

2023 Alfalfa Report

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Introduction

Alfalfa (*Medicago sativa*) has historically been the highest-yielding, highest-quality forage legume grown in Kentucky. It is an important part of Kentucky's cash hay enterprise and is an important component in dairy, horse, beef, and sheep diets. Choosing a good variety is a key step in establishing a stand of alfalfa. The choice of variety can impact yield, thickness of stand, and persistence.

This report provides yield data on alfalfa varieties included in current yield trials in Kentucky as well as guidelines for selecting alfalfa varieties. Tables 14 and 15 (Roundup Ready varieties) show a summary of all alfalfa varieties tested in Kentucky during the past 18 years. The UK Forage Extension website (<https://forages.ca.uky.edu>) contains electronic versions of all forage variety testing reports from Kentucky and surrounding states as well as a large number of other forage publications.

Considerations in Selecting an Alfalfa Variety

Local adaptation and persistence. High yields in variety tests over a range of years and locations are the best indication that a variety is locally adapted and persistent. Several varieties are adapted for use in Kentucky as determined from results in this report.

Winter-hardiness. Each variety has a fall dormancy (FD) rating that ranges from 1 (very dormant) to 9 (non-dormant). In general, varieties with lower dormancy ratings are more winter-hardy but are slower to initiate growth in the spring and show reduced fall growth. Fall dormancy can lead to reduced annual yields compared to less-dormant varieties. Generally, alfalfa varieties with FD ratings of 3 to 5 will show good winter survival in Kentucky. Varieties with ratings of 6 and above are usually not winter-hardy under Kentucky conditions. Many Kentucky producers have found that FD 4 varieties provide the best combination of yield and winter survival. In recent years some companies also have begun to report a winter survival index (WS) that ranges from 1 to 6. Varieties with a WS of 1 show superior winter survival, and varieties with a WS of 6 are not winter-hardy.

Disease and pest resistance. In Kentucky, producers should use varieties that are resistant (R) or highly resistant (HR) to aphanomyces root rot (APH), phytophthora root rot (PRR), and anthracnose (AN) and have at least a moderate resistance (MR) to bacterial wilt (Bw) and fusarium wilt (Fw). Kentucky research indicates that aphanomyces root rot is a widespread problem in the state during stand establishment and resistance is beneficial, particularly in soils also infested with phytophthora root rot. Ideally, choose varieties resistant to Aphanomyces race 1 and race 2.

Phytophthora root rot is a fungal disease associated with poorly drained soils or excessive rainfall. This disease causes yellowish- to reddish-brown areas on roots and crowns that eventually become black and rotten. The top growth of infected plants appears stunted and yellow.

Anthracnose is a fungal disease that attacks the stems of alfalfa, preventing water flow to the rest of the shoot and causing sudden wilting. These wilted shoots have a characteristic "shepherd's crook" appearance. Anthracnose can also cause a bluish-black crown rot. Bacterial wilt and fusarium wilt are infections of the water-conducting tissues of alfalfa roots and do not cause any noticeable root rot. These diseases prevent water flow to leaves, resulting in wilting of shoots and the eventual death of infected plants. Roots infected with bacterial wilt often have a yellowish-brown discoloration of the inner woody cylinder of the taproot. Fusarium infection can be recognized by brown to red streaks in the inner woody cylinder of the taproot.

Aphanomyces root rot is another fungal disease associated with poorly drained soils or excessive rainfall. Affected seedlings will be stunted but remain upright, unlike those with symptoms of damping off. In established plants, root symptoms are not as well defined as those for phytophthora root rot, but brown lesions on the taproot indicate where lateral roots were destroyed. This disease can be associated with phytophthora root rot, and together they may form a root disease complex. Aphanomyces root rot is known to affect new seedlings in Kentucky, but it is unclear how it affects established alfalfa. In years with overly cool and wet spring weather, alfalfa stands have suffered great damage due to aphanomyces when planted with varieties susceptible to this disease. Producers who have experienced stand losses at the seedling stage in their fields are advised to choose varieties with resistance to both Aphanomyces Race 1 and Race 2. Ask your local seed supplier for more information or download the complete disease and insect ratings for all U.S. varieties at www.alfalfa.org/pdf/2023_Alfalfa_Variety_Leaflet.pdf. The Alfalfa Analyst publication also provides good information on diagnosing disease and insect damage. Download from alfalfa.org under the publications tab.

Certain alfalfa varieties are reported to have resistance to sclerotinia crown and stem rot. However, research at the University of Kentucky has shown that some of these varieties have only limited resistance when conditions are ideal for disease development. Therefore, the best prevention against sclerotinia is to plant by mid-August if fall seeding or plant in the spring.

Seed quality. Buy premium-quality seed that is high in germination and purity and free from weed seed. Buy certified seed or proprietary seed of an improved variety. An improved variety is one that has performed well in independent trials, such as those that are reported in this publication or others like it. Other information on the label will include the test date, which must be within the previous nine months, the level of germination, and the percentage of other crop and weed seed. Order seed well in advance of planting time to assure it will be available when needed.

Description of the Tests

The current alfalfa variety tests shown in this report were established at Lexington (2019, 2020, 2021, 2022, and 2023) and Princeton (2022) as part of the forage variety testing program. The summary reports also contain past years results from alfalfa tests in Princeton and Quicksand as well as Lexington. The soils in Lexington (Maury), Princeton (Crider) and Quicksand (Nolan) are well drained silt loams and are well suited for alfalfa production.

Plots were 5 feet by 20 feet in a randomized complete block design with four replications with a harvested plot area of 5 feet by 15 feet. In each test, 20 pounds of seed per acre were planted into a prepared seedbed using a disk drill. All seed was either planted pre-inoculated with rhizobia bacteria inoculum or inoculum was added before seeding. With pre-inoculated seed, the seeding rate was adjusted to account for the weight of any seed coatings. Plots were harvested with a sickle-type forage plot harvester. First cuttings in the seeding year were delayed to allow alfalfa to reach maturity, indicated by full bloom. Otherwise, harvests were taken when the alfalfa was in the bud to early flower stage. Fresh weight samples were taken at each harvest to calculate percentage of dry matter production. Management of all tests for establishment, fertility (P, K, Boron, and lime based on regular soil tests), pest control, and harvest management was according to Kentucky Cooperative Extension recommendations. Pests (weeds and insects) were controlled so that they would not limit yield or persistence. Roundup was applied for weed control in the Roundup Ready trials.

