Oklahoma Panhandle Research & Extension Center

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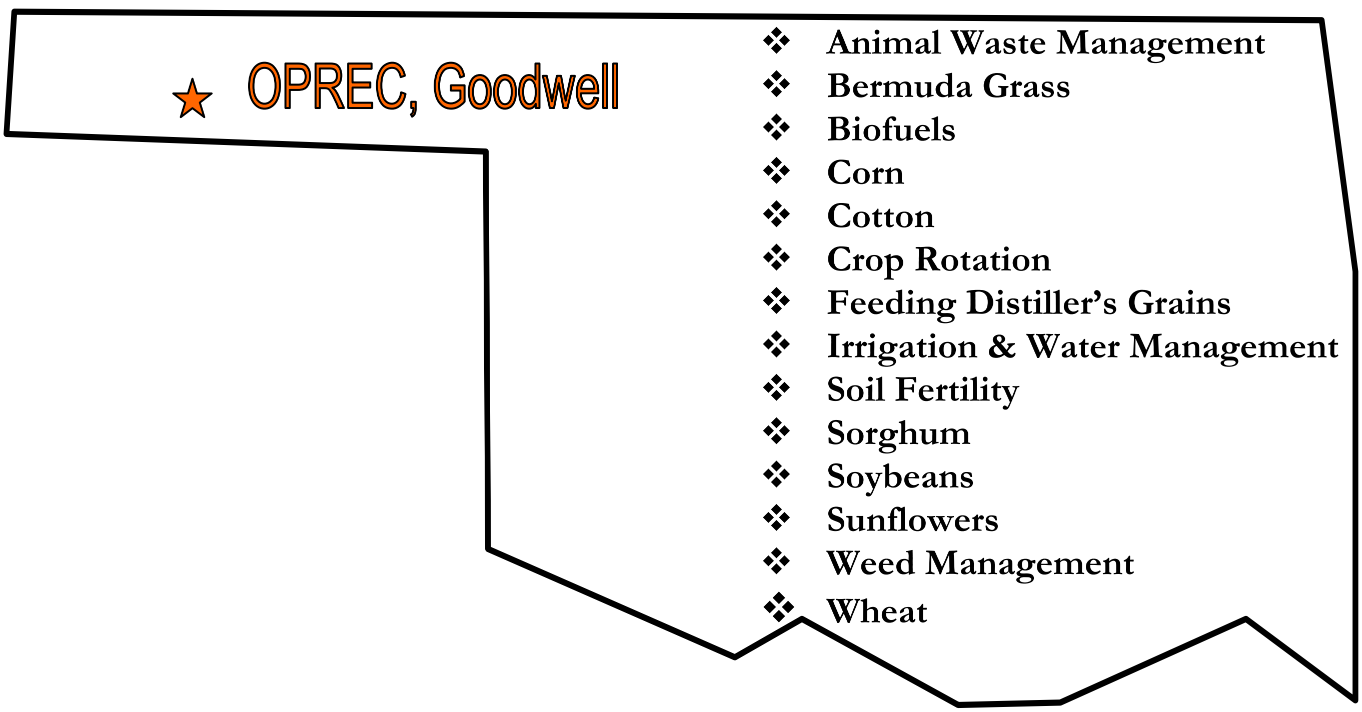

- Animal Waste Management
- Bermuda Grass
- Biofuels
- Corn
- Cotton
- Crop Rotation
- Feeding Distiller's Grains
- Irrigation & Water Management
- Soil Fertility
- Sorghum
- Soybeans
- Sunflowers
- Weed Management
- Wheat

2007 Research Highlights

Division of Agricultural Sciences and Natural Resources
Oklahoma Panhandle Research and Extension Center
Oklahoma State University
Field & Research Services Unit
Department of Animal Science
Department of Entomology and Plant Pathology
Department of Plant and Soil Sciences
Department of Biosystems and Agricultural Engineering
USDA – ARS

OKLAHOMA PANHANDLE RESEARCH AND EXTENSION CENTER

The Division of Agricultural Sciences and Natural Resources (DASNR), Oklahoma Agricultural Experiment Stations (OAES), and Oklahoma Cooperative Extension Service (OCES) at Oklahoma State University (OSU) have a long history of working cooperatively with Oklahoma Panhandle State University (OPSU). The initial Panhandle Research Experiment Station at Goodwell was established in 1923. A Memorandum of Agreement that outlined the major missions of each entity strengthened and enlarged this cooperative effort in July 1994, resulting in the formation of the Oklahoma Panhandle Research and Extension Center (OPREC). The Memorandum of Agreement was updated in 2006 to meet the changing needs of all involved parties. OPSU's primary role is teaching. OAES is the research arm of DASNR and is responsible for the fundamental research. OPREC's overall operation is within the Field and Research Services Unit (FRSU) of the OAES. OCES transfers technology generated from the research programs to clientele. These entities constitute a true partnership in solving problems related to panhandle agriculture.

Oklahoma State University has staffed the Oklahoma Panhandle Research and Extension Center at Goodwell with people who are making a difference in research, extension, and teaching in the panhandle area. Curtis Bensch as OPREC Director/Asst. State Specialist/Lecturer, Rick Kochenower as Area Agronomy Research and Extension Specialist, Britt Hicks as Area Livestock Extension Specialist, and Lawrence Bohl as Senior Station Superintendent. These individual are addressing critical production issues that face Oklahoma producers. Other essential OPREC personnel include Donna George (Senior Secretary), Craig Chesnut (Field Foreman II), Matt Lamar (Field Assistant and Equipment Operator), and several wage payroll and part-time OPSU student laborers. OSU faculty from Plant and Soil Sciences, Entomology and Plant Pathology, Horticulture, Biosystems and Agricultural Engineering, Agriculture Economics, Animal Science, and USDA/ARS utilize OPREC to conduct research and extension efforts in the panhandle area. In addition, commodity associations and agriculture industries also use OPREC facilities to hold meetings and other activities.

Progress is being made in the development of research and education programs adapted to the panhandle area. All involved recognize the importance of agriculture in the Oklahoma Panhandle and are dedicated to the continued success and improvement of OPREC. Your continued support of OPREC's research, teaching and extension programs will help us to better serve the clientele of the panhandle area.

Curtis Bensch

Curtis Bensch,
Director OPREC

The staff at OPREC, OAES F&RSU, Department of Plant and Soil Sciences, Department of Animal Science and Department of Biosystems and Ag Engineering at Oklahoma State University would like to thank the companies and individuals listed below, for providing resources utilized in research projects. Their valuable contributions and support allow researchers to better utilize research dollars. This research is important for producers in the high plains region, not just the Oklahoma panhandle. We would ask that the next time you see these individuals and companies that you say thank you with us.

Archer Daniels Midland Company
Bayer Crop Sciences
Dow Agro Sciences (Jodie Stockett)
DuPont (Jack Lyons and Robert Rupp)
Farm Credit of Western Oklahoma
Garst Seed
Golden Harvest (Bart Arbuthnot)
Hitch Enterprises
Steve Kraich
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Monsanto (Mike Marlow, Ben Mathews, T. K. Baker, Mike Lenz)
NC+ Hybrids (Ron Joiner)
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Oklahoma Wheat Commission
Oklahoma Wheat Growers
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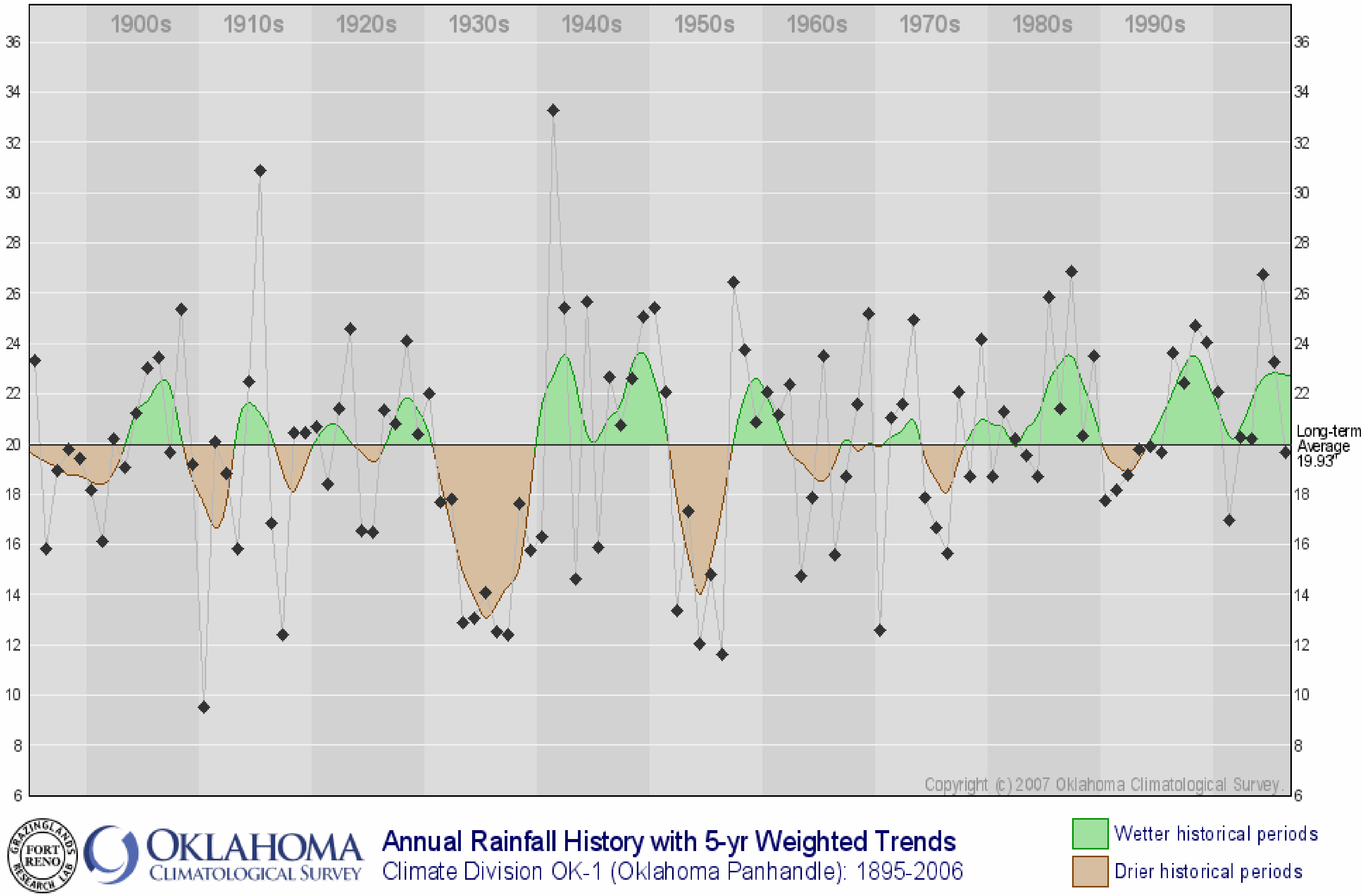
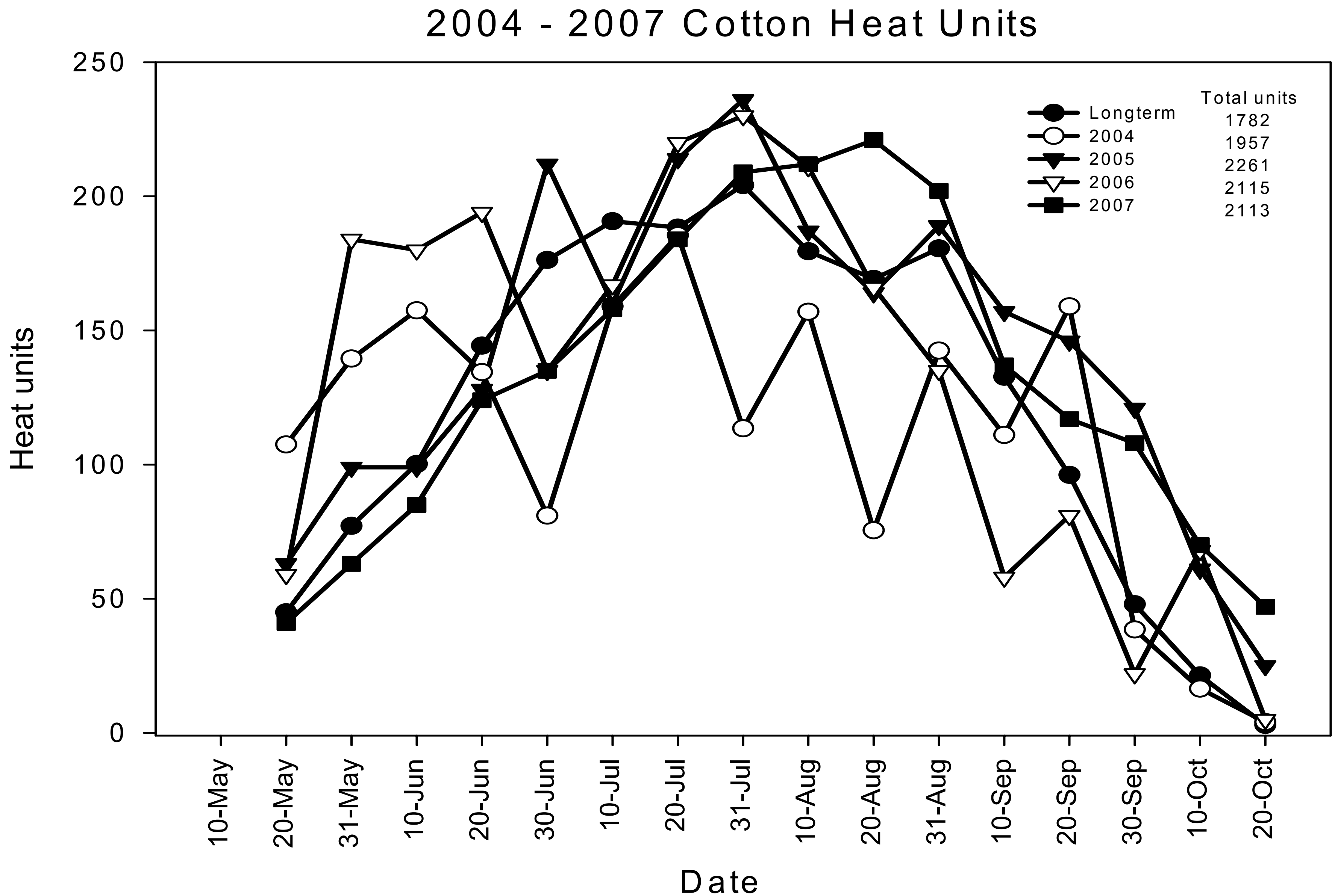


1900s
1910s
1920s
1930s
1940s
1950s
1960s
1970s
1980s
1990s
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
Long-term Average 19.93"
Copyright (c) 2007 Oklahoma Climatological Survey.
GRAZINGLANDS RESEARCH LAB FORT RENO
OKLAHOMA CLIMATOLOGICAL SURVEY
Annual Rainfall History with 5-yr Weighted Trends
Climate Division OK-1 (Oklahoma Panhandle): 1895-2006
Wetter historical periods
Drier historical periods

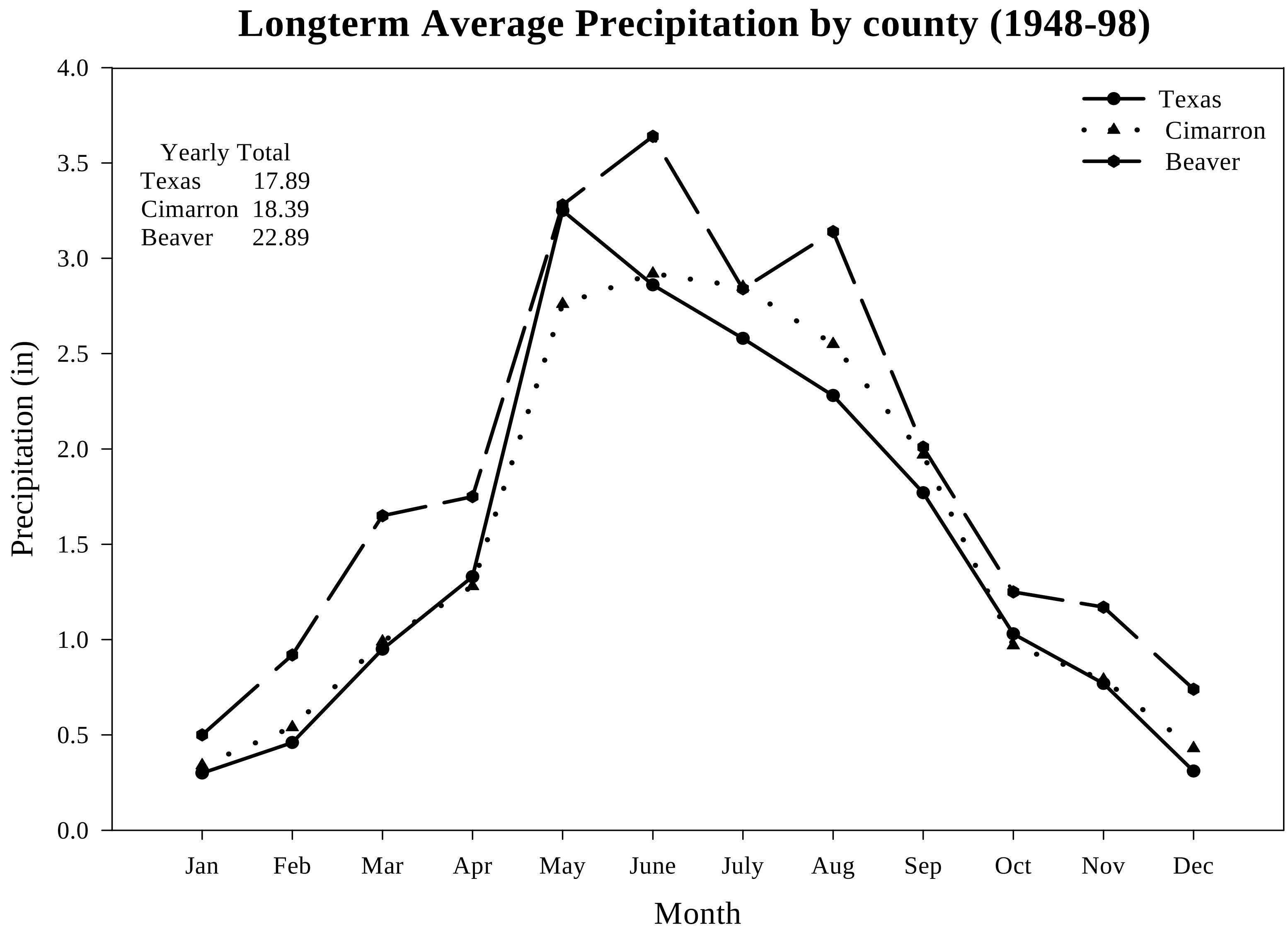
Climatological data for Oklahoma Panhandle Research and Extension Center, 2007.

