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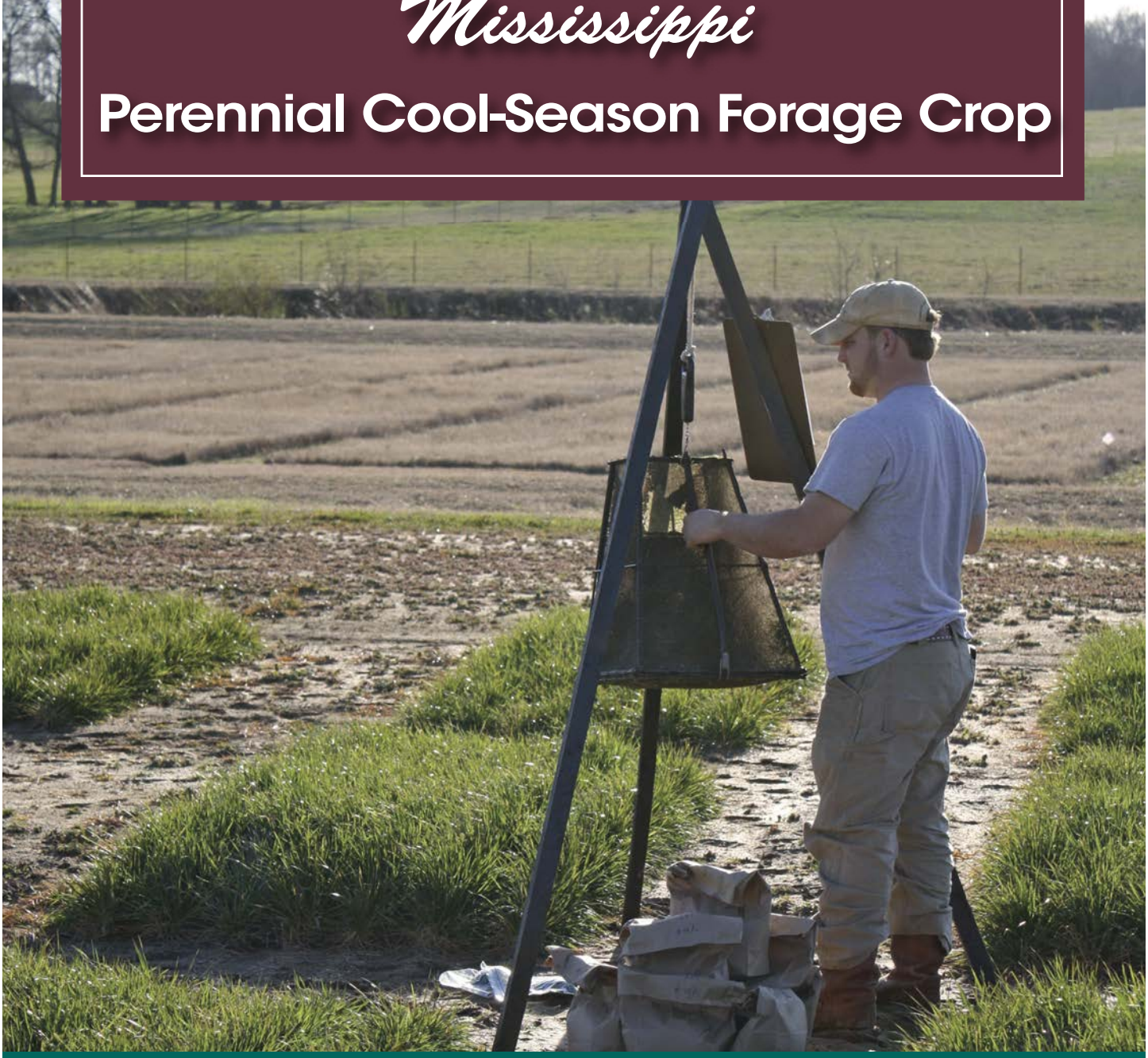
Mississippi Perennial Cool-Season Forage Crop



VARIETY TRIALS, 2015

Mississippi's Official Variety Trials

MAFES

Mississippi Agricultural & Forestry Experiment Station • George M. Hopper, Director

Mississippi State University • Mark E. Keenum, President • Gregory A Bohach, Vice President

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This report contains data generated as part of the Mississippi Agricultural and Forestry Experiment Station. Joint sponsorship by the organizations listed on page 8 is gratefully acknowledged.

