PR-677

UNIVERSITY OF KENTUCKY College of Agriculture,

2014 Red and White Clover Report

G.L. Olson, S.R. Smith, and G.D. Lacefield, Plant and Soil Sciences

Introduction

Red clover (*Trifolium pratense L.*) is a high-quality, short-lived, perennial legume used in mixed or pure stands for pasture, hay, silage, green chop, soil improvement, and wildlife habitat. This species is adapted to a wide range of climatic and soil conditions. Stands of improved varieties generally are productive for 2½ to 3 years, with the highest yields occurring in the year following establishment. Red clover is used primarily as a renovation legume for grass pastures. It is a dominant forage legume in Kentucky because it is relatively easy to establish and has high forage quality, yield, and animal acceptance.

White clover (*Trifolium repens L.*) is a low-growing, perennial pasture legume with white flowers. It differs from red clover in that the stems (stolons) grow along the surface of the soil and can form adventitious roots that may lead to the development of new plants. Three types of white clover grow in Kentucky: Dutch, intermediate, and ladino. Dutch white clover, sometimes called "common," naturally occurs in many Kentucky pastures and even lawns. It is generally long lived and reseeds readily, but its small leaves

Table 1. Temperature and rainfall at Lexington, Kentucky in 2011, 2012 and 2013.

		20	12			20	13			20	14 ²	
	Tei	mp	Raiı	nfall	Tei	mp	Raiı	nfall	Tei	mp	Raiı	nfall
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	38	+7	4.80	+1.94	38	+7	4.50	+1.64	25	-6	2.28	58
FEB	40	+5	5.39	+2.18	36	+1	1.78	-1.43	30	-5	5.47	+2.26
MAR	56	+12	5.64	+1.24	39	-5	5.47	+1.07	39	-5	3.08	-1.32
APR	56	+1	3.26	-0.62	55	0	4.46	+0.58	58	+3	5.27	-1.89
MAY	69	+5	4.02	-0.45	65	+1	5.23	+.076	66	+2	5.72	+1.25
JUN	73	+1	2.42	-1.24	72	0	7.32	+3.66	75	+3	2.93	-0.73
JUL	81	+5	2.50	-2.50	72	-4	9.33	+4.33	74	-2	3.18	-1.82
AUG	75	0	1.68	-2.25	72	-3	3.68	-0.25	76	+1	6.53	+2.60
SEP	67	-1	6.40	+3.20	67	-1	2.21	-0.99	69	+1	3.63	+.43
OCT	55	-2	2.00	-0.57	55	-2	7.02	+4.45	57	0	5.55	+2.98
NOV	43	-2	1.81	-0.65	41	-4	3.06	-0.33				
DEC	42	+6	9.57	+4.94	36	0	4.19	+0.21				
Total			49.49	+4.94			58.25	+13.70			44.14	+6.96

DEP is departure from the long-term average.
 2014 data is for ten months through October.

and low growth habit result in low forage yield. The intermediate type is a cross between ladino and Dutch white clover and has been developed to give higher yields than the Dutch type and 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 and is the highest yielding of the three white clover types. Information on the grazing tolerance of white clover varieties can be found in the 2014 Red

and White Clover Grazing Tolerance Report (PR-683).

Yield and persistence of red and white clover varieties are dependent on environment and pressure from diseases and insects. The most common red clover diseases in Kentucky are southern anthracnose, powdery mildew, sclerotinia crown rot, and root rots. For white clover, the most common pests are stolon rots, root rots, and potato leafhoppers. High yield and persistence (as measured by percent stand) are two indications that a

Table 2. Temperature and rainfall at Princeton, Kentucky in 2013 and 2014.

		20	13			20	14 ²	
	Tei	mp	Raiı	nfall	Te	mp	Raiı	nfall
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP
JAN	38	+4	6.31	+2.51	30	-4	1.70	-2.10
FEB	39	+1	3.09	-1.34	32	-6	4.75	+0.32
MAR	42	-5	4.34	-0.60	43	-4	7.43	-0.51
APR	57	-2	5.72	+0.92	59	0	8.5	+3.70
MAY	66	-1	4.26	-0.70	68	+1	1.96	-3.00
JUN	74	-1	7.55	+3.70	76	+1	3.25	-0.60
JUL	75	-3	4.44	+0.15	73	-5	1.56	-2.73
AUG	75	-2	5.59	+1.58	78	0	9.33	+5.32
SEP	71	0	5.37	+2.04	69	-2	0.97	-2.36
OCT	59	0	4.04	+0.99	59	0	4.36	+1.31
NOV	44	-3	1.37	-3.26				
DEC	38	-1	5.41	+0.37				
Total			57.49	+6.36			40.81	-0.65

DEP is departure from the long-term average.

Table 3. Temperature and rainfall at Quicksand, Kentucky in 2013 and 2014.

		20	13			20	14 ²	
	Tei	mp	Rair	nfall	Tei	mp	Raiı	nfall
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP
JAN	38	+7	5.61	+2.37	29	-2	2.66	-0.63
FEB	38	+5	1.81	-1.79	36	+3	4.52	+0.92
MAR	40	-1	4.55	+0.21	43	+2	5.68	+1.34
APR	56	+3	3.55	-0.55	58	+5	5.12	+1.02
MAY	64	+2	3.98	-0.50	65	+3	2.71	-1.77
JUN	73	+3	6.44	+2.62	75	+5	1.81	-2.01
JUL	75	+1	5.24	-0.01	72	-2	7.14	+1.89
AUG	73	0	5.85	+1.84	74	+1	7.94	+3.93
SEP	68	+2	1.71	-1.81	69	+3	1.93	-1.59
OCT	58	+4	2.07	-0.84	57	+3	6.36	+3.45
NOV	43	+1	3.05	-0.83				
DEC	40	+7	6.84	+2.70				
Total			50.70	+3.36			45.87	+6.55

¹ DEP is departure from the long-term average.



