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Forage Yields from 2008-2009 Small Grains Variety Trial

THE SAMUEL ROBERTS NOBLE FOUNDATION

by Jagadeesh Mosali, J. Guretzky, M. Saha, J. Baker and S. Norton

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Introduction

Livestock and forage production are the largest contributors to agricultural income in the primary service region of the Noble Foundation. The small grains variety testing program which includes oats, rye, triticale and wheat is designed to provide up-to-date performance information to producers in Oklahoma and Texas about varieties that are commercially and commonly available. In addition, the program provides a tool to evaluate and compare experimental breeding lines emerging from the Noble Foundation breeding program as well as other public and private breeding programs.

The program is intended to furnish producers with supplemental information and to aid decision-making and idea formation. The information coming from the variety testing program should be a valuable tool when used with similar information from other sources. The objective of this report is to summarize forage and grain yields from the 2008-2009 small grains variety trials.

Materials and Methods

The small grains variety trials were conducted at the Noble Foundation Dupy Farm (Dale silt loam) near Gene Autry and the Red River Demonstration and Research Farm near Burneyville, Okla. The experimental design was a randomized complete block with three replications. The experimental unit is a 5- by 10-foot plot of a single variety. The trial consisted of 30 entries of wheat, 10 entries of oats, 14 entries of rye and 12 entries of triticale that were evaluated during the 2008-2009 crop growing season.

The entries were seeded in a clean-tilled seedbed on Oct. 1, 2008, at the Dupy Farm (Dupy) and on Sept. 29, 2008, at the Red River Demonstration and Research Farm (Red River). Depending on the crop and variety, approximately 90 to 120 lbs/ac (pure live seed basis) of seed was planted which amounts to 2,000,00 PLS/ac.

Each entry was drilled in two adjacent 5- by 10-foot plots, in 7-inch rows, at 1-inch planting depth with a HEGE 500 drill. These adjacent plots were used to represent forage only and dual purpose (forage and grain). Fertilization consisted of preplant incorporation of 80 lbs N/ac on Oct. 3, 2008, at Dupy and on Oct. 6, 2008, at Red River. Soil tests showed all other nutrients to be adequate at both ▸

locations. Plots received a topdress application of 80 lbs N/acre on Feb. 5, 2009, at Dupy and on Feb. 6, 2009, at Red River. Annual ryegrass was controlled using Amber application at 0.56 ou/ac on Oct. 2, 2008, at both farms.

Plots are harvested with a HEGE sickle bar forage plot harvester at a 3-inch height. Adjacent plots of each variety were harvested at the same time for forage during fall until first hollow stem stage of wheat was reached. At hollow stem stage, the dual purpose half is no longer harvested and was allowed to grow for grain production. At Dupy, forage-only plots were harvested on Jan. 23, March 2, April 22 and June 2, 2009. At Red River, they were harvested on Feb. 10, March 3, May 5 and June 6, 2009. At Dupy, dual purpose plots were harvested on Jan. 23, and at Red River, they were harvested on Feb. 10, 2009.

Data was analyzed with the general linear models procedure in SAS (Statistical Analysis Software, Cary, N.C.), and means were separated by the least significant difference (LSD) method ($P \leq 0.05$).

Results and Discussion

Average growing conditions at the Dupy Farm and the Red River Farm are reported in Tables 1 and 2, respectively. Even though the total rainfall was almost the same as the 30-year average during the growing season, most of the rainfall occurred during April and May. Severe drought conditions existed from September to March, and the total monthly rainfall was significantly less than the 30-year average. Low rainfall during the growing season and a freeze greatly affected the forage and grain yields. There was no harvestable forage during fall.

Forage Production

Forage yields are reported in Tables 3, 4, 5 and 6. Total forage production and typical seasonal production during fall and spring are important factors for small grains production in the Southern Great Plains. Historically, rye has produced the most fall forage. Triticale has also been a strong fall and early spring forage producer. Wheat matures later and produces the majority of its forage during spring. Oat is the latest maturing of the small grains, producing the majority of its forage from April to May.

