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Mississippi *Perennial Cool-Season* FORAGE CROP

VARIETY TRIALS, 2012

MAFES

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Trade names of commercial and public varieties tested in this report are included only for clarity and understanding. All available names (i.e., trade names, experiment code names or numbers, chemical names, etc.) and varieties, products or source seed in this research are listed on page 6.

Mississippi Perennial Cool-Season Forage Crop Variety Trials, 2012

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Introduction

MAFES evaluates varieties of forage crops every year in small-plot trials. Seed companies and state universities provide seed for the entries, which are tested at one or more locations across Mississippi. All entries from privately owned companies are tested on a fee basis. MAFES may add standard varieties as a reference for comparison purposes. In addition, we may also add varieties of interest when applicable. Sources of seed are presented in Table 10. This report contains data from 11 varieties of tall fescue, 17 varieties of perennial clovers, and six varieties of alfalfa. Tall fescue entries include endophyte-infected, endophyte-free, and novel endophyte types. Alfalfa entries include both Roundup Ready® and conventional varieties, and the perennial clover test includes red and white clovers. Locations include the North Mississippi Branch Experiment Station at Holly Springs, Leveck Animal Research Center Forage Unit at Mississippi State, and White Sands Research Unit at Poplarville. Perennial clover and alfalfa were planted in fall 2011 at Holly Springs, Starkville, and Poplarville, but due to insufficient stands of perennial clover and alfalfa in Poplarville and Holly Springs, data was recorded in Starkville only. Tall fescue was planted in fall 2011 at Starkville and Holly Springs — the two most northern locations — and stands were successful in both locations. Red clover entries did not survive the summer in Starkville and had to be replanted in fall 2012. Growth was not sufficient enough to justify a harvest in the fall for red and white clover. Alfalfa in Starkville was severely infected with crown rot by September 2012 due to cool, wet conditions early in the fall preceded by persistent summer rains late in the summer. Climate data by location is presented in Tables 1 and 2.

Data presented in Tables 4–9 can be used to evaluate the performance of each forage variety within that test. Comparisons can be statistically evaluated by using the LSD (least significant difference). The LSD represents the amount of yield that must be observed between any two varieties to determine if the differences observed were due to variety variation alone.

Table 1. Monthly rainfall totals for Starkville and Holly Springs in 2012.

Location	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	in	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*
Starkville	3.01	4.05	7.39	3.74	3.3	2.84	9.34	7.76	5.36	4.91	2.23	6.93
Holly Springs	4.24	2.62	5.42	3.7	3.77	2.21	2.65	3.07	4.16	6.99	2.07	6.12

Table 2. Monthly high and low mean temperature by location through the duration of the trial.

Location	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	in	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*
Starkville												
High	62	59	76	77	86	88	93	88	85	73	65	61
Low	36	38	53	54	63	67	72	69	61	49	37	40
Holly Springs												
High	57	56	75	76	84	88	93	91	84	71	62	58
Low	32	34	49	50	58	61	70	66	58	46	32	40

Protocol

Tall fescue, perennial clover, and alfalfa trials across the state were established from October 4–9, 2011. The Mississippi State University Soil Testing Lab Soil analyzed soil samples from each location. Trial areas were fertilized with lime, phosphorus (P_2O_5), and potassium (K_2O) according to the soil test recommendations. Recommendations for phosphorus and potassium in grass were usually fulfilled with one application of 15-5-10. Tall fescue trials were fertilized with 335 pounds of 15-5-10 per acre at planting, followed by 50 pounds of N per acre using urea ammonium sulfate (33-0-0S) after each harvest. Perennial clover and alfalfa trials were fertilized with 100 pounds of 0-0-60 at planting and an additional 100 pounds per acre of phosphorus and potassium early in the spring using 0-20-20. Plots were 6 feet wide and 11 feet long and were planted using a precision cone seeder on a prepared seedbed. Trial design was a randomized complete block replicated four times. Recommended seeding rates for individual trials were utilized using pure live seed (PLS) and are presented in Table 3. All grass plots were harvested when 75% of the plots achieved 15 inches of growth. Alfalfa was harvested at 50% bloom, and clovers were harvested when 75% of plots were 10–15 inches in height. Perennial clovers, alfalfa, and tall fescue were harvested to a stubble height of 4 inches. Plots were harvested using a Ferris "Zero-Turn" mower with a bagging system that collected a 4.3-by-11-foot swath to calculate total yield. A subsample was collected and dried at 131°F until dry to calculate dry matter percentage (DM). Data were analyzed using the general linear model (PROC GLM) of SAS, and mean separation was conducted using the least significant difference (LSD) at $\alpha = 0.05$.

