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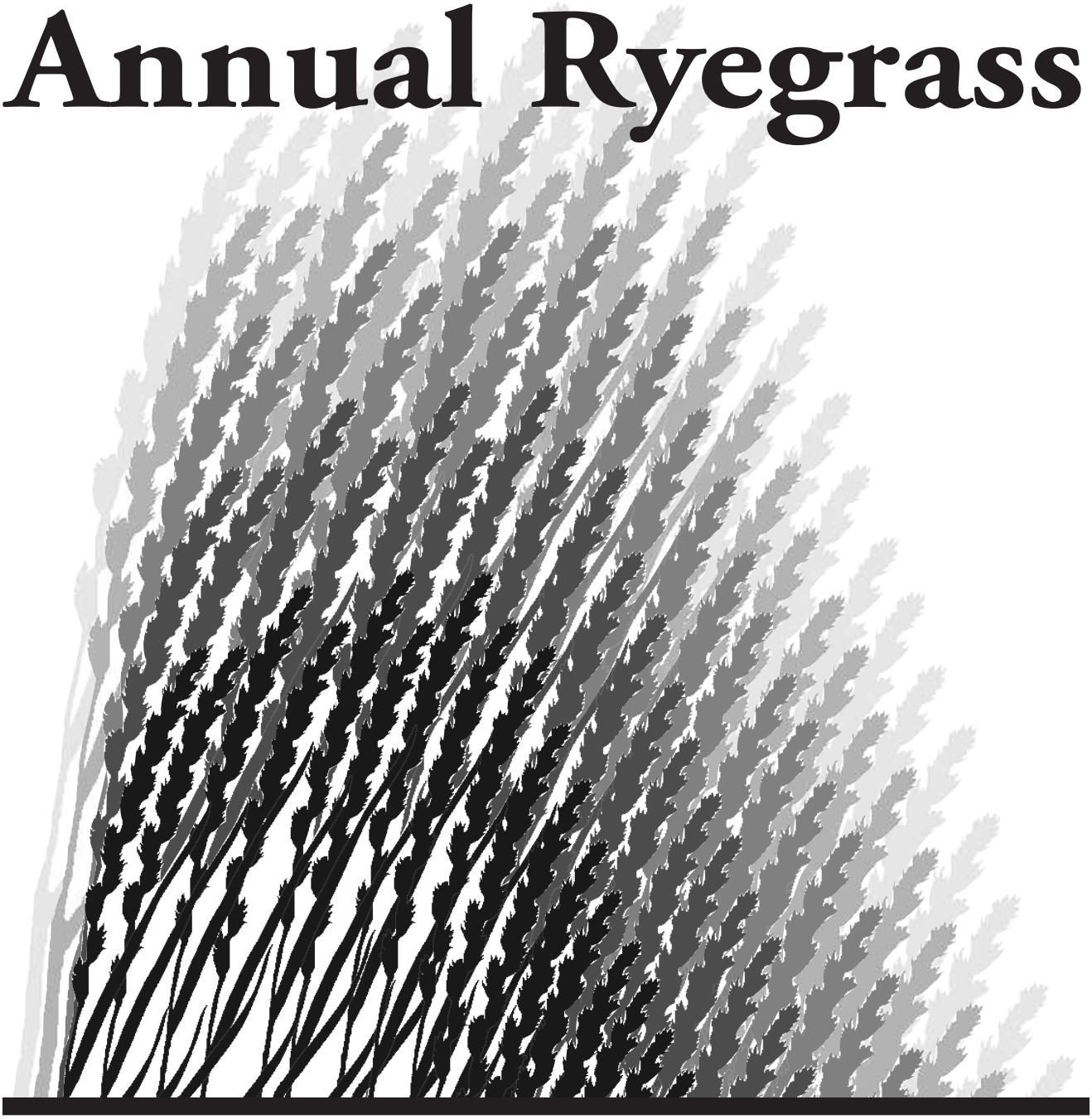
Mississippi Annual Ryegrass



VARIETY TRIALS, 2008-2009

MAFES

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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 11 is gratefully acknowledged.

