

2005 Red and White Clover Grazing Tolerance Report

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Introduction

Red clover (*Trifolium pratense*) and white clover (*Trifolium repens*) are both high quality forage legumes that are used primarily in mixed stands with tall fescue or orchardgrass for improving yield and quality of pastures. Stands of improved red clover are generally productive for two to three years, while white clover can be productive for three to four years. Their high palatability causes them to be overgrazed easily. Red clover is not persistent under heavy, close grazing, but white clover is tolerant to close grazing. Three types of white clover grow in Kentucky: Dutch, intermediate, and ladino. The intermediate type has been developed to persist better than the ladino type under pasture or continuous grazing conditions. Ladino white clover has larger leaves and taller growth than the intermediate and Dutch types.

This report summarizes current research on the grazing tolerance of clover varieties when subjected to continuous grazing pressure. Go to the UK Forage Extension Web site at www.uky.edu/AG/Forage to obtain electronic versions of all forage variety testing reports as well as other forage publications.

Description of the Tests

Red and white clover tests for grazing were established in Lexington in the falls of 2002 and 2004. A test was sown in the fall of 2003, but due to high plant mortality during the winter of 2003/2004, they were replanted in the 2004 test. Soils at the test site are well-drained silt loams and are well suited to clover production. Plots were 5 by 15 feet in a randomized complete block design with each variety replicated six times.

Red clover was seeded at the rate of 12 pounds per acre and white clover at 3 pounds per acre into a prepared seedbed using a disk drill. All seed lots were inoculated prior to planting. Plots were grazed continuously beginning the spring after fall seeding. In general, plots were grazed from mid-April to mid-September to a height of 1 to 3 inches. 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 on total ground cover. Fertilizers (lime, P, K, and Boron) were applied according to University of Kentucky recommendations.

Results and Discussion

Weather data for Lexington for 2003, 2004, and 2005 are presented in Table 1.

Data on percent stand are presented in Tables 2 and 3. Statistical analyses were performed on these data 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.

Table 1. Temperature and rainfall at Lexington, Kentucky in 2003, 2004 and 2005.

	2003				2004				2005			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	26	-5	0.96	-1.90	30	-1	3.14	+0.28	37	+6	4.35	+1.49
FEB	32	-3	3.59	+0.38	36	+1	1.32	-1.89	39	+4	1.68	-1.53
MAR	47	+3	2.09	-2.31	47	+3	3.43	-0.97	41	-3	2.79	-1.61
APR	57	+2	3.14	-0.74	55	0	3.06	-0.82	56	+1	3.30	-0.58
MAY	63	-1	6.68	+2.21	68	+4	9.79	+5.32	61	-3	1.78	-2.69
JUN	69	-3	4.85	+1.19	72	0	3.13	-0.53	75	+3	1.33	-2.33
JUL	74	-2	2.68	-2.32	73	-3	7.65	+2.65	77	+1	3.30	-1.70
AUG	75	0	5.26	+1.33	71	-4	2.91	-1.02	78	+3	3.34	-0.59
SEP	65	-3	4.22	+1.02	68	0	2.61	-0.59	72	+4	0.59	-2.21
OCT	56	-1	1.61	-0.96	58	+1	5.65	+3.08	58	+1	0.92	-1.65
NOV	50	+5	4.63	+1.24	49	+4	6.29	+2.90	47	+2	1.54	-1.85
DEC	36	0	3.26	-0.72	36	0	3.20	-0.78				
Total			42.97	-1.58			52.18	+7.63			25.32	-15.25

DEP is departure from the long-term average.

There were differences in persistence between white versus red clover. Red clover entries did not tolerate continuous, heavy grazing (Tables 2 and 3). In contrast, there were several white clover entries that persisted into the third season under the abusive grazing of these trials.

Tables 4 and 5 summarize information about distributors and persistence across years.

Summary

Although these varieties were abused during the growing season, they were allowed to rest and regrow after September 15 to prepare for winter. 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.

This information should be used along with yield and pest resistance information in selecting the best clover variety for each

individual use. It is not recommended that clover 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 clovers.

Good management for maximum life from grazing clover would include:

- allowing clover 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. Less time is required for white clover.
- adding any needed fertilizer and lime.
- removing grazing livestock from clover fields from mid-September to November 1 to replenish root reserves for winter survival.

Table 2. Percent stand of red and white clover varieties sown September 19, 2002 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Species	Percent Stand				
		Mar 25, 2003	Oct 30, 2003	Mar 26, 2004	Nov 8, 2004	May 26, 2005
Commercial Varieties—Available for Farm Use						
Ivory	white	33	69	10	50	30*
Regal	white	31	48	8	22	21
Tilman II	white	69	72	27	20	21
Crescendo	white	48	63	23	17	19
CA Ladino	white	48	50	12	11	12
Certified Kenland	red	87	14	7	0	0
Cinnamon	red	84	13	5	0	0
Cinnamon Plus	red	81	24	9	0	0
Common	red	88	4	4	0	0
Starfire	red	81	10	7	0	0
Experimental Varieties						
CW 9701	white	47	69	22	28	24
CW 9502	white	62	63	23	25	21
CW 9808	white	52	55	16	17	20
CW 9801	white	43	58	23	18	17
CW 3001	red	82	16	9	0	0
RC 9103	red	78	11	7	0	0
RC 9602	red	81	20	12	0	0
RC 9804G	red	78	14	9	0	0
Mean		65	37	13	12	10
CV,%		14	31	38	55	47
LSD,0.05		11	13	6	7	6