Table 3. Seeding rates used in 2012 variety trials.

Variety	Seeding rate (PLS[1])
	lb/A
Alfalfa	20
Red Clover	12
Tall Fescue	20
White Clover	3

[1]PLS = Pure Live Seed.

Alfalfa

Alfalfa is a perennial legume common in the Midwestern and Northern regions of the United States. Alfalfa varieties have been bred for more Southern climates, but stand persistence can be a problem. Several diseases and pests such as *Sclerotenia* crown, stem rot, alfalfa weevil, and leafhoppers are major problems. Alfalfa is also very sensitive to soil pH, which should be maintained at 6.5 or greater. Alfalfa also needs 65 pounds of P_2O_5 per acre and 350 pounds of K_2O per acre as fertilizer input. Planting should take place between September and October at a seeding rate of 20 pounds per acre on a firm seedbed. Most of the yield distribution for alfalfa is in early summer to early fall. Protein content of alfalfa ranges from 12–18%; acid detergent fiber (ADF), 30–40%; and neutral detergent fiber (NDF), 40–50%. Alfalfa can also be successfully established in warm-season sod grasses to increase hay quality and yield distribution, especially in situations with low nitrogen input.

Table 4. 2012 Dry matter yields for alfalfa varieties in Starkville.[1]

Variety	Harvest date				Total
	4/12/12	5/23/12	6/26/12	7/27/12	
	lb/A	*lb/A*	*lb/A*	*lb/A*	*lb/A*
ALFALFAGRAZE 600RR	544	1,415	1,597	1,218	4,773
AMERISTAND 815TRR	534	1,417	1,303	1,296	4,550
BULLDOG 805	526	1,261	1,450	1,307	4,544
DKA41-18RR	705	1,566	1,689	1,414	5,373
DKA65-10RR	722	1,442	1,630	1,293	5,088
DKA84-10	593	1,461	1,489	1,272	4,814
LSD (0.05)	NS[2]	NS	NS	NS	NS
CV%	30	16	18	13	12
Mean	604	1,427	1,526	1,300	4,857

[1]Planted: October 8, 2011. Soil: Marietta fine sandy loam.
Fertilized: 50 pounds per acre of 0-0-60 at planting. Lime: 2 tons per acre at planting.
Herbicide: Paraquat after each harvest at 1 pint per acre; Pursuit (ammonium salt of imazethapyr) at 4 ounces per acre.
[2]NS = Not Significant.

Perennial Clover

Red clover is a short-lived perennial in Mississippi, rarely surviving the summers. In central to southern Mississippi, it should be treated as an annual. Red clover tolerates wet, acidic soils and withstands shading in the seedling stage, which gives it potential to be overseeded in sod grasses. When propagating in an established pasture system, it is best to plant between October 15 and November 20. In grass mixtures, plant 4–8 pounds per acre; in pure stands, 12 pounds per acre will be sufficient. Red clover does well with 60 pounds of P per acre, 40 pounds of K per acre, and a pH above 5.5. Two to three harvests can be expected if cutting for hay in late spring to early summer.

White clover is much more persistent than red clover, but its yields are typically lower. It does offer more opportunity in grazing situations than in hay harvest because of its prostrate growth. White clover is tolerant of wet soils and prefers a pH of 6. Plant white clover at 3–4 pounds per acre in pure stands or 2–3 pounds per acre in mixtures between September and October. White clover is highly responsive to K, and a starter fertilizer of 20-60-20 pounds per acre will aid in establishment. Like red clover, white clover acts as an annual in the southern part of the state but has a greater reseeding potential. Both clover species have excellent forage quality, but white clover tends to have a greater potential to cause bloat. When grazing white clover, it is recommended to interseed with grass to reduce bloat potential.