Results and Discussion

Weather data for Lexington and Princeton are presented in Table 1 and 2. Yield data (on a dry matter basis) for all tests are reported in tables 3 through 12. Stated yields are adjusted for percentage of weeds; therefore, the value listed is for the crop only. Varieties are listed in order from highest to lowest total production (for the life of the test). Experimental varieties are listed separately at the bottom of the tables and are not available commercially. Yields are given by cutting date for 2023 and as total annual production.

Statistical analyses were performed on all alfalfa yield data (including experimentals) to determine if the apparent differences are due to variety. Varieties not significantly different from the highest numerical value in a column are marked with an asterisk (*). To determine if two varieties are statistically different, compare the difference between the two varieties to the least significant difference (LSD) at the bottom of the column. If the difference is equal to or greater than the LSD, the varieties are truly different when grown under the conditions at a given location. The coefficient of variation (CV), a measure of the variability of the data, is included for each column of means. Low variability is desirable; increased variability within a study results in higher CVs and larger LSDs.

Tables 13 and 14 (Roundup Ready varieties) show information about proprietors, fall dormancy and disease resistance for all the varieties included in the tests discussed in this report. Varieties are listed in alphabetical order.

Tables 15 and 16 (Roundup Ready varieties) are summaries of yield data from 2006 to 2023 of commercial varieties that have been entered in the Kentucky trials. The data is listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, the mean for each trial is 100 percent—varieties with percentages over 100 yielded better than average, and varieties

with percentages less than 100 yielded lower than average. Direct statistical comparisons of varieties cannot be made using the summary tables 15 and 16, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years and at several locations have stable performance; others may have performed well in wet years or on particular soil types. See footnotes in tables 15 and 16 to determine which yearly report should be referenced.

Summary

Consistent production of high yields of alfalfa is the result of good variety selection along with the implementation of good management techniques. For further information about alfalfa management, refer to the following College of Agriculture publications, available at the local county Extension office or in the “Publications” section of the UK Forage website (<https://forages.ca.uky.edu>).

- Alfalfa: The Queen of the Forage Crops (AGR-76)
- Establishing Forage Crops (AGR-64)
- Inoculation of Forage Legumes (AGR-90)
- Grain and Forage Crop Guide for Kentucky (AGR-18)
- Lime and Fertilizer Recommendations (AGR-1)
- Weed Control Strategies for Alfalfa and Other Forage Legume Crops (AGR-148)
- Insect Management Recommendations for Field Crops and Livestock (ENT-17)
- Alfalfa Hay: Quality Makes the Difference (AGR-137)
- Fertilizer Management in Alfalfa (AGR-210)
- “Emergency” Inoculation for Poorly Nodulated Legumes (PPFS-AG-F-04)
- Common Alfalfa Seedling Diseases and Disorders (PPFS-AG-F-03)
- Managing Diseases of Alfalfa (PPFS-AG-F-09)
- Managing Legume-Induced Bloat in Cattle (ID-186)
- Growing Alfalfa in the South, a publication of the National Alfalfa & Forage Alliance: www.alfalfa.org/pdf/alfalfainthesouth.pdf
- Alfalfa Management Guide: www.crops.org/files/publications/alfalfa-management-guide.pdf
- Alfalfa Analyst (ID guide to alfalfa disease and insect damage and soil fertility deficiencies): www.alfalfa.org/pdf/AlfalfaAnalyst.pdf
- Alfalfa Variety Ratings, Winter Survival, Fall Dormancy & Pest Resistance Ratings for Alfalfa Varieties: www.alfalfa.org/varietyLeaflet.php
- Grazing Alfalfa: Economic and Sustainable Use of a High Value Crop: www.alfalfa.org/GrazingAlfalfaFinal.pdf
- Alfalfa for Beef Cows: www.alfalfa.org/AlfalfaForBeefCows.pdf
- Alfalfa: The High Quality Hay for Horses; www.alfalfa.org/publications.php

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Table 1. Temperature and rainfall at Lexington, Kentucky, in 2019, 2020, 2021, 2022, and 2023.

	2019				2020				2021				2022				2023 ²			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	33	+2	4.11	+1.25	40	+9	3.72	+0.86	34	+3	4.51	+1.65	29	-2	4.93	+2.07	44	+13	6.28	+3.42
FEB	42	+7	7.64	+4.43	38	+3	5.14	+1.93	31	-4	4.60	+1.39	38	+3	7.69	+4.48	47	+12	3.73	+0.52
MAR	43	-1	3.49	-0.91	51	+7	3.79	-0.61	50	+6	5.12	+0.72	49	+5	4.27	-0.13	48	+4	4.45	+0.05
APR	54	+4	4.76	+0.88	52	-3	4.92	+1.04	54	-1	2.72	-1.16	55	0	3.71	-0.17	58	+3	2.36	-1.52
MAY	69	+5	4.49	+0.02	62	-2	5.69	+1.22	62	-2	4.34	-0.13	69	+5	3.84	-0.63	65	+1	2.53	-1.94
JUN	73	+1	6.13	+2.47	72	0	2.56	-1.10	73	+1	6.26	+2.60	76	+4	2.10	-1.56	72	0	6.75	+3.09
JUL	79	+3	3.30	-1.70	79	+3	3.23	-1.77	75	-1	5.90	+0.90	80	+4	6.46	+1.46	78	+2	5.32	+0.32
AUG	77	+2	2.42	-1.51	75	0	3.41	-0.52	76	+1	6.16	+2.23	77	+2	4.27	+0.34	76	+1	2.40	-1.53
SEP	77	+9	0.18	-3.02	68	0	4.43	+0.83	69	+1	3.03	-0.17	70	+2	1.50	-1.70	71	+3	0.99	-2.21
OCT	61	+4	7.55	+5.58	57	0	4.98	+2.41	62	+5	4.64	+2.10	57	0	0.96	-1.61	61	+4	2.30	-0.27
NOV	41	-4	5.39	+2.00	49	+4	2.18	-1.21	43	-2	2.13	-1.26	49	+4	2.10	-1.29				
DEC	43	+7	5.74	+1.76	36	0	2.27	-1.71	47	+11	4.41	+0.43	40	+4	3.46	-0.52				
Total			55.20	+10.65			45.92	+1.37			53.85	+9.30			45.29	+0.74			37.11	-0.07

¹ DEP is departure from the long-term average.
² 2023 data is for ten months through October.

