

2004 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. This report summarizes current research on the grazing tolerance of clover varieties when subjected to continuous grazing pressure.

Description of the Tests

Red and white clover tests for grazing were established in Lexington in the fall of 2000, 2001, and 2002. A test was sown in the fall of 2003 but due to high plant mortality during the winter of 2003/2004 the test was replanted in the fall of 2004. 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 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 first spring after seeding. In general, plots were grazed from mid-April to 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 and 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 the 2001, 2002, 2003 and 2004 growing seasons are presented in Table 1.

Data on percent stand are presented in Tables 2, 3, and 4. 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.

There were differences in persistence between white versus red clover. Red clover entries did not tolerate continuous, heavy grazing (Tables 2, 3, and 4). In contrast, there were several white clover entries that persisted after two seasons.

Table 5 summarizes information about distributors and persistence across two years.

Summary

These studies indicate there are white clover varieties that express tolerance to overgrazing. Red clover entries have not shown the same tolerance to overgrazing.

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

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 Nov. 1 to replenish root reserves for winter survival.

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Table 1. Temperature and rainfall at Lexington during the 2001, 2002, 2003 and 2004 growing seasons.

	2001				2002				2003				2004			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	31		0.92	-1.94	38	+7	2.12	-0.7	26	-5	0.96	-1.90	30	-1	3.14	+0.28
FEB	40	+5	3.20	-0.01	38	+3	1.28	-1.9	32	-3	3.59	+0.38	36	+1	1.32	-1.89
MAR	40	-4	2.73	-1.67	45	+1	7.93	+3.5	47	+3	2.09	-2.31	47	+3	3.43	-0.97
APR	59	+4	1.66	-2.22	58	+3	4.19	+0.3	57	+2	3.14	-0.74	55	0	3.06	-0.82
MAY	66	+2	4.85	+0.38	61	-3	4.36	-0.1	63	-1	6.68	+2.21	68	+4	9.79	+5.32
JUN	71	-1	2.04	-1.12	74	+2	2.45	-1.2	69	-3	4.85	+1.19	72	0	3.13	-0.53
JUL	75	-1	5.58	+0.58	78	+2	1.10	-3.9	74	-2	2.68	-2.32	73	-3	7.65	+2.65
AUG	76	+1	4.75	+0.82	77	+2	0.95	-3.0	75	0	5.26	+1.33	71	-4	2.91	-1.02
SEP	65	-3	2.99	-0.21	72	+4	4.90	+1.7	65	-3	4.22	+1.02	68	0	2.61	-0.59
OCT	56	-1	3.62	+1.05	55	-2	5.61	+3.0	56	-1	1.61	-0.96	58	+1	5.65	+3.08
NOV	51	+6	2.83	-0.56	43	-2	3.76	+0.4	50	+5	4.63	+1.24	49	+4	6.29	+2.90
Total			35.17	-5.40			38.65	-1.92			39.71	-0.86			48.98	+8.41

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

Table 2. Percent stand of red and white clover varieties sown September 19, 2000 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Species	Percent Stand			
		Apr 9, 2001	Oct 15, 2001	Apr 2, 2002	Oct 14, 2002 ¹
Commercial Varieties—Available for Farm Use					
Starfire	red	89	31	36	2
Certified Kenland	red	86	15	31	0
Red Gold Plus	red	86	20	33	0
Experimental Varieties					
AGRTR 205	white	72	63	61	48*
AGRTR 208	white	60	69	63	30
AGRTR 207	white	68	68	58	5
ZR 9908R	red	88	35	43	3
AGRTP 101	red	82	5	14	2
RC 9803G	red	89	47	52	2
ZR 9906R	red	90	40	40	0
Mean		81.0	39.2	42.8	9.0
CV, %		11.8	24.6	19.4	70.7
LSD, 0.05		11.1	11.2	9.7	7.4

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

¹ Experiment was terminated in the spring of 2003 due to high plant mortality across varieties.