² 2014 data is for ten months through October.

² 2014 data is for the ten months through October.

Table 4. Dry matter yields, seedling vigor and stand persistence of red clover varieties sown August 9, 2012 at Lexington, Kentucky.

	Seedling		Pe	ercent Star	nd				Yie	ld (tons/a	cre)		
	Vigor ¹	2012	20	13	20	14	2013			2014			2-year
Variety	Sep 27, 2012	Sep 27	Mar 20	Sep 26	Apr 1	Oct 6	Total	May 13	Jun 10	Jul 11	Sep 18	Total	Total
Commercial Varietie	es—Available fo	r Farm Us	e										
SS-0303RCG	4.8	100	96	78	83	40	6.05	1.19	0.46	0.64	0.38	2.67	8.73*
Cinnamon Plus	4.0	99	96	83	74	40	5.94	1.07	0.49	0.58	0.30	2.43	8.37*
Kenland (certified)	4.1	99	96	89	70	25	6.13	0.81	0.54	0.45	0.30	2.10	8.23*
LS 9703	3.9	98	94	89	75	30	5.69	0.91	0.42	0.40	0.31	2.04	7.73*
Freedom!	4.0	97	98	72	64	20	5.49	0.74	0.45	0.31	0.16	1.66	7.15
Common O	4.5	100	99	6	4	2	3.93	0.19	0.20	0.09	0.09	0.57	4.50
Experimental Varie	ties												
XLFRC1	3.9	98	94	94	90	40	6.17	1.17	0.47	0.57	0.42	2.63	8.81*
CW 0702	4.4	98	97	92	78	43	5.69	0.97	0.41	0.46	0.38	2.22	7.90*
RC 9806	3.3	97	96	95	85	43	5.80	0.81	0.51	0.48	0.30	2.10	7.90*
IS-TP-12	2.8	100	97	54	31	14	5.24	0.86	0.42	0.42	0.36	2.05	7.30
GA-Bull-AST	4.0	100	98	68	53	18	5.21	0.80	0.35	0.37	0.23	1.76	6.97
GA-Bulldog-S	3.3	100	98	60	46	11	4.84	0.64	0.38	0.29	0.17	1.48	6.32
Mean	3.9	99	96	73	63	27	5.52	0.85	0.43	0.42	0.28	1.98	7.50
CV,%	15.7	2	3	21	21	40	6.21	25.40	25.30	26.88	48.83	25.34	10.19
LSD,0.05	0.9	2	4	22	20	16	0.50	0.31	0.16	0.17	0.20	0.73	1.12

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

red or white clover variety is resistant to or tolerant of these pests when grown in Kentucky.

This report provides current yield data on red and white clover varieties included in yield trials in Kentucky as well as guidelines for selecting clover varieties. Tables 14 and 15 show a summary of all clover varieties tested in Kentucky for the past 15 years. The UK Forage Extension Web site at www.uky.edu/Ag/Forage

contains electronic versions of all forage variety testing reports from Kentucky and surrounding states and a large number of other forage publications.

Important Selection Considerations

Local adaptation and persistence. The variety should be adapted to Kentucky as indicated by superior performance across years and locations in replicated yield trials such as those reported in this publication. High-yielding varieties are generally also those varieties that are the most persistent. Improved red clover generally produces

measurable yields for $2\frac{1}{2}$ to 3 years, with the year of establishment considered as the first year. The highest yields occur in the year following establishment. White clover may persist longer than red clover, particularly in wet seasons, and has the ability to reseed even under grazing.

Seed quality. Buy premium-quality seed that is high in germination and 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, such as those reported in this publication. 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.

Table 5. Dry matter yields, seedling vigor and stand persistence of red clover varieties sown August 21, 2013 at Lexington, Kentucky.

	Seedling	Percent Stand Yield (tons/acre) 2013 2014 2024 2014								
	Vigor ¹	2013	20	14			20	14		
Variety	Sep 26, 2013	Sep 26	Apr 1	Oct 6	May 12	Jun 10	Jul 11	Aug 12	Sep 18	Total
Commercial Varieti	es—Available f	or Farm U	se							
Kenland (certified)	4.1	100	100	100	2.31	1.33	1.48	0.93	1.66	7.70*
Freedom!	4.1	98	100	98	2.11	1.38	1.55	0.93	1.53	7.50*
Commom O	4.6	100	100	98	2.20	1.46	1.34	0.97	1.42	7.39*
Cinnamon Plus	4.4	100	100	100	2.47	1.24	1.15	0.77	1.62	7.26*
FSG 402	4.4	100	100	100	2.78	1.20	1.21	0.68	1.17	7.04*
Gallant	3.4	100	100	100	2.37	1.16	1.31	0.73	1.45	7.02*
Experimental Varie	ties									
RC 0401	4.1	100	100	100	2.31	1.18	1.62	0.86	1.57	7.55*
B-12.2689	3.4	93	97	96	2.11	1.42	1.44	0.83	1.50	7.29*
AMP-RC0501	4.1	98	99	99	2.25	1.12	1.38	0.79	1.57	7.10*
GA-Bulldog-S	4.0	100	100	98	2.32	1.15	1.41	0.76	1.34	6.97*
B-12.2688	3.6	96	100	100	2.64	1.26	1.23	0.58	1.24	6.95*
B-12.3051	3.3	99	99	98	2.30	1.03	1.43	0.63	1.29	6.68
GA 9908	4.4	98	99	98	2.21	1.05	1.14	0.66	1.57	6.62
GA-Bull-AST	3.4	100	100	99	2.43	1.06	1.17	0.58	1.29	6.54
Mean	3.9	99	100	99	2.34	1.22	1.35	0.76	1.44	7.12
CV,%	17.9	2	1	2	12.53	11.63	22.48	23.36	12.91	8.85
LSD,0.05	1.0	3	1	3	0.42	0.20	0.43	0.26	0.27	0.90

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.