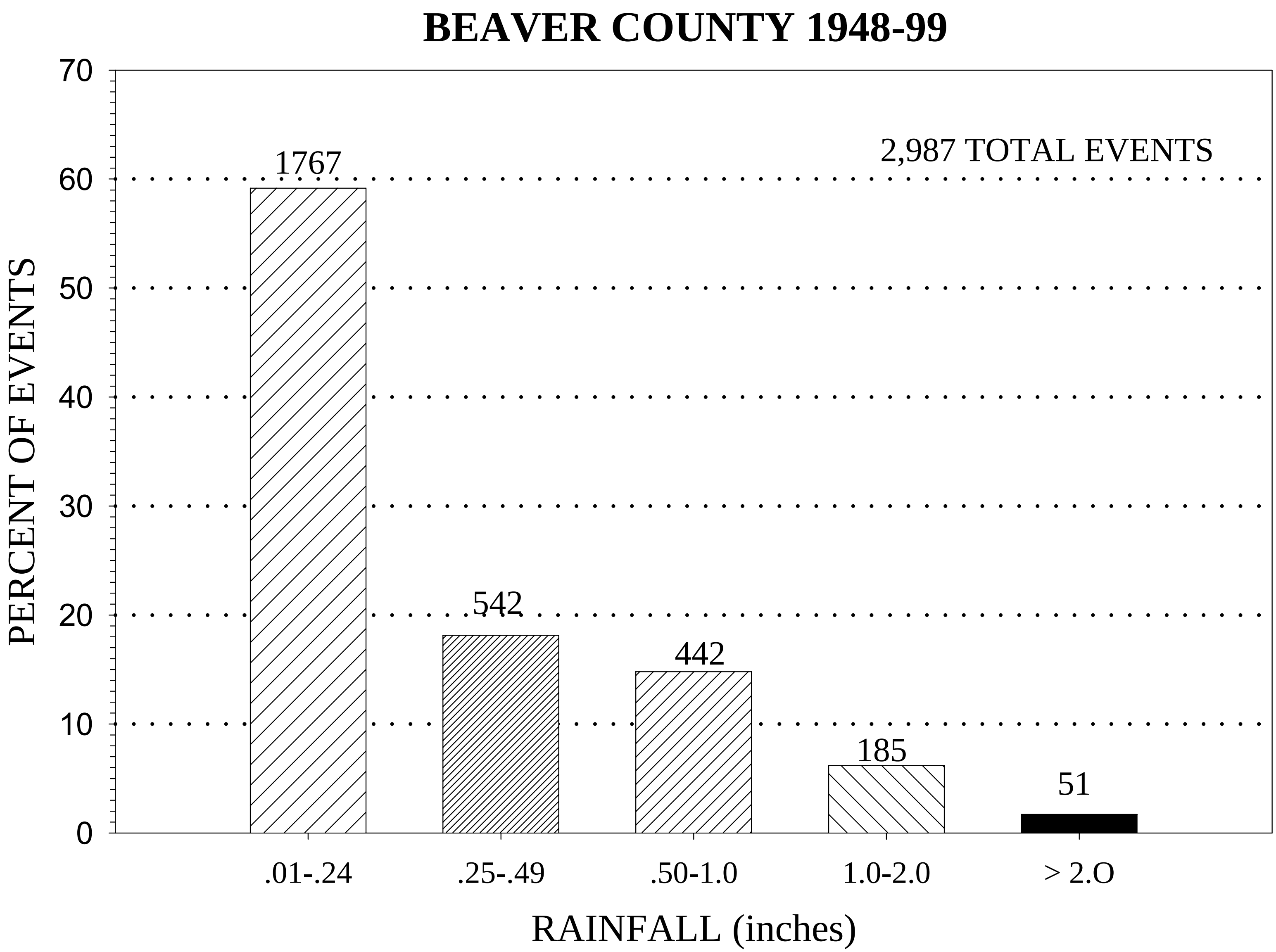
	Temperature				Precipitation			Wind	
Month	Max	Min	Max. mean	Min. mean	Inches	Long term mean	One day total	AVG mph	Max mph
Jan	67	5	40	19	0.97	0.30	0.25	12.3	39.9
Feb	74	-5	50	22	0.12	0.46	0.11	12.2	37.9
March	85	17	65	37	2.12	0.95	0.86	12.4	50.4
April	82	27	62	38	2.10	1.33	0.60	13.8	51.9
May	87	43	76	50	1.48	3.25	0.51	11.9	59.9
June	94	40	85	58	1.62	2.86	0.60	11.1	58.7
July	103	55	93	63	2.00	2.58	2.00	10.5	43.7
Aug	106	61	96	66	0.26	2.28	0.15	12.2	68.6
Sept	101	43	87	57	0.35	1.77	0.22	13.2	44.7
Oct	94	30	78	43	0.00	1.03	0.00	13.8	53.9
Nov	81	13	61	27	0.14	0.77	0.13	11.8	45.1
Dec	74	2	46	20	0.84	0.31	0.42	12.0	67.5
Annual total			70.8	42.9	12.00	17.9	NA	NA	NA

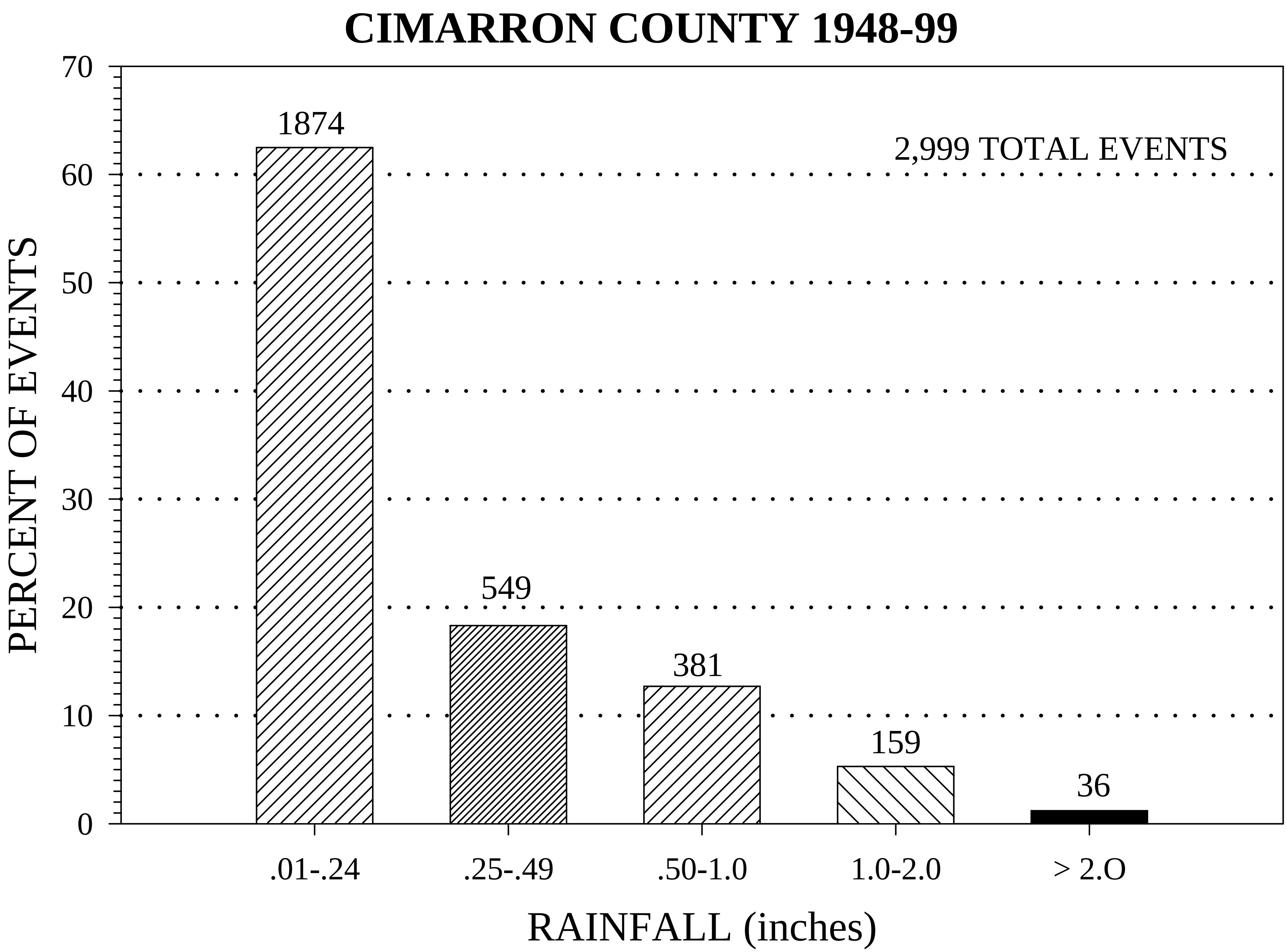
Data from Mesonet Station at OPREC

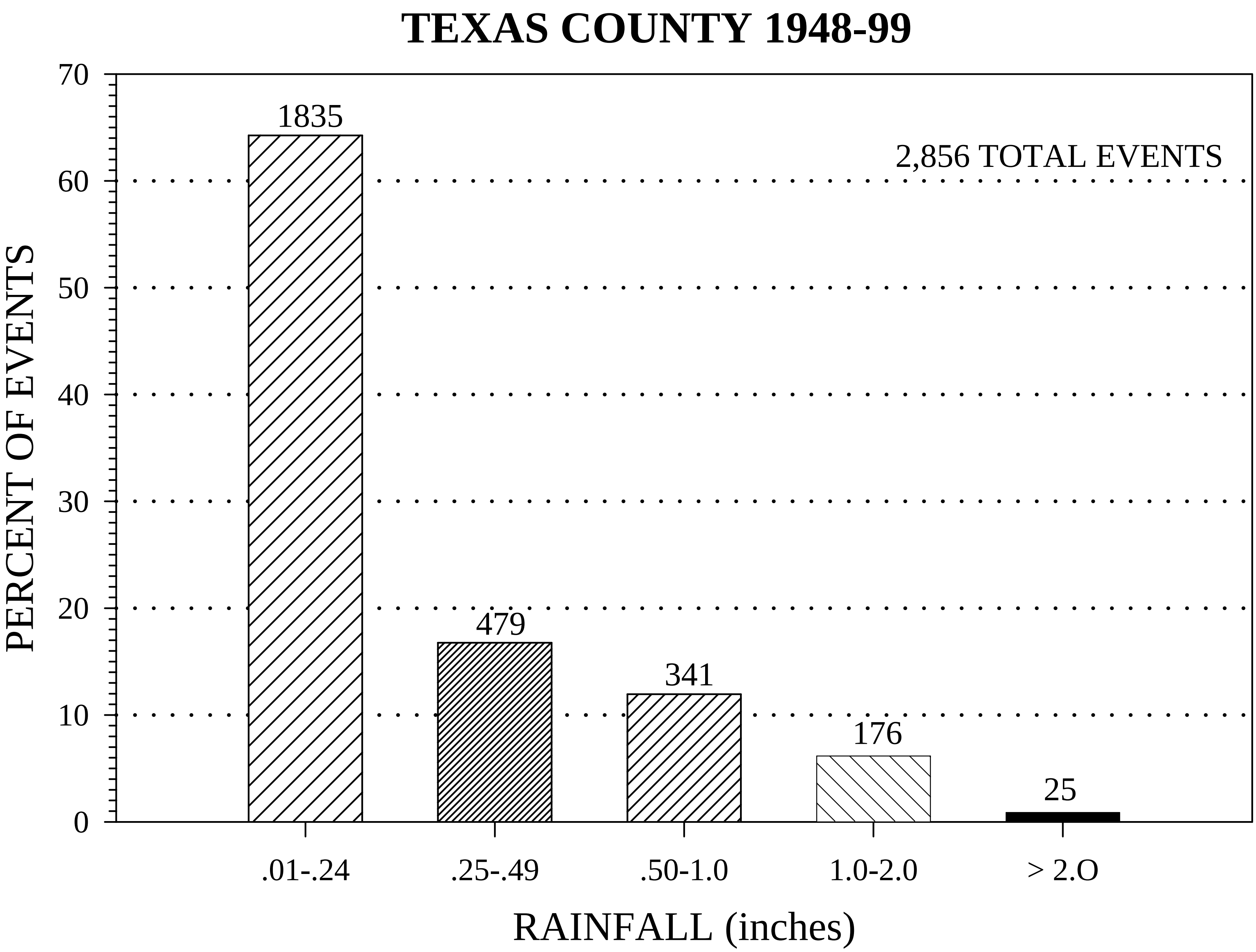


2004 - 2007 Cotton Heat Units
Heat units
250
200
150
100
50
0
Longterm
2004
2005
2006
2007
Total units
1782
1957
2261
2115
2113
10-May
20-May
31-May
10-Jun
20-Jun
30-Jun
10-Jul
20-Jul
31-Jul
10-Aug
20-Aug
31-Aug
10-Sep
20-Sep
30-Sep
10-Oct
20-Oct
Date


Longterm Average Precipitation by county (1948-98)
Yearly Total
Texas 17.89
Cimarron 18.39
Beaver 22.89
Texas
Cimarron
Beaver
Precipitation (in)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sep
Oct
Nov
Dec
Month


BEAVER COUNTY 1948-99
2,987 TOTAL EVENTS
PERCENT OF EVENTS
70
60
50
40
30
20
10
0
1767
542
442
185
51
.01-.24
.25-.49
.50-1.0
1.0-2.0
> 2.O
RAINFALL (inches)


CIMARRON COUNTY 1948-99
PERCENT OF EVENTS
70
60
50
40
30
20
10
0
1874
549
381
159
36
2,999 TOTAL EVENTS
.01-.24
.25-.49
.50-1.0
1.0-2.0
> 2.O
RAINFALL (inches)


TEXAS COUNTY 1948-99
PERCENT OF EVENTS
70
60
50
40
30
20
10
0
1835
479
341
176
25
2,856 TOTAL EVENTS
.01-.24
.25-.49
.50-1.0
1.0-2.0
> 2.O
RAINFALL (inches)

Oklahoma Panhandle Research & Extension Center
2007 Research Highlights

Crops

Animal Science

Extension Publications

GRAIN YIELDS FROM SWINE EFFLUENT APPLICATIONS

J. Clemn Turner and Jeff Hattey–Department of Plant and Soil Sciences
Oklahoma State University, Stillwater
Rick Kochenower–Oklahoma Panhandle Research and Extension Center, Goodwell

OBJECTIVES

1. To evaluate grain yields of continuous corn production under conventional tillage practices utilizing beef manure, swine effluent and anhydrous ammonia in the southern Great Plains region as part of an animal waste management system.
2. To evaluate the grain yields of a multi-year no-till corn–wheat–sunflower–fallow crop rotation production system in the southern Great Plains regions as part of a swine effluent management system.
3. Evaluate the effects of long-term land application of animal wastes on biological, chemical and physical properties of the soil.

INTRODUCTION

Swine and cattle production are important components to agriculture production in the Oklahoma panhandle. Therefore an effort to evaluate integration of swine and cattle production systems through the use of swine effluent and beef manure applications to crop production systems is important. Current production practices were evaluated, in addition to a crop production practice aimed at maximizing the utilization of available water resources in a no-till rotational cropping scheme.

PROCEDURE

Research plots were established in 1995 for the continuously cropped, conventionally tilled corn (*Zea mays* L.) production system (E701); with soil samples which were collected prior to establishment and each annual fertilizer application. During the 2006 growing season N was applied at rates of 50, 150, and 450 lb N ac^{-1} as swine effluent (SE), beef manure (BM) or urea (UN). In 1999 research plots were established to evaluate a no-till corn–wheat–sunflower–fallow (E703) and a no-till sorghum-wheat-sunflower-fallow (E704) crop rotation production system; with which soil samples were collected prior to establishment and each annual fertilizer application. During the 2007 growing season N was applied to both E703 and E704 at rates of 100, 200, and 400 lb N ac^{-1} as swine effluent (SE) or urea (UN); a tillage control plot was also included. Research plots consisted of a 15x30 ft (450 ft^2) area each of which had three replicates; plots had borders separating the replications to minimize effluent movement between the plots and to control for wind effects. In 2004 research plots were established to evaluate a sub-surface irrigation system (ESDI) to a Corn-Soybean-Wheat-Fallow rotation. In the ESDI experiment N is applied at rates of 0, 100 and 200 lb N ac^{-1}, while water is applied at a normal and a limited watering rate.