Commercial and public varieties tested in this research project (trade names, experiment code names or numbers, etc.) and source of seed are listed on page 11.

Mississippi Annual Ryegrass Variety Trials, 2008-2009

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Introduction

Annual ryegrass (*Lolium multiflorum* L.) is the most important and versatile cool-season annual grass for livestock producers in Mississippi. In pasture and hay systems, annual ryegrass is popular forage because of its ease of establishment, high nutritive value, high yields, good reseeding ability, and adaptability to a wide range of soil types. Annual ryegrass can be established in pure stands or mixed with small grains and/or clovers for cool-season forage production. For these reasons, annual ryegrass is a main staple for many cool-season grazing programs in Mississippi.

Planting date varies with location. Overall, the best planting time is September for prepared seedbed or October if overseeded on a warm-season perennial grass pasture. Seeding rates are 30 pounds per acre for pure stands and 20 pounds per acre for mixtures with small grains and/or clovers. Annual ryegrass grows best at a pH of 6.0 to 7.0. Phosphorus and potassium levels should be at least in the medium range for optimum yields. Annual ryegrass is very responsive to nitrogen fertilizer that is split into two to four applications during the growing season. When established with clovers, a single nitrogen application in early winter is often recommended to limit annual ryegrass competition with the clover.

Reasonable productivity can be expected from November to May in the southern part of Mississippi and February to May in the northern part of Mississippi. Annual ryegrass should normally be allowed to reach a height of 8 inches before grazing begins. Normal stocking rates are 700 pounds per acre in winter and 1,400–2,000 pounds per acre in spring. Typically average daily gains for respective animal class are: suckling calves, 2.75 pounds; stocker calves, 2.3 pounds; yearling horse, 1.75 pounds; lambs, 0.3 pound. However, all of these factors are greatly influenced by environmental conditions and management style.

When selecting an annual ryegrass variety, the variety should be adapted to Mississippi as indicated by its performance across years and locations in the Mississippi annual ryegrass variety-testing program. Select high-yield varieties and varieties that are productive during the desired season of use. Purchase premium-quality seed that is high in germination and purity and is free from weed seed. We recommend buying certified seed or proprietary seed of an improved variety. Order or book seed well in advance of the planting season to guarantee that it is available when needed.

In an effort to assist livestock producers in Mississippi, new, improved, and standard varieties of annual ryegrass are evaluated in the Mississippi annual ryegrass variety trial each year. All entries from privately owned companies are tested on a fee basis. The Mississippi annual ryegrass-testing program is open to all commercially available varieties and experimental lines of annual ryegrass. This report contains data collected during the 2008-09 growing season.

Materials and Methods

The annual ryegrass variety trials were established in fall 2008 at the North Mississippi Branch Experiment Station at Holly Springs, Leveck Animal Research Center Forage Unit at Mississippi State, Coastal Plain Experiment Station at Newton, and White Sands Research Unit at Poplarville (Figure 1.). Entries were sown into a prepared seedbed at a seeding rate of 30 pounds per acre with a precision cone seeder. Five-by-11-foot plots were arranged in a randomized complete block design with four replicates.

The tests were fertilized with lime, phosphorus (P_2O_5), and potassium (K_2O) according to Mississippi State University Soil Testing Lab recommendations. At planting, a mixed fertilizer was applied to provide 50 pounds of N, 17 pounds of P_2O_5, and 33 pounds of K_2O per acre. Subsequently, ammonia nitrate at a rate of 50 pounds of N per acre was applied after each harvest. Herbicides were applied as needed to plots to control broadleaf weeds. In each plot, samples to determine yield were taken from a 19.25-square-foot area harvested to a 3-inch stubble height. A subsample of the harvested herbage mass, approximately 1 pound, was taken from each plot at each harvest and dried until constant weight was achieved for dry matter determination. Maturity was estimated as the portion of plants with an emerged seedhead (early anthesis to early dough).

Statistical analyses were performed on all data using the general linear model of Statistical Analysis Systems (Cary, North Carolina). Responses are reported as different at the $P < 0.05$ level. Differences between variety means were separated using Fisher's protected LSD.