Oat forage yields varied greatly with location. The forage yields at Dupy were double the forage yields at Red River. At Dupy, the total forage yields of oats ranged from 3,891 lbs/ac to 4,867 lbs/ac, whereas at Red River, they ranged from 5,725 to 8,127 lbs/ac.

At Dupy, the total forage yields of rye ranged from 7,381 lbs/ac to 11,186 lbs/ac, whereas at Red River, they ranged from 6,135 to 9,768 lbs/ac. At Dupy, the total forage yields of triticale ranged from 6,133 lbs/ac to 8,165 lbs/ac, whereas at Red River, they ranged from 4,173 to 5,462 lbs/ac. At Dupy, the total forage yields of wheat ranged from 4,897 lbs/ac to 7,856 lbs/ac, whereas at Red River, they ranged from 3,219 to 4,983 lbs/ac. Under the environmental conditions during the trials, rye had better overall forage production at both locations compared to other grains

Grain Production

Grain yields are reported in Table 7. An early freeze had a severe effect on wheat grain production. The dual purpose wheat was harvested only once before the first hollow stem stage. At the time of harvest, we were unable to harvest wheat due to either no grain production in most of the varieties or, in some varieties, not enough grain to justify harvest. Some varieties had some late tillers with grain, but were not ready by harvest. The varieties which had late tillers with heads were Cocker 9553, Jackpot, NF 98120, NF 97117, Endurance and NF 96107A. Wheat varieties which had very little grain and were not harvested are Forage Maxx, OK Bullet, 327, Kingrazer and Rangerbrand. All the remaining varieties had no grain.

At Red River, the test weights (pounds per bushel) for oats ranged from 31.5 to 34.4 lbs/bu, whereas the yield ranged from 10.2 to 21 bu/ac. At Dupy, the test weights for oats ranged from 27.8 to 30.3 lbs/bu, whereas the yield ranged from 16 to 37 bu/ac. At both the locations for oats, there were no significant differences in yield among the entries. At Red River, the test weights for rye ranged from 51.8 to 53.7 lbs/bu, whereas the yield ranged from 26.6 to 37.1 bu/ac. At Dupy, the test weights for rye ranged from 48.4 to 51.1 lbs/bu, whereas the yield ranged from 11.3 to 36.3 bu/ac. At Red River, the test weights for triticale ranged from 46.1 to 48.1 lbs/bu, whereas the yield ranged from 24.6 to 47.9 bu/ac. At Dupy, the test weights for oats ranged from 39.9 to 47.2 lbs/bu, whereas the yield ranged from 4.5 to 28.1 bu/ac. At Dupy, two varieties of triticale and three varieties of oats didn't yield enough to determine the bushel weight. These varieties are (oats) Harrison (172.8 lbs/ac), NF27 (119 lbs/ ac) and NF27A (206.4 lbs/ac); and (triticale) NF96210 (334.4 lbs/ac) and NF 97226 (448 lbs/ac).

When studying the data, producers should look for consistency and dependability of crop performance of a variety across multiple years rather than within individual years. The producer should also take into account the location that best approximates their production situation (i.e., soil type, location proximity, yield goals, fertility levels, etc.) when using this data to assist decision making.

Table 1. Average 2008 and 2009 monthly high and low temperatures (°F) and precipitation (inches) for the Noble Foundation Dupy Farm, Gene Autry, Okla.

		Temperature		Precipitation	
Month	Year	Avg. High	Avg. Low	Total	30-yr Avg.
Sept	2008	84	60	1.88	4.17
Oct	2008	77	50	1.37	4.43
Nov	2008	66	40	0.50	2.70
Dec	2008	55	30	0.18	2.32
Jan	2009	55	29	0.58	1.85
Feb	2009	64	39	1.40	2.19
Mar	2009	66	45	1.19	3.20
Apr	2009	74	50	6.19	3.19
May	2009	77	58	10.60	5.08
Sept- May	2008-2009			23.89	29.13

Table 2. Average 2008 and 2009 monthly high and low temperatures (°F) and precipitation (inches) for the Noble Foundation Red River Research and Demonstration Farm, Burneyville, Okla.