RESULTS

E701

Corn grain yields responded to N treatments when compared to the control in 2007 in an experiment that has been in a continuously cropped, conventional cultivation production (E701) system for twelve years (Table 1, Figure 1). The median yield was 165.10±5.58 bu ac^{-1}, with lower and upper (95% confidence) levels at 103.89 and 223.98, respectfully (Table 1). Beef manure applied at 150 lb N ac^{-1} increased grain yields above the control (Table 1), although when applied at 504 kg N ha^{-1} rates there seemed to be no additional benefit, other than yields decreased for this harvest year (Figure 1). Swine effluent (SE) had a linear response to N applications; increasing yields at all N loading rates when compared to the control. However, only at the 450 lb N ac^{-1} rate were the yields significantly increase above the control (Table 1). Swine effluent at the highest N loading rate produced the greatest yields (209 bu), followed by BM at the medium N loading rate (198 bu) as seen in Table 1. Corn grain yields from the UN applications were slightly increased above the control and were similar to the SE medium N loading rate; however, there were no significant differences from the control (Table 1).

E703

In 2007 corn harvested under no-till (E703) management practices did not yield greater quantities than the conventional tillage study (E701); overall yields averaged 148.25±3.7 bu ha^{-1}, with lower and upper (95% confidence) levels at 113.81 and 212.72, respectfully (Table 2). Increased corn yields were seen for the surface applied SE high N loading rate and both the UN applications; while no significant differences were observed for the other treatments (Figure 2). Table 3 shows the differences each treatment had when compared to the control (0 N rate); the control has been subtracted from the treatment means, showing the increase or decrease of each treatment from the control. The increases from N applications were approximately 30 bu greater than the control or tillage check for this harvest year (Table 3). Since inception this study (E703) has, because of conserved water in the soil profile, resulted in greater yields when compared to the conventional tillage (E701) experiment, excluding 2007 and 2006 data.

Results of wheat (*Triticum aestivum* L.) grain (E703) yields in 2007 are interesting. Following the corn harvest in 2006, wheat was planted and fertilized with UN at 100 lb N ac^{-1}. The yields indicate that N not used in corn production in 2006 was utilized in the increased growth of wheat grain for 2007; overall yields averaged 56.74±4.28 bu ac^{-1}, with lower and upper (95% confidence) levels at 13.45 and 98.49, respectfully (Table 2). Sprinkler and surface applied SE treatments had linear responses to their yields, indicating that the uniform application of UN was not the only N utilized in the production of grain (Figure 2). The linear increases to grain yields are a result of N mineralized from the applications of SE previously applied for corn production. When compared to the control (Table 3), the medium and high N loading SE rates resulted in significant yield increases. The potential to utilize stored N from N mineralization processes is one reason duel cropping schemes are able to work.

Sunflower (*Helianthus annuus*) yields from the no-till study (E703) again in 2007 had no significant treatment effects (Table 2); overall yields averaged 822.69±49.79 lb ac^{-1} (Figure 2), with lower and upper (95% confidence) levels at 182 and 1504, respectfully (Table 2). It should be noted that N applications are applied to the corn crop and that sunflower yields are obtained from any residual N from previous applications; the sunflower crop receives no N applications.

E704

Grain sorghum results for the sorghum-wheat-sunflower-fallow (E704) study did not yield any significant differences; overall yields averaged 104.78±1.9 bu ac^{-1}, with lower and upper (95% confidence) levels at 73.4 and 133.5, respectfully (Table 4). When compared to the control (Table 5) no significant differences were seen; yields were almost uniform across all N loading rates.

However, for wheat grain yields in E704, yields followed the same pattern that was observed in E703 wheat yields. Following the sorghum harvest in 2006, wheat was planted and fertilized with UN at 100 lb N ac^{-1}. The yields indicate that N not used in sorghum production in 2006 was utilized in the increased growth of wheat grain for 2007; overall yields averaged 35.8±3.6 bu ac^{-1}, with lower and upper (95% confidence) levels at 13.4 and 98.5, respectfully (Table 4). The similarity to wheat grain yields in E703 (corn) reconfirm the residual N utilization concept. When compared to the control (Table 5), the medium and high N loading SE rates resulted in significant yield increases from N mineralized and not used from the 2006 sorghum growth year.

Sunflower yields from the no-till study (E704) again in 2007 had no significant treatment effects (Table 2); overall yields averaged 824.58±36.34 lb ac^{-1} (Figure 3), with lower and upper (95% confidence) levels at 281 and 1408, respectfully (Table 4). It should be noted that N applications are applied to the corn crop and that sunflower yields are obtained from any residual N from previous applications; the sunflower crop receives no N applications.

ESDI

Corn grain yields in 2007 responded to N treatments in an experiment is a no-till and sub-surface irrigated (Table 6, Figure 4). The median yield was 227.68±5.23 bu ac^{-1}, with lower and upper (95% confidence) levels at 195.41 and 286.96, respectfully (Table 6). For the full water treatments, corn yields increased linearly with addition N applied (Figure 4); while corn yields remained similar for the low water treatments (Figure 4). When compared to the control (Table 6) yields were not significantly different. While there were no significant differences among the treatments it should be pointed out that yields from sub-surface irrigation resulted in yields that were 62 and 79 bu greater than E701 and E703, respectfully. These increased yields due to method of irrigation are exciting, because with a decrease in water applied and the reduction of water lost to evaporation, this experiment has consistently out produced the continuously cropped, conventional cultivation production (E701) system and the no-till corn–wheat–sunflower–fallow (E703) studies. In the ESDI study even the lowest yielding treatments (0N) resulted in greater yields than were observed in the other two corn studies. This clearly indicates a direct benefit from sub-surface irrigation.

Soybean yields in 2007 responded to N treatments in an experiment is a no-till and sub-surface irrigated (Table 6, Figure 4). The median yield was 51.1±1.6 bu ac^{-1}, with lower and upper (95% confidence) levels at 24.4 and 67.8, respectfully (Table 6). Soybeans, however, in 2007 had a negative response to N additions (Figure 4). With soybean yields water seemed to limit production the greatest (Table 6), but N additions also decreased overall production.

FUTURE WORK

Grain yield evaluation will continue on a yearly basis. In addition, soil samples will be collected to measure soil properties, biological changes in soil environment due to additions of moisture, organic C, and readily available nutrients. Other soil properties of interest are inorganic N, phosphorus loading, soil organic C, micronutrients, and salt levels. Of particular importance in these soils will be movement of salts at various depths within the soil profile. With high rates of evapotranspiration in this semiarid environment there is a potential for increased levels of salt accumulation in the upper portion of the soil profile. Long term high rates of salt accumulation in the profile will limit agronomic production and be a major concern in this agroecosystem. Physical properties examined include bulk density, soil structure, and water infiltration.

Table 1 Corn grain yields in 2007 for a continuously cropped corn system under conventional tillage (E701) using applications of Urea (UN), beef manure (BM), and swine effluent (SE) at N loading rates of 0, 50, 150, and 450 lb N ac^{-1}. Study is located at OPREC, Goodwell, OK.

Year	N Source†	N Rate‡	Yield	Std Err§	DF	T Value	Pr > |t|
		lb N ac^{-1}	——Bu ac^{-1}——				
2007	CONTROL	0	128.80	8.36	26	15.40	<.0001
	BM	50	165.44	14.49	26	11.42	<.0001
		150	197.66	14.49	26	13.64	<.0001
		450	179.51	14.49	26	12.39	<.0001
	SE	50	155.82	14.49	26	10.76	<.0001
		150	170.07	14.49	26	11.74	<.0001
		450	209.54	14.49	26	14.46	<.0001
	UN	50	161.59	14.49	26	11.15	<.0001
		150	178.38	14.49	26	12.31	<.0001
		450	176.73	14.49	26	12.20	<.0001

† Nitrogen source (BM=beef manure, SE=swine effluent, UN=urea).
‡ Annual N additions using N source.
§ Standard error = standard deviation of the samples adjusted by the number of samples.

Table 2 Grain yields in 2007 from a No-Till Corn-Wheat-Sunflower-Fallow rotation (E703) evaluating surface and sprinkler applications of SE. Study is located at OPREC, Goodwell, OK.

YEAR	TRT§	N App†	N Rate‡	————Corn————			——Wheat——			——Sunflower——		
				————————Bu ac^{-1} ±Std Err————————						—lb ac^{-1} ±Std Err—		
2007	1	SPR	0.5	133.17	8.91	***	59.07	8.65	***	937.7	180.95	***
	2		1	143.72	8.91	***	72.33	8.65	***	931.41	180.95	***
	3		2	164.99	8.91	***	102.21	8.65	***	474.26	180.95	*
	4	SUR	0.5	120.60	8.91	***	56.55	8.65	***	1036.99	180.95	***
	5		1	167.29	8.91	***	84.34	8.65	***	523.85	180.95	**
	6		2	175.78	8.91	***	97.10	8.65	***	915.41	180.95	***
	12	UN	1	168.00	8.91	***	64.78	8.65	***	567.87	180.95	**
	13		2	185.85	8.91	***	59.20	8.65	***	771.12	180.95	***
	10	CHK	0	134.96	6.30	***	32.31	6.12	***	1000.89	127.95	***
	14	TCHK	0	124.79	8.91	***	45.05	8.65	***	882.42	180.95	***

*, **, *** Significant at the 0.05, 0.01, and 0.001 probability levels, respectfully. § Treatment number. † Method of N application (SPR= sprinkler; SUR=surface; INJ=injection; UN=urea; CHK=check; TCHK=tillage check). ‡ Rate of N applied annually (0.5X, 1X, and 2X, where X=200 lb N ac^{-1}).

Table 3 The Standard Error of Differences (SED) in a corn-wheat-sunflower-fallow study (E703) in 2007. Where the control has been subtracted from the mean of each treatment, then statistically computed to determine the effect of each treatment. Yields are ± the control.

TRT‡	Corn			Wheat			Sunflower		
	Bu ac^{-1}						lb ac^{-1}		
1	-1.80	10.91	NS†	26.77	10.60	NS	-63.19	221.62	NS
2	8.76	10.91	NS	40.02	10.60	**	-69.48	221.62	NS
3	30.02	10.91	NS	69.90	10.60	***	-526.63	221.62	NS
4	-14.36	10.91	NS	24.25	10.60	NS	36.10	221.62	NS
5	32.33	10.91	NS	52.03	10.60	***	-477.03	221.62	NS
9	5.98	10.91	NS	3.42	10.60	NS	-124.47	221.62	NS
12	33.03	10.91	*	32.47	10.60	NS	-433.02	221.62	NS
13	50.89	10.91	***	26.89	10.60	NS	-229.77	221.62	NS
14	-10.18	10.91	NS	12.75	10.60	NS	-118.47	221.62	NS

** Significant at the 0.01 probability level. † not significant.
‡ Treatment number, refer to Table 2 for a more complete explanation.

Table 4 Grain yields in 2007 from a No-Till Sorghum-Wheat-Sunflower-Fallow rotation (E704) evaluating surface and sprinkler applications of SE. Study is located at OPREC, Goodwell, OK.

YEAR	TRT§	N App†	N Rate‡	Sorghum			Wheat			Sunflower		
				Bu ac^{-1} ±Std Err						lb ac^{-1} ±Std Err		
2007	1	SPR	0.5	107.30	6.63	***	26.73	6.06	***	550.44	142.44	***
	2		1	106.62	6.63	***	44.76	6.06	***	954.65	142.44	***
	3		2	106.52	6.63	***	71.87	6.06	***	999.05	142.44	***
	4	SUR	0.5	114.15	6.63	***	46.96	6.06	***	865.81	142.44	***
	5		1	104.09	6.63	***	73.82	6.06	***	717.54	142.44	***
	6		2	119.08	6.63	***	69.29	6.06	***	862.39	142.44	***
	7	INJ	0.5	88.08	6.63	***	22.55	6.06	***	690.01	142.44	***
	8		1	100.68	6.63	***	18.73	6.06	**	883.13	142.44	***
	9		2	99.77	6.63	***	15.67	6.06	*	833.46	142.44	***
	12	AA	1	114.37	6.63	***	19.52	6.06	**	871.59	142.44	***
	13		2	110.73	6.63	***	39.24	6.06	***	904.87	142.44	***
	10	CHK	0	99.63	4.69	***	16.44	4.28	***	791.86	100.72	***
	14	TCHK	0	96.26	6.63	***	19.25	6.06	**	827.50	142.44	***

*, **, *** Significant at the 0.05, 0.01, and 0.001 probability levels, respectfully. § Treatment number. † Method of N application (SPR= sprinkler; SUR=surface; INJ=injection; AA=anhydrous ammonia; CHK=check; TCHK=tillage check). ‡ Rate of N applied annually (0.5X, 1X, and 2X, where X=200 lb N ac^{-1}).

Table 5 The Standard Error of Differences (SED) in a sorghum-wheat-sunflower-fallow study (E704) in 2007. Where the control has been subtracted from the mean of each treatment, then statistically computed to determine the effect of each treatment. Yields are ± the control.

TRT‡	Sorghum			Wheat			Sunflower		
	Bu ac^{-1}						lb ac^{-1}		
1	7.67	8.12	NS†	10.29	7.42	NS	-241.42	174.45	NS
2	6.99	8.12	NS	28.32	7.42	**	162.80	174.45	NS
3	6.89	8.12	NS	55.43	7.42	***	207.19	174.45	NS
4	14.51	8.12	NS	30.52	7.42	**	73.95	174.45	NS
5	4.45	8.12	NS	57.39	7.42	***	-74.32	174.45	NS
6	19.45	8.12	NS	52.85	7.42	***	70.53	174.45	NS
7	-11.55	8.12	NS	6.11	7.42	NS	-101.85	174.45	NS
8	1.05	8.12	NS	2.30	7.42	NS	91.27	174.45	NS
9	0.14	8.12	NS	-0.77	7.42	NS	41.60	174.45	NS
12	14.74	8.12	NS	3.08	7.42	NS	79.73	174.45	NS
13	11.10	8.12	NS	22.80	7.42	*	113.02	174.45	NS
14	-3.38	8.12	NS	2.81	7.42	NS	35.64	174.45	NS

** Significant at the 0.01 probability level. † not significant.
‡ Treatment number, refer to Table 4 for a more complete explanation

Table 6 Grain yields in 2007 from a Sub-Surface No-Till Corn-Wheat-Soybean-Fallow rotation (ESDI) evaluating subsurface irrigation using several N rates under full and limited water applications. The standard error of differences (SED) were included where the control has been subtracted from the mean of each treatment, and then statistically computed to determine the effect of each treatment. SED yields are ± the control. Study is located at OPREC, Goodwell, OK.

YEAR	TRT§	H_2O†	N Rate‡	Corn			Wheat	Soybean		
				Bu ac^{-1} ±Std Err						
2007	1	Full	High	255.83	11.52	***		51.25	3.59	***
	2	Full	Low	234.43	11.52	***		53.61	3.59	***
	3	Full	None	211.19	11.52	***		59.50	3.59	***
	4	Limited	High	229.68	11.52	***		49.70	3.59	***
	5	Limited	Low	211.77	11.52	***		52.72	3.59	***
	6	Limited	None	223.18	11.52	***		39.67	3.59	***
				Standard Error of Differences (SED) Bu ac^{-1} ±Std Err						
	1	Full	High	32.65	16.30	NS		11.58	5.08	NS
	2	Full	Low	11.25	16.30	NS		13.95	5.08	*
	3	Full	None	-11.98	16.30	NS		19.83	5.08	**
	4	Limited	High	6.51	16.30	NS		10.03	5.08	NS
	5	Limited	Low	-11.40	16.30	NS		13.06	5.08	NS

*, **, *** Significant at the 0.05, 0.01, and 0.001 probability levels, respectfully. § Treatment number. † Water applied (Full or Limited). ‡ Rate of N applied annually (None=0, Low=100, and High=200 lb N ac^{-1}).

