

2003 Alfalfa Grazing Tolerance Variety 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 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.

Description of the Tests

Alfalfa variety tests for grazing tolerance were established in Lexington in the fall of 2000 and 2001. The soils at this location are well-drained silt loams and are well suited to alfalfa. Plots were 5 by 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. Plots are grazed continuously beginning the first spring after seeding. Grazing pressure is maintained to keep plant height to less than 3 inches. In general, plots are grazed from April until mid-September. 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. Rainfall during the 2003 growing season was excellent and soil moisture was not a limiting factor.

Data on percent stand are presented in Tables 2 and 3. 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.

Significant varietal differences in grazing tolerance were observed for both the 2000 and the 2001 seedings (Tables 2 and 3). Apollo has been used widely in trials such as these as a grazing-sensitive variety. Therefore, the response of this variety provides a useful measure of the severity of the grazing pressure applied to the plots. In general, types developed for tolerance to grazing, ABT 405 and FK 421 for example, tolerated heavy grazing pressure better than hay types such as Apollo and Saranac AR.

Three seasons of grazing reduced stands of Apollo alfalfa seeded in fall of 2000 to less than one-half the ground cover of varieties with the greatest stand densities by the end of the 2003 grazing season (Table 2). Ground cover declined dramatically during the 2003 grazing season for all varieties in the 2000 trial. Two experimental varieties had stands equal to those of the highest-rated commercial varieties in this trial.

Measurements in October 2003 in the trial established during the fall of 2001 and grazed during two seasons also showed lower stand values for Apollo and Saranac AR than for some other varieties (Table 3). Stand percentages for hay-type varieties at the end of 2003 were numerically similar for the 2000 and 2001 seedings (Tables 2 and 3). Whereas several varieties from the 2001 trial had stand percentages above 30% at the end of 2003, stand percentages of all varieties in the 2000 trial had fallen to 17% or less by the end of 2003.

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

Summary

Measurements taken after multiple years of grazing in these trials indicate that alfalfa varieties have been developed that exhibit improved tolerance to heavy continuous grazing pressure compared with hay-type varieties. The grazing management imposed in these trials included continuous stocking between the initiation of grazing in spring and mid-September, when grazing was terminated for the season to allow stands to acclimate for winter. Heavy grazing pressure was purposely used in these trials to better differentiate among varieties for relative grazing tolerance. A reduced grazing pressure 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.

Good management for maximum life from grazing alfalfa includes:

- 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 regazing.
- adding any needed fertilizer and lime.
- removing grazing livestock from alfalfa fields from mid-September to Nov. 1 to replenish root reserves.

Table 1. Temperature and rainfall at Lexington during the 2002 and 2003 growing seasons.

	2002				2003			
	Temp		Rainfall		Temp		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	38	+7	2.12	-0.7	26	-5	0.96	-1.90
FEB	38	+3	1.28	-1.9	32	-3	3.59	+0.38
MAR	45	+1	7.93	3.5	47	+3	2.09	-2.31
APR	58	+3	4.19	0.3	57	+2	3.14	-0.74
MAY	61	-3	4.36	-0.1	63	-1	6.68	+2.21
JUN	74	+2	2.45	-1.2	69	-3	4.85	+1.19
JUL	78	+2	1.10	-3.9	74	-2	2.68	-2.32
AUG	77	+2	0.95	-3.0	75	0	5.26	+1.33
SEP	72	+4	4.90	1.7	65	-3	4.22	+1.02
OCT	55	-2	5.61	3.0	56	-1	1.61	-0.96
NOV	43	-2	3.76	0.4	50	+5	4.63	+1.24
TOTAL			38.7	-1.92			39.71	-0.86

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

Table 2. Percent stand of alfalfa varieties planted September 19, 2000, in a cattle grazing tolerance study at Lexington, Kentucky.				
Variety	Percent Stand			
	April 2, 2002	October 14, 2002	March 26, 2003	October 31, 2003
Commercial Varieties				
Alfagraze	76	56	64	13*
Feast	63	53	59	12*
Amerigraze 401+Z	64	58	59	11
115brand	69	71	71	11
ABT 405	61	63	58	6
ABT 350	49	48	48	6
Haygrazer	55	41	44	5
Apollo	38	31	32	4
Experimental Varieties				
FOO 501	74	71	72	17*
ZG 9840	72	67	73	16*
CW 54056	58	53	53	10
5M85	35	18	23	3
Mean	59.56	52.36	54.65	9.44
CV, %	13.61	22.74	18.39	52.84
LSD, 0.05	9.38	13.78	11.63	5.77
* Not significantly different from the highest value in the column.				

Table 3. Percent stand of alfalfa varieties planted September 12, 2001, in a cattle grazing tolerance study at Lexington, Kentucky.				
Variety	Percent Stand			
	April 4, 2002	October 15, 2002	March 28, 2003	October 30, 2003
Commercial Varieties				
FK 421	90	75	90	38*
ABT 405	90	73	88	33*
Alfagraze	90	65	88	23
Amerigraze 401+Z	90	60	84	21
Grazeking	90	57	81	12
Apollo	90	53	76	7
Saranac AR	90	51	81	5
Experimental Varieties				
CW 83053	90	67	88	36*
PHI EXP 1	90	72	88	18
Mean	90	63.54	84.81	21.32
CV, %	0	15.97	6.95	30.12
LSD, 0.05	0	11.84	6.87	7.49
* Not significantly different from the highest value in the column.				

Table 4. Characterization and persistence of alfalfa varieties under heavy grazing pressure across years.

Variety	Proprietor/KY Distributor	Variety Characteristics ¹						Lexington								
		FD ⁴	Disease Resistance ²					2000 ³				2001				
			BW	FW	AN	PRR	APH	Apr ⁵ 2001	Oct 2001	Oct 2002	Oct 2003	Apr 2002	Oct 2002	Oct 2003		
Commercial Varieties—Available for Farm Use																
115 Brand	Monsanto Global Seed	3	HR	HR	R	HR	R	*	*	*						
ABT350	several	3	HR	HR	HR	HR	HR	*								
ABT405	several	4	HR	HR	HR	HR	R	*		*		*	*	*		
Alfagraze	America's Alfalfa	2	MR	R	MR	LR	-	*	*		*	*	*			
Amerigraze 401+Z	ABI/America's Alfalfa	4	HR	HR	HR	HR	R	*		*		*				
Apollo	ABI/America's Alfalfa	4	R	R	LR	R	-					*				
Feast	ABI/AgriPro	3	HR	HR	MR	HR	R	*		*						
FK421	Donely Seed Co.	4	HR	HR	HR	HR	HR					*	*	*		
Grazeking	FFR/Southern	5	MR	HR	HR	R	S					*				
Haygrazer	Great Plains	4	HR	HR	R	R	MR	*								
Saranac AR	public	4	MR	R	HR	LR	-					*				
Wintergreen	ABI Alfalfa	3	HR	HR	HR	HR	R									
Experimental Varieties																
5M85	Forage Genetics International	-	-	-	-	-	-	*								
CW54056	Cal/West Seeds	-	-	-	-	-	-	*								
CW 83053	Cal/West Seeds	-	—	-	—	—	—					*	*	*		
FOO-501	FFR Cooperative	—	—	-	-	-	-	*	*	*	*					
PHI exp1	Pioneer Hi—Bred Int'l	-	-	-	HR	R	LR					*	*			
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.

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