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

Table 3. Percent stand and vigor rating of red and white clover varieties sown September 3, 2004 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Species	Seedling Vigor ¹ Nov 8, 2004	Percent Stand	
			Apr 8, 2005	Oct 31, 2005
Commercial Varieties—Available for Farm Use				
Barblanca	white	3.3	57	91*
Ivory	white	3.5	58	88*
Colt	white	3.2	60	84*
Durana	white	3.2	55	83*
CW7000	white	4.3	62	82*
Patriot	white	3.0	60	79
Seminole	white	3.7	29	75
Alice	white	3.0	58	71
Experimental Varieties				
AGRTR219	white	3.3	62	88*
KYSynthetic	white	3.2	67	87*
AGRTR216	white	3.0	48	84*
GA178	white	4.7	65	80*
AGRTR218	white	3.2	41	77
AGRTR217	white	4.2	52	63
AGRTAxA102	white x caucasian	2.8	58	55
ZR003R	red	4.2	28	53
AGRTAxA101	white x caucasian	2.5	68	51
ZR009R	red	4.0	21	48
GA-CAG-S	red	5.0	27	45
GAc1RC	red	4.3	25	43
Mean		4	50	71
CV,%		15	37	14
LSD,0.05		1	21	11

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

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

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Table 4. Summary of persistence of red clover varieties under heavy grazing pressure across years at Lexington, Kentucky.

Variety	Proprietor/KY Distributor	2002 ¹					2004	
		Mar 2003 ²	Oct 2003	Mar 2004	Nov 2004	May 2005	Apr 2005	Oct 2005
Commercial Varieties—Available for Farm Use								
Cinnamon	FFR/Southern States	*	*	X	*	*		
Cinnamon Plus	FFR/Southern States	*	*	*	*	*		
Common	Public	*	X	X	*	*		
Kenland, certified	Public	*	*	*	*	*		
Starfire	Ampac Seed Co.	*	X	*	*	*		
Experimental Varieties								
CW 3001	Cal/West Seeds	*	*	*	*	*		
GAc1RC	University of Georgia						*	*
GA-CAG-S	University of Georgia						*	*
RC 9103	FFR/Southern States	*	*	*	*	*		
RC 9602	FFR/Southern States	*	*	*	*	*		
RC 9804G	Seed Research of Oregon	*	*	*	*	*		
ZR003R	ABI Alfalfa, Inc.						*	*
ZR009R	ABI Alfalfa, Inc.						*	*

¹ Establishment year.

² Date of rating of percent stand

*Not significantly different from the most persistent red clover variety.

An x in the block indicates the variety was in the test but the stand survival was significantly less than the most persistent red clover variety.

An open block indicates the variety was not in the test.

Table 5. Summary of persistence of white clover varieties under heavy grazing pressure across years at Lexington, Kentucky.

Variety (Type)	Proprietor/KY Distributor	2002 ¹					2004	
		Mar 2003 ²	Oct 2003	Mar 2004	Nov 2004	May 2005	Apr 2005	Oct 2005
Commercial Varieties—Available for Farm Use								
Alice	Public						*	X
Barblanca	Barenbrug USA						*	*
CA Ladino	Public	X	X	X	X	X		
Colt (Intermediate)	Seed Research of Oregon						*	*
Crescendo (Ladino)	Cal/West Seeds	X	*	*	X	X		
CW7000	Cal/West Seeds						*	*
Durana (Dutch)	Pennington Seed						*	*
Ivory	Cebeco Internatiional Seeds, Inc.	X	*	X	*	*	*	*
Patriot (Intermediate)	Pennington Seed						*	*
Regal (Ladino)	Public	X	X	X	X	X		
Seminole (Seminole)	Saddle Butte Ag, Inc						X	X
Tillman II	Caudill Seed Co.	*	*	*	X	X		
Experimental Varieties								
AGRtAxA1013	AgResearch(USA) Limited						*	X
AGRtAxA1023	AgResearch(USA) Limited						*	X
AGRTR 216	AgResearch(USA) Limited						*	*
AGRTR 217	AgResearch(USA) Limited						*	X
AGRTR 218	AgResearch(USA) Limited						X	X
AGRTP 219	AgResearch(USA) Limited						*	*
CW 9502	Cal/West Seeds	*	*	*	X	X		
CW 9701	Cal/West Seeds	X	*	*	X	X		
CW 9801	Cal/West Seeds	X	X	*	X	X		
CW 9808	Cal/West Seeds	X	X	X	X	X		
GA178	Unversity of Georgia						*	*
KY Synthetic (Dutch)	KY Agric. Exper. Station						*	*
¹ Establishment year. ² Date of rating of percent stand ³ Cross between white and caucasian clover. *Not significantly different from the most persistent white clover variety. An x in the block indicates the variety was in the test but the stand survival was significantly less than the most persistent white clover variety. An open block indicates the variety was not in the test.								



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