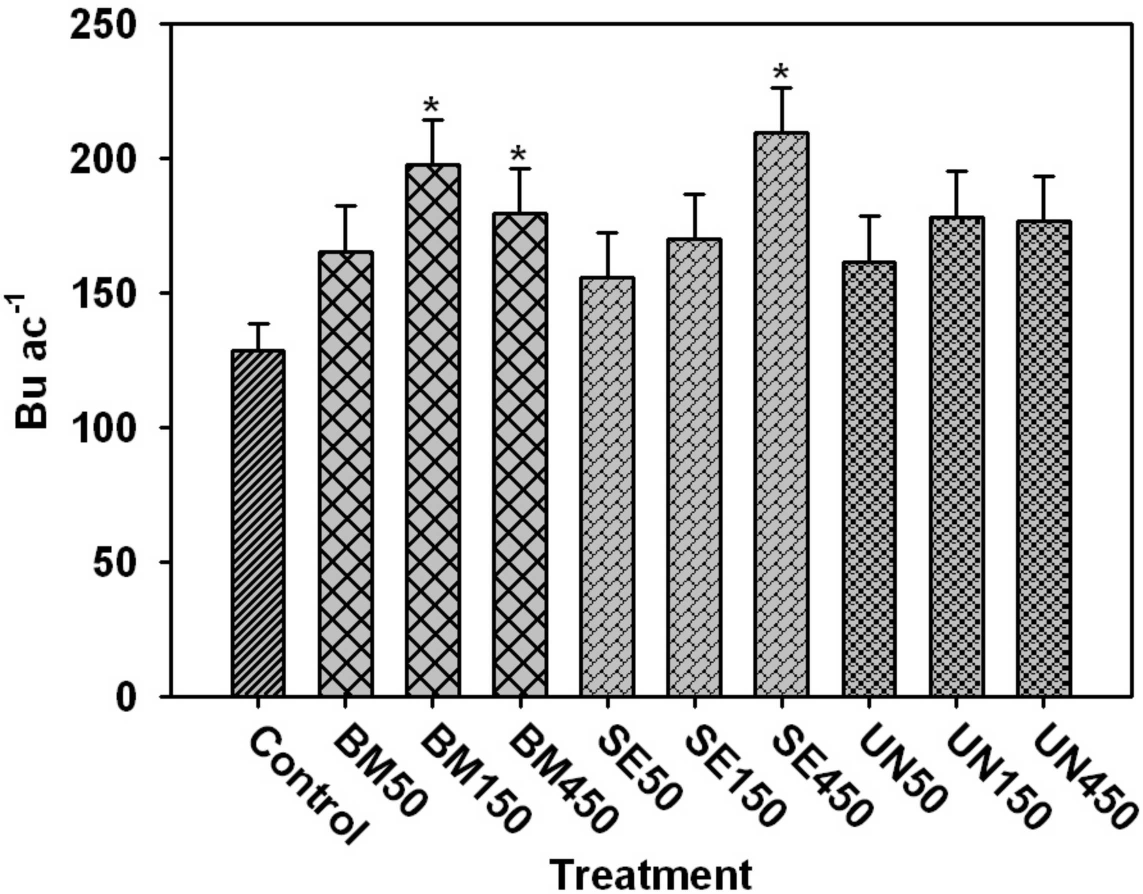


Figure 1 Corn grain yields in 2007 for a continuously cropped corn system under conventional tillage (E701) using applications of urea (UN), beef manure (BM), and swine effluent (SE) at N loading rates of 0, 50, 150, and 450 lb N ac^{-1}. Study is located at OPREC, Goodwell, OK. Control has 0 N applied.

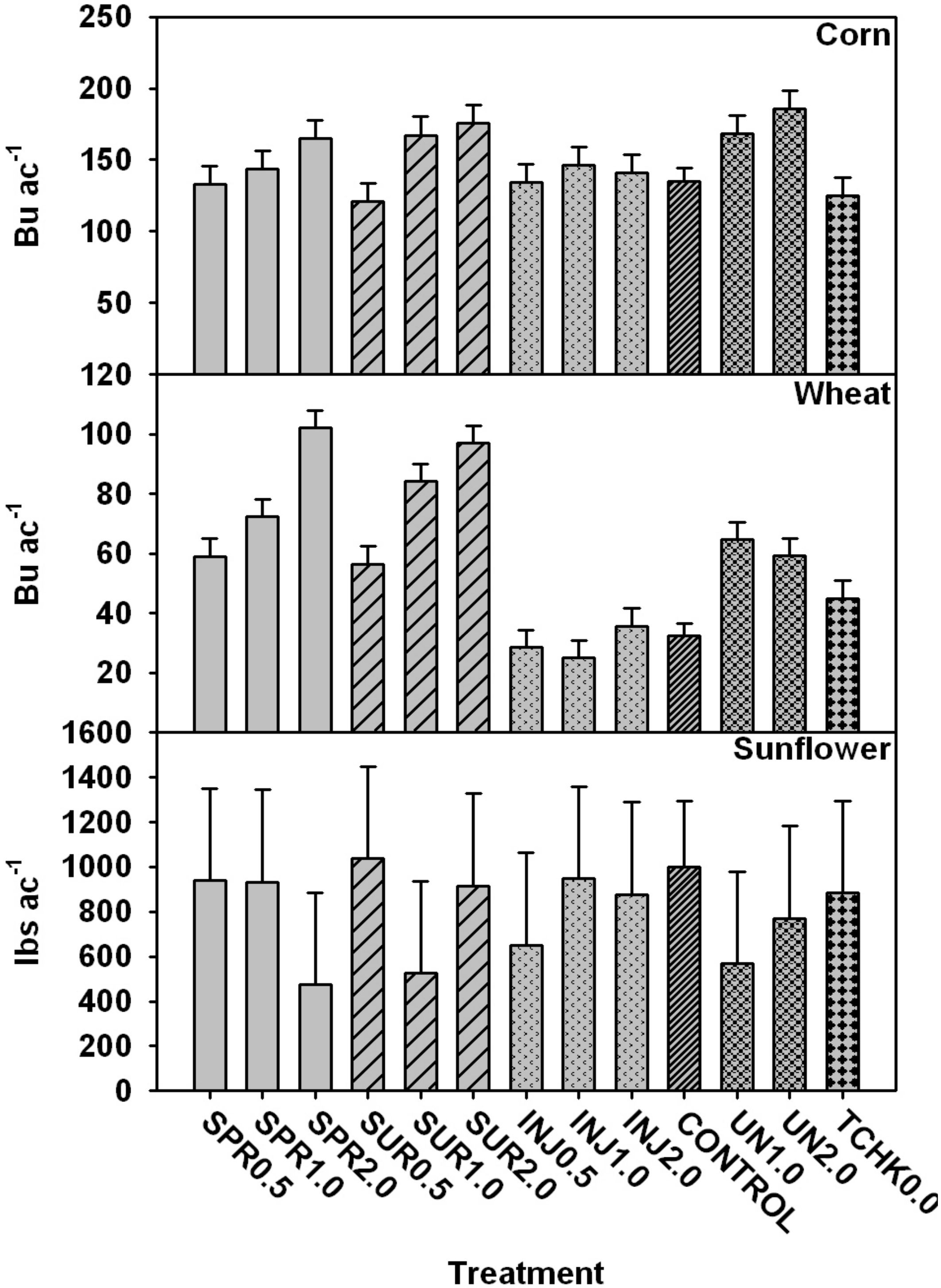


Figure 2 Grain yields in 2007 from a No-Till Corn-Wheat-Sunflower-Fallow rotation (E703) evaluating surface (SUR), sprinkler (SPR), and injection (INJ) applications of SE; these are compared to urea (UN), a control (0 N rate), and tillage control (TCHK, with 0 N applied). N rates are 0.5X, 1X, and 2X, where X=200 lb N ac^{-1}. Study is located at OPREC, Goodwell, OK.

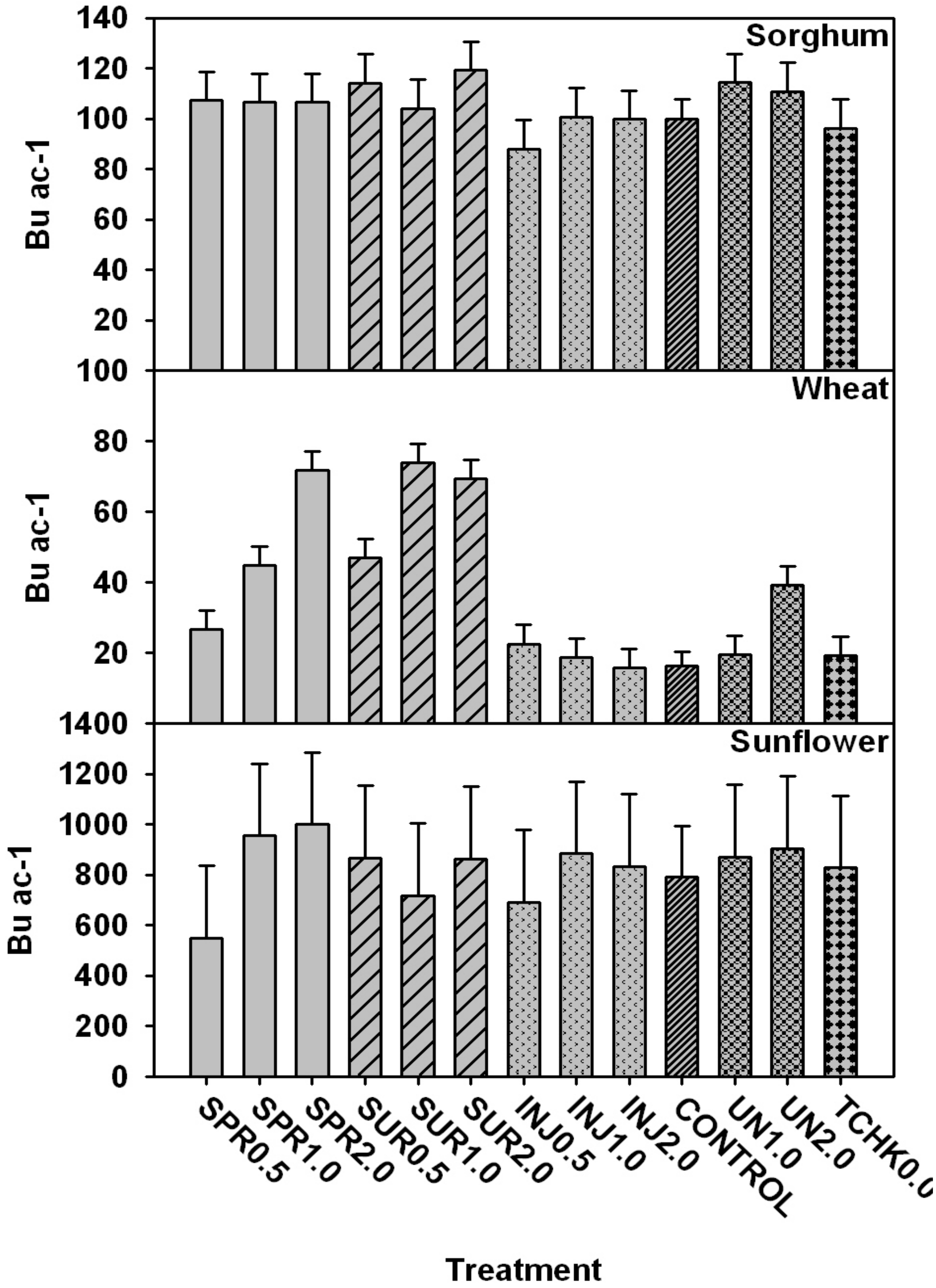


Figure 3 E704 Grain yields in 2007 from a No-Till Sorghum-Wheat-Sunflower-Fallow rotation (E704) evaluating surface (SUR), sprinkler (SPR), and injection (INJ) applications of SE; these are compared to urea (UN), a control (0 N rate), and tillage control (TCHK, with 0 N applied). N rates are 0.5X, 1X, and 2X, where X=200 lb N ac^{-1}. Study is located at OPREC, Goodwell, OK.

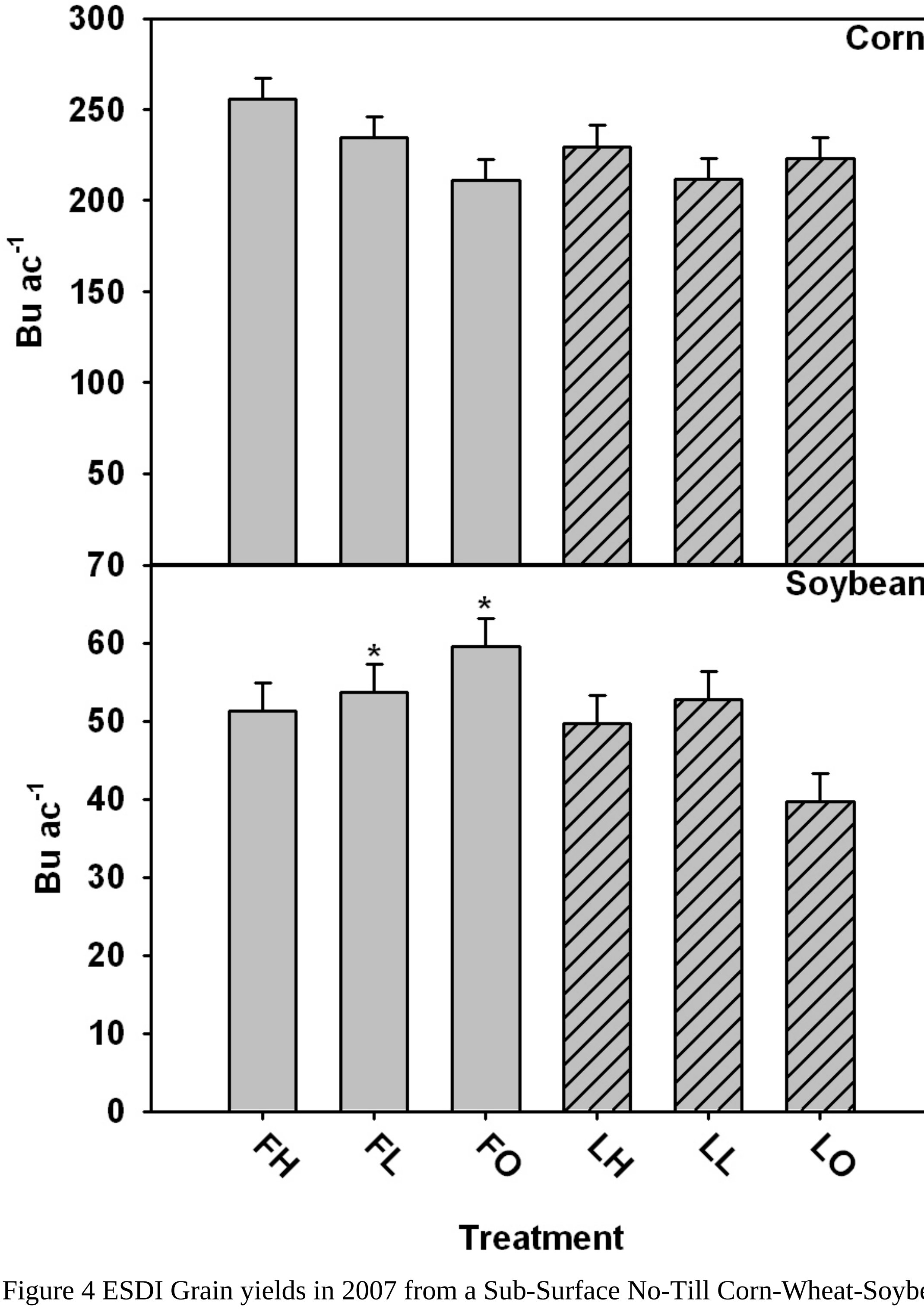


Figure 4 ESDI Grain yields in 2007 from a Sub-Surface No-Till Corn-Wheat-Soybean-Fallow rotation (ESDI) evaluating subsurface irrigation using several N rates under full and limited water applications. The standard error of differences (SED) were included where the control has been subtracted from the mean of each treatment, then statistically computed to determine the effect of each treatment. SED yields are ± the control. Study is located at OPREC, Goodwell, OK.

APPLICATION OF SWINE EFFLUENT THROUGH SUBSURFACE DRIP IRRIGATION AND NUTRIENT DISTRIBUTIONS

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Introduction

Agricultural production systems located in semi-arid environments require rigorous management of water resources. In the southern High Plains region, water management strategies must account for both intermittent, capricious precipitation events (annual average of 15 to 22 inches) and the depletion of ground water resources. Livestock production in this semi-arid region also requires the use of these ground water resources, i.e. to maintain proper water levels in anaerobic lagoons so that they function properly. In order to alleviate the strain placed on valuable water resources in this region, the reuse of animal wastes waters is required. The reuse of these animal effluents on agronomic crops can provide needed water and valuable nutrient supplies. The reuse and utilization of swine effluents in animal waste management strategies provide economical and environmentally sound solutions to the animal waste issues, but additionally it provides an alternative to directly depleting the ground water resources that are so valuable in this region. While sprinkler irrigation systems are generally used to apply these animal effluents, an examination of more effective water delivery systems are needed. One such delivery system is referred to as sub-surface drip irrigation (SDI). In addition to its capacity to supply water, sub-surface drip irrigation allows for the application of animal effluents to the growing crop, supplying both needed water and valuable nutrients to the root zone when and where they are needed most. This study attempts to examine the distribution of nutrients in the soil profile after animal effluents are applied in a sub-surface drip irrigation system.

Procedure

At the Oklahoma Panhandle Research and Extension Center (OPREC), a sub-surface drip irrigation system was installed to evaluate various components related to crop production and soil chemical and biological properties; corn and soybeans are grown in a no-till rotation. However, for this study, two SDI water emission rates were chosen to examine the movement of nutrients within the soil profile. These water application rates include the highest and lowest emitter rates of 0.63 and 0.19 gal hr^{-1}, respectfully. Vacuum suction lysimeters were placed at both the inlet and distal end of a single lateral irrigation line within each plot; the stimulus to monitor the inlet and distal ends were to evaluate the nutrient distribution changes due to known water pressure decreases along a single lateral line. Four lysimeters were placed in the soil, approximately 6 in. apart, 8 in. away from but along the lateral line between two adjacent emitters, to allow for the collection of soil water; also another set of four lysimeters were placed 16 in. away from the lateral line. This was repeated on both sides of the lateral line at each collection site; therefore 16 lysimeters were used at each of four collection sites. Lysimeters were placed randomly at depths of 6, 12, 18, and 24 inches (the depth of the lateral line is approximately 15 in). Vacuum pressure applied to the lysimeters constructed from ceramic cups and PVC pipe was used to draw soil solution from the surrounding soil. Lysimeters were evacuated to remove soil water accumulation that had occurred between applications, prior to any effluent applications. Vacuum pressure was allowed to remain in the lysimeters after evacuation and prior to effluent applications to facilitate and expedite soil solution collections. Soil solutions were collected 24 hrs. after effluent was applied. Soil solution samples were treated with sulfuric acid then refrigerated for transport; pH was measured while in the field. Laboratory analysis included determination of sample volume collected, along with concentrations of nitrate-N (NO_3-N), ammonia-N (NH_4-N), orthophosphate (P), calcium (Ca), copper (Cu), and zinc (Zn).

