MISSISSIPPI WARM-SEASON FORAGE CROP

VARIETY TRIALS, 2018

Information Bulletin 538 • April 2019

MISSISSIPPI'S OFFICIAL VARIETY TRIALS

MISSISSIPPI STATE UNIVERSITY™
MS AGRICULTURAL AND
FORESTRY EXPERIMENT STATION

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This report contains data generated as part of the Mississippi Agricultural and Forestry Experiment Station. Trade names of commercial and public varieties tested in this report are included only for clarity and understanding.

Cover photo by Rocky Lemus

Mississippi Warm-Season Forage Crop Variety Trials, 2018

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Recognition is given to student workers Renee Anderson and Joey Hessner for their assistance in cultivating, packing, planting, harvesting, and recording plot data. This information was published by the Office of Agricultural Communications, a unit in the Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine.

This document was approved for publication as Information Bulletin 538 of the Mississippi Agricultural and Forestry Experiment Station. It was published by the Office of Agricultural Communications, a unit of the Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine.

Find variety trial information online at ***mafes.msstate.edu/variety-trials***.

Mississippi Warm-Season Forage Crop Variety Trials, 2018

INTRODUCTION

Forage-crop varieties are evaluated every year in the MAFES small-plot trials. Seed is provided by seed companies and state universities and tested at one or more locations across Mississippi. All entries from privately owned companies are tested on a fee basis. Standard varieties may be added by MAFES as a reference for comparison purposes. In addition, varieties of interest may also be added when applicable. This report contains data collected from 2018 for seeded bermudagrass (*Cynodon dactylon),* sorghum, sorghum x sudangrass and sudangrass (*Sorghum bicolor*), pearl millet (*Pennisetum glaucum*), teffgrass (*Eragrostis tef*), and crabgrass (*Digitaria sanguinalis*) varieties. Seeding rates are presented in Table 1. Available rainfall and temperature data during the 2018 growing season are presented in Tables 2 and 3. Data presented in Tables 4–14 can be used to evaluate annual biomass production of each forage variety within that test. Biomass production was statistically evaluated by using the least significant difference (LSD) at $\alpha = 0.05$. 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. Seeding rates.

Species	Seeding rate
	lb/A PLS[1]
Bermudagrass	10
Pearl millet	35
Sorghum	20
Sorghum/Sudan	35
Teffgrass	10
Crabgrass	10

[1]Rates listed are the recommended seeding rates used to calculate pure live seed (PLS) for each entry.

Table 2. Monthly rainfall totals for Poplarville, Newton, Starkville, Prairie, and Holly Springs, 2018.

Location	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	in	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*	*in*
Poplarville	4.74	8.63	4.20	5.40	0.90	3.82	8.95	2.24	—	—	—
Newton	2.48	9.46	5.35	6.52	2.66	4.70	8.52	4.82	7.07	—	—
Starkville	2.03	10.33	5.61	5.93	1.92	4.34	4.98	2.82	11.08	—	—
Prairie	1.32	10.26	2.79	8.70	4.21	3.28	3.80	4.29	4.01	—	—
Holly Springs	3.37	12.98	3.74	7.49	4.44	7.50	3.05	5.02	6.92	—	—
MS 30-yr. avg.	4.96	4.76	5.04	4.96	4.37	4.13	4.80	4.25	3.03	3.94	4.76

Table 3. Mean high and low temperatures by month for Poplarville, Newton, Starkville, Prairie, and Holly Springs, 2018.

Location	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F
Poplarville												
High	51	69	71	61	74	73	77	67	85	—	—	—
Low	30	48	47	40	53	57	60	52	69	—	—	—
Newton												
High	55	71	71	75	89	93	94	92	91	81	—	—
Low	30	50	46	48	64	71	73	72	72	59	—	—
Starkville												
High	49	65	67	71	88	93	93	93	90	79	—	—
Low	26	43	43	44	64	71	72	71	70	56	—	—
Prairie												
High	—	—	—	—	—	—	—	—	—	—	—	—
Low	—	—	—	—	—	—	—	—	—	—	—	—
Holly Springs												
High	49	63	63	70	87	90.7	92	91	88	77	—	—
Low	27	44	41	46	65	70	73	71	70	56	—	—
MS 30-yr. avg.												
High	56	60	69	76	83	89	92	92	87	77	67	58
Low	35	38	45	52	62	69	72	71	65	53	44	37