		Temperature		Precipitation	
Month	Year	Avg. High	Avg. Low	Total	30-yr Avg.
Sept	2008	85	59	1.43	4.00
Oct	2008	79	49	1.26	4.39
Nov	2008	68	37	0.51	2.73
Dec	2008	57	27	0.27	2.38
Jan	2009	57	26	0.35	1.73
Feb	2009	65	38	1.56	2.14
Mar	2009	68	45	1.89	3.37
Apr	2009	74	49	15.36	3.33
May	2009	79	57	4.90	5.07
Sept- May	2008-2009			27.53	29.14

Table 3. Forage yield of commercial and advanced experimental lines of Oats, Rye and Triticale at the Noble Foundation Red River Demonstration and Research Farm, Burneyville, Okla.

		Harvest dates – yield lbs/ac				
Crop	Variety [Source]	2/20/09	3/3/09	5/5/09	6/2/09	Total
Oats	NF95401A	303	2,685	1,463	416	4,867
	NF98410	475	3,029	1,216	84	4,804
	NF7	0	3,141	1,390	168	4,700
	NF95418	227	3,002	1,248	111	4,587
	LA99016	248	2,741	1,313	235	4,537
	Harrison	195	2,937	1,010	242	4,383
	Dallas	0	2,683	868	550	4,100
	LA9339 (Plot spike)	57	2,363	991	637	4,048
	NF27A	0	2,145	1,138	688	3,970
	NF27	0	2,145	1,231	515	3,891
	LSD	**510**	**367**	**491**	**461**	**850**
Rye	NF95319B	3,613	4,701	1,453		9,768
	NF95307A	4,752	2,971	1,394		9,117
	NF97326	4,207	3,495	1,377		9,079
	Maton	3,064	4,024	1,583		8,672
	Maton II	3,392	3,553	1,655		8,601
	NF97325	2,696	4,553	1,332		8,581
	Bates	3,728	3,312	1,496		8,536
	Bates RS4	3,033	3,347	1,338		7,718
	Elbon	2,387	3,773	1,371		7,532
	Oklon	1,235	4,041	2,081		7,358
	Wintergrazer 70	2,053	3,555	1,394		7,002
	NF95307B	2,339	3,196	1,441		6,976
	NF97308	2,254	3,430	1,230		6,913
	Thunder green	1,751	2,883	1,501		6,135
	LSD	**2,532**	**1,118**	**532**		**2,440**
Triticale	NF96210	574	3,839	1,049		5,462
	Thunder Cale V	296	3,192	1,651		5,139
	NF97201A	603	3,293	1,046		4,942
	Thunder Cale	1	2,730	2,148		4,879
	TAMcale 5019	483	3,200	1,132		4,815
	NF96213	240	2,898	1,610		4,748
	NF95215B	370	3,450	880		4,701
	NF97210A	203	3,455	960		4,618
	Thunder Cale K	169	3,265	1,121		4,556
	TCale102	0	2,513	1,883		4,396
	NF97226	0	2,766	1,587		4,353
	Thundertall	14	2,220	1,939		4,173
	LSD	**334**	**843**	**711**		**929**

*Shaded numbers are not statistically different from the highest yielding entry within a column.

Table 4. Forage yield of commercial and advanced experimental lines of wheat at the Noble Foundation Red River Demonstration and Research Farm, Burneyville, Okla.

		Harvest dates – yield lbs/ac			
Crop	Variety [Source]	2/20/09	3/3/09	5/5/09	Total
Wheat	APO6TA4520	578	3,358	708	4,983
	Coker 9553 (soft)	99	3,781	720	4,651
	Duster	43	3,588	771	4,544
	Deliver	90	3,636	591	4,539
	NF96131	240	3,399	728	4,495
	Tam203	262	3,440	702	4,479
	NF95134A	540	2,916	856	4,404
	Coker 9700 (soft)	93	3,315	914	4,393
	NF97117	182	3,249	717	4,370
	NF96107A	210	3,333	742	4,326
	Tam401	202	3,152	839	4,294
	Overley	195	3,267	770	4,190
	Kingrazer (soft)	223	3,042	866	4,188
	Doans	166	3,456	659	4,155
	2174	36	3,130	787	4,130
	Crawford (soft)	100	2,860	1157	4,117
	SantaFe	365	3,152	600	4,108
	Jagger	384	2,871	783	3,958
	Fannin	0	3,165	940	3,935
	NF98117	129	3,008	778	3,857
	TX4A35 (soft)	0	2,984	812	3,762
	NF98120	221	2,927	778	3,747
	Endurance	294	2,573	1047	3,732
	Ranger Brand (soft)	12	2,959	532	3,713
	Jackpot	152	2,772	939	3,711
	327	181	2,602	985	3,623
	APO6T3832	65	2,825	949	3,549
	Shocker	363	2,450	813	3,521
	OK Bullet	24	2,608	923	3,349
	ForageMaxx (soft)	0	2,406	965	3,219
	LSD	**426**	**686**	**342**	**1,036**