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

Description of the Tests

This report summarizes studies at Lexington (two in 2012, 2013 and 2014), Princeton (2013) and Quicksand (2013). The soils at Princeton (Crider), Lexington (Maury) and Quicksand (Nolin) are well-drained silt loams. All are well-suited to clover production. Plots were 5 feet by 20 feet in a randomized complete block design with four replications with a harvested plot area of 5 feet by 15 feet.

Seedings were made at 12 pounds of seed per acre for red clover and 3 pounds of seed per acre for white clover into a prepared seedbed using a disk drill. The first cutting in the seeding year was delayed to allow the clover to completely reach maturity as indicated by full bloom, which generally occurs about 60 to 90 days after seeding. Otherwise, harvests were taken when the clover was in the bud to early flower stage using a sickletype forage plot harvester. Fresh weight samples were taken at each harvest to calculate percent dry matter production. All tests for establishment, fertility (P, K and lime based on regular soil tests), and harvest management were managed

Table 6. Dry matter yields, seedling vigor and stand persistence of red clover varieties sown April 10, 2014 at Lexington, Kentucky.

	Seedling	Percent	t Stand		Yield (to	ns/acre)	
	Vigor ¹	20	14		20	14	
Variety	May 27, 2014	May 27	Oct 6	Jul 8	Aug 12	Sep 18	Total
Commercial Variet	ies—Available f	or Farm U	se				
Common O	4.8	94	94	0.98	0.78	1.53	3.29*
Freedom!	4.3	90	91	1.03	0.62	1.41	3.06*
Starfire II	3.8	88	88	0.87	0.67	1.41	2.96*
Cinnamon Plus	4.0	88	89	0.85	0.55	1.48	2.88*
Kenland (certified)	3.9	88	89	0.84	0.60	1.35	2.79*
SS-0303RCG	4.0	91	91	0.89	0.50	1.39	2.78*
Mean	4.1	90	90	0.91	0.62	1.43	2.96
CV,%	20.0	6	6	22.74	22.08	11.73	14.07
LSD,0.05	1.2	8	8	0.31	0.21	0.25	0.63

Yigor 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.

according to University of Kentucky Cooperative Extension Service recommendations. Weeds were controlled to avoid limiting production and persistence.

Results and Discussion

Weather data for Lexington, Princeton and Quicksand are presented in Tables 1, 2 and 3.

Yield data (on a dry matter basis) are presented in Tables 4 through 11. Yields

are given by cutting date for 2014 and as total annual production. Varieties are listed in order from highest to lowest total production (for the life of the test). Experimental varieties are listed separately at the bottom of the tables and are not available commercially.

Statistical analyses were performed on all clover data (including experimental varieties) to determine whether the apparent differences are truly due

Table 7. Dry matter yields, seedling vigor and stand persistence of red clover varieties sown April 9, 2013 at Princeton, Kentucky.

	Seedling		Percen	t Stand				Yie	l d (tons/a	icre)		
	Vigor1	20	13	20	14	2013			2014			2-year
Variety	May 15, 2013	May 15	Oct 8	Apr 4	Oct 22	Total	May 20	Jun 18	Jul 16	Sep 17	Total	Total
Commercial Variet	ies—Available	for Farm l	Jse									
Kenland (certified)	3.5	98	96	96	81	3.13	2.56	1.56	0.42	0.39	4.93	8.06*
Gallant	4.3	98	98	96	93	3.14	2.47	1.37	0.46	0.38	4.68	7.82*
Freedom!	3.8	98	97	95	81	3.07	2.38	1.62	0.38	0.34	4.72	7.79*
FSG 402	4.4	100	100	100	95	3.25	2.29	1.34	0.51	0.39	4.52	7.77*
SS-0303RCG	4.8	100	99	97	76	3.20	2.48	1.33	0.40	0.25	4.47	7.67*
Cinnamon Plus	4.3	99	98	96	90	2.96	2.15	1.34	0.37	0.29	4.15	7.11*
LS 9703	2.5	84	85	80	66	2.58	2.01	1.07	0.33	0.17	3.58	6.17
Common O	4.8	100	89	83	19	2.71	1.55	1.20	0.15	0.09	2.99	5.70
Experimental Vari	eties											
RC0401	4.5	99	99	99	96	3.21	2.76	1.37	0.47	0.38	4.98	8.19*
GA-Bulldog-S	4.3	99	96	95	64	3.18	2.39	1.35	0.36	0.27	4.37	7.56*
GA 9908	4.1	100	98	96	79	2.96	2.36	1.45	0.43	0.33	4.57	7.53*
CW 0702	4.9	100	98	97	74	3.07	2.36	1.35	0.35	0.28	4.33	7.40*
AMP-RC0501	4.3	99	97	97	75	2.97	2.20	1.38	0.47	0.29	4.34	7.31*
XLF-RC1	3.8	98	97	96	83	2.90	2.32	1.18	0.35	0.28	4.13	7.03*
GA-Bull-AST	4.3	98	97	94	40	2.86	2.37	1.21	0.36	0.09	4.03	6.89*
RC 9806	3.0	97	94	91	65	2.94	2.07	1.26	0.36	0.20	3.88	6.83*
IS-TP-12	2.8	96	91	86	56	2.64	2.12	1.29	0.33	0.23	3.97	6.61*
B-12-2689	2.5	86	81	71	38	2.84	1.70	1.20	0.28	0.16	3.34	6.18
B-12.3051	2.8	95	80	66	60	2.84	1.58	0.88	0.32	0.17	2.96	5.80
B-12.2688	3.1	97	93	92	65	2.25	1.71	0.96	0.31	0.21	3.18	5.44
Mean	3.8	97	94	91	70	2.94	2.19	1.29	0.37	0.26	4.11	7.04
CV,%	16.0	3	6	9	24	20.93	19.78	17.41	29.61	49.77	18.09	17.62
LSD,0.05	0.9	5	8	12	24	0.87	0.61	0.32	0.16	0.18	1.05	1.76