Table 2. Temperature and rainfall at Princeton, Kentucky, in 2022 and 2023.

	2022				2023 ²			
	Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP
JAN	32	-2	5.04	+1.24	43	+9	5.11	+1.31
FEB	39	+1	7.44	+3.01	46	+8	3.27	-1.16
MAR	51	+4	4.85	-0.09	48	+1	6.89	+1.95
APR	56	-2	6.41	+1.61	57	-2	2.14	-2.66
MAY	68	+1	2.54	-2.42	67	0	4.47	-0.49
JUN	75	0	3.46	-1.39	72	-3	1.59	-2.26
JUL	80	+2	4.75	+0.46	77	-1	11.23	+6.54
AUG	76	-1	5.85	+1.84	75	-1	8.87	+4.86
SEP	69	-2	0.32	-3.01	71	0	2.77	-0.56
OCT	57	-2	1.19	-1.86	59	0	3.82	+0.77
NOV	47	0	1.45	-3.18				
DEC	38	-1	3.95	-1.09				
Total			46.25	-4.88			50.16	+8.70

¹ DEP is departure from the long-term average.
² 2023 data is for ten months through October.

Table 3. Dry matter yields, seedling vigor, and stand persistence of alfalfa varieties sown April 2, 2019, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² May 3, 2019	Percent Stand										Yield (tons/acre)										5-year Total	
			2019		2020		2021		2022		2023		2019	2020	2021	2022	2023							
			May 3	Oct 11	Mar 17	Sep 24	Mar 24	Sep 30	Mar 22	Sep 22	Mar 9	Oct 4	Total	Total	Total	Total	May 11	Jun 9	Jul 11	Aug 11	Sep 14	Total		
Commercial Varieties-Available for Farm Use																								
Rebound 6XT	4	4.9	100	100	99	97	97	97	97	96	96	96	96	1.30	4.18	6.68	7.34	1.91	1.62	1.41	1.47	0.87	7.29	26.79*
FSG415BR	4	5.0	100	100	100	98	98	98	98	97	97	96	96	1.29	4.02	7.00	6.68	1.89	1.41	1.30	1.24	0.67	6.50	25.49*
GA-497HD	5	4.9	100	100	99	96	96	97	97	95	95	95	90	1.41	4.39	7.08	6.35	1.67	1.39	1.17	1.20	0.55	5.98	25.21*
GA-535	5	4.8	98	98	98	94	94	94	96	95	95	90	1.41	4.39	7.08	6.35	1.67	1.39	1.17	1.20	0.55	5.98	25.21*	
Ameristand 403T Plus	4	4.5	100	99	99	95	95	95	96	95	95	94	1.51	4.31	6.98	6.25	1.68	1.21	1.14	1.14	0.47	5.65	24.70*	
WL 349HQ	4	4.6	99	99	99	96	98	98	98	95	95	94	0.94	3.91	6.74	6.49	1.65	1.44	1.44	1.34	0.69	6.57	24.65*	
Charger	5	4.4	99	98	98	95	96	96	96	95	95	94	1.10	4.30	6.75	6.01	1.58	1.28	1.19	1.17	0.56	5.79	23.95*	
Paola	5	5.0	100	100	99	91	93	93	92	91	92	87	1.47	4.21	5.95	5.83	1.47	1.33	1.14	1.11	0.48	5.53	22.99*	
55V50	5	5.0	100	100	100	95	96	96	96	93	93	76	1.26	3.60	6.54	5.73	1.55	1.00	0.95	0.95	0.41	4.86	22.00	
Saranac AR (certified)	4	4.5	99	100	99	87	86	84	83	81	81	76	1.27	3.97	5.88	5.22	1.44	1.03	0.81	0.86	0.45	4.60	20.94	
Triade	5	4.9	100	100	97	89	89	87	86	81	79	64	1.08	3.94	5.54	5.08	1.22	1.09	0.85	0.78	0.29	4.22	19.86	
Alfagraze	3	4.1	99	99	98	74	78	78	87	84	84	70	0.96	3.38	5.53	4.44	1.20	0.82	0.79	0.71	0.28	3.80	18.10	
Mean		4.7	99	99	99	92	93	93	93	91	91	86	1.21	4.04	6.45	6.03	1.61	1.26	1.12	1.09	0.52	5.60	23.34	
CV,%		4.9	1	1	2	7	5	6	4	7	7	13	23.72	15.30	11.60	14.47	19.80	18.81	15.68	17.70	37.25	18.04	11.82	
LSD,0.05		0.3	1	1	3	9	6	8	6	9	9	16	0.41	0.89	1.08	1.25	0.45	0.34	0.25	0.28	0.28	1.45	3.97	

