



2001 Alfalfa Grazing Tolerance Variety Report

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Introduction

Alfalfa (*Medicago sativa*) is historically 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 varieties reported to be tolerant of heavy and even continuous grazing have raised the following question: Do varieties differ in tolerance to overgrazing?

This report summarizes current research on the grazing tolerance of alfalfa varieties when subjected to continuous, heavy grazing pressure during the grazing season. Although some yield data are presented, the focus is on plant stand survival.

Description of the Tests

Alfalfa variety tests for grazing tolerance were established in Lexington in the fall of 1997, 1998, 1999, and 2000. The soils at this location are well-drained silt loams and are well suited to alfalfa. Plots were 5 x 15 feet in a randomized complete block design with each variety replicated six times. In each test, 20 pounds of seed per acre were planted into a prepared seedbed using a disk drill. All seed lots were treated with metalaxyl and inoculated if not supplied with these treatments. Grazing was continuous from April until October. Supplemental hay was fed during periods of slowest growth. Visual ratings of percent stand were made in the fall and spring after each grazing season. Pests (weeds and insects) were controlled so they would not limit yield or persistence. Fertilizers (lime, P, K, and Boron) were applied as needed. Included in each trial were Alfagraze as the grazing-tolerant check variety and Apollo as the grazing-susceptible check variety.

Results and Discussion

Weather data for Lexington are presented in Table 1. In 2001, temperature and precipitation were close to normal.

Data on percent stand are presented in Tables 2 through 5. Statistical analyses were performed on all alfalfa yield data (including experimentals) to determine if 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 if 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.

Two years of grazing were sufficient to severely deplete the stands of Apollo and show differences among most commercial varieties (Tables 2, 3, 4). In the 2000 seeding, stands of Apollo were depleted (after one year of grazing). Apollo is the grazing-susceptible check variety, and its depletion is an indication of heavy grazing pressure.

Table 6 summarizes information about distributors, fall dormancy, disease resistance, and persistence across years and locations for all varieties in these tests.

Summary

These studies indicate alfalfa varieties have been developed that express tolerance to overgrazing without going out of stand, compared to standard hay-type alfalfas. In addition, newer grazing-tolerant varieties have significantly improved yields over Alfagraze. It should be noted, however, that although these varieties were abused during the growing season, they were allowed to rest and regrow after September 15 to prepare for winter.

This information should be used along with yield and pest resistance information in selecting the best alfalfa variety for each individual use. It is *not* recommended that alfalfa be continuously grazed as was done in this trial. While several varieties expressed tolerance to the level of grazing pressure used in these trials, overgrazing greatly reduces yield and therefore profitability of these alfalfas.

Good management for maximum life from grazing alfalfa would include:

- allowing grazing alfalfa to become completely established before grazing
- using rotational grazing where animals harvest available forage in seven 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 to November 1 to replenish root reserves.

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Table 1. Temperature and rainfall at Lexington during the 1998, 1999, 2000, and 2001 growing seasons.

MON	1998				1999				2000				2001			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	41	+10	3.96	+1.10	36	+5	5.64	+2.78	32	+1	3.48	+0.62	31	0	0.9	-1.9
FEB	41	+6	2.54	-0.67	40	+5	2.32	-0.89	43	+8	4.97	+1.76	40	+5	3.2	0
MAR	46	+2	3.40	-1.00	40	-4	3.27	-1.13	48	+4	3.47	-0.93	40	-4	2.7	-1.7
APR	54	-1	6.20	+2.32	56	+1	1.87	-2.01	53	-2	4.10	+0.22	59	+4	1.7	-2.2
MAY	67	+3	6.14	+1.67	65	+1	1.35	-3.12	67	+3	2.96	-1.51	66	+2	4.9	+0.4
JUN	73	+1	10.81	+7.15	74	+2	3.89	+0.23	73	+1	3.22	-0.44	71	-1	2.0	-1.6
JUL	75	-1	7.98	+2.98	80	+4	1.00	-4.00	74	-2	3.42	-1.58	75	-1	5.6	+0.6
AUG	76	+1	0.29	-3.64	75	0	1.31	-2.62	74	-2	3.38	-0.55	76	+1	4.8	+0.8
SEP	74	+6	0.61	-2.59	69	+1	1.03	-2.17	66	-2	5.47	+2.27	65	-3	3.0	-0.2
OCT	58	+1	2.41	-0.16	57	0	1.91	-0.66	59	+2	0.92	-1.65	56	-1	3.6	+1.1
NOV	47	+2	2.09	-1.28	51	+6	1.70	-1.69	43	-2	1.59	-1.80	51	+6	2.8	-0.6
AVG	59.3	+2.7	4.2	+0.5	58.5	+1.9	2.3	-1.4	57.5	+0.8	3.4	-0.8	57.3	+0.7	3.2	-0.5

DEP is departure from the long-term average for that location.