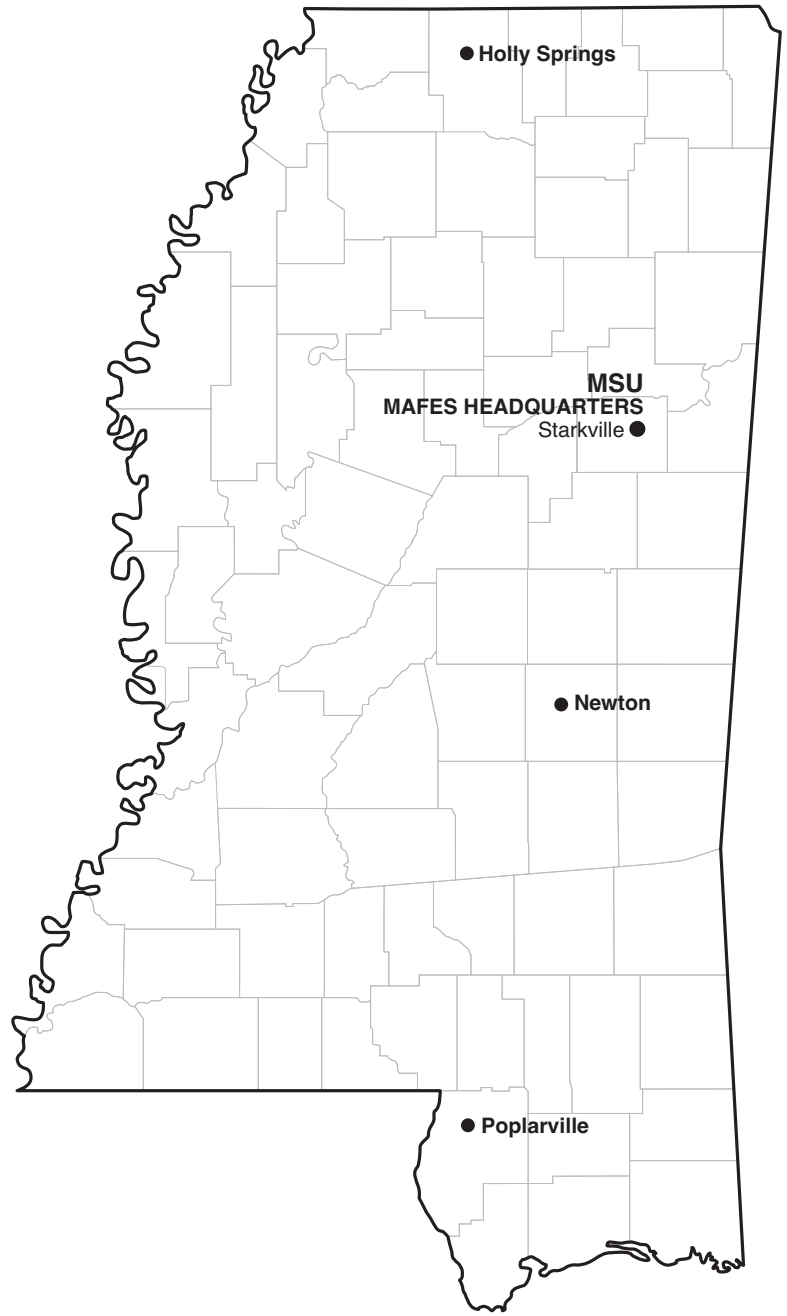

Figure 1. Locations of the 2008–09 Mississippi Annual Ryegrass Variety Trial.

Use of Data Tables and Summary Statistics

The yield potential of a given variety cannot be predicted with complete accuracy. Consequently, replicated plots of all varieties are evaluated for yield, and the yield of a given variety is estimated as the mean of all replicate plots of that variety. Yields vary somewhat from one replicate plot to another, which introduces a certain degree of error to the estimation of yield potential. This natural variation is often responsible for yield differences among different varieties. Thus, even if the mean yields of two varieties are numerically different, they are not necessarily significantly different in terms of yield potential. In other words, the ability to measure yield is not precise enough to determine whether such small differences are observed purely by chance or because of superior performance.