¹ FD=fall dormancy.
² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 4. Dry matter yields, seedling vigor, and stand persistence of alfalfa varieties sown April 3, 2020, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² June 3, 2020	Percent Stand								Yield (tons/acre)								4-year Total		
			2020		2021		2022		2023		2020	2021	2022	2023							
			June 3	Sep 24	Mar 24	Sep 29	Mar 22	Sep 22	Mar 9	Oct 4	Total	Total	Total	May 10	Jun 8	Jul 11	Aug 10	Sep 14		Total	
Commercial Varieties-Available for Farm Use																					
Alfabar	3	4.1	97	96	96	96	96	95	94	94	2.53	7.46	7.67	2.43	1.69	1.66	1.35	1.10	8.23	25.89*	
FSG-415BR	4	4.9	100	100	99	99	99	98	98	98	2.56	7.70	7.72	2.29	1.64	1.55	1.26	1.08	7.81	25.80*	
HVS4220Q	4	4.8	100	99	99	99	99	98	98	98	2.15	7.86	7.50	2.14	1.74	1.63	1.29	1.02	7.82	25.33*	
GA-497HD	5	4.8	98	97	98	98	97	95	95	96	2.45	7.25	7.56	2.02	1.78	1.57	1.24	1.00	7.60	24.86*	
GA-535	5	4.8	98	97	98	98	98	98	98	98	2.31	7.02	7.22	2.06	1.79	1.71	1.36	1.08	8.01	24.56*	
GA-409	4	4.6	100	100	100	100	98	96	96	96	2.47	6.59	7.14	2.07	1.76	1.63	1.29	1.05	7.80	24.00*	
Ameristand 403T Plus	4	4.3	99	98	97	97	97	97	97	95	2.21	6.93	7.15	2.11	1.53	1.43	1.17	1.00	7.24	23.53*	
FSG-527	5	4.3	97	98	98	98	98	98	98	98	1.95	7.21	6.85	1.81	1.60	1.57	1.34	1.02	7.34	23.35	
Paola	5	4.8	99	98	98	99	99	97	97	97	2.38	7.20	6.88	1.61	1.54	1.39	1.13	1.03	6.70	23.15	
Saranac AR (certified)	4	4.5	100	96	96	96	95	94	94	91	2.23	6.85	6.65	2.00	1.49	1.30	1.04	0.93	6.76	22.49	
Triade	5	5.0	100	100	100	100	99	98	98	95	2.34	6.99	6.67	1.56	1.46	1.26	1.02	0.96	6.26	22.27	
Alfagraze	3	4.1	96	94	94	94	94	94	94	94	2.32	6.11	6.08	1.91	1.38	1.34	1.14	0.91	6.67	21.18	
Mean		4.6	99	98	98	98	97	96	96	96	2.33	7.10	7.09	2.00	1.62	1.50	1.22	1.01	7.35	23.87	
CV,%		9.5	2	2	2	2	2	2	2	3	11.28	8.75	8.75	12.51	11.24	10.63	11.11	12.87	9.53	7.09	
LSD,0.05		0.6	3	3	3	3	3	3	3	4	0.38	0.89	0.89	0.36	0.26	0.23	0.19	0.19	1.01	2.44	

¹ FD=fall dormancy.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 5. Dry matter yields, seedling vigor, and stand persistence of Roundup Ready alfalfa varieties sown May 15, 2020, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² June 11, 2020	Percent Stand								Yield (tons/acre)								4-year Total		
			2020		2021		2022		2023		2020	2021	2022	2023							
			Jun 11	Sep 24	Mar 24	Sep 29	Mar 22	Sep 22	Mar 9	Oct 4	Total	Total	Total	May 10	Jun 8	Jul 11	Aug 10	Sep 14		Total	
Commercial Varieties-Available for Farm Use																					
438 RR	4	5	100	100	100	100	100	100	98	96	1.74	8.43	6.42	1.55	1.18	1.41	1.27	0.80	6.22	22.81*	
Ameristand 405T RR	4	5	100	100	100	100	100	100	98	97	1.91	7.95	5.88	1.36	1.04	1.20	1.12	0.72	5.45	21.19*	
Alfagraze 300 RR	3	5	100	100	100	100	100	100	99	98	1.60	8.16	5.62	1.40	0.96	1.11	1.12	0.58	5.17	20.55*	
Ameristand 433T RR	3	5	100	100	100	100	100	100	99	97	1.58	7.70	5.26	1.24	0.93	1.10	1.05	0.59	4.91	19.45*	
Mean		5	100	100	100	100	100	100	98	97	1.68	7.99	5.69	1.36	1.01	1.19	1.12	0.66	5.33	20.69	
CV,%		0	0	0	0	0	0	0	2	3	13.60	10.34	19.72	23.85	18.99	21.28	16.89	27.08	20.20	14.59	
LSD, 0.05		0	0	0	0	0	0	0	3	4	0.33	1.18	1.60	0.46	0.27	0.37	0.27	0.25	1.54	4.31	

¹ FD=fall dormancy.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 6. Dry matter yields, seedling vigor, and stand persistence of alfalfa varieties sown April 5, 2021, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² Jun 1, 2021	Percent Stand						Yield (tons/acre)								3-year Total	
			2021		2022		2023		2021	2022	2023							
			Jun 1	Sep 29	Mar 22	Sep 22	Mar 9	Oct 4	Total	Total	May 10	Jun 9	Jul 11	Aug 11	Sep 13	Total		
Commercial Varieties-Available for Farm Use																		
HighFive	5	4.5	99	98	96	96	96	95	2.18	4.38	1.69	1.31	1.38	1.25	0.43	6.06	12.62 *	
54VQ52	4	5.0	99	99	95	95	95	94	2.20	4.42	1.72	1.28	1.26	1.12	0.40	5.79	12.41*	
54Q29	4	4.8	100	98	97	95	92	93	1.97	4.04	1.47	1.32	1.31	1.21	0.51	5.81	11.81*	
FSG450	4	4.8	96	92	91	90	89	87	1.98	4.05	1.37	1.24	1.36	1.20	0.47	5.65	11.68*	
Ameristand 403T Plus	4	4.1	97	97	95	93	92	89	2.00	4.18	1.53	1.16	1.24	1.03	0.41	5.37	11.55*	
Signature	4	4.5	98	96	92	91	90	91	1.95	3.97	1.25	1.25	1.27	1.15	0.51	5.43	11.35*	
54Q16	4	4.9	98	96	95	94	92	91	1.95	3.99	1.42	1.15	1.23	1.12	0.46	5.38	11.32*	
GA-497HD	5	4.9	100	98	97	95	93	92	1.99	4.00	1.33	1.17	1.25	1.13	0.40	5.28	11.27*	
Mariner V	4	4.4	96	96	95	91	89	74	2.12	3.84	1.37	1.13	1.24	1.11	0.38	5.23	11.18*	
Alfagraze	3	4.3	94	93	93	92	93	90	2.02	3.85	1.57	1.09	1.13	1.07	0.35	5.20	11.07*	
55H96	5	4.3	96	96	95	91	90	86	2.08	3.72	1.40	1.02	1.16	1.03	0.40	5.00	10.80*	
Saranac AR (certified)	4	4.5	98	96	93	90	84	79	1.97	3.42	1.18	0.99	1.05	0.89	0.30	4.41	9.80	
Mean		4.6	98	96	94	93	91	88	2.03	3.99	1.44	1.18	1.24	1.08	0.42	5.38	11.41	
CV,%		11.5	2	3	4	5	5	9	15.78	19.16	20.30	15.17	14.32	14.47	24.44	15.04	15.25	
LSD,0.05		0.8	3	4	5	6	7	11	0.46	1.45	0.42	0.26	0.26	0.23	0.15	1.16	2.50	