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 8.

Mississippi Perennial Cool-Season Forage Crop Variety Trials, 2015

MAFES Official Variety Trial Contributors

Joshua White
Forage Variety Testing Manager
Department of Plant and Soil Sciences
Mississippi State University
Starkville, Mississippi

Rocky Lemus
Associate Extension/Research Professor,
Extension Forage Specialist
Department of Plant and Soil Sciences
Mississippi State University
Starkville, Mississippi

James R. Saunders
Facilities Coordinator
North Mississippi Branch Experiment Station
Mississippi State University
Holly Springs, Mississippi

Daniel Rivera
Assistant Extension Professor
South Mississippi Branch Experiment Station
Mississippi State University
Poplarville, Mississippi

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

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INTRODUCTION

Varieties of forage crops are evaluated every year in small-plot trials conducted by the Mississippi Agricultural and Forestry Experiment Station (MAFES). Seed for the entries are 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 were added by MAFES as a reference for comparison purposes. In addition, varieties of interest were also added when applicable. Seed sources are presented in Table 12.

This report contains data from seven varieties of orchardgrass (*Dactylis glomerata*), six varieties of tall fescue, four varieties of perennial clovers (white clover, *Trifolium repens*; red clover, *Trifolium pretense*), and nine varieties of alfalfa (*Medicago sativa*), all of which were established in fall 2013. Tall-fescue entries include endophyte-infected, endophyte-free, and novel-endophyte types. Alfalfa entries include both Roundup Ready® and conventional varieties, and perennial clover entries includes red and white clovers. Locations are the North Mississippi Branch Experiment Station at Holly Springs, H. H. Leveck Animal Research Farm Forage Unit at Starkville, and White Sands Research Unit at Poplarville.

STAND ESTABLISHMENT AND PERSISTENCE

The tall fescue/orchardgrass trial in Starkville suffered considerably in 2015. The tall fescue entries were able to persist similarly, but all orchardgrass plots experienced severe decline by midsummer. In Holly Springs, orchardgrass persistence was comparable to that of tall fescue, but dry matter yields were lower.

All varieties in the Starkville alfalfa trial did not persist through the summer. This problem may have been caused in part by a location that held water after heavy rainfall. Alfalfa performance was typical, with very high production in 2014 (establishment year) but quickly diminishing production by spring 2015. In Holly Springs, stands were not noticeably different by the end of 2015 compared to 2014.

Perennial clovers in Starkville did not get established, so results were not included. Persistence was sufficient for both white and red clover by the second year in Holly Springs. In Poplarville, both red and white clover had complete stand loss by midsummer 2015, possibly due to drought. Climate data by location for 2015 is presented in Tables 1 and 2.

Data presented in Tables 4–11 can be used to evaluate the performance of each forage variety or species within that test. Comparisons were 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. Coefficient variation (CV) describes the accuracy of the test compared to other tests. Highly variable trials between replications will be reflected in a high CV.

Table 1. Monthly rainfall totals for Poplarville, Starkville, and Holly Springs in 2015.

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*
Poplarville	3.13	2.3	3.79	5.33	11.44	4.01	4.71	1.00	0.01	6.92	4.4	8.46
Starkville	5.71	4.98	5.47	5.06	5.45	3.18	4.09	2.20	0.95	1.43	0.20	0.09
Holly Springs	0.00	0.53	2.37	2.27	3.09	2.21	0.51	1.00	0.02	0.41	6.44	2.22
MS 30-yr. avg.	5.30	4.70	5.80	5.60	5.10	3.30	4.50	3.80	3.60	3.30	4.80	5.90

Table 2. Mean high and low temperatures by month for Poplarville, Starkville, and Holly Springs, 2015.

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	61	61	76	81	86	91	95	93	81	83	74	71
Low	37	37	55	62	64	71	74	75	76	57	53	51
Starkville												
High	52	48	64	74	81	87	91	89	85	76	66	64
Low	30	29	44	43	59	66	70	66	62	52	44	44
Holly Springs												
High	46	42	59	71	78	87	90	88	84	73	63	59
Low	29	25	40	52	60	67	72	66	63	52	46	42
MS 30-yr. avg.												
High	56	60	69	77	83	90	92	92	87	78	68	59
Low	34	37	45	52	61	68	71	70	65	52	43	37

PROTOCOL

Tall-fescue, orchardgrass, perennial-clover, and alfalfa trials across the state were established from September 23 to October 9, 2013. Soil samples from each location were taken and analyzed by the Mississippi State University Soil Testing Lab.

