromegrass is a cool-season perennial bunch grass. It is widely used in Canada and in some western states to mix with legumes for hay crops and in pastures. It starts spring growth earlier than most other grasses and is ready for grazing at an earlier date. It regrows faster and has more basal leaves than smooth bromegrass. The forage quality is similar to that of smooth bromegrass. The vegetative growth is very palatable to all classes of livestock as both green forage and cured hay. It yields relatively better than most other grass species in late summer if fertilized. Meadow bromegrass is adapted to the same soils and climatic conditions and will grow well wherever smooth bromegrass does well. Meadow bromegrass has good drought tolerance and excellent winter-hardiness. There have been no insect or disease problems observed in fields of meadow bromegrass

Special needs and disadvantages. Meadow bromegrass seedlings have better vigor than smooth bromegrass, so establishment is equal or slightly quicker. However, horizontal spread of established plants is slower so ground cover will be less rapid.

MEADOW FESCUE

General characteristics and advantages. Meadow fescue is a cool-season perennial bunch grass that has been widely used in Canada. It originated in northern Europe while tall fescue originated in southern Europe. It may be more useful than tall fescue in northern managed grazing systems which are typically based on forage mixtures where relatively unpalatable species are chronically refused. This species can tolerate frequent grazing or mowing better than most grass species. It has "softer" leaves and greater palatability than tall fescue. Meadow fescue is a diploid forage grass widely adapted to lowlands. It grows under cool, moist conditions, and tolerates wet and occasionally flooded soils. Once established, it also performs under drier conditions for making hay or silage. Meadow fescue is also a good companion to grow with alfalfa. While yield may be less than for tall fescue, animal intake and performance may be higher. It yields relatively better than most other grass species in late summer if fertilized.

Special needs and disadvantages. Meadow fescue is slow to establish and is best seeded in spring. It is very susceptible to leaf rust.

ORCHARDGRASS

General characteristics and advantages. Orchardgrass is a moderately hardy, bunch-type grass. It regrows quickly and is commonly grown in mixtures with alfalfa. It performs well in mixtures with other grasses, such as smooth bromegrass and reed canarygrass, when fertilized with nitrogen for early- and late-season grazing.

Special needs and disadvantages. For alfalfa-orchardgrass mixtures, carefully select both varieties to ensure a stable hay or silage mixture. The alfalfa variety should be a quick recovery type to help it compete with the fast-growing orchardgrass. Select medium- to late-maturing varieties of orchardgrass for mixture with alfalfa. If they are not available, reduce the orchardgrass seeding rate to half of the recommended amount. Common orchardgrass seed (that which has no variety name) should not be mixed with alfalfa. It matures too early, meaning it will have very mature seed heads when the alfalfa needs to be cut, and it is more competitive than later-maturing varieties. Mature seed heads reduce the nutritive value of the hay or silage, and the competitiveness reduces alfalfa stands. Select varieties for rust resistance for good yield and animal consumption. (See www.uwex.edu/ces/forage/pubs/vargrassinfo.htm for rust-resistant varieties.)

REED CANARYGRASS

General characteristics and advantages. Reed canarygrass is a very hardy, sod-forming grass, especially well-suited for permanent hay or pasture on peat or muck soils. It is also very useful for disposing of liquid manure and canning-crop refuse, producing high yields when nitrogen is present in these applications. It is very drought tolerant and is a good grass for dry, upland soils once established. It is also an excellent choice as a cover crop for wild game or for waterways. Reed canarygrass is invasive to wetlands and should be managed to minimize distribution of seeds and vegetative material to those areas.

Special needs and disadvantages. Reed canarygrass establishes almost as slowly as smooth bromegrass. Little forage will be produced in the first year, with either a late summer or a spring seeding. Reed canarygrass requires careful management for maximum productivity under grazing or hay production. For grazing, it requires rotational grazing with rest periods to allow regrowth and will not tolerate close grazing. For hay production, it should be cut at least three times per year, the first time as soon as possible after heads appear in whorl but before emergence, to maximize the production of high-quality forage. Plant low alkaloid types for grazing.