¹ FD=fall dormancy.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 7. Dry matter yields, seedling vigor, and stand persistence of Roundup Ready alfalfa varieties sown April 5, 2021, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² June 1, 2021	Percent Stand						Yield (tons/acre)								3-year Total	
			2021		2022		2023		2021	2022	2023							
			Jun 1	Sep 29	Mar 22	Sep 22	Mar 9	Oct 4	Total	Total	May 10	Jun 9	Jul 11	Aug 11	Sep 13	Total		
Commercial Varieties-Available for Farm Use																		
54VR10 RR	4	4.9	99	99	99	98	98	98	2.43	5.56	1.94	1.43	1.45	1.27	0.44	6.54	14.53*	
Ameristand 433T RR	3	4.6	98	98	98	96	97	96	2.25	5.27	1.94	1.25	1.27	1.10	0.40	5.96	13.48*	
Ameristand 405T RR	4	4.6	99	99	97	97	96	94	2.25	5.05	1.60	1.29	1.35	1.06	0.46	5.77	13.07	
438 RR	4	4.6	99	98	96	96	95	95	2.24	4.65	1.56	1.26	1.26	0.99	0.43	5.49	12.38	
Alfagraze 300 RR	3	4.6	98	97	96	96	96	96	2.10	4.52	1.68	1.07	1.16	1.02	0.34	5.27	11.89	
Mean		4.7	98	98	97	97	96	96	2.25	5.01	1.74	1.26	1.30	1.09	0.41	5.81	13.07	
CV,%		9.2	1	1	2	2	2	2	11.42	6.13	10.97	9.21	10.52	7.98	22.35	8.88	6.71	
LSD,0.05		0.7	2	2	4	3	3	3	0.40	0.47	0.29	0.18	0.21	0.13	0.14	0.79	1.35	

¹ FD=fall dormancy.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 8. Dry matter yields and stand persistence of alfalfa varieties sown Aug 19, 2022, at Lexington, Kentucky.

Variety	Fall Dormancy	Percent Stand			Yield (tons/acre)						
		2022		2023		2023					
		Nov 19	Mar 9	Oct 4	May 10	Jun 14	Jul 11	Aug 11	Sep 14	Total	
Commercial Varieties-Available for Farm Use											
Alfagraze	3	95	96	97	0.92	0.79	1.19	1.56	0.89	5.35*	
54VQ52	4	99	99	99	0.85	0.70	1.33	1.63	0.83	5.34*	
Saranac AR (certified)	4	98	97	97	0.68	0.83	1.25	1.49	0.86	5.11*	
54Q29	4	98	97	97	0.81	0.76	1.32	1.42	0.79	5.10*	
Ameristand 403T Plus	4	98	98	97	0.72	0.76	1.25	1.49	0.84	5.07*	
HighFive	5	96	95	96	0.58	0.83	1.31	1.52	0.80	5.04*	
54Q16	4	98	98	98	0.66	0.77	1.28	1.52	0.80	5.02*	
Mariner V	4	98	96	97	0.57	0.82	1.26	1.43	0.86	4.95 *	
GA-497HD	5	98	97	98	0.86	0.78	1.16	1.34	0.80	4.94 *	
55H96	5	97	96	97	0.74	0.71	1.22	1.42	0.71	4.80*	
Signature	4	98	98	98	0.45	0.74	1.33	1.44	0.81	4.77 *	
FSG-450	4	98	98	98	0.48	0.80	1.29	1.43	0.75	4.76*	
Mean		98	97	97	0.70	0.78	1.26	1.47	0.81	5.02	
CV,%		3	3	2	15.89	11.45	13.83	9.93	13.59	9.55	
LSD,0.05		4	4	3	0.16	0.13	0.25	0.21	0.16	0.69	

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 9. Dry matter yields and stand persistence of Roundup Ready alfalfa varieties sown April 4, 2022, at Lexington, Kentucky.

Variety	Fall Dormancy	Percent Stand				Yield (tons/acre)							
		2022		2023		2022	2023						2-year Total
		Jul 20	Sep 22	Mar 9	Oct 4	Total	May 11	Jun 8	Jul 11	Aug 11	Sep 14	Total	
Commercial Varieties-Available for Farm Use													
54VR10 RR	4	88	90	90	91	2.03	1.90	1.20	1.43	1.38	0.62	6.53	8.56*
438 RR	4	96	96	96	96	1.98	1.73	1.26	1.46	1.37	0.62	6.45	8.43*
Ameristand 433T RR	3	91	89	91	91	1.88	1.87	1.05	1.47	1.38	0.60	6.37	8.26*
Aflagraze 300 RR	3	84	86	89	89	1.83	1.89	1.06	1.29	1.32	0.55	6.11	7.94*
Ameristand 405T RR	4	80	83	90	90	1.78	1.77	1.17	1.31	1.23	0.62	6.10	7.87*
Mean		88	89	91	92	1.90	1.84	1.13	1.40	1.35	0.60	6.32	8.22
CV,%		8	8	6	5	7.85	8.13	6.57	8.84	9.57	12.68	6.04	5.97
LSD,0.05		10	10	8	6	0.21	0.21	0.11	0.18	0.18	0.11	0.54	0.70

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 10. Dry matter yields, seeding vigor, and stand persistence of alfalfa varieties sown April 4, 2023, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² May 16, 2023	Percent Stand		Yield (tons/acre)			
			2023		2023			
			May 16	Oct 4	Jul 11	Aug 11	Sep 15	Total
Commercial Varieties-Available for Farm Use								
Ameristand 428TQ	4	4.8	100	100	1.09	1.02	0.71	2.82*
Saranac AR (certified)	4	4.4	100	100	1.10	0.98	0.64	2.71*
GA-409	4	4.6	100	100	1.07	1.05	0.58	2.70*
GA-497HD	5	4.8	100	100	1.06	1.01	0.61	2.68*
Alfabar	3	4.1	99	100	1.06	1.02	0.54	2.62*
GA-535	5	4.9	100	100	1.01	0.93	0.60	2.55*
FSG-527	5	4.9	100	100	0.98	0.95	0.58	2.52*
Mariner V	4	4.6	100	100	1.05	0.91	0.55	2.51*
HVS4220Q	4	5.0	100	100	1.01	0.94	0.54	2.50*
WL 3521HQ	5	4.9	100	100	0.86	0.88	0.52	2.25
Mean		4.7	100	100	1.03	0.97	0.59	2.59
CV,%		6.4	0	0	8.93	13.11	20.44	8.44
LSD,0.05		0.4	1	0	0.14	0.19	0.18	0.32

¹ FD=fall dormancy.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 11. Dry matter yields, seeding vigor, and stand persistence of Roundup Ready alfalfa varieties sown April 4, 2023, at Lexington, Kentucky.