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.

to variety. Varieties not significantly different from the top variety within a column are marked with one asterisk (*). To determine if two varieties are truly different, compare the difference between the two varieties with 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.

Certified "Kenland" continues to rank near the top of tests. It is important to note yield differences between certified and uncertified Kenland red clover. Most Kenland offered for sale is uncertified, and our tests show it is significantly lower in yield than certified Kenland. White clover varieties, as managed in these trials, yielded less than most red clover varieties but were more persistent. Again, certified seed of improved varieties is recommended.

In addition to the commercially available varieties and experimental lines, selected "common" red clovers are included in the variety tests for comparison. Common red clover, generally sold as "medium red clover variety unknown," is unimproved red clover with

Table 8. Dry matter yields, seedling vigor and stand persistence of red clover varieties sown August 29, 2013 at Quicksand, Kentucky.

	Seedling	Pe	rcent Sta	nd		Yiel	d (tons/a	icre)	
	Vigor ¹	2013	20	14			2014	-	
Variety	Oct 3, 2013	Oct 3	Mar 27	Nov 3	May 20	Jun 30	Aug 5	Sep 17	Total
Commercial V	arieties—Availa	ble for F	arm Use						
Freedom!	3.125	99	99	98	2.25	2.57	1.98	1.16	7.96*
Kenland (certified)	3.000	99	100	100	2.29	2.55	2.04	0.97	7.85*
SS-0303RCG	3.125	100	100	100	2.21	2.59	1.91	0.86	7.57*
Common O	4.750	100	100	99	1.97	2.71	1.78	0.88	7.34*
LS 9703	2.250	95	95	96	2.12	2.44	1.77	0.96	7.29*
Cinnamon Plus	3.375	100	100	100	2.02	2.24	1.97	0.91	7.14*
Experimental	Varieties								
RC 9806	2.250	99	99	99	2.65	2.26	2.24	1.09	8.25*
IS-TP-12	1.250	96	96	96	2.30	2.58	1.99	0.99	7.86*
XLF-RC1	2.750	99	98	98	2.32	2.23	2.32	0.75	7.62*
CW 0702	4.333	99	99	99	2.29	2.31	1.94	0.87	7.40*
Mean	3.000	98	98	98	2.24	2.45	1.99	0.95	7.63
CV,%	27.400	1	1	2	12.47	15.17	20.88	21.14	12.57
LSD,0.05	1.200	2	2	2	0.41	0.55	0.62	0.30	1.42

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

unknown performance. Several years of testing show only about one out of every 10 common red clovers is as productive as certified or proprietary red clovers. In Kentucky, the average yield advantage of seeding better red clovers compared to common types is 3 tons to 6 tons of dry matter over the life of the stand.

Tables 12 and 13 summarize information about proprietors, distributors, and yield performance across years and locations for all varieties currently included in this report. Varieties are listed in alphabetical order, with the experimental

varieties at the bottom. Experimental varieties are not available for farm use, but commercial varieties can be purchased from dealerships. In Tables 12 and 13, an open block indicates the variety was not included in that particular test (labeled at the top of the column), and an "x" in the block means that the variety was included in the test but yielded significantly less than the top-yielding variety in the test. A single asterisk (*) means the variety was not significantly different from the highest-yielding variety based on the 0.05 LSD. Look at data from several years

Table 9. Dry matter yields, seedling vigor and stand persistence of white clover varieties sown August 9, 2012 at Lexington, Kentucky. (Seed Table 13 for designation of ladino, intermediate or dutch type varieties.)

							•					
	Seedling		Pe	rcent Sta	nd				Yield (to	ons/acre)		
	Vigor ¹	2012	20	13	20	14	2013		20	14		2-year
Variety	Sep 27, 2012	Sep 27	Mar 20	Sep 26	Apr 24	Oct 6	Total	May 13	Jun 3	Sep 18	Total	Total
Commercial V	arieties—Availa	ble for F	arm Use									
Regal	4.3	94	97	91	36	45	3.80	0.46	0.35	0.40	1.21	5.02*
Will	3.6	93	98	90	46	58	3.40	0.40	0.31	0.35	1.06	4.46*
Jumbo II	2.3	89	91	84	43	45	2.49	0.36	0.25	0.36	0.97	3.46
Patriot	3.5	89	92	80	49	35	2.67	0.27	0.20	0.25	0.72	3.39
KY Select	2.0	77	91	76	69	21	2.34	0.42	0.36	0.16	0.94	3.27
Kopu II	3.5	92	90	86	31	26	2.50	0.19	0.19	0.20	0.58	3.08
Durana	2.3	86	95	56	61	28	2.14	0.29	0.29	0.15	0.73	2.87
Crusader II	3.5	91	18	20	38	9	1.11	0.31	0.29	0.15	0.75	1.86
Experimental	Varieties											
IS-TR12	2.5	79	84	86	50	39	2.65	0.30	0.22	0.28	0.80	3.45
XLFWC1	3.0	83	48	33	28	5	1.21	0.12	0.15	0.17	0.43	1.65
Mean	3.0	87	80	70	45	31	2.43	0.31	0.26	0.25	0.82	3.25
CV,%	41.7	11	12	21	50	62	28.46	71.83	68.55	50.55	56.56	32.34
LSD,0.05	1.8	14	14	21	33	28	1.00	0.32	0.26	0.18	0.67	1.52

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.