Each trial area was fertilized with lime, phosphorus (P_2O_5), and potassium (K_2O) according to 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 per acre of 15-5-10 at planting, followed by 50 pounds per acre of N 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.

Plot dimensions were 6 feet by 10 feet, and plots were planted using a precision cone seeder on a prepared seedbed. The experimental design was a randomized complete block replicated four times. Recommended seeding rates were based on 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" commercial mower with a bagging system that collected a 53-inch by 10-foot swath to calculate total yield. A subsample was collected and dried at 131°F to calculate dry matter (DM) percentage. Data was 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 2015 variety trials.[1]

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

[1]PLS = Pure Live Seed.

ALFALFA

Alfalfa is a perennial legume common in the Midwest and irrigated western and northern regions of the U.S. Alfalfa varieties have been bred for more southern climates, but stand persistence can be a problem. Planting should take place between September and October at a seeding rate of 20 pounds per acre on a firm seedbed.

Several diseases and pests, such as crown rot (*Sclerotinia trifoliorum)*, stem rot (*Phytophthora medicaginis*), alfalfa weevil (*Hypera hostica*), and leafhoppers (*Empoasca solana*), are major problems. Alfalfa is also very sensitive to soil pH and should be maintained at 6.5 or greater. Alfalfa also needs annual fertilizer inputs of 65 pounds of P_2O_5 per acre and 350 pounds of K_2O per acre.

Most of the yield distribution for alfalfa is in early summer to early fall. Protein concentration of alfalfa ranges from 12% to 18%, acid detergent fiber (ADF) from 30% to 40%, and neutral detergent fiber (NDF) from 40% to 50%. Alfalfa can also be successfully established in warm-season sod grasses to increase hay quality and yield distribution especially in low nitrogen input situations.

Table 4. Dry matter yields for alfalfa varieties in 2015 and the 2-year average total at Holly Springs, Mississippi.[1]

Variety	Harvest dates		Total	2-year avg.
	4/30/15	6/09/15		
	lb/A	*lb/A*	*lb/A*	*lb/A*
AlfaGraze 600RR	2202	3058	5260	5808
Bulldog 505	2386	2753	5139	6437
Catalina	1710	3088	4798	5018
FSG 639ST	2814	3228	6043	6684
FSG 903	1837	3129	4966	5745
GA-595	2476	3223	5699	6776
GA-805-M	2186	3018	5204	5791
RD132	1806	3251	5056	5518
Super Sonic	1482	3193	4676	5193
Mean	2100	3105	5204	5886
$LSD_{0.05}$	551	NS	NS	811
CV%	18	16	13	9

[1]NS: Not Significant
Planted: September 27, 2013 Soil: Grenada silt loam Fertilizer: lime @ 1 ton/A at planting
Herbicide: Paraquat @ 1 pt/A after each harvest; Pursuit (ammonium salt of imazethapyr) @ 4 oz/A after first harvest

Table 5. Dry matter yields for alfalfa varieties in 2015 and the 2-year average total at Starkville, Mississippi.[1]

Variety	Harvest dates		Total	2-year avg.
	4/22/15	6/10/15		
	lb/A	*lb/A*	*lb/A*	*lb/A*
AlfaGraze 600RR	1813	2664	4477	4929
Bulldog 505	1454	2222	3676	4198
Catalina	979	1601	2580	3230
FSG 639ST	1246	1886	3132	4105
FSG 903	967	1541	2508	3661
GA-595	1306	2057	3363	4232
GA-805-M	1283	2326	3609	4594
RD132	1337	1855	3192	3707
Super Sonic	1333	2165	3498	3906
Mean	1302	2035	3337	4063
$LSD_{0.05}$	NS	677	1087	917
CV%	28	22	22	15

[1]NS: Not Significant
Planted: September 23, 2013 Soil: Marietta fine sandy loam Fertilizer: lime @ 1 ton/A at planting
Herbicide: Paraquat @ 1 pt/A after each harvest; Pursuit (ammonium salt of imazethapyr) @ 4 oz/A after first harvest