Leaves and stems of all reed canarygrass varieties have alkaloids that affect animal performance and health when grazing. Select varieties that do not have tryptamine-type alkaloids (gramine) to avoid certain animal disorders and to maximize animal weight gains. Alkaloids are destroyed during curing so absence of alkaloids is not an important variety selection criterion when using the crop for hay or silage.

RYEGRASS

General characteristics and advantages. Ryegrass is a new crop to Wisconsin. It can be used for overseeding pasture or, in northern Wisconsin, for hay or silage production in mixture with alfalfa or red clover in short-

term rotations (2 to 3 years). It is high in forage quality. Tetraploid types are more palatable and tend to be more winterhardy.

Special needs and disadvantages. Ryegrass should not be seeded alone in Wisconsin, due to its susceptibility to winterkill. Few ryegrass varieties are available on the market. If a choice is available, hybrid or intermediate ryegrasses or festuloliums have the best combination of high summer yields, good persistence in mixture with alfalfa, ability to survive usually for 2 to 3 years, and excellent forage nutritive value. Select varieties for rust resistance to get good yield and animal consumption.

Types

Perennial ryegrasses (diploid and tetraploid) are the hardiest of the ryegrasses, but are also the lowest yielding. Tetraploids usually have greater yields than diploids. Few diploid varieties perform well in Wisconsin. They usually go dormant between late June and mid-August, when conditions are hot and dry. They have excellent nutritive value and yield in spring and fall. Perennial ryegrass can be used with legumes to create high-yielding hay or silage mixtures.

Italian ryegrasses (frequently called annual ryegrass) are not true annuals. Italian ryegrasses are perennial under the right circumstances, which in Wisconsin requires either mild winter conditions or continuous snow cover. They have excellent spring, summer, or fall productivity relative to other ryegrasses. They also have excellent seedling vigor. Many Italian ryegrasses do not produce stems and heads in the seeding year. Refer to table 11 for varieties to plant to avoid heading. We recommend planting only late maturing types because these have better yield distribution throughout the growing season. Frost seeding Italian ryegrass is an excellent way to improve the yield and quality of pastures. The procedure is to broadcast seed during March onto a pasture that has been closely grazed the previous fall.

Hybrid (intermediate) ryegrasses are hybrids between perennial and Italian types. They have intermediate performance for nearly all above-mentioned characteristics.

Festuloliums are derived from hybrids between Italian ryegrass and meadow fescue. They have the winterhardiness and disease resistance of meadow fescue, combined with the high nutritive value and high season-long productivity of Italian ryegrass.

SMOOTH BROMEGRASS

General characteristics and advantages. Smooth bromegrass is extremely hardy, long-lived, and well-adapted to the entire state. It can be grazed or cut for hay or silage. It forms a solid sod that makes it suitable for roadsides or waterways. It has good drought and heat tolerance and is generally capable of higher yields under extreme heat and drought than most other grasses. Thus it may be the most versatile choice for southern and western Wisconsin.

Special needs and disadvantages. Smooth bromegrass is very slow to establish. Spring seedings are recommended, and it is best to use a variety that has seedling resistance to Pythium damping off disease. Make late-summer seedings by mid-August. These seedings rarely provide a productive crop until the second year. Brown leafspot is the most serious disease, but resistant varieties are available. Smooth bromegrass has low tolerance for three- and four-cut systems in an alfalfa-bromegrass mixture, but some varieties have been bred for better persistence under these conditions.

TALL FESCUE

General characteristics and advantages. Tall fescue is a hardy, sod-forming grass that is an excellent choice for use in terraces, waterways, roadsides, feed lots, and other areas where you need a coarse, vigorous sod or ground cover. It is very tolerant of intensive grazing and heavy animal traffic. Tall fescue can provide two to three hay cuttings in a typical year. It requires minimal maintenance and there are turf-type varieties that can be used to make a lawn stay green during midsummer when bluegrass and ryegrass are brown.