The least significant difference (LSD) is an estimate of the smallest difference between two varieties that can be declared to be the result of something other than random variation in a particular trial. Consider the following example for a given trial:

Variety	Yield
A	2000 lb/A
B	1,800 lb/A
C	1,600 lb/A
LSD (P < 0.05)	250 lb/A

The difference between variety A and variety B is 200 pounds per acre (2,000 - 1,800 = 200). This difference is **smaller** than the LSD (250 pounds per acre). Consequently, it is concluded that variety A and variety B have the same yield potential, since the observed difference occurred purely due to chance. The difference between variety A and variety C is 400 pounds per acre (2,000 - 1,600 = 400), which is **larger** than the LSD (250 pounds per acre). Therefore, it is concluded that the yield potential of variety A is superior to that of variety C, since the difference is larger than would be expected purely by chance.

The coefficient of variation (CV) is a measure of the relative precision of a given trial and is used to compare the relative precision of different trials. The CV is generally considered to be an estimate of the amount of unexplained variation in a given trial. This unexplained variation could be the result of variation between plots with respect to soil type, fertility, insects, diseases, weather stress, etc. In general, a higher CV indicates lower precision in a given trial.

Results and Discussion

Weather data for Holly Springs, Mississippi State, Newton, and Poplarville are presented in Tables 1–4. The temperature reported is the monthly mean temperature. Departure from normal (DFN) is the departure from the normal long-term average. All locations were cooler than normal during the fall and winter months and near normal or warmer than normal for spring months. Precipitation at Holly Springs and Newton were near normal. Mississippi State was extremely wet during the growing season. In contrast to Mississippi State, Poplarville was very dry during the growing season.

Ratings for maturity and dry matter forage yields (pounds per acre) are reported in Tables 5–8 for each location, while Table 9 reports total dry matter yield for one year by location. Yields are reported by harvest date and for total annual production. Varieties are listed in alphabetical order. All entries established well at all locations. No winterkill was observed at any location during the study. Generally, yields were greater at the April harvest than the earlier and later harvests at Mississippi State, Newton, and Poplarville. Yields were greater at the May harvest for Holly Springs, which is most likely is due to location. Greater dry matter forage yield in April and May is likely related to better conditions for growth, particularly temperature increase. Location and climate will have implications for stocking rate management of pastures in grazing situation.

Table 10 summarizes information about the source of the seed used in the variety trial. Varieties are listed in alphabetical order. Note that experimental varieties are not available for public use, while commercial varieties can be purchased from forage seed distributors.

SUMMARY

Selecting a variety of annual ryegrass is an important step in planning the cool-season grazing season for many producers in Mississippi. Always evaluate the maturity and seasonal growth distribution to ensure that the annual ryegrass is productive during the desired season of use. Varieties that have performed well over many years and locations have very stable performance, while others may perform well during wet years or on particular soil types. Keep in mind proper management is necessary for even the highest yielding variety to achieve its genetic potential.

Table 1. Mean monthly temperature and precipitation at Holly Springs, Mississippi, for July 2008 to June 2009.

Month	Year	Temperature		Precipitation	
		°F	DFN[1]	in	DFN
July	2008	79	0	1.92	-2.41
August	2008	76	-2	4.83	+1.27
September	2008	71	-5	2.49	-1.17
October	2008	58	-2	5.58	+1.65
November	2008	47	-3	2.81	-2.33
December	2008	41	0	8.3	+2.65
January	2009	37	-1	2.47	-2.37
February	2009	44	+2	4.05	-0.38
March	2009	51	+1	7.37	+1.66
April	2009	58	-2	3.83	-1.45
May	2009	68	0	8.6	+3.17
June	2009	77	+2	2.94	-1.49
Total				55.19	-1.20

[1]DFN is departure from normal long-term average.

Table 2. Mean monthly temperature and precipitation at Mississippi State, Mississippi, for July 2008 to June 2009.