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

and locations when choosing a variety of clover rather than results from one test year, as is reported in Tables 4 through 11. Make sure seed of the variety selected is properly labeled and will be available when needed.

Tables 14 and 15 are summaries of yield data from 1998 to 2014 of commercial varieties that have been entered in the Kentucky trials. The data is listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, the mean for each trial is 100 percent—varieties with percentages over 100 yielded better than average, and varieties with percentages less than 100 yielded lower than average. Direct, statistical comparisons of varieties cannot be made using the summary Tables 14 and 15, 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; 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 the footnotes in Tables 14 and 15 to determine to which yearly report to refer.

Summary

Red and white clovers can be productive components of pasture and hayfields. Choose varieties with proven performance in yield and persistence.

The following College of Agriculture publications related to the establishment, management, and harvesting of clover are available at local county Extension offices and are listed in the "Publications" section of the UK Forage Web site, www. uky.edu/Ag/Forage:

- Lime and Fertilizer Recommendations (AGR-1)
- Producing Red Clover Seed in Kentucky (AGR-2)
- Grain and Forage Crop Guide for Kentucky (AGR-18)
- Renovating Hay and Pasture Fields (AGR-26)
- Growing Red Clover in Kentucky (AGR-33)

Table 10. Dry matter yields, seedling vigor and stand persistence of white clover varieties sown August 21, 2013 at Lexington, Kentucky. (See Table 13 for designation of ladino, intermediate or dutch type varieties.)

		Pe	rcent Sta	nd			Vield (to	ons/acre)		
	Seedling Vigor ¹	2013		14				14		
Variety	Oct 3, 2013	Oct 3	Apr 1	Oct 6	May 13	Jun 3	Jul 8	Aug 19	Sep 19	Total
Commercia	l Varieties—Av	ailable f	or Farm	Use						
Regal	4.0	86	93	93	1.02	1.19	0.46	0.49	0.50	3.66*
Will	3.8	73	82	97	1.19	1.06	0.26	0.35	0.53	3.40*
Durana	2.1	68	69	95	0.97	0.78	0.20	0.16	0.28	2.40
Patriot	1.8	49	61	93	0.80	0.57	0.18	0.09	0.37	2.01
Crusader II	3.3	85	10	84	0.33	0.48	0.24	0.18	0.40	1.63
Experiment	tal Varieties									
GA-178	3.3	69	78	93	1.02	1.02	0.40	0.31	0.32	3.08*
VS-41730	3.6	85	92	93	1.17	0.84	0.17	0.17	0.28	2.64
XLFWC1	3.3	73	30	95	0.48	0.51	0.26	0.12	0.30	1.67
Mean	3.1	73	64	93	0.87	0.81	0.27	0.23	0.37	2.56
CV,%	24.5	27	32	6	23.05	13.20	44.40	50.40	27.07	15.61
LSD,0.05	1.1	29	31	9	0.30	0.16	0.18	0.17	0.15	0.59

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

Table 11. Dry matter yields, seedling vigor and stand persistence of white clover varieties sown April 10, 2014 at Lexington, Kentucky. (See Table 13 for designation of ladino, intermediate or Dutch type varieties.)

	Seedling	Percent	t Stand		Yield (to	ns/acre)	
	Vigor ¹	20	14		20	14	
Variety	May 27, 2014	May 27	Oct 6	Jul 8	Aug 19	Sep 19	Total
Commercial \	/arieties—Availa	able for Far	m Use				
Will	4.8	90	99	0.21	0.40	0.69	1.29*
Seminole	4.3	89	98	0.10	0.35	0.68	1.13*
Domino	3.0	76	93	0.11	0.23	0.59	0.93
Durana	2.8	63	87	0.13	0.21	0.54	0.87
Alice	3.5	76	73	0.12	0.24	0.47	0.83
Patriot	2.8	66	94	0.14	0.16	0.48	0.77
Experimenta	l Varieties						
NFWC04-29	3.4	86	94	0.19	0.37	0.75	1.31*
VS-41730	3.5	79	93	0.19	0.36	0.52	1.08*
GO-FD	3.3	75	91	0.11	0.20	0.57	0.89
NFWC04-49	2.8	85	92	0.12	0.18	0.46	0.76
Mean	3.4	79	91	0.14	0.27	0.58	0.99
CV,%	21.2	13	16	46.54	38.07	21.75	25.00
LSD,0.05	1.0	15	21	0.10	0.15	0.18	0.36

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

- Establishing Forage Crops (AGR-64)
- Inoculation of Forage Legumes (AGR-90)
- Growing White Clover in Kentucky (AGR-93)
- Weed Control Strategies for Alfalfa and Other Forage Legume Crops (AGR-148)
- Insect Management Recommendations for Field Crops and Livestock (ENT-17)
- Kentucky Plant Disease Management Guide for Forage Legumes (PPA-10D)
- "Emergency" Inoculation for Poorly Nodulated Legumes (PPFS-AG-F-04)

About the Authors

G.L. Olson is a research specialist and S.R. Smith and G.D. Lacefield are Extension professors in Forages.

