



2019 Alfalfa Grazing Tolerance Report

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Introduction

Alfalfa (*Medicago sativa*) is the highest-yielding, highest-quality forage legume grown in Kentucky. It forms the basis of Kentucky's cash hay enterprise and is an important component in dairy, horse, beef, and sheep diets. Recent emphasis on its use as a grazing crop and the release of grazing-tolerant varieties have raised the following question: Do varieties differ in tolerance to grazing? We have chosen to use the standard tolerance test recommended by the North American Alfalfa Improvement Conference. This test uses continuous heavy grazing to sort out differences in grazing tolerance in a relatively short period of time.

This report summarizes research on the grazing tolerance of alfalfa varieties when subjected to continuous heavy grazing pressure during the grazing season. Table 5 shows a summary of all alfalfa varieties tested in Kentucky during the last 18 years and information about distributors, fall dormancy ratings, and disease resistance. The UK Forage Extension website, at forages.ca.uky.edu, contains electronic versions of all forage variety testing reports from Kentucky and surrounding states and from a large number of other forage publications.

Important Selection Considerations

Local adaptation and seasonal yield.

The variety should be adapted to Kentucky as indicated by good winter survival and good performance across years and locations in replicated yield and grazing trials, such as those presented in this publication. Choose high-yielding, persistent varieties and varieties that are productive during the desired season of use. Refer to the 2019 Alfalfa Report (PR-763) (or previous years if needed) for yield data on specific varieties of interest and the summary Table 5 of this report for variety performance since 2004.

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2017, 2018, and 2019.

	2017				2018				2019 ²			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	40	+9	6.81	+3.95	31	0	2.01	-0.85	33	+2	4.11	+1.25
FEB	47	+12	4.46	+1.25	45	+10	9.77	+6.56	42	+7	7.64	+4.43
MAR	48	+4	3.34	-1.06	42	-2	5.16	+0.76	43	-1	3.44	-0.91
APR	62	+7	4.17	+0.29	50	-5	5.52	+1.64	54	+4	4.76	+0.88
MAY	66	+2	7.74	+3.27	73	+9	8.39	+3.92	69	+5	4.49	+0.02
JUN	73	+1	7.68	+4.02	76	+4	6.42	+2.76	73	+1	6.13	+2.47
JUL	76	0	4.49	-0.51	77	+1	6.15	+1.15	79	+3	3.30	-1.70
AUG	74	-1	6.66	+2.73	77	+2	6.45	+2.52	77	+2	2.42	-1.51
SEP	69	+1	4.72	+1.52	74	+6	12.88	+9.68	77	+9	0.18	-3.02
OCT	60	+3	6.06	+3.49	59	+2	6.54	+3.97	61	+4	8.15	+5.58
NOV	47	+2	3.09	-0.30	42	-3	5.64	+2.25				
DEC	35	-1	2.66	-1.32	40	+4	7.35	+3.37				
Total			61.88	+17.33			82.28	+37.73			44.67	+7.49

¹ DEP is departure from the long-term average.

² 2019 data is for ten months through October.

Seed quality. Buy premium-quality seed that is high in germination, high in 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. Other information on the label will include the test date (which must be within the previous nine months), the level of germination, and percentage of other crop and weed seed. Order seed well in advance of planting time to assure that it will be available when needed.

Description of the Tests

Alfalfa variety tests for grazing tolerance were established in Lexington in the fall of 2016 and 2017. The soils at this location are well-drained silt loams and are well-suited to alfalfa. Plots were 5 feet by 20 feet in a randomized complete block design, with each variety replicated six times. In each test, 20 pounds per acre of seed were planted into a prepared seedbed using a disk drill. All seed lots were treated with metalaxyl fungicide and inoculated if not supplied with these treatments. Plots were grazed continuously beginning the first spring after seeding. Grazing pressure was maintained to keep plant height to less than 3 inches.

In general, plots were grazed from mid-May until mid-September. Supplemental hay was fed during periods of slowest growth. Visual ratings of percent stand were made in the fall several weeks after the cattle were removed to check stand survival after the grazing season. Ratings were made in the spring prior to grazing to check on winter survival and spring growth. Since trials were seeded in rows, persistence ratings were based on density within a row and not total ground cover. Pests (weeds and insects) were controlled so they would not limit yield or persistence. Fertilizers (lime, P, K, and boron) were applied based on soil test recommendations. In each trial, Alfagraze was the grazing-tolerant check variety.

Results and Discussion

Weather data for Lexington is presented in Table 1.

Data on percent stand are presented in tables 2 and 3. Statistical analyses were performed on all alfalfa yield data (including experimentals) to determine whether the apparent differences are truly due to variety or just due to chance. Varieties not significantly different from the highest numerical value in a

column are marked with one asterisk (*). To determine whether two varieties are truly 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), which is a measure of the variability of the data, is included for each column of means. Low variability is desirable, and increased variability within a study results in higher CVs and larger LSDs.

Table 4 summarizes information about distributors, fall dormancy ratings, and disease resistance information for all varieties included in current tests.