Results

Nutrient concentrations of the swine effluent used in this study and prior to SDI applications are given in Table 1. Comparison of effluent nutrient concentrations with the soil solution collected from lysimeters (data not shown) indicates that overall nutrient concentrations decreased with the exception of nitrate-N and calcium. This expected decrease to soil solution nutrient concentrations are due to soil sorption and plant uptake. Nitrification of effluent NH_4-N accounts for the increases observed in NO_3-N levels found in the soil solutions. Increased Ca concentrations likely resulted from the solubilization of Ca when water was added in these high calcium soils (data not shown). Several missing data points indicate that either no sample was obtained, or there was insufficient sample volume for analysis (Figure 1 and 2). The missing sample data may indicate potential areas of insufficient moisture contents at the time of sampling. In some cases, lysimeters ceased producing solution over the course of the study. This may result from an inability to maintain a vacuum within these particular lysimeters. Visual comparison of each site during application events indicated that the 0.63 gal hr^{-1} emitter rate exceeded the soils ability to absorb moisture resulting in water collecting on the surface at the inlet end; additionally there was a large pressure differential that occurred between the inlet and distal end of the field. This drop in pressure resulted in little to no soil solution collection throughout the entire period of the study from the lysimeters located at the distal end of the 0.63 gal hr^{-1} lateral line. Crop production of corn and soybeans did not show obvious visual signs of water stress or nutrient deficiencies.

Variations in P concentrations were observed between samples, as well as between treatments. Background P concentrations at the inlet ends of the 0.63 and 0.19 gal hr^{-1} emitter rates (Figure 1) averaged 1.44 (SD=0.66) and 1.37 (SD=0.37) ppm, respectively. Overall variations in P concentrations were greater for the 0.63 gal hr^{-1} emitter when compared to the 0.19 gal hr^{-1} emitter. Over time, the concentrations of P increased with each additional effluent application with both emitter rates; however, the overall increase appears to be the greatest when the 0.63 gal hr^{-1}emitter was used. Additional analysis indicates movement of P away from the emitter, where the highest concentrations of P were found in the lysimeters located 8 in. from the lateral at the 0.63 gal hr^{-1} emitter application rate. Orthophosphate movement occurred along the wetting front and may prove problematic in the case of surfacing (water accumulating on the surface) or from a high water table. However, orthophosphate concentrations with the 0.19 gal hr^{-1} applications appear more evenly distributed throughout the profile indicating that the occurrence of soil moisture had an equipoise distribution within the soil profile.

An interesting relationship between NO_3-N and NH_4-N concentration are seen in Figures 3 and 4. At certain sampling locations (lysimeters: 121, 124, and 133), as NO_3-N concentration increases, concentrations of NH_4-N decreased demonstrating the known relationship that exists when NH_4-N is converted to NO_3-N. A similar pattern was not clearly evidenced at the lower emitter application rate (Figure 5 and 6). However, this difference may be a direct result of the different wetting patterns seen for each emitter rate. Average NO_3-N and NH_4-N concentrations of soil solutions prior to swine effluent applications were 26.24 ppm (SD=18.83) and 0.48 ppm (SD=0.71) at the 0.63 gal hr^{-1} emitter rate and 27.29 ppm (SD=21.29) and 0.11 ppm (SD=0.17) at the 0.19 gal hr^{-1} emitter rate, for the inlet and distal ends, respectfully. Ammonium-N concentrations approached or were below detection limits for several samples collected at the inlet end of the 0.19 gal hr^{-1} emitter application rate. Similar to the P data, nitrogen variations were evident between each lysimeter as well as each treatment. Nitrate-N concentrations at the 0.19 gal hr^{-1} increased following the first two effluent applications before decreasing following the third application, which occurred two weeks later than initially scheduled due to mechanical malfunction of the filtering system. The four week lag between applications would have decreased overall nutrients inputs, NH_4-N in particular, resulting in decreased NO_3-N production and coupled with increased nitrogen uptake, due to plant production, may account for the observed NO_3-N concentrations found in the soil solution (Figure 4).

After collection of soil solution samples for one cropping season, it was determined that a clear pattern of nutrient distribution could not be found; this is confounded by the missing samples. However, it does appear that certain relationships exist between application rates and nutrient movement. When application rates exceed the soils infiltration limits, soluble nutrients receive less contact time with soil particles and these nutrients are more likely to move through the soil profile with the wetting front. Application rates are designed to account for saturation rates, and allow for increased contact time with soil particles, thereby resulting in an equipoise distribution of the nutrients within the soil profile.

Future Considerations

As seen in Figures 1 and 2, there were several lysimeters which failed to produce soil solution throughout the study period. This is likely due to either inadequate moisture content of the surrounding soil or bush-league fabrication of the lysimeters; where mediocre lysimeters may be limited with their ability to hold a vacuum and thereby allow for adequate sample collection. The measurement of soil moisture potentials to determine the movement of water through the soil profile away from a point source with devices such as tensiometers would be an added benefit. Currently, it is assumed that samples removed by lysimeters represent the application event as it occurs over a 24 hour period. With the addition of soil moisture data at a given distance or depth from the lateral, it would enable more accurate estimates of the point at which the wetting front reached each set of lysimeters. These temporal and spatial variables may prove significant in the efficiency of the systems ability to apply nutrients to the desired area. Analysis of crops within the area of the lysimeter array may provide helpful ancillary information to determine the ultimate outcome of the applied nutrients and produce an estimate of the mass balance of nutrients for this irrigation method.

Table 1 Swine effluent nutrient concentrations on a 'as is basis' prior to sub-surface drip irrigation (SDI) applications in a corn-soybean rotation study, located at OPREC, Goodwell, OK.

Date	pH	NO_3^--N	NH_4^+-N	OP	Ca	Cu	Zn	EC†
		ppm						µS cm^{-1}
17-May-06	7.98	0.43	698	56.55	41.63	1.14	7.83	8300
05-Jun-06	7.40	0.84	831	52.53	110.53	3.29	32.99	12740
19-Jun-06	7.89	525‡	705	65.60	133.90	1.23	10.55	11240
25-Jul-06	-	-	-	-	-	-	-	-
08-Aug-06	-	-	-	-	-	-	-	-
AVERAGE§	7.76	0.65	745	58.23	95.35	1.89	17.12	10760

† EC data recorded in lab, excluding samples obtained on 17-May-06.

‡ Values exceed all other reported concentrations of samples collected from the same lagoon; this likely sample contamination was not used to determine averages.

§ Average includes all measured concentrations of effluent applied to SDI, excluding June 19th nitrate-N concentration.

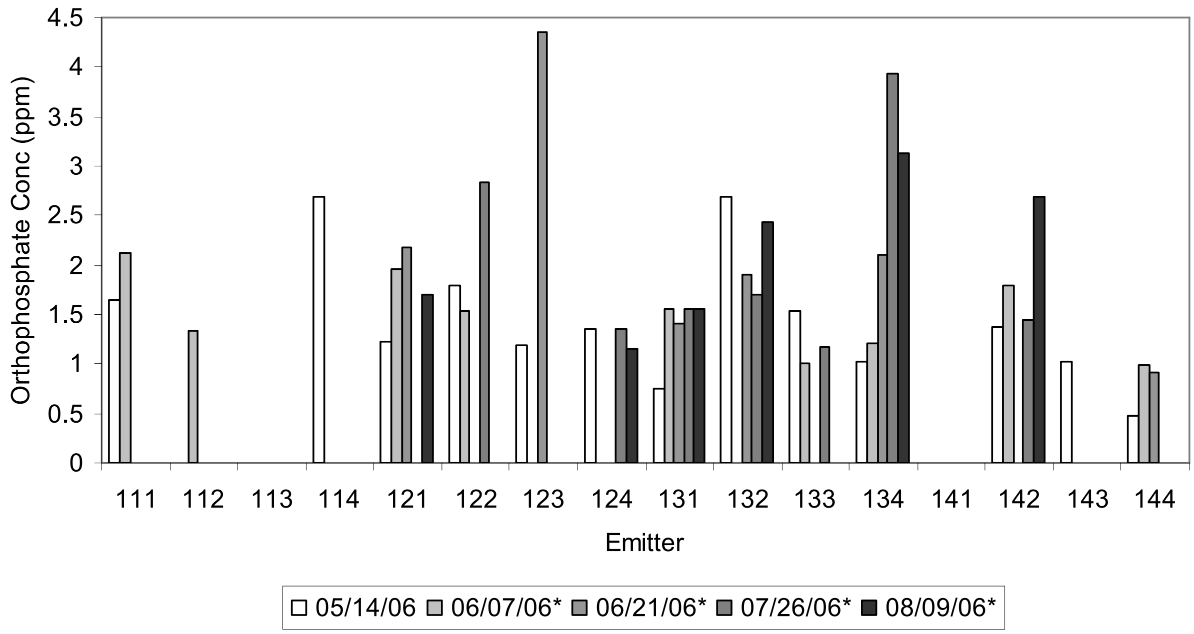

Figure 1 Orthophosphate concentrations (ppm) at the inlet end of field with a 0.63 gal hr^{-1} emitter application rate. Background samples (05/14/06) were taken prior to annual effluent applications and soil solutions were sampled following each of the four effluent applications. Missing samples are due to inadequate sample volume collected for analysis.

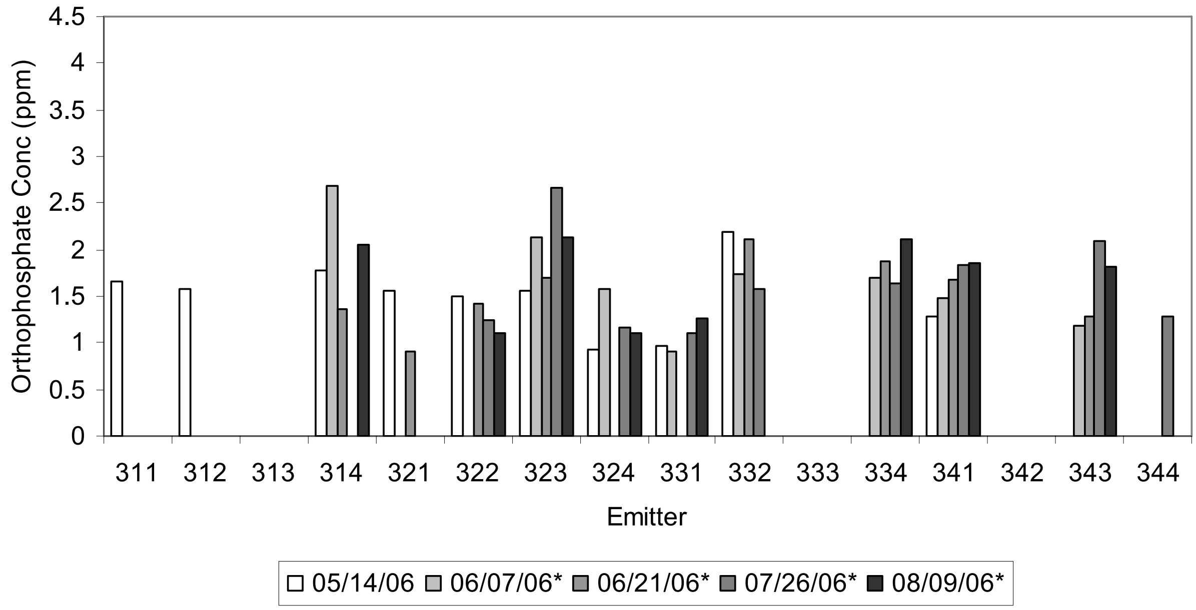

Figure 2 Orthophosphate concentrations (ppm) at the inlet end of field with a 0.19 gal hr^{-1} emitter application rate. Background samples (05/14/06) were taken prior to annual effluent applications and soil solutions were sampled following each of the four effluent applications. Missing samples are due to inadequate sample volume collected for analysis**.**

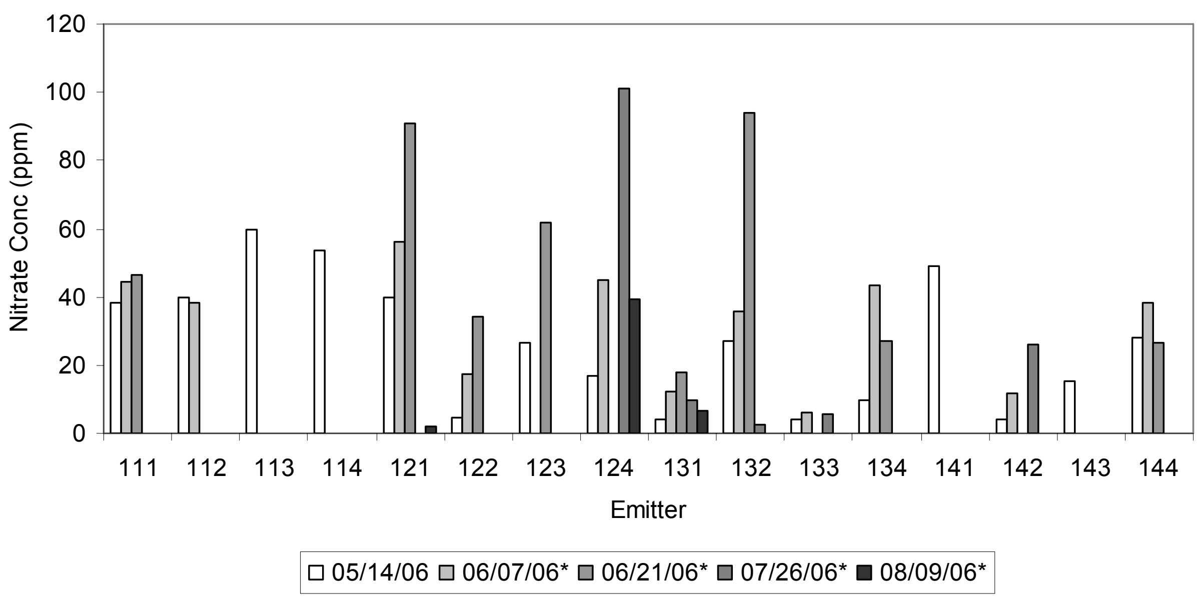

Figure 3 Nitrate-N concentrations (ppm) at the inlet end of field with a 0.63 gal hr^{-1} emitter application rate. Background samples (05/14/06) were taken prior to annual effluent applications and soil solutions were sampled following each of the four effluent applications. Missing samples are due to inadequate sample volume collected for analysis**.**

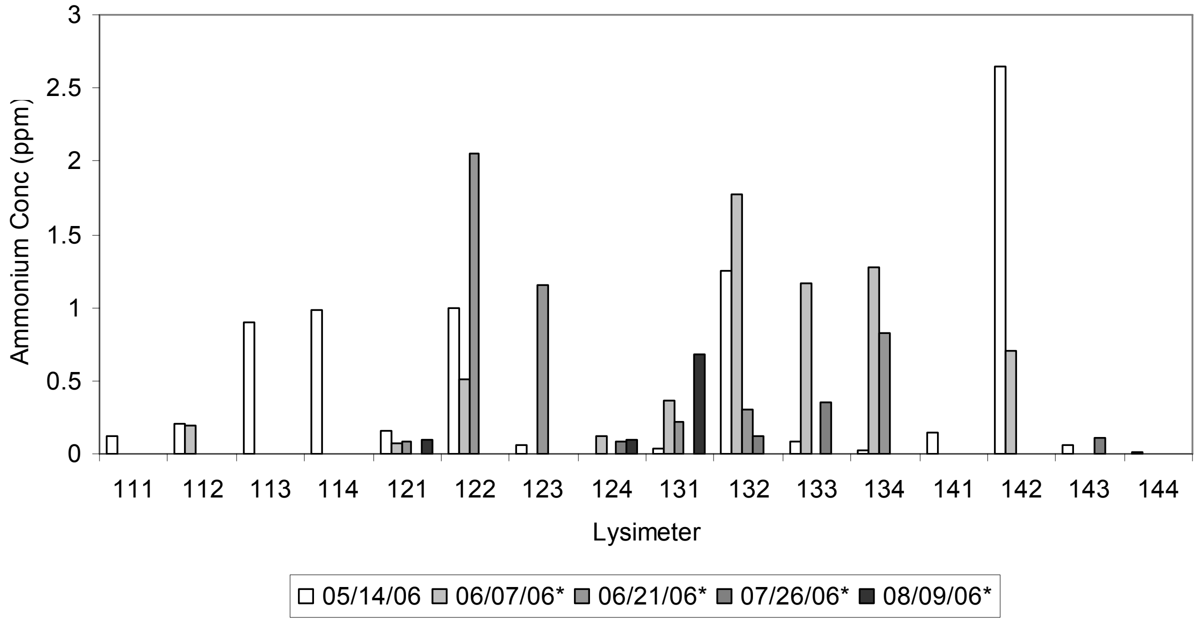

Figure 4 Ammonium-N concentrations (ppm) at the inlet end of field with a 0.63 gal hr^{-1} emitter application rate. Background samples (05/14/06) were taken prior to annual effluent applications and soil solutions were sampled following each of the four effluent applications. Missing samples are due to inadequate sample volume collected for analysis.