SEEDED BERMUDAGRASS

Background

Bermudagrass is very drought tolerant and can be planted throughout the state. Seeded bermudagrass should be planted between April and June at a seeding rate of 5 to 10 pounds of pure live seed per acre. Nitrogen and potassium fertilization are essential for high yields, especially for hay production. To maintain a balance between yields and forage quality in a hay production system, it is recommended to harvest hay in intervals of 30 to 35 cutting days. Bermudagrass production can be negatively affected by leaf spot disease (*Bipolaris cynodontis*) and leaf rust (*Puccina cynodontis*). In addition to these leaf diseases, a relatively new pest known as the bermudagrass stem maggot (*Anterigona reversura*) can weaken bermudagrass enough to encourage greater leaf disease. These affects can be further amplified when fertility management is lacking in potassium.

Protocol

The experimental design was a randomized complete block with four replications. Plots were 6 feet by 10 feet in size with 2-foot alleys between plots and 3-foot alleys between blocks. The study was planted on May 31, 2018, in Newton, May 25, 2018, in Starkville, and May 23, 2018, in Holly Springs using an ALMACO plot drill. Initial fertilizer application was 335 pounds per acre of 15-5-10 2 weeks after planting date. Nitrogen was applied in July at a rate of 50 pounds of N per acre at each location after the initial clean-off harvest, when no data was collected due to majority weed composition. Harvest took place in the fall when 50% of the plots reached a forage height of 12–15 inches and forages made up the majority of the composition. Plots were harvested with a "Zero Turn" mower to a 3-inch stubble height by removing a 52-inch swath. Yields were recorded, and subsamples were collected for dry matter analysis. Data were analyzed using the General Linear Model (PROC GLM) of SAS and mean separation was conducted using the LSD at $\alpha = 0.05$. Tables 4–5 present 2018 dry matter yields of seeded bermudagrass varieties in Starkville and Holly Springs. Stand establishment was analyzed using a providence square, which was a meter square evenly subdivided into 25 squares. When bermudagrass was represented in one of the subdivided squares, it accounted for 4% of the plot.

Results

The trial planted in Newton was established, but it was terminated after major rainfall left standing water on the plot area long enough to kill more than 50% of the plots across replications before the first harvest. In Starkville and Holly Springs, plots were established, but heavy weed competition from barnyard grass (*Echinochloa crus-galli*) suppressed growth throughout the season, despite several herbicide applications and clean-off harvest. As a result, only one harvest and stand rating was recorded in the fall. In Holly Springs, differences were not significant between varieties, considering dry matter yield and stand percentages using the providence square. In Starkville, stands were incomplete, averaging only 40% of the area, with the greatest percentage no more than 60% of the area. Typically, forage yields between bermudagrass varieties are the most variable during the establishment year, but the intense competition from weedy species at the Starkville location likely caused much of the establishment issues and could be considered a random effect beyond variety performance.

Table 4. Seeded bermudagrass dry matter yields and stand ratings at Holly Springs, 2018.

Variety	Rating[1]	Harvest date 10/13/18
	%	*lb/A*
BAR RUB 619	84	791
Cheyenne II	96	727
Common	92	572
ETSCII325102H	100	684
ETSCITNS1115	92	902
Mowhawk	100	663
Sahara II	96	817
Texas Tough+	92	773
Tierra Verde	92	714
Mean	92	738
CV%	10	32
$LSD_{0.05}$	NS[2]	NS[2]

[1]Rating = Percentage of occurrence within providence square.
[2]NS = Not Significant
Soil type: Grenada silt loam Planted: May 25, 2018
Herbicide: Quinclorac (75%) at 1 lb/A
Fertilizer: 335 lb/A of 15-5-10 after planting; 50 lb/A of N using (33-0-0S) in July after clean-off harvest

Table 5. Seeded bermudagrass dry matter yields and stand ratings at Starkville, 2018.