Variety	FD ¹	Seedling Vigor ² May 16, 2023	Percent Stand		Yield (tons/acre)			
			2023		2023			
			May 16	Oct 4	Jul 11	Aug 11	Sep 15	Total
Commercial Varieties-Available for Farm Use								
438 RR	4	4.6	100	100	0.91	1.29	0.88	3.08*
54VR10 RR	4	4.9	100	100	0.95	1.23	0.84	3.01*
WL3546HQ RR	5	4.4	100	100	0.72	1.12	0.83	2.67*
Ameristand 423TQ RR	4	4.8	100	100	0.81	1.04	0.77	2.62*
WL375HVX RR	5	4.5	99	100	0.69	1.08	0.80	2.58*
Ameristand 481HVX RR	4	4.4	100	100	0.65	1.03	0.72	2.40
Mean		4.6	100	100	0.79	1.13	0.81	2.73
CV,%		8.8	1	0	17.52	12.84	15.40	14.02
LSD,0.05		0.6	1	1	0.21	0.22	0.19	0.58

¹ FD=fall dormancy.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 12. Dry matter yields, seedling vigor, and stand persistence of alfalfa varieties sown April 28, 2022, at Princeton, Kentucky.

Variety	Fall Dormancy	Seedling Vigor ¹ June 1, 2022	Percent Stand			Yield (tons/acre)						2-year Total
			2022		2023	2022		2023			Total	
			Jun 1	Nov 9	Oct 20	Total	Jun 2	Jul 7	Aug 17	Sep 19		
Commercial Varieties-Available for Farm Use												
54VQ52	4	5.0	100	96	98	1.73	2.50	1.63	1.60	1.05	6.78	8.51*
Ameristand 403T Plus	4	4.5	100	95	93	1.51	2.88	1.58	1.46	0.79	6.71	8.22*
Saranac AR (certified)	4	4.6	100	90	86	1.44	2.96	1.56	1.42	0.65	6.58	8.02*
High Five	5	4.9	100	95	98	1.43	2.44	1.51	1.47	0.91	6.33	7.76*
54Q29	4	4.6	98	97	97	1.42	2.47	1.41	1.54	0.90	6.32	7.75*
Alfagraze	2	4.8	99	92	92	1.45	2.72	1.41	1.36	0.80	6.28	7.73*
54Q16	4	5.0	100	94	94	1.29	2.43	1.44	1.52	0.83	6.22	7.51*
Mariner V	4	4.6	99	90	92	1.33	2.40	1.50	1.43	0.84	6.16	7.50*
FSG 450	4	4.8	99	93	94	1.34	2.35	1.43	1.23	0.97	5.98	7.32*
GA-497HD	5	5.0	100	94	90	1.30	2.39	1.46	1.16	0.87	5.88	7.18
55H96	5	4.6	100	91	89	1.55	2.01	1.31	1.51	0.80	5.62	7.18
Signature	4	4.8	99	88	82	1.15	2.08	1.33	1.23	0.77	5.40	6.55
Mean		4.8	99	93	92	1.41	2.47	1.46	1.41	0.85	6.19	7.60
CV,%		6.4	1	6	7	16.02	26.44	14.32	10.71	20.27	12.80	11.94
LSD,0.05		0.4	1	8	9	0.33	0.73	0.30	0.23	0.25	1.14	1.31

¹ Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 13. Characterization and proprietors of alfalfa varieties in current trials in Kentucky.

Variety	Proprietor	Variety Characteristics ¹						
		Disease Resistance ²						
		FD ³	Bw	Fw	An	PRR	APH1	APH2
Commercial Varieties-Available for Farm Use								
Alfabar	Barenbrug	3	HR	HR	HR	HR	HR/R	-
Alfagraze	America's Alfalfa	2	MR	R	MR	R	-	-
Ameristand 403TPlus	America's Alfalfa	4	HR	HR	HR	HR	HR	R
Charger	Beck's Hybrids	5	HR	HR	HR	HR	HR	-
FSG 415BR	Farm Science Genetics	4	HR	HR	HR	HR	HR	-
FSG 450	Allied Seed, L.L.C.	4	HR	HR	HR	HR	HR	HR
FSG 527	Farm Science Genetics	5	HR	HR	HR	HR	HR	R
GA-409	Pref. Alfalfa Genetics	4	HR	HR	HR	HR	HR	HR
GA-497HD	Pref. Alfalfa Genetics	5	HR	HR	HR	HR	HR	-
GA-535	Pref. Alfalfa Genetics	5	HR	HR	HR	HR	HR	-
High Five	Allied Seed, L.L.C.	5	HR	HR	HR	HR	HR	HR
HVS4220Q	MountainView Seeds	4	HR	HR	HR	HR	HR	HR
Mariner V	Allied Seed, L.L.C.	4	HR	HR	HR	HR	HR	HR
Paola	Interlake Forage Seeds	5	HR	HR	HR	HR	HR	HR
Rebound 6XT	Croplan Genetics	4	HR	HR	HR	HR	HR	HR
Saranac AR (certified)	Public	4	MR	R	HR	LR	-	-
Signature	Allied Seed, L.L.C.	4	HR	HR	HR	HR	HR	HR
Triade	Interlake Forage Seeds	5	HR	HR	HR	HR	HR	HR
WL-349HQ	W-L Research	4	HR	HR	HR	HR	HR	HR
WL 365HQ	W-L Research	5	HR	HR	HR	HR	HR	-
WL 3521HQ	W-L Research	5	HR	HR	HR	HR	HR	HR
54Q16	Pioneer	4	HR	HR	HR	HR	HR	HR
54Q29	Pioneer	4	HR	HR	HR	HR	R	R
54VQ52	Pioneer	4	HR	R	HR	HR	HR	HR
55H96	Pioneer	5	HR	HR	HR	HR	HR	HR
55V50	Pioneer	5	HR	R	HR	HR	HR	HR

¹ Variety characteristics: FD=fall dormancy, Bw=bacterial wilt, Fw=fusarium wilt, An=anthracnose, PRR=phytophthora root rot, APH-aphanomyces root rot. Information provided by seed companies.