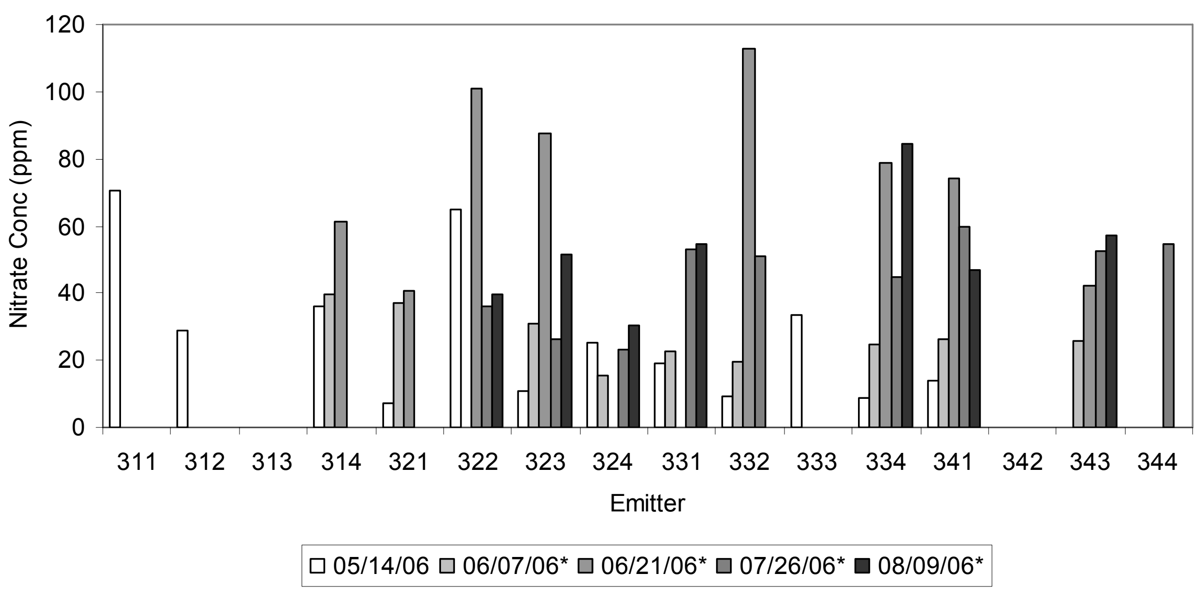

Figure 5 Nitrate-N concentrations (ppm) at the inlet end of field with a 0.19 gal hr^{-1} emitter application rate. Background samples (05/14/06) were taken prior to annual effluent applications and soil solutions were sampled following each of the four effluent applications. Missing samples are due to inadequate sample volume collected for analysis.

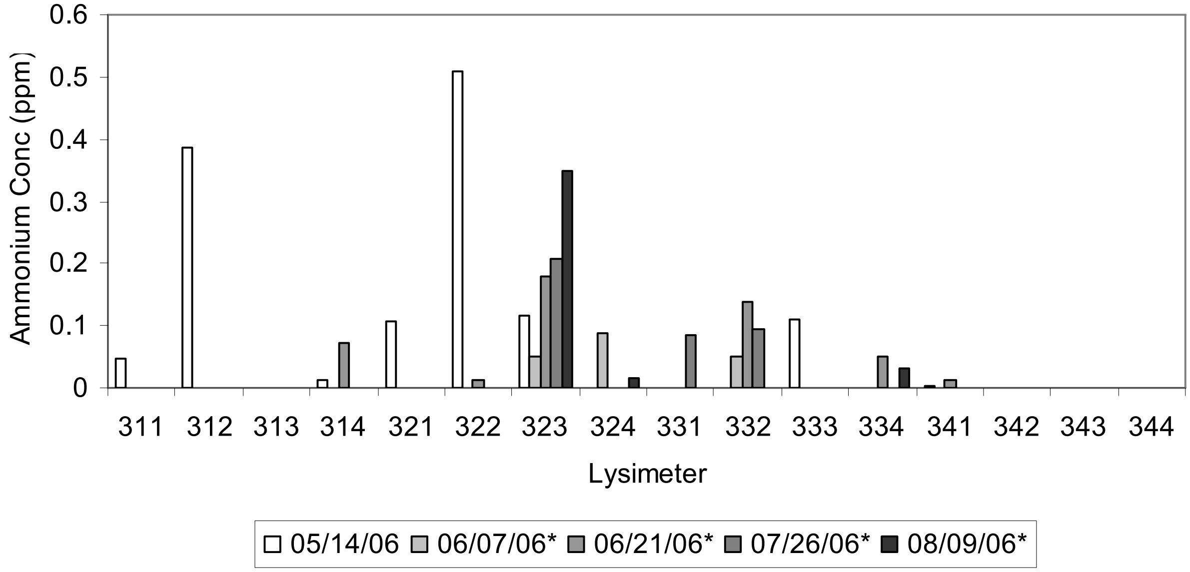

Figure 6 Ammonium-N concentrations (ppm) at the inlet end of field with a 0.19 gal hr^{-1} emitter application rate. Background samples (05/14/06) were taken prior to annual effluent applications and soil solutions were sampled following each of the four effluent applications. Missing samples are due to inadequate sample volume collected for analysis.

Forage Bermudagrass for the High Plains

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Interest in utilizing irrigation for production of improved grasses in the high plains has grown in the recent years. With higher fuel cost and declining capacity of irrigation wells, producers have begun to adopt high yielding and cold hardy bermudagrass for grazing in the region. With this increased interest, a bermudagrass variety trial was established in 2003. The trial includes varieties that demonstrated good performance in a previous trial established in 1997 and discontinued after data collection in 2003. The 2003 planted trial contains additional varieties not tested in the 1997 trial. Forage yield data were first collected in 2004 for all varieties except Midland and OSU Greenfield. Plots of those two varieties had to be re-established in 2004. In 2007, LCB 84X 16-66 was released as the variety "Goodwell" by the Oklahoma Agricultural Experiment Station. Forage yield data for all varieties in 2007 are given in (Table 1). Ozark, A-12245, and Goodwell are the best three forage performers in 2007. Forage yield data for varieties other than Midland and OSU Greenfield for 4-years (2004 through 2007) are given in (Table 2). Over the four years, Ozark and Goodwell bermudagrasses are significantly superior in forage production that the other tested varieties. Table 3 gives average yield data for all varieties for the years 2005 and 2006.

In May of 2004, a half circle of Goodwell bermudagrass was sprigged on the Joe Webb farm south of Guymon to evaluate its response to stocker grazing and stocker performance. The remaining half circle was sprigged to Goodwell in May 2005. Goodwell bermudagrass had demonstrated early greenup, good cold tolerance, and high yield performance in the 1997 trial at OPREC. The half a circle sprigged in 2004 was grazed in 2005 with a stocking rate of 5.1 head/ac for 109 days. The average daily gain for these cattle was 1.49 lb/day. Stocker gain on the half circle totaled 50,100 pounds. In the fall of 2005 the bermudagrass was inter-seeded with wheat. With the late first frost in 2005, not enough wheat forage was grown in the fall to allow winter grazing of the wheat. Although the interseeded wheat did provide grazing from later winter to spring. In 2006, stocker cattle grazed the complete circle with a stocking rate of 4.8 head/ac for 90 days. The average daily gain of 0.5 lb/day in 2006 was less than 2005. The reduced rate of gain was most likely due to poorer quality cattle that only gained 1.2 lbs/day on wheat pasture. The bermudagrass was again interseeded with wheat in the fall 2006. As in the fall of 2005 the first freeze was later than normal and not enough fall forage was available for grazing. Although the late winter and spring grazing was adequate (no data on stocking rate or average daily gain). In 2007, the full circle of bermudagrass was grazed for 101 days with a stocking rate of 4.9 head/ac. The average daily gain of 1.64 lbs/day is the highest obtained in the first three years. The higher rate of gain may be attributed to the 1.4 lbs/day/head of 20 % cake. Total pounds of beef remove from the circle in the summer of 2007 was 96,413 which does not include the 42,010 pounds of beef that was removed from grazing of the interseeded wheat. The results point to high biomass production and consequent high stocker carrying capacity. The differential results in individual animal gains in 2005 and 2006 indicate the need for further evaluation relative to nutritional value of the bermudagrass. Evaluation of Mr. Webb's planting will continue in 2008.

Table 1. Forage yields of bermudagrass varieties in Test 2003-1, Oklahoma Panhandle Research & Extension Center, Goodwell, OK. 2007.

Variety	**Harvest Date**				**Seasonal Total**
	6/5/07	**7/11/07**	**8/7/07**	**8/7/07**	
	---------------- Dry tons/acre ---------------------				
Ozark	4.44	6.42	4.34	5.73	20.93
A-12245	3.59	5.46	4.71	5.42	19.19
Goodwell†	4.90	4.98	3.88	5.13	18.88
Midland 99	2.65	5.69	4.71	5.37	18.43
Tifton 44	4.61	4.82	4.17	4.26	17.86
Midland	3.79	4.40	3.24	4.86	16.29
Vaughn's # 1	2.70	4.41	3.38	4.59	15.08
OSU Greenfield	3.62	4.92	2.81	3.30	14.66
World Feeder	3.99	3.97	2.52	3.61	14.09
Seay Greenfield	2.93	3.52	2.38	3.05	11.88
Shrimplin	3.55	3.55	2.07	2.69	11.87
Mean	3.71	4.74	3.47	4.37	16.29
CV (%)	33.80	21.92	37.43	27.80	21.23
5% LSD	1.70	0.93	0.85	0.96	2.17

† Goodwell was released as a cultivar in 2007. Its experimental designation was LCB84x16-66 used in previous years.

Table 2. Forage yields of bermudagrass varieties in Test 2003-1, Oklahoma Panhandle Research & Extension Center, Goodwell, OK. 2004-2007.

Variety	Year				Mean
	2004 3-harvests	2005 4-harvests	2006 3-harvests	2007 4-harvests	
	------------------- Dry tons/acre -----------------				
Ozark	10.48	12.66	13.22	20.93	14.32
Goodwell	11.56	12.28	13.75	18.88	14.12
Midland 99	10.32	10.12	12.63	18.43	12.88
A-12245	9.85	10.82	11.54	19.19	12.85
Tifton 44	10.15	10.25	11.69	17.86	12.49
Vaughn’s #1	8.99	9.22	8.89	15.08	10.55
World Feeder	8.70	7.87	8.82	14.09	9.87
Seay Greenfield	8.90	7.14	7.51	11.88	8.86
Shrimplin	5.71	6.27	7.65	11.87	7.88
Mean	9.41	9.63	10.63	16.29	11.53
CV (%)	15.05	16.77	18.20	21.23	8.71
5% LSD	2.07	2.36	2.82	2.17	0.98

Table 3. Forage yields of bermudagrass varieties in Test 2003-1, Oklahoma Panhandle Research & Extension Center, Goodwell, OK. 2005-2006.

Variety	Year		Mean
	2005 4-harvests	2006 3-harvests	
	----------- Dry tons/acre ------------		
Goodwell	12.28	13.75	13.02
Ozark	12.66	13.22	12.94
Midland 99	10.12	12.63	11.38
A-12245	10.82	11.54	11.18
Tifton 44	10.25	11.69	10.97
Midland	8.73	12.31	10.52
Vaughn’s #1	9.22	8.89	9.06
OSU Greenfield	8.26	9.06	8.66
World Feeder	7.87	8.82	8.34
Seay Greenfield	7.14	7.51	7.32
Shrimplin	6.27	7.65	6.96
Mean	9.42	10.64	10.03
CV (%)	16.02	17.33	16.88
5% LSD	2.18	2.66	1.69

Note: Tables 1 and 3 have Midland and OSU Greenfield included. Table 2 does not have Midland and OSU Greenfield included. Midland (Entry 1) and OSU Greenfield (Entry 9) had poor stands initially and were replanted in 2004.

Corn Planting Date

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

Previous research indicates that planting corn before the optimum date reduces yields less than planting after the optimum date (Fig. 1). Therefore, in 2000, a long-term study was initiated to determine the effect of planting date and starter fertilizer on corn ensilage, grain yield, and test weight. Six planting dates were selected April (1, 10, 20, 30) and May (10 and 20). On each selected date, corn was planted with and without a starter fertilizer (5 gal/ac 10-34-0) in the row. No yield increases were observed with starter fertilizer in 2000 - 2002. Therefore, starting in 2003 the starter fertilizer treatment was replaced with a 107-day maturity corn hybrid NC+ 3721B. The use of a shorter season hybrid will determine if corn maturity will influence planting date. Pre-plant fertilizer applications were based on soil test N levels of 250 lb/ac (soil test + applied). P and K are applied to 100% sufficiency based on a soil test. The Dekalb hybrid DK 647BtY was planted in 2000, and in 2001 the hybrid was switched to Pioneer 33B51. Plots were planted in four 30-inch rows by 30 feet long with a target plant population of 32,000 plants per acre. Ten feet of one outside row was harvested for ensilage and the two middle rows harvested for grain.

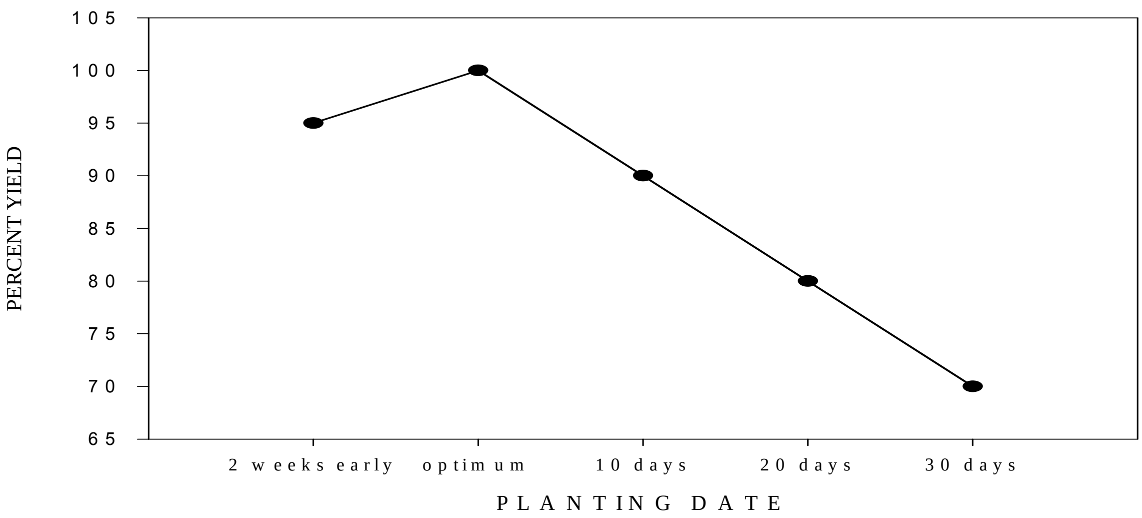

Figure 1. Ten years of grain yields at Lansing, Michigan. Source modern corn production

Aldrich, S.A., W.O. Scott, and R.G. Hoeft. Modern Corn Production. 1986, A & L Publications.

Results

Data was not collected in 2002 due to irrigation well problems or in 2006 due to windstorm.

In 2005 with the cool wet spring some dates were unable to be planted therefore, data was not collected. In 2006, two hail storms in early June severely affected the yield of the second planting date for both hybrids. The yield for the second planting date in 2006 was 42 bu/ac less than the long-term mean for the 114-day hybrid (fig. 2). This is the only time in the duration of the study that April 10 date did not have the highest grain yield for both hybrids (likely due to damage from hailstorm). Therefore data from 2006 will not be used in the long-term averages.

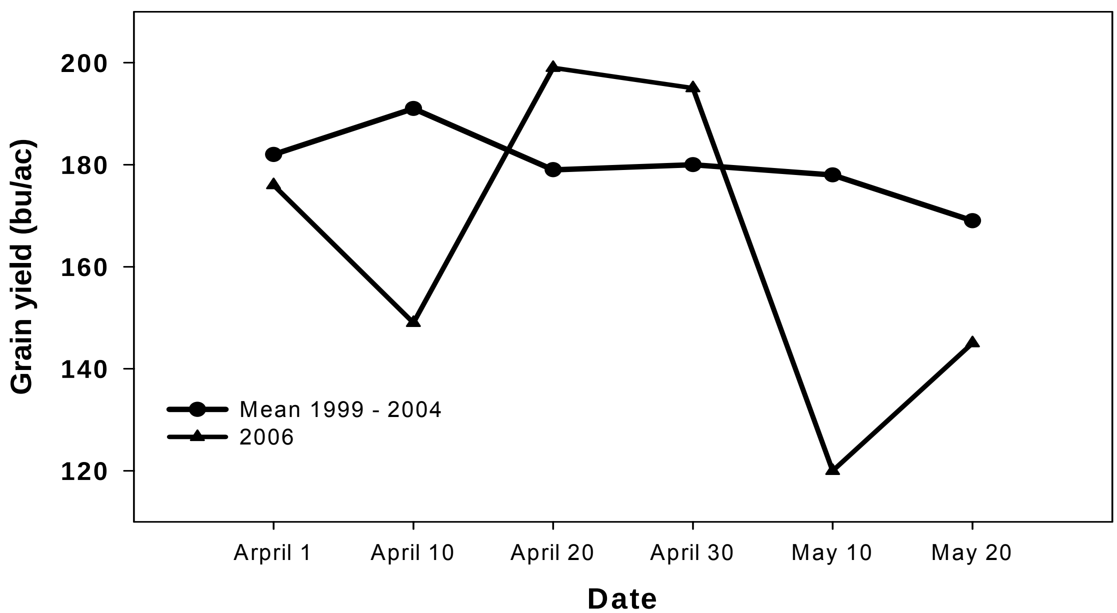

Figure 2. Mean corn grain yields bu/ac from 1999 through 2004 compared to 2006, which demonstrates the yield loss due to hail storms in early June 2006.