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

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

Table 12. Performance of red clover varieties across years and locations.

			Lexi	ngton		Princ	ceton	Quicksand
	Proprietor/KY	20	12 ¹	2013	2014	20	13	2013
Variety	Distributor	13 ²	14	14	14	13	14	14
Commercial Va	rieties—Available for F	arm Us	e		,			
Cinnamon Plus	FFR/Southern States	*	*	*	*	*	*	*
Common O	Public	x ³	Х	*	*	*	Х	*
Freedom!	Barenbrug USA	Х	Х	*	*	*	*	*
FSG 402	Farm Science Genetics			*		*	*	
Gallant	Turner Seed			*		*	*	
Kenland (certified)	KY Agric. Exp. Station	*	*	*	*	*	*	*
LS 9703	Lewis Seed	*	*			*	Х	*
Rustler	Oregro Seeds							
SS-0303RCG	FFR/Southern States	*	*		*	*	*	*
Starefire II	Ampac Seed				*			
Experimental V	arieties				•			
AMP RC0501	Ampac Seed			*		*	*	
B-12.2688	Blue Moon Farms			*		Х	Х	
B-12.2689	Blue Moon Farms			*		*	Х	
B-12.3051	Blue Moon Farms			Х		*	Х	
CW 0702	Cal/West Seeds	*	*			*	*	*
GA-Bull-AST	Univ. of GA	Х	Х	Х		*	*	
GA-Bulldog-S	Univ. of GA	Х	Х	*		*	*	
GA 9908	Univ. of GA			х		*	*	
IS-TP-12	DLF International	Х	*			*	*	*
RC 0401	Allied Seed			*		*	*	
RC 9806	Pickseed USA	*	*			*	Х	*
XLFRC1	Proseeds Marketing	*	*			*	*	*

Table 13. Performance of white clover varieties across years at Lexington.

		Proprietor/KY	201	12 ¹	2013	2014
Variety	Туре	Distributor	13 ²	14	14	14
Commercial Va	rieties—Availa	ble for Farm Use				
Alice	Intermediate	Barenbrug				x ³
Crusader II	Intermediate	Allied Seed, L.L.C.	Х	*	Х	
Domino	_	Grassland Oregon				х
Durana	Intermediate	Pennington	Х	*	Х	х
Jumbo II	Ladino	Ampac Seed Co	Х	*		
Kopu II	Intermediate	Ampac Seed Co	Х	*		
KY Select	Intermediate	Saddlebutte	Х	*		
Patriot	Intermediate	Pennington	Х	*	Х	х
Regal	Ladino	Public	*	*	*	
Seminole	Ladino	Caudill Seed				*
Will	Ladino	Allied Seed, L.L.C.	*	*	*	*
Experimental \	/arieties					
GA-178	_	Univ. of Georgia			*	
GO-FD	_	Grassland Oregon				х
IS-TR12	Ladino	DLF International	Х	*		
NFWC04-29	Intermediate	Noble Foundation				*
NFWC04-49	Intermediate	Noble Foundation				х
VS-41730	Ladino	Turner Seed			Х	*
XLFWC1	_	ProSeeds Marketing	Х	Х	Х	

Table 14. Summa	Table 14. Summary of Kentucky red clover yield trials 2000-2014 (yield shown as a percentage of the mean of the named commercial varieties in the trial).	over y	ield tı	rials 2	000-20)14 (yi	ield sh	own a	s a pe	rcenta) de of	the m	ean oi	f the n	amed	comn	nercia	varie	ties in	the tri	al).								
							Lexington	gton								Prin	Princeton					Quicksand	and			Eder	Eden Shale		
		001,2	00	01	02	03	04	90	80	60	. 01	11 12	12	00	03 (05 (80	11 60	11 1	13 01		03 05	80	10	00	03	80	10	Mean ³
Variety	Proprietor	3yr4	3yr	3yr	3yr 3yr 3yr 3yr 3yr	3yr	3yr	2yr 3yr	3yr	2yr	3yr 3	yr .	2yr	2yr 3yr 3yr 2yr 3yr 3yr 2yr 3yr 2yr 2yr 2yr 2yr 2yr 2yr 2yr 3yr 3yr 3yr 3yr 3yr 3yr 3yr 3yr 3yr	3yr	.yr	yr 2	yr 2	yr 2	vr 2y	r 2y	r 3y	r 3yı	r 3yr	. 3yr	2yr	3yr	3yr	
AA117ER	ABI Alfalfa							110							<u> </u>	87			_			92							96(3)
Acclaim	Allied Seed				65																								ı
Arlington	WI Agr. Exp.Sta.				72																								1
Belle	Agribiotech	88			82														_										85(2)
Cherokee	FL Agr. Exp. Sta.	78			92																								72(2)
Cinnamon	FFR/Sou.St.	111			108																								110(2)
Cinnamon Plus	FFR/Sou.St.					6		109	109 112 123		117	94	116		_	112 1	102	102	100	86		103	_	108 124	_		108	122	109(17)
Common O	Public										96) /6	63							78				72				77	81(6)
Dominion	Seed Research of OR							102								95 1	102					93					109		100(5)
Duration	Cisco Co.			98	100														_	106	9								97(3)
Emarwan	Turf-Seed						91			117							1	106		101	1			66					103(5)
Freedom!	Barenbrug USA	108	105	127	127 123	96	118	91 100		108	106	109	99 1	105 1	110 136 107	36 1	07 1	116 95		107 11	1 10	111 103 119		5 115	106 115 102 102	102	100	100 140	109(28)
Freedom!MR	Barenbrug USA				118	118 115	102	114 114	114		112			Ţ	106	101	1	108			94	1111	_	128	~	118		125	112(14)
FSG 402	Allied Seed												\exists	\exists			\exists	\vdash	-	107									ı

² Harvest year.