Table 5 is a summary of stand persistence data from 1998 to 2019 of commercial varieties that have been entered in the Kentucky trials. The data for each specific trial are listed as a percentage of the grazing-tolerant variety Alfagraze. In other words, in each trial Alfagraze is 100 percent—varieties with percentages over 100 persisted better than Alfagraze and varieties with percentages less than 100 persisted less than Alfagraze. Direct, statistical comparisons of varieties cannot be made using the summary Table 5, 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, while others may have performed well in wet years or on particular soil types. These details may influence variety choice, and the information can be found in the yearly reports. See footnote in Table 5 to identify specific yearly reports which contain more detailed persistence information.

Summary

Measurements taken after multiple years of grazing in these trials indicate that alfalfa varieties have been developed that exhibit improved tolerance to heavy grazing pressure compared to standard hay-type varieties. The grazing management imposed in these trials included continuous stocking from the initiation of grazing in spring until mid-September, when grazing was terminated for the season to allow stands to acclimate to

Table 2. Seedling vigor and stand persistence of alfalfa varieties sown September 8, 2016, in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 4, 2016	Percent Stand							
		2016		2017		2018		2019	
		Oct 4	Mar 15	Oct 11	Mar 16	Sep 26	Mar 28	Nov 5	
Commercial Varieties-Available for Farm Use									
Ameristand 403TPlus	4.7	99	99	86	80	43	18	13*	
Alfagraze	3.8	98	98	88	77	37	13	10*	
Experimental Varieties									
CWA123010	4.8	100	100	89	79	45	17	12*	
AFX143009	4.5	100	100	82	69	23	7	5	
Mean	4.5	99	99	86	76	37	13	10	
CV,%	9.2	2	2	3	13	30	54	62	
LSD,0.05	0.5	2	2	4	12	14	9	7	

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 3. Seedling vigor and stand persistence of alfalfa varieties sown September 9, 2017, in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 11, 2017	Percent Stand				
		2017		2018		2019
		Oct 11	Mar 14	Sep 26	Mar 28	Nov 5
Commercial Varieties-Available for Farm Use						
Ameristand 403TPlus	5.0	100	99	81	47	23*
Alfagraze	5.0	100	100	73	40	18*
Experimental Varieties						
TPCL1701	5.0	100	100	78	44	18*
NF11ALF0006	4.8	100	98	68	33	14*
Mean	4.9	100	99	75	41	18
CV,%	2.6	0	2	17	31	44
LSD,0.05	0.2	0	3	21	17	11

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 4. Characterization and proprietors of alfalfa varieties in current trials in Kentucky.

Variety	Proprietor/KY Distributor	Variety Characteristics ¹					
		FD ³	Disease Resistance ²				
			BW	FW	AN	PRR	APH
Commercial Varieties-Available for Farm Use							
Alfagraze	America's Alfalfa	2	MR	R	MR	LR	-
Ameristand 403T Plus	America's Alfalfa	4	HR	HR	HR	HR	HR
Experimental Varieties⁴							
AFX143009	Alforex Seeds	4	HR	HR	HR	HR	HR
CW A12310	Alforex Seeds	4	-	-	-	-	-
NF11ALF0006	Noble Foundation	6	-	-	-	-	-
TPCL1701	Legacy Seeds	-	-	-	-	-	-

¹ Variety Characteristics: FD=Fall Dormancy, BW=Bacterial Wilt, FW=Fusarium Wilt, AN=Anthracnose, PRR=Phytophthora Root Rot, APH=Aphanomyces Root Rot.

² Disease Resistance: S=Susceptible, LR=Low Resistance, MR=Medium Resistance, R=Resistance, HR=High Resistance. (more detailed disease and insect resistance ratings at www.alfalfa.org/pdf/2019_Alalfa_Variety_Leaflet.pdf).

³ Fall Dormancy: 2=Vernal, 3=Ranger, 4=Saranac, 5=DuPuits.

⁴ Experimental varieties are not available commercially, but provide an indication of the progress being made by forage breeding companies.

winter. Heavy grazing pressure was used purposely in these trials to better differentiate among varieties for relative grazing tolerance. Research has shown that abusive grazing tests are a good way to sort out differences in grazing

tolerance between varieties in a relatively short period of time. Recommended rotational grazing management would improve alfalfa forage productivity and stand persistence.

The information in this report should be used in conjunction with other yield, pest resistance, and adaptation information in selecting the best alfalfa varieties for use in each individual situation.

When grazing alfalfa, good management for maximum life includes:

- Allowing grazing alfalfa to become completely established before grazing
- Using rotational grazing where animals harvest available forage in 7 days or less, followed by resting for 28 days before regrazing

- Adding any needed fertilizer and lime
- Removing grazing livestock from alfalfa fields from mid-September until November 1 to replenish root reserves for winter survival
- Follow recommended practices to reduce the potential for bloat.

For further information about grazing 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 at forages.ca.uky.edu.

- Grazing Alfalfa (ID-97)
- Managing Legume Induced Bloat in Cattle (ID-186)
- Extending Grazing and Reducing Stored Feed Needs (AGR-199)

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