Climate and hybrid maturity appear to impact which date is optimum for planting corn. The full season (114 day) and short season (107 day) hybrids reacted differently in 2003 and 2004 (Table 1). No difference in grain yield was observed for any planting date in 2003 or 2004 for the full season hybrid (Table 1). Although differences were observed for the shorter season hybrid, with yield significantly reduced when planted after May 1. For the full season hybrid, when the yield environment was lower as in (2000 and 2001), the April 10 planting date had the highest yield, and yield was reduced 15 and 21% when planted May 10 or 20, respectively. With the higher yield environment of 2003 and 2004, the highest yield obtained was on April 10, which was approximately 17% higher when compared to 2000 and 2001 (Table 1). Four-year averages for the full season hybrid also show the highest yield for the April 10 planting date. With the difference in yield environments in the preceding years it is difficult to determine which date is ideal for planting corn. Therefore more years of data are required to determine what effect environment and maturity has on corn planting date.

Table 1. Mean grain yields (bu/ac) for selected years, maturities, and corn planting dates at OPREC.

Planting date	2000 – 01 114 day	2003 – 04 114 day	4-year 114 day	2003 –04 107 day
April 10	175.9 a†	205.2 a†	190.6 a†	176.0 ab†
April 1	167.6 ab	196.9 a	182.2 ab	173.1 ab
April 30	161.7 ab	198.4 a	180.1 ab	183.1 a
April 20	155.2 bc	202.6 a	178.9 bc	178.4 a
May 10	152.6 bc	202.8 a	177.7 bc	160.7 bc
May 20	145.5 cc	192.1 a	168.8 cc	150.2 c

†Yields with same letter not significantly different

Test Weight

Test weight decreased when planted after April 10 but remained above the 56 lb/bu level (data not shown) until the April 20 planting. Lower test weights can be attributed to higher grain moisture at harvest for the later planting dates.

Corn Ensilage

As with grain yield, environment has an impact on which date is optimum for planting corn utilized for ensilage (Table 1). In years when environment for grain yield is low (as in 2000 and 2001), an earlier planting date had significant impact on ensilage yield (Table 1). The April 1 planting date had ensilage yields 17% higher in 2000 – 2001, when compared too 2003 – 2004. In years with a high grain yield environment, planting date had no effect on ensilage yields. When looking at four-year means ensilage yields were significantly lower when planted May 20, and consequently corn should be planted earlier. Although hybrid maturity affected grain yield, no differences in ensilage yield were observed in 2003 and 2004 for either the short or full season hybrid.

Table 2. Mean ensilage yields (tons/ac) for selected years and maturities for corn planting date at OPREC.

Planting date	2000 – 01 114 day	2003 – 04 114 day	4-year 114 day	2003 –04 107 day
April 1	26.7 a†	22.8 a†	25.0 a†	22.0 a†
April 10	25.8 a	22.8 a	24.4 a	23.9 a
April 30	24.4 bc	23.1 a	24.4 a	21.6 a
April 20	25.0 a	24.5 a	24.2 a	22.8 a
May 10	22.3 c	25.2 a	23.5 a	22.9 a
May 20	19.6 d	20.5 a	19.9 b	24.0 a

†Yields with same letter not significantly different

EVALUATION OF CORN MATURITY UNDER LIMITED IRRIGATION

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Interest in limited irrigation is increasing due to increasing energy costs of pumping irrigation water and reduced irrigation well output as ground water resources become depleted. In 2007, the second of three years of research was conducted at the Oklahoma Panhandle Research and Extension Center at Goodwell, OK to evaluate the effect of three limited irrigation amounts (5, 8.75 and 12.5 inches per season) on four different corn relative maturity hybrids (92, 100, 108 and 116-day hybrids). The four Dekalb corn varieties used were DK4295 (92-day), DK5020 (100-day), DK5819 (108-day), and DK6623 (116-day). The corn was planted 1.5 inches deep on May 2, 2007 in a Richfield clay loam soil using a John Deere 4-row planter at the rate of 31,600 seeds per acre. The site had been fertilized in March with 180 lb N/acre and 40 lb P_2O_5/acre and was strip tilled prior to planting. The experiment was established as a randomized split plot design with four replications. The whole plot treatments were irrigation amount, and corn maturity the subplot treatments. Subplot size was 10 feet by 30 feet with 25 foot alleys. The sprinklers were modified with shut off valves at the nozzle to allow water to be turned on or off for individual plots and specific irrigation applications. Season long irrigation amounts applied were 12.5 inches (100% treatment), 8.75 inches (70% treatment) and 5 inches (40% treatment). All irrigation amounts are considered "limited" as compared to the amount of irrigation water typically applied by area producers.

Results

Precipitation during the growing season was below the long term average (Table 1). Irrigation events were targeted to apply the water primarily at reproductive growth stages to maximize yield potential (Table 2). One and a quarter inches of water was applied at each irrigation event. Corn yield (averaged across varieties) increased as season long irrigation amounts increased (Table 3). Corn yields averaged across varieties were 62.1, 54.9 and 92.2 bushels/acre at the 5, 8.75, and 12.5 inch irrigation amounts, respectively. Corn yield (averaged across irrigation treatments) also trended upward with the 108-day hybrid yielding the most grain (81.4 bu/acre) (Table 4). The 116-day hybrid with 12.5 inches irrigation was the highest yielding treatment (97.9 bu/acre) of all variety and irrigation treatment combinations (Table 5). It is generally thought that corn hybrids with relative maturities of approximately 110-days are best suited for the Oklahoma panhandle region. This data suggests that even under reduced irrigation the conventional, fuller season hybrids are superior to shorter season hybrids.

Table 1. Precipitation during the 2007 growing season

Month	2007	Long-term Mean
April	2.10	1.33
May	1.48	3.25
June	1.62	2.86
July	2.00	2.58
Aug.	0.26	2.28
Totals:	7.46	12.30

Table 2. Irrigation dates and amounts.

	40% trt	**70% trt**	**100% trt**
Date	---------------inches irrigation water ---------------		
June 1, 2007	1.25	1.25	1.25
June 11	--	--	1.25
June 25	--	1.25	1.25
July 1	1.25	1.25	1.25
July 9	--	--	1.25
July 19	--	1.25	1.25
July 31	1.25	1.25	1.25
August 6	--	--	1.25
August 10	1.25	1.25	1.25
August 14	--	1.25	1.25
SEASON TOTAL	***5.00***	***8.75***	***12.50***

Table 3. Mean corn grain yield (bu/acre) (averaged across varieties) for three irrigation treatments.

Irrigation	*Mean*
5 inches	*62.1*
8.75 inches	*78.2*
12.5 inches	*92.2*
LSD (0.05)	*11.6*

Table 4. Mean corn grain yield (bu/acre) (averaged across irrigation treatments) for four maturity hybrids.

Variety	*Mean*
92-day variety	*70.0*
100-day variety	*79.8*
108-day variety	*81.4*
116-day variety	*78.8*
LSD (0.05)	*10.6*

Table 5. Mean corn grain yield (bu/acre) as affected by maturity and irrigation.

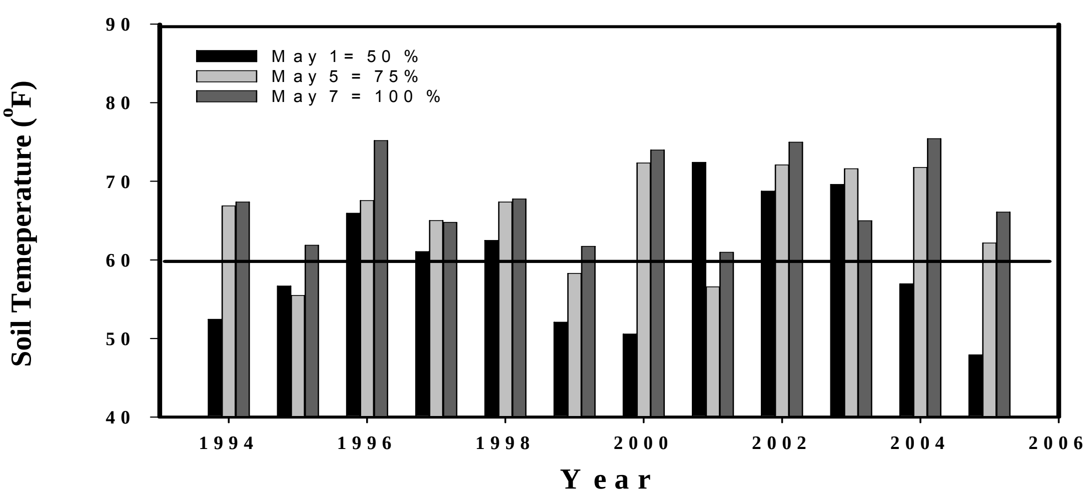
Variety	5 inch irrig.	8.8 inch irrig.	12.5 inch irrig.
92-day variety	58.0	66.4	85.7
100-day variety	62.1	82.1	95.3
108-day variety	67.0	87.4	89.7
116-day variety	61.3	77.1	97.9

IMPACT OF PLANTING DATE AND VARIETY SELECTION ON COTTON YIELDS IN THE HIGH PLAINS

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
J.C. Banks, Southwest Research and Extension Center, Altus
Shane Osborn, Southwest Research and Extension Center, Altus

In recent years cotton acres have increased in the high plains region. However, there was no data available for variety selection or the effect planting date would have on yields and quality of cotton. Therefore, in 2003, six cotton varieties (DP 555 B/R, PM 2280 B/R, PM 2266 RR, ST 2454 RR, PM 2145 RR, and PM 2167 RR) were planted on two dates, May 10 and May 30. These dates were selected because of the number of long-term cotton heat unit's available (1970 units) for the period from May 10 to October 20 is lower than in the traditional cotton producing areas. Therefore with limited heat units, maximizing those units is key to successfully growing cotton in this region. In 2005 the dates were changed to (May 1, 15, and 30), to determine if planting before May 10 would increase cotton yields and quality. In 2006 the dates as again changed, (May 1, 10, 20, and 30) were selected one variety PM 2140 B2RF was planted. 2140 B2RF was selected because of the ability to spray roundup for the full season. In the last 12 years the average soil temperature on May 1 is above 60º F half the time, whereas on May 7 the average soil temperature is above 60º F every year (Fig. 1).

Fig. 1 Mean soil temperatures for selected dates for years 1999-2005, at OPREC.



Many producers are growing cotton due to the lower water requirement for cotton compared to irrigated corn; therefore, maximum irrigation applied for this study was limited to 9 inches, although 6 inches has been the highest irrigation total to date. Plots were planted in 2-rows by 25 feet long, with a tractor powered two-row cone planter. In 2003 plots were hand harvested and since 2004 plots were mechanically stripped.

Results

In the summer of 2006 it was difficult to obtain reliable data from crops planted in April and May due to two hail storms in early June, therefore no data is reported. In 2007 there was no difference in yield or quality due to planting date (Table 1). This may be due to the larger than average number of heat units for the year. Also the heat units were above average from the end of July to October 20th (see cotton heat unit graph elsewhere in the report). The large number of heat units in the last half of the year would benefit later planted cotton. The yields were also the highest for any year of the experiment with an average of 2.86 bales/ac

Table 1. Cotton lint yield lb/ac and loan rate for selected dates at OPREC in 2007.

Date	Lint yield (lbs/ac)	Loan rate $/lb
May 1	1390	0.497
May 10	1450	0.500
May 20	1370	0.498
May 30	1330	0.514

It appears cotton can be successfully grown in the high plains, even with years like 2004 when the total heat units were 188 less than the long-term mean (heat unit graph is in climate section of highlights). With these decreased heat units in 2004, planting date severely affected cotton lint yield (Table 2). In 2005, the May 1 planting date (actually planted May 7) had higher yields than did May 15 and 30 (Table 3) although variety didn’t have the same affect as in years past. The picker cotton DP 555 B/R will not work in this region because of short growing season, it was the only variety that was significantly different in yield in 2005 at all dates. It appears that cotton needs to be planted as soon as soil temperature will allow, to obtain the highest yields.

Table 2. Cotton lint yields (lbs/ac) for year, variety, and planting date at OPREC.

Variety	Planting Date	2003	2004	Two-year
PM 2145 R	5/10	1,087 a†	1,153 a†	1,120 a†
PM 2266 RR	5/10	1,029 a	1,049 a	1,039 a
PM 2167 RR	5/10	1,033 a	1,024 a	1,029 a
PM 2280 B/R	5/10	746 bc	1,025 a	885 ab
DP 555 B/R	5/10	664 bc	1,102 a	883 ab
ST 2454 R	5/10	859 b	813 ab	836 abc
PM 2167 RR	5/30	998 a	403 b	701 bc
PM 2266 RR	5/30	885 b	434 b	659 bc
ST 2454 R	5/30	795 b	468 b	632 bc
PM 2145 R	5/30	923 a	281 b	602 bc
DP 555 B/R	5/30	613 bc	502 b	558 c
PM 2280 B/R	5/30	747 bc	310 b	529 c

†Yields with same letter not significantly different

Table 3. Cotton lint yields (lbs/ac) for 2005 by planting date and highest yielding variety at OPREC.

Planting date	Yield	PM 2145 R
May 7	845	1,064
May 15	682	786
May 30	509	646
L.S.D.	73	NA

Table 4. Lint yields and loan rates for cotton variety trial planted at OPREC, in 2007

Variety	Lint yield lbs/ac	Loan rate $/lb
FM 9058 F	1,431	0.524
PM 2140 B2F	1,292	0.515
PM 2141 B2F	1,219	0.518
NG 3550 F	1,212	0.517
PM 3225 B2F	1,200	0.493
AFD 5064 F	1,178	0.504
NB 3273 B2F	1,166	0.512
AFD 5065 B2F	1,156	0.538
PM 2150 B2F	1,104	0.520
NG 1572 F	1,077	0.520
Mean	1,203	0.516
CV%	14.3	4.9
L.S.D.	NS	NS

NO-TILL VS MINIMUM-TILL DRY-LAND CROP ROTATIONS

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

A study was initiated in 1999 to evaluate four different dry-land cropping rotations and two tillage systems for their long-term productivity in the panhandle region. Rotations evaluated include Wheat-Sorghum-Fallow (WSF), Wheat-Corn-Fallow (WCF), Wheat-Soybean-Fallow (WBF), and Continuous Sorghum (CS). Soybean and corn were not successful in the first five years of the study; therefore in 2004 cotton replaced soybean and sunflower replaced corn in the rotation, also continuous sorghum was replaced with a grain sorghum-sunflower (SF) rotation. Tillage systems include no-till and minimum tillage. Two maturity classifications were used with all summer crops in the rotations until 2001, at which time all summer crops were planted with single maturity hybrids or varieties. Most dry-land producers in the panhandle region utilize the WSF rotation. Other rotations would allow producers flexibility in planting, weed management, insect management, and marketing.

Results

Climate

Data from the Oklahoma Climatological Service indicated the summers (June – August) of 2000 through 2002 were some of the driest in the last 53 years. Precipitation for these years has averaged 41% of the long-term mean, with 2001 only reaching 16.5% of the long term mean (Table 1). The summer of 2007 was the driest of the last five years with a precipitation totaling 50% of the long term average. In 2003, 2004, 2005, and 2006 precipitation was 107%, 118%, 86%, and 109% of the long-term mean respectively when the highest grain sorghum yields have been observed. One-half of the rainfall in the summer of 2006 was received in August and delayed maturity of grain sorghum grown with conventional tillage practices. Although rainfall was above the long-term mean in 2003, it was not received at critical growth stages of grain sorghum and consequently yield was affected. Yearly precipitation totals have ranged from a low 12.0 inches in 2007 to a high of 20.31 in 2004. The average for the last eight years of 17.2 is near the long term mean of 17.89 inches per year. With four years 2001, 2003, 2005, and 2007 receiving less than 15 inches per year.