*Shaded numbers are not statistically different from the highest yielding entry within a column.

Table 5. Forage yield of commercial and advanced experimental lines of Oats, Rye and Triticale at the Noble Foundation Dupy Farm, Gene Autry, Okla.

		Harvest dates – yield lbs/ac				
Crop	Variety [Source]	1/23/09	3/2/09	4/22/09	6/2/09	Total
Oats	LA9339 (Plot spike)	698	1,623	4,022	1,784	8,127
	NF95418	690	2,009	4,019	956	7,674
	NF27	1,055	1,779	3,788	741	7,362
	NF27A	926	1,763	3,718	700	7,106
	NF98410	709	2,335	3,510	342	6,897
	Dallas	285	1,833	3,890	730	6,738
	NF7	835	1,800	3,485	458	6,578
	LA99016	337	1,256	3,552	1,212	6,358
	NF95401A	892	1,465	3,504	429	6,290
	Harrison	588	1,673	3,157	307	5,725
	LSD	**583**	**500**	**1,329**	**563**	**2,047**
Rye	Maton	1,529	6,030	3,626		11,186
	Elbon	1,331	3,902	3,104		8,337
	NF95307A	2,232	4,165	1,863		8,260
	NF97326	2,059	3,997	2,111		8,167
	NF95307B	2,624	3,739	1,758		8,121
	Thundergreen	636	2,765	4,720		8,121
	NF97308	1,419	3,727	2,872		8,019
	Bates	1,435	3,714	2,862		8,011
	NF97325	2,191	3,562	2,220		7,973
	Wintergrazer 70	1,310	4,011	2,626		7,947
	Bates RS4	2,124	3,727	1,731		7,581
	Maton II	1,626	3,783	2,172		7,581
	Oklon	1,186	3,766	2,626		7,578
	NF95319B	1,968	3,571	1,843		7,381
	LSD	**1021**	**1,122**	**1,157**		**2,587**
Triticale	Thunder Cale K	758	3,516	3,891		8,165
	NF97226	1,113	4,378	2,273		7,764
	NF96210	1,672	3,540	2,529		7,741
	Thunder Cale V	593	3,721	3,409		7,723
	NF96213	1,519	4,058	1,949		7,526
	Thundertall	522	2,784	4,081		7,386
	TCale102	289	3,855	3,218		7,361
	NF97201A	1,365	3,956	1,903		7,224
	Thunder Cale	462	3,406	3,227		7,094
	TAMcale5019	844	3,611	2,373		6,828
	NF95215B	1,330	3,230	1,781		6,341
	NF97210A	1,022	3,680	1,430		6,133
	LSD	**649**	**719**	**845**		**860**

*Shaded numbers are not statistically different from the highest yielding entry within a column.

Table 6. Forage yield of commercial and advanced experimental lines of wheat at the Noble Foundation Dupy Farm, Gene Autry, Okla.