Month	Year	Temperature		Precipitation	
		°F	DFN[1]	in	DFN
July	2008	82	0	2.31	-2.31
August	2008	78	-3	9.51	+5.90
September	2008	74	-2	5.19	+2.09
October	2008	62	-3	2.32	-0.67
November	2008	50	-4	2.96	-0.98
December	2008	45	-2	12.47	+7.36
January	2009	42	-3	7.04	+1.91
February	2009	48	0	9.93	+4.79
March	2009	55	0	7.82	+1.95
April	2009	61	-3	3.52	-1.45
May	2009	70	-2	10.59	+6.27
June	2009	80	+1	4.08	+0.17
Total				77.74	+25.03

[1]DFN is departure from normal long-term average.

Table 3. Mean monthly temperature and precipitation at Newton, Mississippi, for July 2008 to June 2009.

Month	Year	Temperature		Precipitation	
		°F	DFN[1]	in	DFN
July	2008	78	-2	4.07	-0.94
August	2008	77	-3	9.84	+5.77
September	2008	74	-1	5.90	+2.33
October	2008	61	-3	2.83	-0.31
November	2008	51	-4	2.64	-1.77
December	2008	49	+2	8.13	+2.79
January	2009	45	-1	3.51	-1.74
February	2009	49	0	3.53	-1.76
March	2009	57	+1	7.39	+1.46
April	2009	62	-1	2.05	-3.28
May	2009	72	+1	6.02	+1.96
June	2009	79	+2	0.61	-3.21
Total				56.52	+1.30

[1]DFN is departure from normal long-term average.

Table 4. Mean monthly temperature and precipitation at Poplarville, Mississippi, for July 2008 to June 2009.

Month	Year	Temperature		Precipitation	
		°F	DFN[1]	in	DFN
July	2008	82	0	3.02	-3.52
August	2008	80	-2	8.56	+3.02
September	2008	76	-2	8.98	+4.44
October	2008	65	-4	2.66	-0.60
November	2008	57	-3	2.01	-2.33
December	2008	55	+1	0.00	-5.57
January	2009	50	-2	1.81	-3.32
February	2009	54	0	2.56	-2.95
March	2009	62	+2	7.36	+1.25
April	2009	72	+5	0.12	-4.92
May	2009	74	0	0.00	-4.86
June	2009	87	+7	0.08	-5.11
Total				37.16	-24.47

[1]DFN is departure from normal long-term average.

Table 5. Mean dry matter yield and maturity of annual ryegrass at Holly Springs, Mississippi, 2008-2009.[1]

Variety	Harvest date			Total	5/14/2009
	4/6/2009	5/14/2009	6/16/2009		Maturity[2]
	lb/A	*lb/A*	*lb/A*	*lb/A*	
Attain	884	1650	640	3174	78
Big Boss	1543	1648	836	4027	70
Bruiser	930	1984	841	3755	76
Bulldog Grazer	1633	1830	844	4307	76
Chipola	1005	1907	751	3663	84
DH-3	878	1927	183	2988	78
Diamond T	1082	2111	775	3968	71
DynaGain	1051	2158	825	4034	78
Ed	1164	1909	770	3843	69
Fantastic	1178	2134	809	4121	83
FL/NE2006(misc2x)LRCT	1278	2154	939	4371	85
FLX 2002 (LA 3) LRCT	1547	2539	680	4766	83
FLX 2003-SM	914	1960	683	3557	83
FLX 2008 Red 4X	752	2524	771	4047	88
Flying A	1159	1874	1017	4050	71
Jackson	1089	1897	928	3914	81
Jumbo	975	2108	880	3963	83
Marshall	1809	2103	1126	5038	75
Maximus	1406	2110	725	4241	75
ME-4	1063	1800	986	3849	73
ME-94	1175	2467	875	4517	78
M/FLX 20084xER	1139	1987	429	3555	66
Passerel Plus	1320	2322	688	4330	88
Prine Tetraploid	1063	1719	888	3670	80
Rio	1180	2372	1205	4757	86
TAM 90	956	1701	865	3522	69
TAM TBO	1656	2034	915	4605	73
Tetra Pro	1579	1774	847	4200	69
TXR 2006 T22	1107	2592	785	4484	89
Verdure	838	1773	681	3292	83
LSD (P < 0.05)	518	568	259	827	15
CV %	31.3	19.8	22.8	14.6	13.2
Mean	1178	2036	806	4020	78

[1]Planted: 11/7/08. Soil: Grenada silt loam.
Fertilizer: 333 pounds of 15-5-10 per acre at planting and 147 pounds of 34-0-0 per acre after each harvest.
Herbicide: Glyphosate at 1 quart per acre 1 week before planting and Weedmaster at 1 quart per acre on 2/18/09.
[2]Percentage seed heads.