Special needs and disadvantages. Tall fescue is not frequently used for forage production in Wisconsin. This may be partly due to its undeserved reputation as having poor winterhardiness and partly due to its tendency to cause disorders in grazing animals. The animal disorders have been positively linked to an endophyte, a fungus living in stems of tall fescue. Once a plant has the fungus, it stays as a permanent resident. The fungus is believed to provide the host plant with a mechanism for resisting diseases, insects, and winter and summer stresses. Thus, tall fescue seed for use in lawns, roadways, waterways, etc. should have the endophyte. Tall fescue seed

for use in establishing pastures should not have the endophyte. Tall fescue varieties with novel endophyte are generally not sufficiently winterhardy for Wisconsin. We recommend endophyte-free varieties. Select varieties for rust resistance to get good yield and animal consumption. (See www.uwex.edu/ces/forage/pubs/vargrassinfo.htm for rust-resistant varieties.)

TIMOTHY

General characteristics and advantages. Timothy is a very hardy, bunch-type grass used primarily in mixture with red clover in central and northern Wisconsin. It is best adapted to cooler climates and performs better in the central and northern parts of the state than in the south. It can also be used in mixture with alfalfa and is recommended for seeding with birdsfoot trefoil. Most varieties appear to have good disease resistance.

Special needs and disadvantages. Timothy can be grazed, but it requires long rest periods and a rotational grazing system for maximum productivity and persistence. It does not form sod and has low tolerance for traffic, so it is not well-suited for feed lots, roadways, or waterways. For mixtures with red clover, select late-maturing varieties to best match the growth pattern and cutting schedule of red clover. For alfalfa, select early-maturing varieties, because they are more tolerant of the frequent cutting that is used for alfalfa-grass hay or silage production. Timothy is not well-suited to droughty or heat-prone areas.

Table 9. Performance of orchardgrass, meadow bromegrass, meadow fescue, tall fescue, timothy, festulolium, and perennial ryegrass varieties

	Hay yield						Grazing				
	Arlington				MAR[b]	Ave.[c]	Lancaster				
Varieties	2005[a]	2006	2007	2008	2006	[site-yrs]	Intake[d]	Palat.[e]	Mat.[f]	Rust[g]	Marketers
Orchardgrass											
COMMAND	.	.	107	.	.	104 [4]	.	.	L	yes	Seed Research of Oregon; Forage First Winfield Solutions
CRISTOSS	.	.	97	.	.	104 [2]	.	.	L	yes	ProSeeds Marketing
ENDURANCE	.	104*	.	.	.	98 [2]	.	.	E	.	DLF-International Seeds
HARVESTAR	96	.	.	.	.	95 [3]	.	.	L	yes	Columbia Seeds
ICON	111*	.	123*	.	.	108 [7]	.	.	ML	yes	Seed Research of Oregon; Forage First Winfield Solutions
OLYMPIA	.	87	.	.	.	90 [2]	.	.	ML	yes	Pennington Seed
PIZZA	104*	.	.	.	.	106 [6]	.	.	ML	yes	Forage First Winfield Solutions
PROFIT	92	.	.	.	.	101 [4]	.	.	ML	yes	Ampac Seed
SECO	.	110*	.	.	.	108 [3]	.	.	L	yes	Seed Research of Oregon; Forage First Winfield Solutions
TAKENA II	99	.	.	.	.	103 [3]	.	.	ML	yes	Smith Seed Services
VAILLANT	.	.	98	.	.	110 [2]	.	.	L	yes	ProSeeds Marketing
Meadow bromegrass											
FLEET	.	95	.	.	107*	104 [6]	.	.	.	.	Grassland West
PADDOCK	.	98*	.	.	107*	111 [10]	.	.	E	.	Grassland West; Allied Seed
REGAR	.	.	.	.	110*	110 [3]	.	.	.	.	Circle S Seeds
MACBETH	.	.	108*	.	.	114 [2]	.	.	M	.	Delong Co.
Meadow fescue											
BARTURA	.	93	.	.	90*	92 [6]	.	.	.	.	Barenbrug USA
LAURA	.	.	.	.	102*	95 [3]	.	.	.	.	DLF-International Seeds
PRADEL	.	106*	.	.	98*	97 [6]	.	.	.	.	Barenbrug USA