Variety	Rating[1]	Harvest date 10/13/18
	%	*lb/A*
BAR RUB 619	12	554
Cheyenne II	60	799
Common	36	598
ETSCII325102H	60	1386
ETSCITNS1115	56	1267
Mowhawk	44	520
Sahara II	28	727
Texas Tough+	40	559
Tierra Verde	36	752
Mean	40	795
$LSD_{0.05}$	24	1139
CV%	43	45

[1]Rating = Percentage of occurrence within providence square.
Soil Type: Savannah fine sandy loam Planted: May 25, 2018
Herbicide: Quinclorac (75%) at 1 lb/A
Fertilizer: 335 lb/A of 15-5-10 after planting; 50 lb/A of N using (33-0-0S) in July after clean-off harvest

SORGHUM AND PEARL MILLET

Background

The sorghum and pearl millet variety tests include varieties from pearl millet, sorghum, sudangrass, and sorghum/sudangrass hybrids. Sorghum is not tolerant of acidic soils and is adapted well to sandy loam and clay loam soils with a pH ranging between 6 and 7. Pearl millet is more tolerant to acidic soils than sorghum but similarly drought tolerant. When harvested for silage, seed should be in the dough stage and can possibly be harvested twice in Mississippi if planted by May and weather conditions are favorable. They are very responsive to nitrogen and can be rotationally grazed with a high stocking rate to utilize rapid growth. Hay quality is best when harvested at 30 to 40 inches.

Protocol

The experimental design was a randomized complete block with four replications. Plots were 6 feet by 10 feet in size with 3-foot alleys between plots and blocks. Tests were planted May 31, 2018, in Poplarville, May 25, 2018, in Starkville, May 30, 2018, in Prairie, and May 23, 2018, in Holly Springs using an ALMACO plot drill. Initial fertilizer application was 335 pounds per acre of 15-5-10 2 weeks after planting. Plots were harvested when more than 50% of the plots had reached 40 inches of height. The entire plot was harvested using a Winterstieger Cibus S (Austria). Yields were recorded and subsamples collected for dry matter determination. Tables 6–9 present 2018 dry matter yields collected from Holly Springs, Starkville, Prairie, Starkville, and Poplarville. Data was analyzed using the General Linear Model (PROC GLM) of SAS and mean separation using the LSD at $\alpha = 0.05$.

Results

The variety tests were harvested July 24, 2018, in Poplarville, July 10, 2018, in Starkville, and August 2, 2018, in Prairie, and August 1, 2018, in Holly Springs. All locations, except Holly Springs, were infested with aphids and armyworms at the time of harvest, possibly suppressing growth for a second harvest. Holly Springs produced the greatest average yields with a relative yield of 140% of the state average (4,818 pounds of dry matter per acre). Prairie and Starkville locations produced only 62% and 84 % of the state average, respectively, in dry matter yield. Poplarville produced 112% of the state average. At all locations, pearl millet varieties produced dry matter yields greater than those of sorghum/sudangrass varieties.

Table 6. Sorghum and pearl millet dry matter yields at Holly Springs, 2018.

Variety	Species	Harvest date 8/1/18
		lb/A
ExCeddll BMR	Pearl Millet	7475
Epic BMR	Pearl Millet	3746
Tifleaf-3	Pearl Millet	7162
Surpass BMR	Sorghum/Sudangrass	6117
Xtragraze BMR	Sorghum/Sudangrass	5422
Premium stock	Sorghum/Sudangrass	8011
Leafy 22	Pearl Millet	9457
Leafy 23	Pearl Millet	5986
Pearl millet F1	Pearl Millet	8678
Hayking sudan	Sudangrass	6877
Green Grazer V	Sorghum/Sudangrass	5640
Mean		6779
CV%		19
$LSD_{0.05}$		1926

Soil Type: Grenada silt loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 7. Sorghum and pearl millet dry matter yields at Prairie, 2018.

Variety	Species	Harvest date 8/2/18
		lb/A
ExCeddll BMR	Pearl Millet	2840
Epic BMR	Pearl Millet	3547
Tifleaf-3	Pearl Millet	4156
Surpass BMR	Sorghum/Sudangrass	2359
Xtragraze BMR	Sorghum/Sudangrass	2723
Premium stock	Sorghum/Sudangrass	1876
Leafy 22	Pearl Millet	3882
Leafy 23	Pearl Millet	2540
Pearl millet F1	Pearl Millet	3429
Hayking sudan	Sudangrass	2925
Green Grazer V	Sorghum/Sudangrass	2733
Mean		3001
CV%		23
$LSD_{0.05}$		1193

Soil Type: Houston clay Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 8. Sorghum and pearl millet dry matter yields at Starkville, 2018.