Table 6. Mean dry matter yield and maturity of annual ryegrass at Mississippi State, Mississippi, 2008-2009.[1]

Variety	Harvest date					Total	5/15/2009
	2/9/2009	3/11/2009	4/16/2009	5/15/2009	6/15/2009		Maturity[2]
	lb/A	*lb/A*	*lb/A*	*lb/A*	*lb/A*	*lb/A*	
Attain	377	1021	1724	918	169	4209	46
Big Boss	370	1362	2163	929	274	5098	43
Bruiser	397	1100	2422	1236	387	5542	50
Bulldog Grazer	515	1092	1998	1183	300	5088	75
Chipola	772	1491	1370	1072	287	4992	91
DH-3	766	1056	2088	1046	237	5193	45
Diamond T	517	1467	2143	937	247	5311	38
DynaGain	457	1002	2367	1134	402	5362	36
Ed	441	1127	1883	983	304	4738	34
Fantastic	641	1357	1563	1115	234	4910	71
FL/NE2006(misc2x)LRCT	421	1040	1874	947	307	4589	25
FLX 2002 (LA 3) LRCT	673	1059	2226	1017	305	5280	30
FLX 2003-SM	526	1227	1885	694	259	4591	21
FLX 2008 Red 4X	298	1340	1925	960	302	4825	58
Flying A	601	1245	2068	868	234	5016	34
Jackson	393	1249	1903	1052	338	4935	40
Jumbo	401	1117	2065	832	256	4671	25
Marshall	295	1010	2446	993	311	5055	20
Maximus	689	1581	2047	862	285	5464	39
ME-4	281	784	2679	1034	295	5073	23
ME-94	349	840	2587	1111	382	5269	29
M/FLX 20084xER	315	1275	1712	984	267	4553	91
Passerel Plus	538	1443	1820	1001	305	5107	58
Prine Tetraploid	450	1065	2045	968	267	4795	34
Rio	595	1302	2218	1137	305	5557	55
TAM 90	576	1057	1982	1022	273	4910	35
TAM TBO	366	1310	2160	955	289	5080	33
Tetra Pro	535	1224	2134	956	96	4945	51
TXR 2006 T22	267	902	1945	850	271	4235	34
Verdure	610	1198	1927	932	236	4903	46
LSD (P < 0.05)	223	326	288	236	113	763	9
CV %	33	19.6	10	16.9	28.6	10.9	14.5
Mean	481	1178	2046	991	281	4977	44

[1]Planted: 10/15/08. Soil: Marietta fine sandy loam.
Fertilizer: 333 pounds of 15-5-10 per acre at planting and 147 pounds of 34-0-0 per acre after each harvest.
Herbicide: Glyphosate at 1 quart per acre 1 week before planting.
[2]Percentage seed heads.

Table 7. Mean dry matter yield and maturity of annual ryegrass at Newton, Mississippi, 2008-2009.[1]