Table 2. Dry matter yields (tons/acre) and percent stand of alfalfa varieties sown September 2, 1997, at Lexington, Kentucky, in a grazing tolerance study.

Variety	Percent Stand			
	Nov 9, 1999	Mar 21, 2000	Oct 20, 2000	Apr 2, 2001
Commercial varieties — available for farm use				
Alfagraze	70.0*	73.3*	58.3*	49.2*
ABT 205	70.0*	73.3*	45.0	40.8*
ABT 405	70.0*	73.3*	36.3	34.2
Amerigraze 401+ Z	66.7	63.3	30.8	25.8
Wintergreen	58.3	66.7	18.3	28.3
Grazeking	58.3	61.7	14.2	20.0
Haygrazer	51.7	56.7	16.8	19.2
Apollo	51.7	53.3	9.2	15.8
Experimental varieties — not available for farm use				
ZG9632	80.0*	80.0*	54.2*	54.2*
ZG9633	73.3*	71.7*	48.3*	48.3*
ZG9631A	75.0*	80.0*	51.7*	46.7*
ZG9641	76.7*	80.0*	52.5*	44.2*
ZG9640	70.0*	70.0*	35.0	31.7
BARUSA 96-54	56.7	66.7	14.2	20.0
A9201	60.0	63.3	8.0	14.2
A9303	48.3	55.0	6.3	15.0
Mean	64.8	68.0	31.2	31.7
CV, %	9.3	13.4	35.7	36.7
LSD, 0.05	10.7	10.5	12.8	13.4

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

Table 3. Percent stand of alfalfa varieties sown September 15, 1998, at Lexington, Kentucky, in a grazing tolerance trial.

Variety	Percent Stand		
	Nov 9, 1999	Nov 20, 2000	Apr 2, 2001
Commercial varieties — available for farm use			
Alfagraze	88.3*	4.5	32.0
WL 326 GZ	85.0*	18.3	28.3
Gold Plus	85.0*	5.8	26.3
Pro Gro	86.7*	5.2	25.5
Baralfa 54	88.3*	7.7	24.7
Spreador 3	83.3	22.5	24.2
Wintergreen	86.7*	22.5	23.3
Pioneer 98	88.3*	13.5	18.3
Amerigraze 401+ Z	86.7*	12.2	17.5
Apollo	90.0*	12.0	14.5
Experimental varieties — not available for farm use			
ZG9740	88.3*	65.0*	68.3*
ZG9741	90.0*	55.0*	61.7*
Mean	87.2	20.4	30.4
CV, %	5.06	48.16	52.9
LSD, 0.05	0.51	11.34	18.6

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

Table 5. Percent stand of alfalfa varieties sown September 19, 2000, at Lexington, Kentucky, in a grazing tolerance trial.

Variety	Percent Stand	
	Apr 9, 2001	Oct 17, 2001
Commercial varieties — available for farm use		
Alfagraze	89.2	75.8*
115 Brand	90.0	65.0*
Feast	89.2	61.7
Amerigraze 401+Z	90.0	56.7
ABT405	89.2	54.2
ABT350	88.3	33.3
Haygrazer	88.3	31.7
Apollo	83.3	20.0
Experimental varieties — not available for farm use		
FOO-501	88.3	74.2*
ZG9840	90.0	70.0*
CW 54056	87.5	50.8
5M85	90.0	12.5
Mean	88.6	50.5
CV, %	2.99	19.5
LSD, 0.05	3.06	11.4

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

Table 4. Percent stand of alfalfa varieties sown March 27, 2000, at Lexington, Kentucky, in a grazing tolerance trial.