² Disease resistance: S=susceptible, LR=low resistance, MR=moderate resistance, R=resistance, HR=high resistance (more detailed disease and insect resistance ratings at www.alfalfa.org/pdf/2023_Alfalfa_Variety_Leaflet.pdf).

³ Fall dormancy-check varieties: 1=Spredor 3, 2=Vernal, 3=Ranger, 4=Saranac, 5=DuPuits.

Table 14. Characterization and proprietors of Roundup Ready alfalfa varieties in current trials in Kentucky.

Variety	Proprietor	Variety Characteristics ¹						
		Disease Resistance ²						
		FD ³	Bw	Fw	An	PRR	APH1	APH2
Commercial Varieties-Available for Farm Use								
Alfagraze 300 RR	America's Alfalfa	3	HR	R	HR	HR	HR	-
Ameristand 405T RR	America's Alfalfa	4	HR	HR	HR	HR	HR	MR
Ameristand 423TQ RR	America's Alfalfa	4	HR	HR	HR	HR	HR	HR
Ameristand 433T RR	America's Alfalfa	3	HR	R	R	HR	HR	-
Ameristand 481HVX	America's Alfalfa	4	HR	HR	HR	HR	HR	HR
WL3546HQ	W-L Research	5	HR	HR	HR	HR	HR	HR
WL 375HVX	W-L Research	5	HR	HR	HR	HR	HR	HR
438 RR	Allied Seed	4	HR	HR	HR	HR	HR	-
54VR10 RR	Pioneer	4	HR	HR	R	HR	HR	-

¹ Variety characteristics: FD=fall dormancy, Bw=bacterial wilt, Fw=fusarium wilt, An=anthracnose, PRR=phytophthora root rot, APH-aphanomyces root rot. Information provided by seed companies.

² Disease resistance: S=susceptible, LR=low resistance, MR=moderate resistance, R=resistance, HR=high resistance (more detailed disease and insect resistance ratings at www.alfalfa.org/pdf/2023_Alfalfa_Variety_Leaflet.pdf).

³ Fall dormancy-check varieties: 1=Spredor 3, 2=Vernal, 3=Ranger, 4=Saranac, 5=DuPuits.

Table 15. Summary of Kentucky Roundup Ready alfalfa yield trials 2011-2023 (yield shown as a percentage of the mean of the commercial varieties in the test).

Variety	Proprietor	Variety Characteristics ¹							Lexington					Princeton			Quicksand	Mean ⁵ (# trials)
		FD	Disease Resistance ²						12 ^{3,4}	15	16	20	21	11	13	15	14	
			Bw	Fw	An	PRR	APH1	APH2	6yr ⁶	6yr	5-yr	4-yr	3yr	5yr	4yr	2yr	2yr	
Alfagraze 300 RR	America's Alfalfa	3	HR	R	HR	HR	HR	–	95	96	100	99	91	93	99	93		96(8)
Alfagraze 600 RR	America's Alfalfa	6		R	HR	R	R	–		97						85	93	92(3)
Ameristand 405T RR	America's Alfalfa	4	HR	HR	HR	HR	HR	MR	100	100	89	102	100	97	100	98	93	98(9)
Ameristand 433T RR	America's Alfalfa	3	HR	R	R	HR	HR	–	92	98	100	94	103		95	96	107	98(8)
Ameristand 445TQ RR	America's Alfalfa	4	HR	HR	HR	HR	HR	–	105	104					100			103(3)
AphaTron RR	Croplan Genetics	4	HR	HR	HR	HR	HR	HR	99						98			99(2)
Consistency 4.10 RR	Croplan Genetics	4	HR	HR	HR	HR	HR	–	101					102				102(2)
DKA-41-18 RR	Monsanto	4	HR	HR	HR	HR	HR	–	100					101		100		100(3)
DKA 44-16 RR	Monsanto	4	HR	HR	HR	HR	HR	–	104						100			102(2)
Stratica RR	Croplan Genetics	4	HR	HR	HR	HR	HR	–	97		105				96			99(3)
Tonnica RR	Crop Genetics	5	HR	HR	HR	HR	HR	–	105						101			103(2)
WL 355 RR	W-L Research	4	HR	HR	HR	HR	HR	–	99					102		110		104(3)
WL 356HQ RR	W-L Research	5	HR	HR	HR	HR	HR	HR	100	99					96			98(3)
WL 372HQ RR	W-L Research	5	HR	HR	HR	HR	HR	–	102						106			104(2)
428 RR	Allied Seed	4	HR	HR	HR	HR	HR	–		100	100					104		111
438 RR	Allied Seed	4	HR	HR	HR	HR	HR	–				110	95					103(2)
54R02 RR	Pioneer	4	HR	HR	HR	HR	HR	–	97	107	96			104		102		97
54VR10 RR	Pioneer	4	HR	HR	R	HR	HR						111					–
55VR06 RR	Pioneer	5	HR	R	HR	HR	HR	MR		95								99
55VR08 RR	Pioneer	5	–	HR	HR	HR	HR	HR		103	111						110	
6516R RR	NEXGROW	5	HR	–	HR	HR	HR	–	106						109			108(2)

¹ Variety characteristics: FD=fall dormancy, Bw=bacterial wilt, Fw=fusarium wilt, An=anthracnose, PRR=phytophthora root rot, APH=aphanomyces root rot. Information provided by seed companies.

² Disease resistance: S=susceptible, LR=low resistance, MR=moderate resistance, R=resistance, HR=high resistance (more detailed disease and insect resistance ratings at www.alfalfa.org/pdf/2022_Alfalfa_Variety_Leaflet.pdf).