3 x in the box indicates the variety was in the test but yielded significantly less than the top variety in the test. Open boxes indicate the variety was not in the test.

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

 ¹ Establishment year.

 2 Harvest year.

 3 x in the box indicates the variety was in the test but yielded significantly less than the top variety in the test. Open boxes indicate the variety was not in the test.

^{*}Not significantly different from the top-ranked white clover variety in the test.

Table 14. (continued)

Name								Lexinat	naton								Prine	Princeton					Ouicksand	and			Eden	Eden Shale		
Figure 3 May			001,2	1	\vdash	02			90	_	60	10	11				15 0	8				0	1 05	08		-		08		Mean
Seed	Variety	Proprietor	3yr4		-	\vdash		-	2yr	3yr	2yr		-			-		-	\vdash	\vdash	\vdash	\vdash		-	-			\vdash	3yr	(#trial
Secretary Mathematical Mathemat	FSG 9601	Allied Seed																												ı
Secolar 106 97 97 98 98 98 98 98 98	Gallant	Turner Seed											П						H	10	∞									1
bead 1	Impact	Specialty Seeds	106												86															100(3
PSS. A. S.	Juliet	Caudill Seed									84						55		0									84	59	82(5)
Paralle Signature Signatur	Kenland (cert.)	KY Ag.Exp Sta.	110					_	117	66	111		_				_											110		110(28
Postata 105 4 material states 105	Kenland (uncert)	Public										82						4			83				67			99	92	77(6)
Cybin 100 91 110 92 110 93 94 94 96 94 96 94 96 94 96 94 96 94 96 94 96 94 96 94 96 <	Kenstar	KY Ag.Exp Sta.		105											104															105(2
Figure 106 104 111 134 9 9 119 118 9 9 100	Kenton	KY Ag.Exp Sta.	100						112	121									4		93					102				102(19
Seedy Seed	Kenway	KY Ag.Exp Sta.	106	_	-	-		97	119	_				<u> </u>	100	5		-)3		100	0	103	-	_	102				106(15
Seeds 113 Seeds 113 Seeds Seeds 113 Seeds Se	LS 9703	Lewis Seed												107						8	10									96(2)
ed 113 113	Morning Star	Cal/West Seeds															5	0										06		90(2)
ed 3 5 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	Plus	Allied Seed	113			113													_							97				108(3
May altering in the designation of the designat	Plus II	Allied Seed								130														97						114(2
eed 3 9	Prima	Public	92			74																								83(2)
Marketing State	Quinequeli	Caudill Seed									92							œ	0										57	76(3)
eed 95 96 98 98 98 99 90	Red Gold	Proseeds Marketing							81								8	6										102		91(3)
fight 95 104 96 93 93 93 93 94 95 <th< td=""><td>Red Gold Plus</td><td>Turner Seed</td><td></td><td>6</td><td>97</td><td></td><td></td><td>95</td><td></td><td></td><td></td><td></td><td>Н</td><td></td><td>95</td><td>\vdash</td><td></td><td>Н</td><td>\vdash</td><td></td><td>86</td><td></td><td></td><td></td><td></td><td>86</td><td></td><td></td><td></td><td>9)/6</td></th<>	Red Gold Plus	Turner Seed		6	97			95					Н		95	\vdash		Н	\vdash		86					86				9)/6
Falfility 102 78 104 95 9	RedlanGraze	ABI Alfalfa	95																											I
fa 102 78 95 9 <td>RedlanGraze II</td> <td>Americas Alfalfa</td> <td></td> <td></td> <td>91</td> <td>104</td> <td></td> <td>93</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>96(3)</td>	RedlanGraze II	Americas Alfalfa			91	104															93									96(3)
aa 102 78 79	Redland Max	ABI Alfalfa						95							\exists	\dashv		-	-	_						_				ı
ed 92 92 92 93 94 95 94 95<	Redstart	Syngenta	102			78																								90(2)
Learch of OR Everach of OR 110 110 106 108 108 Fearch of OR 99 101 101 101 101 101 101 101 108 St. 108 92 91 10 83 101 84 10 106 10 104 90 104	Robust	Scott Seed	95																											I
search of OR 10 106 106 106 106 106 108 108 108 108 108 108 108 108 108 108 108 108 108 108 108 109 109 101 84 108 101 84 108 101 84 108 101 84 101 101 84 101	Robust II	Seed Research of OR													\exists	\dashv	_	0	-	_						_		108		109(2
St. 108 99 9 101 84 9	Rocket	Seed Research of OR															-	90										108		107(2
St. 108 92 91 96 9	Rojo Diablo	Great Plains			66																10									100(2
eeds 94 95 101 84 101 84 94 99 94 99 104 dd 95 9 95 10	Royal Red	FFR/Sou.St.	108	_		91						1	\dashv	\dashv	\dashv	\dashv	\dashv	+	\dashv	+	-	-	-	-	\dashv	\dashv				97(4)
lins lins lins lins lins lins lins lins	Rustler	Oregro Seeds								83		101	84		\dashv	\dashv	+	\dashv	\dashv					94	+				104	94(6)
lins 91 98 84 79 98 87 86 90 76 76 105 84 70 76	Scarlet	Dairyland	95										1		\dashv	\dashv		1	\dashv						1					I
St. Seed 97 102 98 84 79 98 87 86 90 70 70 105 98 94 98 87 86 90 106 70 106 70 106 70	Sienna	Great Plains			91													-	\dashv	-	100	2								99(2)
St. St. <td>Solid</td> <td>Production Service</td> <td>97</td> <td>102</td> <td></td> <td>86</td> <td>-</td> <td></td> <td>79</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>98</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>76</td> <td></td> <td></td> <td>105</td> <td>_</td> <td></td> <td></td> <td>91(11</td>	Solid	Production Service	97	102		86	-		79								98						76			105	_			91(11
eed 97 93 99 101 111 95 112 95 115 111 111 111 112 112 113 113 111 111 111 111 112 112 113 111 111 111 111 112 112 113 111	SS-0303RCG	FFR/Sou.St.																		10	9									ı
&Ampac B 101 111 111 111 112 112 110 112 115 111 <td>Starfire</td> <td>Ampac Seed</td> <td>97</td> <td>93</td> <td></td> <td>66</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>86</td> <td></td> <td></td> <td>-</td> <td>\dashv</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>95</td> <td></td> <td></td> <td></td> <td>96(5)</td>	Starfire	Ampac Seed	97	93		66									86			-	\dashv	_						95				96(5)
fa 53 101 92 92 92 92 92 92 92 93 94 95 96 96 96 96 96 96 98	Starfire II	Cal/West & Ampac								101		111					-	12						110	-	~		115	-	110(7
ts 53 101 107 96 98 9	Triple Trust 350	ABI Alfalfa							101							5	75						92							95(3)
ing Seeds	Vesna	DLF-Jenks			53										\dashv			-			96	_								75(2)
	Wildcat	Brett Young Seeds									101		\exists	\dashv	\dashv	\dashv	\dashv	7		_	_			_	98					102(3