Variety	Species	Harvest date 7/10/18
		lb/A
ExCeddll BMR	Pearl Millet	4102
Epic BMR	Pearl Millet	3556
Tifleaf-3	Pearl Millet	3927
Surpass BMR	Sorghum/Sudangrass	3760
Xtragraze BMR	Sorghum/Sudangrass	4236
Premium stock	Sorghum/Sudangrass	3784
Leafy 22	Pearl Millet	5741
Leafy 23	Pearl Millet	2896
Pearl millet F1	Pearl Millet	4440
Hayking sudan	Sudangrass	4799
Green Grazer V	Sorghum/Sudangrass	3539
Mean		4071
CV%		30
$LSD_{0.05}$		NS[1]

[1]NS: Not Significant
Soil Type: Marietta fine sandy loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 9. Sorghum and pearl millet dry matter yields at Poplarville, 2018.

Variety	Species	Harvest date 7/24/18
		lb/A
ExCeddll	Pearl Millet	6423
Epic BMR	Pearl Millet	5099
Tifleaf-3	Pearl Millet	7355
Surpass BMR	Sorghum/Sudangrass	4747
Xtragraze BMR	Sorghum/Sudangrass	6251
Premium stock	Sorghum/Sudangrass	2894
Leafy 22	Pearl Millet	5784
Leafy 23	Pearl Millet	3820
Pearl millet F1	Pearl Millet	6330
Hayking sudan	Sudangrass	5614
Green Grazer V	Sorghum/Sudangrass	5331
Mean		5423
CV%		27
$LSD_{0.05}$		2550

Soil Type: Basin loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

CRABGRASS AND TEFFGRASS

Background

Teff is a warm-season C_4 annual grass that originated in Africa with great potential for hay production in the South. It can be used as a summer rotation crop in fallow areas where only annual ryegrass is utilized as winter forage. Teff is characterized by a small seed (about 1.3 million seeds per pound), a large crown, and fine stems (which increase curing time when used for hay production). Its inflorescence is a loose or compact panicle. It is not recommended for grazing since it has a very shallow root system. Teff can fill a gap in summer forage production and make excellent hay for horses and livestock.

Crabgrass is a warm-season C_4 grass with long stolons and high reseeding ability. Crabgrass is very leafy with a tall ligule. Leaves are sparsely hairy, and the collar region has very long hairs. Seeds have three or more spikes. Crabgrass has been utilized in the South for forage production as pasture, hay, silage, and green chop. It is often considered a weedy grass species because of its invasive tendency, particularly into established warm-season, perennial pastures subject to heavy, close grazing. It can be double cropped with small grains or annual ryegrass during the cool season.

Protocol

The experimental design was a randomized complete block with four replications. Plots were 6 feet by10 feet in size with 3-foot alleys between plots and blocks. Tests were planted May 31, 2018, in Poplarville, May 25, 2018, in Starkville, May 30, 2018, in Prairie, and May 23, 2018, in Holly Springs using an ALMACO plot drill. Initial fertilizer application was 335 pounds per acre of 15-5-10 2 weeks after planting. Plots were harvested when more 50% of the plots had reached 40 inches of height. The entire plot was harvested using a Winterstieger Cibus S (Austria). Yields were recorded and subsamples collected for dry matter determination. Tables 10–14 present 2018 dry matter yields collected from Starkville. Data was analyzed using the General Linear Model (PROC GLM) of SAS and mean separation using the LSD at $\alpha = 0.05$.

Results

Teffgrass and crabgrass were harvested later than what would be considered ideal for forage production, allowing more dry matter accumulation and less chance of regrowth. Plots were well established at all locations. The two most northern locations, Holly Springs and Prairie, produced 58% and 99%, respectively, relative to the state average. Newton produced the greatest dry matter with 134% of the state average, while Starkville and Poplarville produced 103% and 105%, respectively, of the state average (4,465 pounds of dry matter per acre). Teffgrass averaged more dry matter production than crabgrass at Holly Springs, Starkville, and Newton, while Poplarville favored crabgrass production. Both species preformed similarly at Newton.