Variety	Harvest date					Total	4/14/2009
	2/4/2009	3/4/2009	4/14/2009	5/16/2009	6/15/2009		Maturity[2]
	lb/A	*lb/A*	*lb/A*	*lb/A*	*lb/A*	*lb/A*	
Attain	789	1197	2621	1618	280	6505	5
Big Boss	820	1222	2941	1455	159	6597	6
Bruiser	774	1170	2908	1409	287	6548	10
Bulldog Grazer	1124	1273	3238	1295	192	7122	25
Chipola	1163	1198	3180	1278	179	6998	55
DH-3	1165	1256	3660	1186	167	7434	13
Diamond T	916	1381	3151	1712	261	7421	5
DynaGain	895	1094	3063	1398	220	6670	18
Ed	938	1197	2828	1500	182	6645	11
Fantastic	789	1211	2809	1465	197	6471	21
FL/NE2006(misc2x)LRCT	806	1322	3422	1505	253	7308	5
FLX 2002 (LA 3) LRCT	883	1349	3418	1500	187	7337	15
FLX 2003-SM	775	1238	2708	1473	361	6555	5
FLX 2008 Red 4X	734	1261	3017	1526	383	6921	15
Flying A	1101	1335	3543	1525	189	7693	9
Jackson	899	1369	2928	1438	209	6843	9
Jumbo	789	1271	2950	1607	336	6953	5
Marshall	833	1277	3519	1585	241	7455	5
Maximus	728	1260	3196	1629	120	6933	5
ME-4	1005	1293	3277	1461	245	7281	5
ME-94	736	1206	3323	1604	264	7133	9
M/FLX 20084xER	778	1929	3102	1454	219	7482	25
Passerel Plus	996	1272	3536	1326	341	7471	28
Prine Tetraploid	777	1164	3147	1593	267	6948	5
Rio	987	1313	3500	1554	165	7519	15
TAM 90	866	1125	3196	1140	104	6431	14
TAM TBO	833	2010	3232	1572	299	7946	5
Tetra Pro	947	1184	2995	1466	271	6863	21
TXR 2006 T22	814	1015	2404	1641	511	6385	5
Verdure	1034	1210	2636	1557	177	6614	13
LSD (P < 0.05)	231	511	519	337	132	956	4
CV %	18.4	28.2	11.9	16.2	38.7	9.8	20.3
Mean	890	1287	3115	1482	242	7016	13

[1]Planted: 10/21/08. Soil: Prentiss fine sandy loam
Fertilizer: 333 pounds of 15-5-10 per acre at planting and 147 pounds of 34-0-0 per acre after each harvest.
Herbicide: Glyphosate at 1 quart per acre 1 week before planting.
[2]Percentage seed heads.

Table 8. Mean dry matter yield and maturity of annual ryegrass at Poplarville, Mississippi, 2008-2009.[1]

Variety	Harvest date				Total	4/9/2009
	1/27/2009	3/3/2009	4/9/2009	5/20/2009		Maturity[2]
	lb/A	*lb/A*	*lb/A*	*lb/A*	*lb/A*	
Attain	568	1349	2409	1469	5795	9
Big Boss	667	1340	2359	2057	6423	11
Bruiser	559	1138	2540	1569	5806	43
Bulldog Grazer	602	1495	2828	1299	6224	63
Chipola	438	1237	2672	1076	5423	85
DH-3	520	1367	2332	966	5185	19
Diamond T	495	1236	2119	1163	5013	8
DynaGain	470	1305	2415	1192	5382	16
Ed	478	1349	2791	1257	5875	23
Fantastic	506	1240	2537	1351	5634	39
FL/NE2006(misc2x)LRCT	421	1071	2626	1850	5968	9
FLX 2002 (LA 3) LRCT	478	1202	2803	1690	6173	34
FLX 2003-SM	476	913	2680	1354	5423	10
FLX 2008 Red 4X	376	1044	2516	1247	5183	26
Flying A	463	1556	3005	1395	6419	36
Jackson	386	1256	2552	1435	5629	24
Jumbo	355	1096	2537	2111	6099	8
Marshall	493	1252	2836	1462	6043	5
Maximus	598	1420	2456	1537	6011	8
ME-4	476	1149	2685	1519	5829	8
ME-94	382	1001	2767	1938	6088	10
M/FLX 20084xER	448	1521	2583	1049	5601	54
Passerel Plus	472	1171	2582	1371	5596	44
Prine Tetraploid	512	1218	2341	1460	5531	6
Rio	547	1478	2872	1527	6424	10
TAM 90	547	1311	2960	2090	6908	13
TAM TBO	783	1765	3186	1488	7222	6
Tetra Pro	432	1397	2680	1515	6024	48
TXR 2006 T22	472	1142	2551	1595	5760	5
Verdure	449	1165	2306	1558	5478	9
LSD (P < 0.05)	231	372	313	412	813	20
CV %	33.1	20.7	8.5	19.7	9.9	63.5
Mean	496	1273	2618	1486	5872	23

[1]Planted: 10/24/08. Soil: Basin loam.
Fertilizer: 333 pounds of 15-5-10 per acre at planting and 147 pounds of 34-0-0 per acre after each harvest
Herbicide: Glyphosate at 1 quart per acre 1 week before planting
[2]Percentage seed heads.