Variety	Percent Stand	
	May 3, 2001	Oct 17, 2001
Commercial varieties — available for farm use		
Alfagraze	68.3	23.3*
Feast	67.5	19.7
115 Brand	75.0	13.3
Amerigraze 401+Z	52.5	5.8
Apollo	43.3	4.3
Experimental varieties — not available for farm use		
ZG9834	65.0	33.3*
ZG9830	73.3	29.2*
GA-AG-MPX	71.7	27.0*
A9811	65.0	24.7*
ZG9840	59.2	16.7
Mean	64.1	19.7
CV, %	22.1	48.5
LSD, 0.05	16.5	11.1

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

Table 6. Characterization and persistence of alfalfa varieties under heavy grazing pressure across years and locations.

		Variety Characteristics ¹						Lexington											
		Disease Resistance ²						1997 ³				1998				1999		2000	
Variety	Proprietor/KY Distributor	FD ⁴	BW	FW	AN	PRR	APH	Nov ⁵ 1999	Mar 2000	Nov 2000	Apr 2001	Nov 1999	Mar 2000	Nov 2000	Apr 2001	May 2001	Oct 2001	Apr 2001	Oct 2001
Commercial varieties — available for farm use																			
115 Brand	Monsanto Global Seed	3	HR	HR	R	HR	R									*		*	*
ABT205	several	2	HR	HR	HR	HR	R	*	*		*								
ABT350	several																		*
ABT405	several	4	HR	HR	HR	HR	R	*	*										*
Alfagraze	America's Alfalfa	2	MR	R	MR	LR	-	*	*	*	*	*	*			*	*	*	*
Amerigraze401+Z	ABI/America's Alfalfa	4	HR	HR	HR	HR	R					*	*						*
Apollo	ABI/America's Alfalfa	4	R	R	LR	R	-					*	*						
Baralfa54	Barenbrug	5	R	HR	HR	HR	-					*	*						
Feast	ABI/AgriPro	3	HR	HR	MR	HR	R									*		*	
Gold Plus	MBS Inc.	4	HR	HR	HR	HR	R					*							
Grazeking	FFR/Southern States	5	MR	HR	HR	R	S												
Haygrazer	Great Plains Research	4	HR	HR	R	R	MR												*
ProGro	MBS Inc.	4	HR	HR	R	HR	MR					*	*						
Spredor 3	Novartis	1	HR	HR	R	MR	S												
Wintergreen	ABI Alfalfa	3	HR	HR	HR	HR	R					*							
WL326GZ	W-L Research Inc.	4	HR	HR	HR	HR	HR					*	*						
Experimental varieties — not available for farm use																			
5M85	Forage Genetics Int'l																		*
A9201	FFR Cooperative	4	HR	HR	HR	HR	R												
A9303	FFR Cooperative	4	R	HR	R	HR	R												
A9811	FFR Cooperative															*	*		
BARUSA96-54	Barenbrug		R	HR	HR	HR	HR												
CW54056	Cal/West Seeds																		*
FOO-501	FFR Cooperative																		*
GA-AG-MPX	University of Georgia	2	HR	HR	R	R	R									*	*		
I97PE98	Pioneer	2	-	-	HR	MR	MR					*	*						
ZG9631A	ABI Alfalfa	3	HR	HR	HR	HR	HR	*	*	*	*								
ZG9632	ABI Alfalfa	3	HR	HR	HR	HR	HR	*	*	*	*								
ZG9633	ABI Alfalfa	3	HR	HR	HR	HR	HR	*	*	*	*								
ZG9640	ABI Alfalfa	4	HR	HR	HR	HR	HR	*	*										
ZG9641	ABI Alfalfa	3	HR	HR	HR	HR	HR	*	*	*	*								
ZG9740	ABI Alfalfa	4	HR	HR	HR	HR	HR					*	*	*	*				
ZG9741	ABI Alfalfa	4	HR	HR	HR	HR	HR					*	*	*	*				
ZG9830	ABI Alfalfa	3	HR	HR	HR	HR	HR									*	*		
ZG9834	ABI Alfalfa	2	HR	HR	HR	HR	HR									*	*		
ZG9840	ABI Alfalfa	4	HR	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.

² Disease Resistance: S=Susceptible LR=Low Resistance MR=Moderate Resistance R=Resistance HR=High Resistance.

³ Establishment Year.

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

⁵ Date of measurement of percent stand.

Shaded boxes indicate that the variety was not in the test.

Open boxes indicate the variety was in the test, but its persistence was significantly less than the top-ranked variety in the test.

* Not significantly different from the top-ranked variety in the test.