Table 6. Dry matter yields for alfalfa varieties in 2015 and the 2-year average total at Poplarville, Mississippi.[1]

Variety	3/27/15	2-year avg.
	lb/A	*lb/A*
AlfaGraze 600RR	1125	4928
Bulldog 505	1112	4899
Catalina	1139	4733
FSG 639ST	1201	4987
FSG 903	1413	5219
GA-595	821	4387
GA-805-M	1716	5656
RD132	975	4901
Super Sonic	1244	5530
Mean	1194	5027
$LSD_{0.05}$	NS	NS
CV%	34	15

[1]NS: Not Significant
Planted: October 9, 2013 Soil: Basin loam Fertilizer: 0-0-60 @ 315 lb/A at midseason
Lime: 1 ton/A at planting
Herbicide: Paraquat @ 1 pt/A after each harvest; Pursuit (ammonium salt of imazethapyr) @ 4 oz/A after first harvest

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 during the seedling stage, which gives it potential to be overseeded in sod grasses. When seeding in an established pasture system, it is best to plant between October 15 and November 20.

In grass mixtures, plant red clover at 4–8 pounds per acre, but in pure stands, 12 pounds per acre will be sufficient. Red clover performs well when 60 pounds per acre of P_2O_5 and 40 pounds per acre of K_2O are applied and pH is 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 yields are typically less. It does offer more opportunity in grazing situations than in hay harvest because of its prostrate growth habit. White clover is tolerant of wet soils and prefers a pH of 6 or above. 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 responsive to K_2O, and a starter fertilizer of 20-60-20 will aid in establishment. Like red clover, white clover acts as an annual in the southern part of the state, but it has a greater reseeding potential.

Both clover species of 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 it with grass to reduce bloat potential.

Table 7. Dry matter yields for perennial clover varieties in 2015 and the 2-year average total at Holly Springs, Mississippi.[1]

Variety	4/21/15	2-year avg.
	lb/A	*lb/A*
Red		
B-11.1814	1044	2350
Cinnamon+	1569	2743
Southern Belle	1378	3255
White		
Durana	1208	2058
Ocoee	1225	2080
Patriot	1070	2104
Mean	1249	2432
$LSD_{0.05}$	258	488
CV%	13	13

[1]Planted September 27, 2013 Soil: Grenada silt loam
Lime: 1 ton/A at planting Herbicide: Pursuit (ammonium salt of imazethapyr) @ 4 oz/A after first harvest

Table 8. Dry matter yields for perennial clover varieties in 2015 and the 2014-15 2-year average total at Poplarville, Mississippi.

Variety	4/22/15	2-year avg.
	lb/A	*lb/A*
Red		
B-11.1814	1425	1075
Cinnamon+	1825	1491
Southern Belle	2568	1891
White		
Durana	1919	1395
Ocoee	1447	1171
Patriot	1790	1298
Mean	1829	1387
$LSD_{0.05}$	NS	NS
CV%	39	33

[1]Planted October 9, 2013 Soil: Basin loam
Lime: 1 ton/A at planting Herbicide: Pursuit (ammonium salt of imazethapyr) @ 4 oz/A after first harvest

TALL FESCUE AND ORCHARDGRASS

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 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. Tall fescue tolerates soil pH of 5.5 to 7.5 and responds well to nitrogen. Tall fescue requires 60–70 pounds per acre per year 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.

Orchardgrass is a perennial grass not typically grown in Mississippi. It is similar to tall fescue as it is a cool-season that should be established from September to October at a seeding rate of 15 to 20 pounds per acre. It typically has better forage quality and palpability when compared to tall fescue. However, it does not tolerate acidic or saturated soils, and stands tend to decrease in hot, humid conditions. Unlike tall fescue, it does not cause toxic endophyte issues. Orchardgrass responds well to nitrogen.