(continued)

Table 9. Performance of orchardgrass, meadow bromegrass, meadow fescue, tall fescue, timothy, festulolium, and perennial ryegrass varieties *(continued)*

	Hay yield						Grazing				
	Arlington				MAR[b]	Ave.[c]	Lancaster				
Varieties	2005[a]	2006	2007	2008	2006	[site-yrs]	Intake[d]	Palat.[e]	Mat.[f]	Rust[g]	Marketers
Tall fescue											
ARIDO	.	.	100	.	.	123 [2]	.	.	M	yes	Seed Research of Oregon; Forage First Winfield Solutions
GOLIATH	.	.	.	108*	.	.	.	.	M	.	Ampac Seed
KY31+	.	.	.	96*	.	.	.	.	.	.	U of KY
RUSTLER	.	110*	.	.	.	104 [2]	.	.	.	.	Grassland Oregon
SAVORY	.	.	107	.	.	121 [2]	.	.	M	.	DLF-International Seeds
SEINE	107*	.	.	.	.	100 [6]	.	.	ML	yes	Seed Research of Oregon; Forage First Winfield Solutions
TUSCANY II	.	.	112*	.	.	134 [2]	.	.	M	.	Seed Research of Oregon; Forage First Winfield Solutions
Timothy											
CREST	.	.	80	.	.	87 [3]	.	.	L	.	LaCrosse Forage and Turf Seed
DERBY	.	.	94	.	.	91 [3]	.	.	E	.	Allied Seed
EXPRESS	.	.	84	.	.	85 [3]	.	.	M	.	Seed Research of Oregon; Forage First Winfield Solutions
NOVIO	.	97	.	.	.	90 [2]	.	.	.	.	Parsons Seed
SUMMIT	.	.	84	.	.	86 [3]	.	.	E	.	LaCrosse Forage and Turf Seed
TALON	91	.	98	.	.	80 [6]	.	.	E	.	Seed Research of Oregon; Forage First Winfield Solutions
Festulolium											
SPRING GREEN	.	.	.	94*	.	.	.	.	.	yes[h]	Rose Agri-Seed
Perennial ryegrass											
BOOST	.	.	.	.	.	.	114*	2.9	M	yes	LaCrosse Forage and Turf Seed
POWER	.	.	.	.	.	.	76	3.0	ML	.	Ampac Seed; Delong Co.
VERANO	.	.	.	.	.	.	73	3.7*	M	yes	Columbia Seeds
Trial ave. (tons/a)	6.04	5.43	6.98	4.84	3.90	—	3.84	3.2	—	—	

* Varieties not significantly different from highest value in column.

[a] Seeding year.

[b] MAR = Marshfield.

[c] Average yield including concluded studies not listed. Number in brackets is number of site-years (e.g., 3 years at 2 sites = 6 site-years). Higher site-year values indicate greater confidence.

[d] Intake is based on difference between before-graze and after-graze pasture plate measurements.

[e] Palatability rating (% grazed): 0 = 0%, 1 = 20%, 2 = 40%, 3 = 60%, 4 = 80%, 5 = 100%. Palatibility of grasses under grazing is determined by visual estimation of percent defoliation. Assessment is made midway during mob grazing by beef cows.

[f] Maturity: E = early, M = medium, ML = medium late, L = late.

[g] Resistant to stem rust. For more information on rust-resistant varieties, visit www.uwex.edu/ces/forage/pubs/vargrassinfo.htm.