Table 9. Mean total dry matter yield of annual ryegrass at Holly Springs, Newton, Starkville, Poplarville, Mississippi, 2008-2009.

Variety	Holly Springs	Newton	Starkville	Poplarville	Four-location average
	lb/A	*lb/A*	*lb/A*	*lb/A*	*lb/A*
Attain	3174	6505	4209	5795	4921
Big Boss	4027	6597	5098	6423	5536
Bruiser	3755	6548	5542	5806	5413
Bulldog Grazer	4307	7122	5088	6224	5685
Chipola	3663	6998	4992	5423	5269
DH-3	2988	7434	5193	5185	5200
Diamond T	3968	7421	5311	5013	5428
DynaGain	4034	6670	5362	5382	5362
Ed	3843	6645	4738	5875	5275
Fantastic	4121	6471	4910	5634	5284
FL/NE2006(misc2x)LRCT	4371	7308	4589	5968	5559
FLX 2002 (LA 3) LRCT	4766	7337	5280	6173	5889
FLX 2003-SM	3557	6555	4591	5423	5032
FLX 2008 Red 4X	4047	6921	4825	5183	5244
Flying A	4050	7693	5016	6419	5795
Jackson	3914	6843	4935	5629	5330
Jumbo	3963	6953	4671	6099	5422
Marshall	5038	7455	5055	6043	5898
Maximus	4241	6933	5464	6011	5662
ME-4	3849	7281	5073	5829	5508
ME-94	4517	7133	5269	6088	5752
M/FLX 20084xER	3555	7482	4553	5601	5298
Passerel Plus	4330	7471	5107	5596	5626
Prine Tetraploid	3670	6948	4795	5531	5236
Rio	4757	7519	5557	6424	6064
TAM 90	3522	6431	4910	6908	5443
TAM TBO	4605	7946	5080	7222	6213
Tetra Pro	4200	6863	4945	6024	5508
TXR 2006 T22	4484	6385	4235	5760	5216
Verdure	3292	6614	4903	5478	5072
LSD ($P < 0.05$)	827	956	763	813	—
CV %	14.6	9.8	10.9	9.9	—
Mean	4020	7016	4977	5872	5471

Table 10. Source of seed, 2008-2009.

Variety	Seed Company/Source
Attain	Smith Seed Services
Big Boss	Smith Seed Services
Bruiser	Ampac Seed Company
Bulldog Grazer	The University of Georgia
Chipola	University of Florida
DH-3	Oregro Seeds, Inc.
Diamond T	Oregro Seeds, Inc.
DynaGain	Oregro Seeds, Inc.
Ed	Smith Seed Services
Fantastic	Ampac Seed Company
FL/NE2006(misc2x)LRCT	Oregro Seeds, Inc.
FLX 2002 (LA 3) LRCT	Lewis Seed Company
FLX 2003-SM	Lewis Seed Company
FLX 2008 Red 4X	University of Florida
Flying A	Oregro Seeds, Inc.
Jackson	Wax Seed Company, LLC
Jumbo	Barenburg USA
Marshall	Wax Seed Company, LLC
Maximus	Barenburg USA
ME-4	Wax Seed Company, LLC
ME-94	Wax Seed Company, LLC
M/FLX 20084xER	University of Florida
Passerel Plus	Pennington Seed Company
Prine Tetraploid	Ragan & Massey
Rio	Pro Seeds
TAM 90	East Texas Seed Company
TAM TBO	Oregro Seeds, Inc.
Tetra Pro	American Grass Seed Producers
TXR 2006 T22	Texas Agri Life Research
Verdure	Smith Seed Services

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