³ Year trial was established.

⁴ Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific test. For example, the Princeton trial planted in the spring of 2011 was harvested for five years, so the final yield report would be "2015 Alfalfa Report" archived in the UK Forage website (<https://forages.ca.uky.edu>).

⁵ Mean only presented when respective variety was included in two or more trials.

⁶ Number of years of data.

Table 16. Summary of Kentucky alfalfa yield trials 2006-2023 (yield shown as a percentage of the mean of the commercial varieties in the test).

Variety	Proprietor	Variety Characteristics ¹								Princeton													Mean ⁵ (# trials)		
		Disease Resistance ²						06 ^{3,4}	08	11	12	15	16	17	18	19	00	01	05	08	09	11		13	
		FD	Bw	Fw	An	PRR	APH1	APH2	7yr ⁶	6yr	6yr	6yr	5yr	6yr	6yr	5yr	5yr	4yr	3yr	5yr	5yr	6yr		4yr	3yr
A-4440	Producers Choice	4	HR	HR	HR	HR	HR	HR																	100(2)
A 5225	Producers Choice	5	HR	HR	HR	HR	R	R		104											107				106(2)
Adrenalin	Brett Young Seeds	4	HR	HR	HR	HR	HR	-														104			-
Alfabar	Barenbrug USA	3	HR	HR	HR	HR	HR/R	-											108						-
Alfagraze	America's Alfalfa	3	HR	HR	HR	HR	HR	-										78	89	97					88(3)
Ameristand 403T	America's Alfalfa	4	HR	HR	HR	HR	HR	R	99	91	102	94									100	101	107	99	99(8)
Ameristand 403T Plus	America's Alfalfa	4	HR	HR	HR	HR	HR	R					104	102	107	112	106	99	101			94			103(8)
Ameristand 407TQ	America's Alfalfa	4	HR	HR	HR	HR	HR	R														103	104		104(2)
Ameristand 427TQ	America's Alfalfa	4	HR	HR	HR	HR	HR	HR					109												-
Anchormate	ProSeed Marketing	-	-	-	-	-	-	-		100															-
Arc (certified)	Public	4	LR	MR	HR	-	-	-			93	92								95	86			95	92(5)
Archer III	America's Alfalfa	5	HR	HR	HR	HR	HR	-														106			-
Baralfa 53HR	Barenbrug USA	5	HR	R	HR	HR	HR	-												104					-
Buffalo	Public	-	-	-	-	-	-	-	86	80	89		85							95	78	87		91	86(8)
Bulldog-505	Univ. of GA	5	-	HR	-	R	-	-				103		93	91							96		103	97(5)
Caliber	Beck's Hybrids	4	HR	HR	HR	HR	HR	-				99	105	99	105								99		101(5)
Charger	Beck's Hybrids	5	HR	HR	HR	HR	HR	-									103						106		104(2)
Contender	Beck's Hybrids	5	HR	HR	HR	HR	HR	-					101	103	101										101(3)
DKA 43-13	Monsanto	4	HR	HR	HR	HR	HR	-		102															-
DKA 50-18	Monsanto	5	HR	HR	HR	HR	HR	-		110															-
DG4210	Crop Production	4	HR	HR	HR	HR	HR	-															101	103	102(2)
Dynagro Everlast	United Agr. Prod.	4	HR	HR	HR	HR	R	-												101					-
Evermore	Southern States	5	HR	HR	HR	HR	HR	-				100		102	107										103(3)
Expedition	NEXGROW	5	HR	HR	R	RR	R	-	112											96					104(2)
Fierce	Beck's Hybrids	4	HR	HR	HR	HR	HR	-				102		107											104(2)
FSG 403LR	Farm Sci. Genetics	4	HR	HR	HR	HR	HR	-																102	-
FSG 408DP	Allied Seeds	4	HR	HR	HR	HR	R	-													110				-
FSG 415BR	Allied Seeds	4	HR	HR	HR	HR	HR	-						103			109	108							107(3)
FSG 424	Farm Sci. Genetics	4	HR	HR	HR	HR	HR	-																109	-
FSG 426	Farm Sci. Genetics	4	HR	HR	HR	HR	HR	HR				103													-
FSG 450	Farm Sci. Genetics	4	HR	HR	HR	HR	HR	HR												102					-
FSG 524	Farm Sci. Genetics	5	HR	HR	HR	HR	HR	-																96	-
FSG 527	Farm Sci. Genetics	5	HR	HR	HR	HR	HR	-										98							-
FSG 528SF	Lewis Seed Co.	5	HR	R	HR	HR	R	-		107															-
GA-409	Pref. Alf. Genetics	4	HR	HR	HR	HR	HR	-										101							-
GA-497HD	Pref. Alf. Genetics	5	HR	HR	HR	HR	HR	-						104			109	104	99						104(4)
GA-535	Pref. Alf. Genetics	5	HR	HR	HR	HR	HR	-								108	103								109(2)
Genoa	NEXGROW	4	HR	HR	HR	HR	HR	-		99										98	118				105(3)
Gunner	Croplan Genetics	5	HR	HR	HR	HR	HR	-															103		-
HighFive	Allied Seeds	5	HR	HR	HR	HR	HR	HR															111		-
HVS4220Q	Mountain View Seeds	4	HR	HR	HR	HR	HR	-										106							-
KingFisher 243	Cal/West	5	HR	HR	HR	HR	HR	-														98			-
Kingfisher 4020	Byron Seeds	4	HR	HR	HR	HR	HR	-				101													-
L447HD	Legacy Seeds	4	HR	HR	HR	HR	HR	-		105															-
L449Aph2	Legacy Seeds	4	HR	HR	HR	HR	HR	HR															97		-
L455HD	Legacy Seeds	4	HR	HR	HR	HR	HR	-																102	-
Lancer	Allied Seeds	4	HR	HR	HR	HR	HR	-															101		-
LegenDairy 5.0	Croplan Genetics	3	HR	HR	HR	HR	HR	-	99											103					101(2)
Mariner III	Allied Seeds	4	HR	HR	HR	HR	HR	R													99				-

(continued on the next page)

2023 Alfalfa Report



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