[h] Resistant to crown and stem rust.

For seasonal distribution yield results, visit www.uwex.edu/ces/forage.

Table 10. Italian ryegrass yields, expressed as a percent of trial average

Varieties	Hay yield Spooner 2008[a]	Maturity[b]	Rust[c]	Marketer(s)
Italian ryegrass				
FEAST II	102*	M	yes	Ampac Seed; Delong; Welter Seed
MAX	100*	M	yes	Pickseed Canada
Trial average (tons/a)	2.16			

* Varieties not significantly different from highest value in column.

[a] Seeding year.

[b] Maturity: E = early, M = medium, ML = medium late, L = late.

[c] Resistant to stem rust.

Table 11. Ryegrass heading in Wisconsin and Michigan for varieties planted spring 2008

Heading in the seeding year occurs when plants become vernalized (exposed to sufficient cold to initiate heading). Different varieties have differing vernalization requirements. Thus, some varieties never head, some always head, and some have varying responses at different locations. Select varieties that don't head when planting ryegrass as a cover crop with alfalfa.

Variety	WISCONSIN Arlington	Lancaster	Marshfield	Spooner	MICHIGAN Chatham	Marketer(s)
Annual ryegrass						
HERCULES	YES[a]	YES	YES	YES	no	Barenbrug
RIBEYE	YES	YES	YES	YES	YES	Barenbrug
Italian ryegrass						
AJAX	no	no	no	no	no	DLF-International Seeds
BARDELTA	no	no	no	no	no	Barenbrug
BAREXTRA	no	no	no	no	no	Barenbrug
DANERGO	no	no	no	no	no	DLF-International Seeds
FEAST II	no	no	no	no	no	Ampac Seed; Delong; Welter Seed
JEANNE	no	no	no	no	no	DLF-International Seeds
SULTAN	no	no	no	no	no	DLF-International Seeds
TETRABANA	YES	YES	YES	YES	YES	Forage First Winfield Solutions
ZORRO	no	no	no	no	no	DLF-International Seeds
Hybrid ryegrass						
TETRELITE II	no	no	no	no	no	DLF-International Seeds

[a] Heading categories: yes = variety fully headed; no = no heads observed.

PASTURE SEEDING MIXTURES

For seeding into existing sod

Under most circumstances, only legumes should be seeded into an existing sod because the grass sod is normally too competitive against grass seedlings to allow their establishment. These rates may be used for either frost seeding or no-till seeding. Be sure to remove the cover crop as seedlings emerge and again periodically during the season.

Table 12. Seeding rates into existing sod

Legume	Rate (lb/acre)	Comments
Alfalfa	3–4	Best for droughty soils
Birdsfoot trefoil	2–3	Best for wet soils
Red clover	3–4	Easiest to establish

For seeding into tilled or sod-killed fields

Seeding mixtures should have three components: a long-lived grass, a legume, and a rapid-establishing cover crop. The cover crop may be a small-seeded grain although annual or perennial ryegrass is recommended.

Table 13. Pasture seeding mixtures (select a column based on water drainage)

	——Well-drained soils——				——Less well-drained soils——				Poorly drained	
Mixture	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Long-lived grass	seeding rate, lb/acre									
Bromegrass		3–6		3–6	3–6			3–6		
Orchardgrass	2–4		2–4			2–4				
Reed canarygrass										6
Timothy					2–4		3–4	2–4	2–4	
Legume										
Alfalfa	4–6	4–6								
Alsike clover								3		
Birdsfoot trefoil									6	
Ladino clover								1		
Red clover			4–6	3–6	6	6	6			
Cover crop										
Ryegrass	2	2	2	2	2	2	2	2	2	2

Table 14. Planting rate and date for forages in Wisconsin

Rates are based on normal seedbeds and on normal size, good quality seed. Rates used will vary greatly depending on desired stand, expected mortality, emerging ability, seed weight, seed germination, seedbed condition, depth of planting, and planting equipment. Rates are for pure live seed (PLS); if PLS (% germination x % purity) is less than 90%, adjust seeding rate accordingly.