Table 3. Percent stand of red clover varieties sown September 12, 2001 in a cattle grazing study at Lexington, Kentucky.		
Variety	Percent Stand	
	Apr 4, 2002	Oct 15, 2002¹
Commercial Varieties—Available for Farm Use		
Emarwan	71	5*
Starfire	64	5*
Certified Kenland	77	3*
Freedom!	81	3*
Duration	58	3*
Vesna	79	2*
Uncertified Kenland	66	1
Experimental Varieties		
RC 9301	57	5*
Kenton (KNARS)	62	3*
RC 9501	67	3*
RC 9803G	64	3*
Mean	67.7	3.1
CV, %	14.9	80.9
LSD, 0.05	11.7	2.9
*Not significantly different from the highest value in the column, based on the 0.05 LSD.		
¹ Experiment was terminated in the spring of 2003 due to high plant mortality across varieties.		

Table 4. 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
Commercial Varieties—Available for Farm Use					
Ivory	white	33	69	10	50*
Regal	white	31	48	8	22
Tillman II	white	69	72	27	20
Crescendo	white	48	63	23	17
CA Ladino	white	48	50	12	11
Certified Kenland	red	87	14	7	0
Cinnamon	red	84	13	5	0
Cinnamon Plus	red	81	24	9	0
Common	red	88	4	4	0
Starfire	red	81	10	7	0
Experimental Varieties					
CW 9701	white	47	69	22	28
CW 9502	white	62	63	23	25
CW 9801	white	43	58	23	18
CW 9808	white	52	55	16	17
CW 3001	red	82	16	9	0
RC 9103	red	78	11	7	0
RC 9602	red	81	20	12	0
RC 9804G	red	78	14	9	0
Mean		65.1	37.3	12.8	11.5
CV, %		14.1	30.5	28.3	54.6
LSD, 0.05		10.5	13.1	5.6	7.2
*Not significantly different from the highest value in the column, based on the 0.05 LSD.					

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

Variety	Species	Proprietor/KY Distributor	2000 ¹				2001		2002			
			Apr 2001 ²	Oct 2001	Apr 2002	Oct 2002	Apr 2002	Oct 2002	Mar 2003	Oct 2003	Mar 2004	Nov 2004
Commercial Varieties—Available for Farm Use												
CA Ladino	white	Public							X	X	X	X
Cinnamon	red	FFR/Southern States							*	X	X	X
Cinnamon Plus	red	FFR/Southern States							*	X	X	X
Common	red	Public							*	X	X	X
Crescendo	white	Cal/West Seeds							X	*	*	X
Duration	red	Cisco Companies					X	*				
Emarwan	red	Turf Seed, Inc.					*	*				
Freedom!	red	Barenbrug USA					*	*				
Ivory	white	Cebeco International Seeds, Inc.							X	*	X	*
Kenland, certified	red	Public	*	X	X	X	*	*	*	X	X	X
Kenland, uncertified	red	Public					X	X				
Red Gold Plus	red	Turner Seed, Inc.	*	X	X	X						
Regal	white	Public							X	X	X	X
Starfire	red	Ampac Seed Co.	*	X	X	X	X	*	*	X	X	X
Tillman II	white	Caudill Sed Co.							X	*	*	X
Vesna	red	DLF-Jenks					*	*				
Experimental Varieties												
AGRTR 205	white	AgResearch(USA) Limited	X	*	*	*						
AGRTR 207	white	AgResearch(USA) Limited	X	*	*	X						
AGRTR 208	white	AgResearch(USA) Limited	X	*	*	X						
AGRTP 101	red	AgResearch(USA) Limited	*	X	X	X						
CW 3001	red	Cal/West Seeds							*	X	X	X
CW 9502	white	Cal/West Seeds							X	*	*	X
CW 9801	white	Cal/West Seeds							X	X	*	X
CW 9808	white	Cal/West Seeds							X	X	X	X
Kenton (KNARS)	red	KY Agric. Exp. Station					X	*				
RC 9103	red	FFR/Southern States							*	X	X	X
RC 9301	red	FFR/Southern States					X	*				
RC 9501	red	FFR/Southern States					X	*				
RC 9602	red	FFR/Southern States							*	X	X	X
RC 9803G	red	FFR/Southern States	*	X	X	X	X	*				
RC 9804G	red	Seed Research of Oregon							*	X	X	X
ZR 9906R	red	America's Alfalfa	*	X	X	X						
ZR 9908R	red	ABI Alfalfa, Inc.	*	X	X	X						

¹ Establishment year.

² Date of rating of percent stand

* Not significantly different from the most persistent variety.

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

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



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