Table 9. Dry matter yields of tall fescue and orchardgrass varieties in 2015 and the 2014-15 2-year average total at Holly Springs, Mississippi.[1]

Variety	Species	Harvest date		Total	2-year avg.
		4/21/15	6/9/15		
		lb/A	*lb/A*	*lb/A*	*lb/A*
Cajun II	TF	4343	4120	8462	7827
GO-SOMO	OG	3248	3634	6881	5861
GT213	TF	3514	4347	7861	7330
K-31	TF	3623	4192	7815	7252
NFTF 1370	TF	3989	3700	7689	7701
Olympia	OG	3080	3640	6719	5800
Pennlate	OG	3456	3664	7120	6271
Persist	OG	3201	2995	6196	5689
Potomac	OG	3791	3525	7316	6284
Profit	OG	3531	3741	7272	6370
Quickdraw	OG	4251	3477	7728	6409
Rustler	TF	4120	3973	8093	7395
Texoma Max Q II	TF	3769	4058	7826	7655
Mean		3686	3774	7460	6757
$LSD_{0.05}$		666	NS	1101	867
CV%		12	15	10	9

[1]NS: Not significant TF: Tall Fescue OG: Orchardgrass
Planted: September 27, 2013 Soil: Grenada silt loam
Fertilizer: 15-5-10 @ 325 lb/A at planting and N @ 50 lb/A using urea ammonium sulfate after harvest
Herbicide: GrazonNext (aminopyralid + 2,4-D) @ 1 pt/A

Table 10. Dry matter yields of tall fescue and orchardgrass varieties in 2015 and the 2-year average total at Starkville, Mississippi.[1]

Variety	Species	Harvest date		Total	2-year avg.
		4/9/15	5/21/15		
		lb/A	*lb/A*	*lb/A*	*lb/A*
Cajun II	TF	2365	4286	6651	5391
GO-SOMO	OG	979	3386	4365	3411
GT213	TF	1912	4830	6741	5381
K-31	TF	2775	4560	7335	6135
NFTF 1370	TF	2888	4347	7236	6306
Olympia	OG	1294	3194	4488	3677
Pennlate	OG	976	3036	4012	3555
Persist	OG	1179	3306	4485	3949
Potomac	OG	1064	3661	4725	3913
Profit	OG	757	3565	4322	4618
Quickdraw	OG	1320	3190	4510	3702
Rustler	TF	2719	4909	7628	5795
Texoma Max Q II	TF	2246	4360	6606	5731
Mean		1729	3895	5623	4736
$LSD_{0.05}$		667	700	935	782
CV%		26	12	11	11

[1]NS: Not significant TF: Tall Fescue OG: Orchardgrass
Planted: September 23, 2013 Soil: Marietta fine sandy loam
Fertilizer: 15-5-10 @ 325 lb/A at planting and N @ 50 lb/A using urea ammonium sulfate after harvest

Table 11. Total 2015 dry matter yields of tall fescue and orchardgrass from Starkville and Holly Springs pooled across varieties.

Species	Starkville		Holly Springs	
	2015 total	2-year avg.	2015 total	2-year avg.
	lb/A	*lb/A*	*lb/A*	*lb/A*
Orchardgrass	4414	3832	7033	6097
Tall Fescue	7032	5789	7957	7526
Mean	5723	4810	7495	6811
$LSD_{0.05}$	365	339	436	330
CV%	11	13	10	9

Table 12. 2015 tall fescue, orchardgrass, alfalfa, and clover seed sources.		
Species	**Variety**	**Company**
Alfalfa	Alfalfagraze 600RR	Forage Genetics International
	Bulldog 505	Athens Seed
	Catalina	S&W Seed Company
	FSG 639ST	Farm Science Genetics
	FSG 903	Farm Science Genetics
	GA-595	University of Georgia
	GA-805-M	University of Georgia
	RD132	S&W Seed Company
	Super Sonic	S&W Seed Company
White Clover	Durana	Pennington Seed
	Ocoee	Allied Seed, L.L.C
	Patriot	Pennington Seed
Red Clover	B-11.1814	Agrilife
	Cinnamon+	Allied Seed, L.L.C
	Southern Belle	Allied Seed, LLC
Tall Fescue	Cajun II	Smith Seed Services
	Estancia	Mountain view seeds
	GT213	AgResearch USA Limited
	Kentucky 31	Starkville Coop
	Texoma Max Q II	Pennington Seed
	NFTF 1370	The Noble Foundation
	Rustler	Grassland Oregon, Inc.
Orchardgrass	GO-SOMO	Grassland Oregon, Inc.
	Olympia	Pennington
	Persist	Smith Seed Services
	Quickdraw	Grassland Oregon, Inc.

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