Table 6. 2012 Total dry matter yields of white and red clover pooled from across varieties in Starkville.

Variety	Yield
	lb/A
Red Clover	2,128
White Clover	1,701
LSD (0.05)	231
CV%	25
Mean	1,914

Table 5. 2012 dry matter yields for perennial clover varieties in Starkville.[1]

Variety	Harvest date		Total
	3/29/12	5/4/12	
	lb/A	*lb/A*	*lb/A*
Red Clover			
Barduro	1,202	730	1,932
Cinamon+	1,014	1,490	2,504
FLMD	1,129	890	2,019
Morningstar	1,106	1,035	2,141
PGI33	821	1,442	2,263
Rustler	1,168	1,203	2,372
Southern Belle	1,046	1,016	2,062
TXRC-05	830	900	1,730
White Clover			
Barablanca	598	1,381	1,979
Chickasaw	600	1,466	2,067
Companion	607	1,246	1,853
Neches	452	1,486	1,937
Ocoee	473	1,036	1,509
OR46	679	1,228	1,907
Patriot	432	1,109	1,542
Regalgraze	269	906	1,175
Resolute	177	1,105	1,283
LSD (0.05)	343	406	618
CV%	32	25	23
Mean	741	1,157	1,898

[1]Planted: October 6, 2011. Soil: Marietta fine sandy loam.
Fertilized: 50 pounds per acre of 0-0-60 at planting; 100 pounds of 0-20-20 in the spring.
Herbicides: Pursuit (ammonium salt of imazethapyr) at 4 ounces per acre; Poast (sethoxydim) at 1 pint per acre.

Tall Fescue

Tall fescue, a perennial grass with short rhizomes, is primarily grown in the northern part of the state. It does well on poorly drained soils, making it very popular in lowland areas. Tall fescue should be established from September to October at a seeding rate of 15–20 pounds per acre. During the establishment year, avoid grazing below 4 inches to minimize stand failure. It tolerates soil pH of 5.5–7.5 and responds well to nitrogen. Tall fescue requires 60–70 pounds per acre of phosphorus and potassium. Endophyte toxicity can be a problem. However, grazing management, the inclusion of clovers, and the use of novel endophyte and endophyte-free varieties can be used to mitigate the harmful effects of the toxin.

Table 7. 2012 dry matter yields of tall fescue varieties in Starkville.[1]

Variety	Type[2]	Harvest date						Total
		3/21/12	4/12/12	5/8/12	6/1/12	9/12/12	11/1/12	
		lb/A	*lb/A*	*lb/A*	*lb/A*	*lb/A*	*lb/A*	*lb/A*
AGRFA 148	NE	1,077	2,859	1,202	1,970	1,610	1,485	10,204
BarOptima Plus E34	NE	1,263	2,804	1,210	1,721	1,364	1,178	9,540
Cowgirl	EF	1,103	2,874	1,125	1,960	1,453	1,159	9,674
Estancia	NE	1,312	2,835	1,041	1,750	2,516	1,357	10,810
Kentucky 31	EI	1,250	2,735	926	2,240	1,714	1,367	10,232
Jesup Max Q	NE	1,100	2,443	1,093	1,829	1,115	970	8,550
NFTF 1044	NE	1,493	3,122	990	1,865	1,331	1,646	10,447
NFTF 1051	NE	1,301	3,033	1,078	1,685	1,367	1,224	9,687
NFTF 1411	NE	1,304	3,030	1,208	1,761	1,264	1,489	10,057
Rustler	EF	1,197	2,548	1,186	1,755	1,474	1,124	9,284
Teton II	EF	1,482	2,938	1,219	1,977	1,297	1,281	10,193
LSD (0.05)		NS[3]	366	NS	NS	555	306	1,220
CV %		36	9	20	14	26	16	9
Mean		1,262	2,838	1,116	1,865	1,500	1,298	9,880

[1]Planted: October 8, 2011. Soil: Marietta fine sandy loam.
Fertilized: 325 pounds of 15-5-10 at planting; 50 pounds of N per acre using urea ammonium sulfate after harvest.
Herbicide: Grazeon Next (aminopyralid + 2,4-D) at 1 pint per acre at maturity; Banvel (dimethylamine salt of dicamba) at 4 ounces per acre at seedling stage.
[2]NE = Novel Endophyte; EF = Endophyte Free; and EI = Endophyte Infected.
[3]NS = Not Significant.