Year trial was established.
 Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final yearly second.
 Use this summary table as a guide in making variety decisions, but refer to specific trial. For example, the Lexington trial planted in 2000 was harvested 3 years, so the final report would be "2002 Red and White Clover Report" archived in the KY Forage website at <www.uky.edu/Ag/ Forages.
 Mean only presented when respective variety was included in two or more trials.
 Number of years of data.

Table 15. Summary of Kentucky white clover yield trials 2002-2014 (yield shown as a percentage of the mean of the commercial varieties in the trial).

							Lexir	gton					Princ	ceton	Quicl	ksand	Eden Shale	
			021,2	03	04	06	07	08	09	10	11	12	03	05	98	03	03	Mean ³
Variety	Туре	Proprietor	3yr ⁴	3yr	3-yr	2-yr	2-yr	3yr	2yr	3yr	3yr	2yr	3yr	3-yr	3yr	2yr	2yr	(#trials)
Advantage	Ladino	Allied Seed, L.L.C.		125													106	116(2)
Alice	Intermediate	Barenbrug USA												86				_
Avoca	Dutch	DLF International Seeds				59								82				71(2)
Barblanca	Intermediate	Barenbrug USA		92														-
CA ladino	Ladino	Public	100		124								103		100	98		105(5)
Colt	Intermediate	Seed Research of OR		90		57								114				87(3)
Common	Dutch	Public	100				53			98				78				82(4)
Companion	Ladino	Oregro Seeds						87	94	92								91(3)
Crescendo	Ladino	Cal/West Seeds	105			140								109				118(3)
Crusader II	Intermediate	Allied Seed, L.L.C.								90	50	54						65(3)
Excel	Ladino	Allied Seed, L.L.C.			100													-
Durana	Intermediate	Pennington		94		94	88	82	85	97	93	84	87	83		101	95	90(12)
GWC-AS10	Ladino	Ampac Seed									102							_
Insight	Ladino	Allied Seed, L.L.C.				128												-
Ivory	Intermediate	Cebeco	96															-
Ivory II	Intermediate	DLF International Seeds					86			101	127							105(3)
Jumbo	Ladino	Ampac Seed	93															-
Jumbo II	Ladino	Ampac Seed									121	101						111(2)
Kopu II	Intermediate	Ampac Seed	97			97	95	95	103	96	80	90						94(8)
KY Select	Intermediate	Saddle Butte Ag. Inc									98	95						97(2)
Ocoee	Ladino	Allied Seed, L.L.C.								89	74							82(2)
Patriot	Intermediate	Pennington		103		87	104	113	95	117	117	99	104	100		98	99	103(12)
Pinnacle	Ladino	Allied Seed, L.L.C.				120								111				116(2)
Rampart	Ladino	Allied Seed, L.L.C.					80	89	97	83								87(4)
Regal	Ladino	Public	99	96	92		125	100	116	118	129	147	107	100	100	104		118(13)
RegalGraze	Ladino	Cal/West Seeds				127	140	102	103									118(4)
Resolute	Intermediate	FFR/Southern States				63												_
Seminole	Ladino	Saddle Butte Ag. Inc			108	70	79											86(3)
Super Haifa	Intermediate	Allied Seed, L.L.C.			77													-
Tillman II	Ladino	Caudill Seed	103															_
WBDX	Dutch	Saddle Butte Ag. Inc									72							_
Will	Ladino	Allied Seed, L.L.C.	107			162	150	132	107	119	137	130		136				131(9)
1 1/	ac octablished	1															1	

¹ Year trial was established.



² Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 2002 was harvested 3 years, so the final report would be "2004 Red and White Clover Report" archived in the KY Forage website at <www.uky.edu/Ag/Forage>.

Mean only presented when respective variety was included in two or more trials.
 Number of years of data.