Crop	Bushel weight (lb)[a]	Seeds/pound (number)	Seeding rate (lb/acre)	Seeding date[b]
Alfalfa alone	60	199,000	12–15	Early spring or late summer
with grass			8	
Barley	48	14,300	60–85	Early spring
Big bluestem	—	150,00	10	Late May through June
Birdsfoot trefoil alone	60	372,000	8	Early spring or late summer
with grass			6	
Bluegrass	14	2,200,000	15	Early spring or late summer
Bromegrass alone	14	136,000	16	Early spring or late summer
in mixtures			3–6	
Canarygrass, annual	50	58,000	30	Early spring
Clover, alsike in mixtures	60	653,000	3	Early spring to August 10
kura	60	230,000	6	Early spring
red alone	60	252,000	10	Early spring to August 10
red with grass	60	252,000	6–8	Early spring to August 10
white in mixtures	60	784,000	1-2	Early spring to August 10
Crownvetch	—	140,000	5–10	Late April through June
Fescue, meadow, alone	24	230,000	15	Early spring or late summer
in mixtures			6	
Fescue, tall, alone	24	230,000	15	Early spring or late summer
in mixtures			6	
Fieldpea alone	60	3,000	180	Early spring
with 1½ to 2 bushels of oats			50	
Indiangrass	—	170,000	10	Late April through June
Kale	—	140,000	4	Early spring to July 1
Millet, barnyard	35	155,000	20	June 1 to July 15
foxtail	48	218,000	15	June 1 to July 15
pearl	—	85,000	20	June 1 to July 15
proso	56	65,000	20	June 1 to July 15
Oats alone	32	16,200	80	Early spring
seeded with alfalfa			32–48	
Orchardgrass alone	14	653,000	10	Early spring or late summer
in mixtures			2–4	
Rape forage	50	145,000	4	Early spring to July 1
Reed canarygrass alone	46	526,000	6	Early spring or late summer
in mixtures			5	
Ryegrass, Italian	24	227,000	20–25	Early spring
perennial	24	230,000	20–25	Early spring
in mixtures			2	Early spring
Sorghum 18- to 40-inch rows	56	15,000	10–12	May 20 to June 5 for grain
6- to 14-inch rows			15	
Soybeans for forage	60	2,500	90	Late spring to July 1
Sudangrass 18- to 40-inch rows	40	44,000	20	May 20 to June 10
6- to 14-inch rows			20–30	
Sweet clover	60	240,000	12	Early spring
Switchgrass	28	370,000	6	Late May through June
Tall fescue alone	25	229,000	10	Early spring or late summer
in mixtures			4	
Timothy alone	45	1,234,000	8	Early spring or late summer
in mixtures			2–4	
Turnip	—	190,000	1.5	April to August 1
Vetch, hairy	60	21,000	20	Early spring
Winter rye or wheat	56	15,000	60	September

[a] U.S. legal if established. If not established, weight given is that most widely accepted in the United States.

[b] For seeding date ranges, early dates are for southern Wisconsin and late dates are for northern Wisconsin.