Table 8. 2012 dry matter yields of tall fescue varieties in Holly Springs.[1]

Variety	Type[2]	Harvest date			Total
		4/13/12	5/10/12	10/30/12	
		lb/A	*lb/A*	*lb/A*	*lb/A*
AGRFA 148	NE	2,313	1,729	1,673	5,714
BarOptima Plus E34	NE	2,215	1,736	1,559	5,510
Cowgirl	EF	2,564	1,758	1,167	5,488
Estancia	NE	2,666	2,008	1,551	6,225
Kentucky 31	EI	2,214	1,981	1,903	6,098
Jesup Max Q	NE	2,456	1,623	1,345	5,423
NFTF 1044	NE	2,104	2,164	1,718	5,986
NFTF 1051	NE	2,349	1,827	1,693	5,869
NFTF 1411	NE	2,720	1,814	1,478	6,011
Rustler	EF	2,542	2,006	1,434	5,981
Teton II	EF	2,654	1,902	1,537	6,093
LSD (0.05)		NS[3]	301	311	677
CV %		15	11	14	8
Mean		2,436	1,868	1,551	5,854

[1]Planted: October 8, 2011. Soil: Grenada Silt Loam.
Fertilized: 325 pounds of 15-5-10 at planting; 50 pounds of N per acre using urea ammonium sulfate after harvest.
Herbicide: Grazeon Next (aminopyralid + 2,4-D) at 1 pint per acre at maturity; and Banvel (dimethylamine salt of dicamba) at 4 ounces per acre at seedling stage.
[2]NE = Novel Endophyte; EF = Endophyte Free; and EI = Endophyte Infected.
[3]NS = Not Significant.

Table 9. Total 2012 dry matter yields of endophyte-infected tall fescue types from Starkville and Holly Springs pooled from across varieties.

Type	Starkville	Holly Springs
	lb/A	*lb/A*
Endophyte Infected	10,232	6,098
Endophyte Free	9,716	5,708
Novel Endophyte	9,899	5,820
LSD (0.05)	NS[1]	NS
CV %	10	9
Mean	9,949	5,875

[1]NS = Not Significant.

Table 10. 2012 tall fescue, alfalfa, and clover seed sources.

Species	Variety	Company
Alfalfa	Alfalfagraze 600RR	Forage Genetics International
	Ameristand 815TRR	Forage Genetics International
	Bulldog 805	Athens Seed
	DKA41-18RR	Monsanto
	DKA65-10RR	Monsanto
	DKA84-10	Monsanto
White Clover	Barablanca	Barenburg USA
	Chickasaw	N/A[1]
	Companion	Memphis Inc.
	Neches	Barenburg USA
	Ocoee	Allied Seed, LLC
	OR46	N/A
	Patriot	Pennington Seed
	Regalgraze	CalWest Seed
	Resolute	Allied Seed, LLC
Red Clover	Barduro	Barenburg USA
	Cinamon+	Allied Seed, LLC
	FLMD	Barenburg USA
	Morningstar	N/A
	PGI33	CalWest Seed
	Rustler	Oregro Seeds
	Southern Belle	Allied Seed, LLC
	TXRC-05	Agrilife Research
Tall Fescue	AGRFA 148	The Noble Foundation
	BarOptima PLUS E34	Barenburg USA
	Cowgirl	Rose Agri-Seed, Inc.
	Estancia	Mountain view seeds
	Kentucky 31	Starkville Coop
	Jesup Max Q	Pennington Seed
	NFTF 1044	The Noble Foundation
	NFTF 1051	The Noble Foundation
	NFTF 1411	The Noble Foundation
	Rustler	Grassland Oregon, Inc.
	Teton II	Mountain View Seeds

[1]N/A = Seed supplied by the Mississippi State University forage variety testing seed inventory.

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