		Harvest dates – yield lbs/ac			
Crop	Variety [Source]	1/23/09	3/2/09	4/22/09	Total
Wheat	NF95134A	1,335	4,411	2,110	7,856
	Endurance	822	3,366	3,392	7,579
	Shocker	1,575	4,116	1,842	7,534
	Coker 9553 (soft)	665	3,776	2,766	7,207
	Duster	1,161	3,494	2,371	7,026
	327	932	3,556	2,150	6,637
	Tam401	1,649	3,352	1,567	6,568
	Fannin	1,138	3,832	1,534	6,504
	NF96131	1,004	3,491	1,931	6,427
	2174	533	2,938	2,809	6,281
	NF98120	1,205	3,393	1,678	6,275
	Coker 9700 (soft)	728	3,725	1,803	6,256
	SantaFe	602	3,435	2,116	6,152
	Ranger Brand(soft)	491	2,638	2,985	6,114
	NF96107A	1,097	3,334	1,647	6,078
	OK Bullet	949	3,063	2,019	6,031
	APO6TA4520	1,604	3,227	1,194	6,025
	Crawford (soft)	587	3,145	2,246	5,978
	TX4A35 (soft)	670	3,093	2,052	5,815
	Deliver	656	2,997	2,114	5,767
	Tam203	485	3,159	2,093	5,737
	Doans	324	3,293	2,100	5,718
	APO6T3832	633	3,294	1,754	5,682
	Jackpot	126	3,509	2,039	5,675
	NF97117	1,005	2,801	1,831	5,637
	ForageMaxx (soft)	454	2,702	2,362	5,518
	Kingrazer (soft)	187	2,513	2,591	5,291
	NF98117	727	2,709	1,753	5,188
	Overley	530	2,725	1,862	5,117
	Jagger	290	2,665	1,942	4,897
	LSD	**692**	**750**	**539**	**1,277**

*Shaded numbers are not statistically different from the highest yielding entry within a column.

Table 7. Grain yield of commercial and advanced experimental lines of small grains at the Noble Foundation Dupy Farm, Gene Autry and Red River Farm, Burneyvile, Okla., harvested in June

		Red River Farm		Dupy Farm	
Crop	Variety [Source]	Test wt lbs/bu	Yield bu/ac	Test wt lbs/bu	Yield bu/ac
Oats	LA9339 (Plot spike)	33.8	21.0	28.4	37.1
	LA99016	34.4	16.5	28.7	24.3
	NF98410	31.5	15.4	28.6	16.2
	Harrison	32.5	15.4	–	–
	NF95401A	33.0	15.1	30.4	18.5
	Dallas	33.1	13.4	29.4	17.8
	NF95418	33.8	13.0	–	–
	NF7	32.2	13.0	27.8	24.0
	NF27A	32.5	12.4	–	–
	NF27	33.6	10.2	–	–
	LSD	**2.1**	**13.1**	**0.8**	**21.5**
Rye	Bates	52.3	31.8	49.6	16.9
	Bates RS4	53.4	30.6	48.9	30.7
	Elbon	53.6	33.1	50.0	15.1
	Maton	52.4	32.9	49.7	21.7
	Maton II	51.8	26.6	49.5	28.6
	NF95307A	53.2	31.7	49.6	11.3
	NF95307B	52.2	29.5	49.1	17.4
	NF95319B	53.7	35.0	50.1	25.3
	NF97308	52.8	37.1	50.1	31.8
	NF97325	53.0	31.5	50.3	18.5
	NF97326	53.2	31.4	50.0	28.3
	Oklon	52.4	34.8	50.6	36.3
	Thundergreen	52.5	28.8	48.4	27.8
	Wintergrazer_70	53.7	33.3	51.1	11.3
	LSD	**1.61**	**8.9**	**0.7**	**19.6**
Triticale	NF95215B	47.6	47.5	43.9	6.9
	NF96210	47.0	36.4	–	–
	NF96213	46.8	35.4	44.6	6.7
	NF97201A	46.1	24.6	46.0	9.3
	NF97210A	47.5	33.6	39.9	4.5
	NF97226	46.9	29.5	–	–
	TAMcale 5019	47.6	33.9	47.2	18.2
	T-Cale/102	48.1	45.6	43.5	18.9
	Thunder Cale	47.2	34.8	44.9	19.8
	Thunder Cale K	47.6	27.7	42.2	22.4
	Thunder Cale V	47.2	47.9	42.8	28.1
	Thundertall	47.9	44.2	44.7	11.4
	LSD	**3.3**	**24.19**	**1.02**	**5.66**

*Shaded numbers are not statistically different from the highest yielding entry within a column.

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