SEED MARKETERS

Marketer	Phone	Web address
AgReliant Genetics	317-896-5552	www.agreliantgenetics.com
Albert Lea Seed House	800-352-5247	www.alseed.com
Allied Seed	800-880-8127	www.alliedseed.com
America's Alfalfa	800-873-2532	www.americasalfalfa.com
Ampac Seed	877-778-7880	www.ampacseed.com
Barenbrug USA	888-470-5569	www.barusa.com
Beck's Hybrids	800-937-2325	www.beckshybrids.com
Bio-Plant Research	800-593-7708	
Blue River Hybrids	800-370-7979	www.blueriverorgseed.com
Brett-Young Seeds	800-665-5015	www.byseeds.com
Brown Seed Farms	888-712-7696	www.brownseed.com
Chemgro Seeds	800-346-4769	www.chemgro.com
Circle S Seeds	406-285-3269	www.circlesseeds.com
Columbia Seeds	888-681-7333	www.columbiaseeds.com
Croplan Genetics	651-765-5712	www.croplangenetics.com
Dahlco Seeds	888-324-5261	www.dahlco.com
Dairyland Seed Co.	800-236-0163	www.dairylandseed.com
Deer Creek Seed	877-247-3736	www.deercreekseed.com
Delong Co.	800-356-0784	www.delongcompany.com
DLF-International Seeds	800-445-2251	www.intlseed.com
Elk Mound Seed	800-401-7333	www.elkmoundseed.com
Farm Science Genetics	888-252-7573	www.farmsciencegenetics.com
FarmPure Seeds	877-791-0500	www.farmpureseeds.com
Forage First Winfield Solutions	800-356-7333	www.foragefirst.com
FS Growmark	309-557-6000	www.growmark.com
Garst Seed	888-464-2778	www.garstseed.com
Golden Harvest Seeds	800-610-7333	www.goldenharvestseeds.com
Grassland Central	877-560-5181	www.grasslandcentral.com
Grassland Oregon	503-566-9900	www.grasslandoregon.com
Grassland West	866-214-2947	www.grasslandwest.com
Jung Seed Genetics	800-242-1855	www.jungseedgenetics.com
Kussmaul Seeds	866-587-7628	www.kussmaulseeds.com
La Crosse Forage & Turf Seed	800-328-1909	www.lftseed.com
Legacy Seeds	866-791-6390	www.legacyseeds.com
Legend Seeds	800-678-3346	www.legendseeds.net
Lemke Seed Farms	262-242-2647	
Midwestern BioAg	800-327-6012	www.midwesternbioag.com
Monsanto/DeKalb	800-768-6387	www.asgrowanddekalb.com
Mustang Seeds	800-952-3234	www.mustangseeds.com
Mycogen Seed	800-692-6436	www.mycogen.com
NC+ Hybrids	800-279-7999	www.nc-plus.com
NK Brand Seeds	800-445-0956	www.nk-us.com
Northstar Seed	800-430-5955	www.northstarseed.com
NuTech Seed	800-942-6748	www.yieldleader.com
Parsons Seed	905-729-2202	

SEED MARKETERS *(continued)*

Marketer	Phone	Web address
Pennington Seed	800-285-7333	www.penningtonseed.com
Pickseed Canada	800-661-4769	www.pickseed.com
Pioneer Hi-Bred Intl.	800-247-6803	www.pioneer.com
Power Seeds	705-324-4400	www.powerseeds.ca
Preferred Seed Company	877-417-7333	www.preferredseed.com
Producer's Choice	866-744-5710	www.producerschoiceseed.com
ProSeeds Marketing	541-928-9999	www.proseeds.net
Renk Seed	800-289-7365	www.renkseed.com
Rose Agri-Seed	503-651-2130	www.roseagriseed.com
Sansgaard Seed Farms	800-544-8751	www.prairiebrandseed.com
Seed Consultants	800-708-2676	www.seedconsultants.com
Seed Research of Oregon	800-253-5766	www.sroseed.com
Smith Seed Services	800-826-6324	www.smithseed.com
Spangler Seedtech	800-284-1080	www.spanglerseed.com
Specialty Seeds	800-685-4521	
Syngenta	800-248-4767	www.nk-us.com
Target Seed	608-526-9509	www.targetseed.com
Trelay	800-421-0397	www.trelay.com
Turner Seed	615-641-7333	www.turnerseedinc.com
UAP Great Lakes	800-362-8049	www.uap.com
Welter Seed	800-728-8450	www.welterseed.com
Western Productions	503-982-8655	www.wpiseed.com
Wilbur-Ellis	503-227-2661	www.wilbur-ellisfeed.com

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