Table 10. Crabgrass and teffgrass dry matter yields at Holly Springs, 2018.

Variety	Species	Harvest date 8/1/18
		lb/A
Red River	Crabgrass	1871
Quick-N-Big Spreader	Crabgrass	2582
CWTF	Teffgrass	2866
CW0604	Teffgrass	2807
NFCG07-1	Crabgrass	2717
IMRR	Crabgrass	2598
Dals big river	Crabgrass	2580
Mean		2574
CV%		19
$LSD_{0.05}$		NS[1]

[1]NS: Not Significant
Soil Type: Grenada silt loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 11. Crabgrass and teffgrass dry matter yields at Prairie, 2018.

Variety	Species	Harvest date 8/2/18
		lb/A
Red River	Crabgrass	3692
Quick-N-Big Spreader	Crabgrass	4999
CWTF	Teffgrass	4217
CW0604	Teffgrass	4604
NFCG07-1	Crabgrass	4913
IMRR	Crabgrass	4389
Dals big river	Crabgrass	4367
Mean		4454
CV%		22
$LSD_{0.05}$		NS[1]

[1]NS: Not Significant
Soil Type: Houston clay Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 12. Crabgrass and teffgrass dry matter yields at Starkville, 2018.

Variety	Species	Harvest date 7/10/18
		lb/A
Red River	Crabgrass	4660
Quick-N-Big Spreader	Crabgrass	4527
CWTF	Teffgrass	5459
CW0604	Teffgrass	5085
NFCG07-1	Crabgrass	3874
IMRR	Crabgrass	5166
Dals big river	Crabgrass	3356
Mean		4590
CV%		19
$LSD_{0.05}$		1351

Soil Type: Savannah fine sandy loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 13. Crabgrass and teffgrass dry matter yields at Newton, 2018.

Variety	Species	Harvest date 7/24/18
		lb/A
Red River	Crabgrass	5995
Quick-N-Big Spreader	Crabgrass	5578
CWTF	Teffgrass	6856
CW0604	Teffgrass	6187
NFCG07-1	Crabgrass	5429
IMRR	Crabgrass	6682
Dals big river	Crabgrass	5340
Mean		6009
CV%		13
$LSD_{0.05}$		NS[1]

[1]NS: Not Significant
Soil Type: Prentiss sandy loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 14. Crabgrass and teffgrass dry matter yields at Poplarville, 2018.

Variety	Species	Harvest date 7/24/18
		lb/A
Red River	Crabgrass	5662
Quick-N-Big Spreader	Crabgrass	4444
CWTF	Teffgrass	4249
CW0604	Teffgrass	3556
NFCG07-1	Crabgrass	4933
IMRR	Crabgrass	4983
Dals big river	Crabgrass	5050
Mean		4697
CV%		22
$LSD_{0.05}$		NS[1]

[1]NS: Not Significant
Soil Type: Basin loam Planted: May 23, 2018
Fertilizer: 335 lb/A of 15-5-10 2 weeks after planting

Table 15. Varieties and seed sources for the 2018 warm-season forage variety trial.

Bermudagrass	
BAR RUB 619	Barenburg
ETSCII325102H	East Texas Seed
ETSCITNS1115	East Texas Seed
Cheyenne II	East Texas Seed
Sahara II	Pennington
Mowhawk	Pennington
Tierra Verde	Pennington
Texas Tough+	East Texas Seed
Common	MSU Check
Pearl Millet and Sorghum	
ExCeddll BMR	Coffey Forage Seeds Inc.
Epic BMR	Coffey Forage Seeds Inc.
Tifleaf-3	Coffey Forage Seeds Inc.
Surpass BMR	Coffey Forage Seeds Inc.
Xtragraze BMR	Coffey Forage Seeds Inc.
Premium stock	MSU Check
Leafy 22	MSU Check
Leafy 23	MSU Check
Pearl millet F1	MSU Check
Hayking sudan	MSU Check
Green Grazer V	MSU Check
Crabgrass and Teffgrass	
Red River	Dalrymple Farms
Quick-N-Big Spreader	Dalrymple Farms
CWTF	Barenburg
CW0604	Barenburg
NFCG07-1	Barenburg
IMRR	Barenburg
Dals Big River	Dalrymple Farms

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George M. Hopper, Director **www.mafes.msstate.edu**