Table 1. Summer growing season precipitation at OPREC

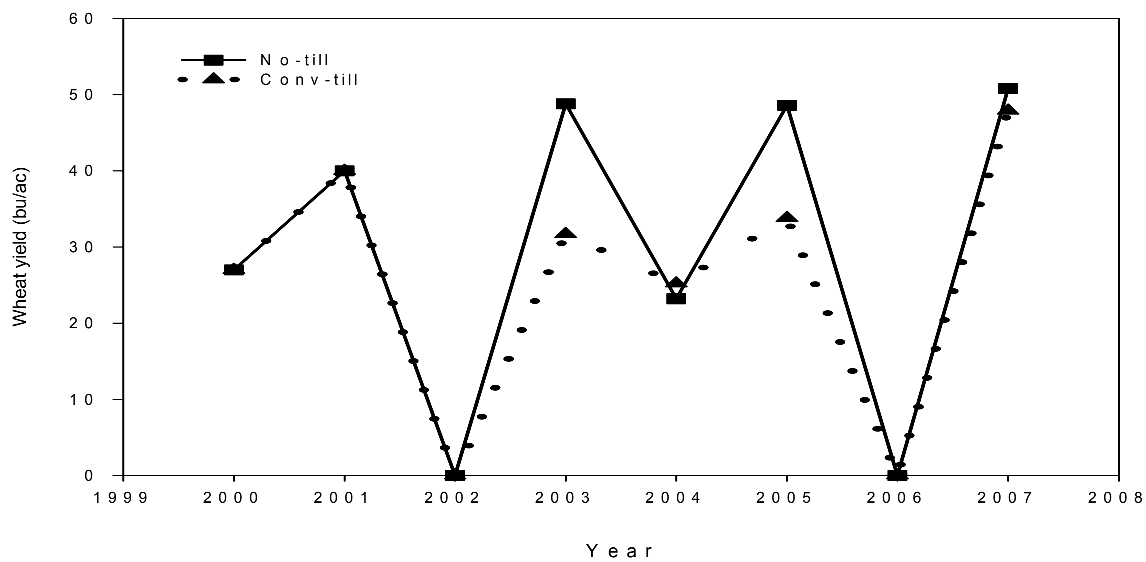
Month	2000	2001	2002	2003	2004	2005	2006	2007	Long-term mean
June	2.29	0.61	1.32	5.26	3.82	2.01	2.34	1.62	2.86
July	0.76	0.00	2.52	1.87	2.43	1.40	2.05	2.00	2.58
August	1.09	0.66	0.27	1.19	2.87	3.21	4.06	0.26	2.28
Total	4.14	1.27	4.11	8.32	9.12	6.62	8.45	3.88	7.72

Wheat

No wheat was harvested in 2002 due to drought and 2006 due to a hail storm.

This report will focus on wheat yields following grain sorghum, because in some years other crops never emerged or were lost to other factors. Wheat yields following other crops used in this experiment were essentially the same as wheat-fallow-wheat because preceding crops didn't emerge or were lost due to other factors. Data from the wheat-cotton-fallow (WCOTF) rotation is reported for 2007, which was the first time wheat was harvested following cotton (Table 2).

Fig. 1. Wheat grain yields (bu/ac) from WSF in dryland tillage and crop rotation study at OPREC.



Neither tillage system produced, or will produce grain when drought occurs and no crops are harvested as in 2002 (Figure 1). In two years 2003 and 2005 no-till wheat grain yields were significantly higher than conventional till by an average of 15.9 bu/ac. In all other years grain yields for both tillage systems were near equal, although, one tillage system yielded slighter higher 2004 and 2007. No difference in test weights was observed between tillage systems. In 2007 wheat grain yields following cotton were less than when following grain sorghum regardless of tillage system, although differences were not statistically significant.

Table 2. Wheat grain yields (bu/ac) from W-Cot-F in dryland tillage and crop rotation study at OPREC.

Rotation	No-till	Conventional till
W-GS-F	50.8	47.9
W-Cot-F	30.1	41.6

Grain Sorghum

As with wheat when no precipitation is received one tillage system makes no difference as in 2002 when no sorghum was harvested. From 1999 – 2003 grain sorghum was the only summer crop successfully harvested each year. Since 2004, grain sorghum yields have been significantly higher for no-till than conventional tillage (Table 3). This increase in sorghum grain yields was in year 6 of the study and this phenomenon has been reported in popular press to occur between year 5 and 7 of switching to no-till. Similar yield differences were also observed in year six in Tribune, KS and reported by researchers at Kansas State University. In 2004, 2006, and 2007 no-till grain yields were double of those for minimum tillage. Part of the higher grain yield in 2006 can be attributed to higher test weights for no-till (Table 4). The delayed maturity of minimum till grain sorghum adversely affected the test weights. In all other years no difference in test weight was observed between tillage treatments, although yields for no-till were higher than minimum till. Planting was delayed in 2004 due to a lack of soil moisture; therefore, an early maturity sorghum was utilized instead of the normal medium maturity.

Figure 2. Grain yields of grain sorghum (bu/ac) for dry-land tillage and crop rotation study at OPREC.

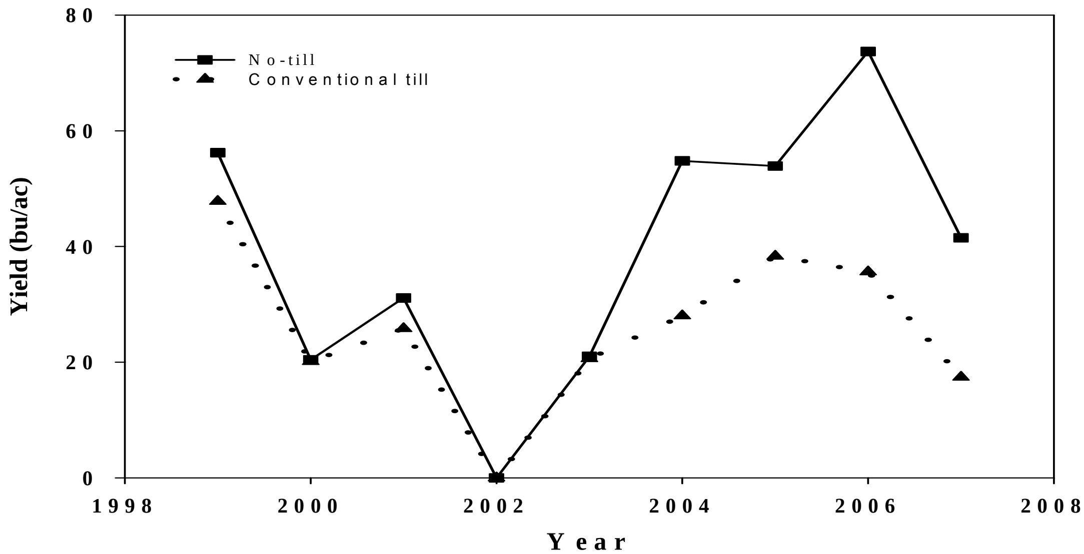


Table 3. Yields of grain sorghum (bu/ac) for dry-land tillage and crop rotation study at OPREC.

Tillage	2004	2005	2006	2007	Four-year
No-till	54.8	53.9	73.7	41.5	56.0
Minimum till	28.0	38.3	35.6	17.4	31.9
Mean	42.3	46.2	53.5	29.5	43.9
CV %	6.4	13.6	19.0	8.0	20.1
L.S.D.	6.1	NS	24.2	8.3	8.4

Table 4. Test weight of grain sorghum (lb/bu) for dry-land tillage and crop rotation study at OPREC.

Tillage	2004	2005	2006	2007	Three-year
No-till	56.5	57.8	56.8	57.9	57.3
Minimum till	55.8	56.9	49.6	57.9	55.0
Mean	56.3	57.2	53.1	57.9	56.2
CV %	0.8	1.6	4.2	0.4	4.5
L.S.D.	NS	NS	5.0	NS	NS

Cotton

Cotton was planted for the first time in 2004 into marginal soil moisture conditions, and the resulting stands were less than ideal. Some cotton did not emerge until rainfall in late June with only 50-60% percent of any plot yielding cotton. Yields may have been higher with adequate stand, but were not adjusted for reduced population or fruit set. There was no difference in yields between tillage treatments (Table 5). Although yields were substantially higher in 2005 and 2007 than 2004, no difference was observed in yield or quality between tillage treatments. In 2006 the hail storms in June affected yields cannot be reported. Although adequate yields have been observed quality could be a concern for dryland cotton production. The 2007 loan rate for no-till and conventional till was $0.408/lb and $0.429/lb respectively. Quality for limited irrigation trials located at OPREC in 2007 was significantly higher at $0.516/b and $0.547/lb.

Table 5. Lint yields of cotton (lbs/ac) for dry-land tillage and crop rotation study at OPREC.

Tillage	2004	2005	2007	Three-year
Minimum till	196.3	594.2	429.1	406.5
Strip-till	193.9	505.8	405.1	385.2
Mean	185.2	561.7	417.1	395.9
CV %	17.4	13.7	15.5	11.9
L.S.D.	NS	NS	NS	NA

Sunflower

Due to planter and herbicide problems, no sunflower was harvested in 2004. In 2005, 2006, and 2007 there were good to excellent stands, but due to jackrabbits removing all or most of the plots they were lost. Due to lack of soil moisture replanting could not be accomplished.

WHEAT VARIETY DEVELOPMENT AND BREEDING RESEARCH

Brett F. Carver and the OSU Wheat Improvement Team

The 2006-2007 crop season culminated in a decision to propose for release a hard white wheat cultivar with the experimental designation, OK00611W. A formal release proposal will be filed with the Oklahoma Agricultural Experiment Station in March 2008, and pending approval, a proposed name will be announced. Naming of this cultivar is currently intended to coincide with the 100th anniversary of Oklahoma statehood and to show linkage with its closely related hard red winter wheat counterpart, OK Bullet. The following text and tables were extracted from the variety release proposal, effective March 1, 2008.

Summary Justification

Substantial genetic improvement has been realized in the HW wheat class in the past decade, such that HW wheat lacks nothing for yield and quality compared with its sister class, HRW wheat. What the HW class does lack is genetic diversity, or to the producer, varietal choice. With a restricted genetic base often comes a restricted adaptation range. Hence, the current state of HW wheat is that superior cultivars are available to producers, but primarily in the High Plains area of the Great Plains region.

Domestic production of HW wheat lags far behind demand. Less than 20 million bushels of HW wheat were harvested nationwide in 2007, yet some estimates indicate that nearly 250 million bushels are needed to satisfy domestic and international markets. Many obstacles stand in the way of that target, but one obstacle should be, and can be, removed—more and better adapted cultivars for a broader geographic region. This necessity is the primary driver for release of OK00611W.

OK00611W has the adaptive capability to extend to semi-arid regions of Oklahoma and the southern and central Plains, where previous releases such as Intrada and Guymon could not go. Its capability is derived from a yield-performance history and disease resistance package comparable, if not identical, to OK Bullet, substantially improved straw strength and standability, and improved tolerance to pre-harvest sprouting.

Background

Original derivation of OK00611W was identical to OK00514 (subsequently named OK Bullet), as these two genotypes constitute sister lines from the same cross. The original hybridization was performed by Dr. David Worrall, formerly with Texas A&M University and the Texas Agricultural Experiment Station at Vernon. He crossed an experimental line identified by its pedigree as KS82W418/Stephens (eventually named 'Jagger') with KS93U206, which was subsequently released by the Kansas Wheat Genetics Resources Center as KS96WGRC39. We recommend the pedigree of OK00611W be given as ***Jagger/KS96WGRC39***. The pedigree of KS96WGRC39 is TAM 107*3/TA2460. This germplasm epitomized a large interspecific breeding effort to introgress novel disease resistance genes from *Triticum tauschii* accessions (TA) into bread wheat. TA2460 provided resistance to leaf rust and tan spot.

The leaf rust resistance gene in TA2460 was originally named *Lr41*. Using nearisogenic lines in the genetic background of Century, we have shown in Oklahoma that *Lr41* can increase yield by 63% and test weight by 5% in the presence of moderate leaf rust infection (Martin et al., 2003. Crop Sci. 43:1712-1717). Effectiveness of this gene has decreased in some environments since 2003, especially in 2007, as races which can overcome resistance have likely increased in frequency.

Dr. Worrall also produced the F_1, F_2, and F_3 generations. In the spring of 1997, Dr. Brett Carver selected 100 single heads from a F_3 bulk population named 97V8054, and from 17 other F_3 bulk populations, produced at the Texas A&M Research and Extension Center located near Chillocothe, TX. These 18 populations were selected solely on the basis of yield potential, desirable height, lodging resistance, and maturity at the time the heads were collected. They were chosen from a larger set of breeding populations graciously made available by Dr. Worrall. The head-row progeny of 97V8054 were evaluated at Stillwater, OK in 1998 as part of the Wheat Genetics Project. OK00611W traces to a single $F_{3:4}$ head-row identified as 981151015-16.

From 2000 through 2007, OK00611W was evaluated in the following replicated yield trials in Oklahoma and surrounding states:

Replicated Yield Trials 1 (RYT1, Western OK)	2000
Replicated Yield Trials 2 (RYT2, Central OK)	2001
Oklahoma Elite Nursery 1 (OET1)	2002
Oklahoma Elite Nursery 2 (OET2), 4 yr	2003, 2004, 2006, 2007
Southern Regional Performance Nursery (SRPN)	2004, 2005
Oklahoma Wheat Variety Trials (WVT), 2 yr	2006, 2007

Probable Area of Adaptation and Limitations

OK00611W should be positioned in the same manner as OK Bullet. Hence it is widely adapted throughout the state, equally so to downstate areas of Oklahoma as to areas in the northwestern region. Its performance outside of Oklahoma is impressionable for grain yield but erratic. Both OK00611W and a reselection of OK00611W have held top-tier positions in the regional nursery evaluation program in Texas, New Mexico, Colorado, Kansas, and Nebraska, but this level of stellar performance tends to be site-specific with no apparent consistency from year to year. Part of the reason for the inconsistency is the extreme inconsistency in growing conditions across the region since 2005.

Certain steps can be taken with this cultivar to improve consistency. First it should not be planted so early that high soil temperatures may delay germination. Delayed germination has been observed in the past to produce season-long erratic stands. With an aggressive pattern of fall biomass accumulation, OK00611W can be planted later in a producer’s line-up and still “catch up” with earlier-planted cultivars with less aggressiveness and less seed dormancy. Second, OK00611W should be planted late enough in a non-grazed system to reduce the probability of accelerated flowering in the spring. OK00611W has been observed to suffer winter injury in the panhandle following excessive vegetative growth (similar to Jagger). Susceptibility to winter injury could account for the inconsistent yield patterns observed in areas north of Oklahoma. Third, OK00611W should not be subjected to intense grazing or heavy stocking rates, much like OK Bullet. For these reasons, OK00611W may provide greater profitability in a grain-only management system than a dual-purpose system.

As was stated during the release of OK Bullet, leaf rust resistance of this particular lineage in our program appears to be in a state of flux. The first sign of susceptibility to leaf rust in Oklahoma was observed late during the severe leaf-rust epidemic of 2007. How that translates to future response under conditions of less severity is unknown. However, as acreages increase for OK Bullet and Overley or any other cultivar with the seedling resistance gene *Lr41*, subsequent positioning of OK00611W should toward western Oklahoma, where the disease historically has a lower presence.

Varietal Replacement

Cultivar	Superior attribute of OK00611W justifying replacement
Guymon, Intrada	Greater yield potential (Tables 1, 2) Much improved straw strength Larger kernel size (but lower test weight) Improved tolerance to pre-harvest sprouting More appealing in vegetative stages (leaf size, growth habit) Improved resistance to leaf rust Improved tolerance to tan spot and Septoria leaf blotch (vs. Guymon) Much improved green-leaf duration
Danby	Greater yield potential (Tables 1, 2) Greater straw strength Improved resistance to leaf rust Improved history of reaction to WSBMV/WSSMV Improved tolerance to tan spot Improved green-leaf duration

End-use quality summary

The following quality profile of OK00611W may be extracted from currently available data: acceptable test weight, much larger kernel size than Guymon or Intrada, good straight-grade flour yield at an acceptable flour ash content, high protein levels with acceptable, but not excessive, tolerance to over-mixing with intermediate mixing time, high bake water absorption and high loaf volume which are commensurate with high flour protein content, good crumb grain, and acceptable crumb color. Visual attributes of baking quality are indistinguishable from OK Bullet and other HW cultivars with good baking quality. OK00611W possesses the same *Glu-1* genotype for high-molecular-weight glutenin subunit composition as OK Bullet (1, 17+18, 5+10 for the A, B, and D locus, respectively); no locus contains alleles which have been negatively associated with baking quality. Both lines are non-carriers of any wheat-1RS rye translocation.

Pre-harvest sprouting summary

The genetic propensity for good end-use quality is wasted if the grain does not remain dormant during intermittent periods of high moisture or rainfall immediately preceding harvest. This is especially true for HW wheat, which as a class of wheat, shows greater susceptibility to pre-harvest sprouting (PHS), or precocious loss of seed dormancy, than HRW wheat. Pre-harvest sprouting tolerance was determined for OK00611W and a reselection of OK00611W in various ways, primarily based on germination of seed harvested from field plots at physiological maturity. Such tests often give disparate results, because the environment in which the seed is produced (e.g., temperature and moisture stress during grain-fill) can have a strong effect—and possibly stronger than the genetic effect—on seed dormancy expression. The ultimate goal is to find patterns from multiple tests that emerge from the data, rather than relying on one specific assay for a resistant vs. susceptible assessment.

The data in Table 3 indicate a useful level of PHS tolerance in OK00611W and its reselection that is comparable to OK Bullet and Danby. Again, individual environments may produce different specific results. For example, from the rain-soaked field plots at Stillwater in 2007, OK00611W showed only marginal tolerance compared with OK Bullet, but still much better than susceptible types such as Guymon (data not shown). This assessment of phenotype must eventually be bolstered with genotypic data based on molecular markers to allow a more reliable assessment of PHS tolerance. At best, we can say that OK00611W and the reselection offer improvement in PHS tolerance over the last HW release, Guymon. The level of tolerance merely delays sprouting but does not prevent it. These assessments were corroborated with falling-number measurements in 2007 (data not shown).

Seed Production Plan and Status

OK00611W was placed under foundation seed production by OFSS Inc. near Gate, OK in fall 2006. Breeder seed was provided that year in the amount of 11 bu. About 60 acres were seeded in fall 2007 near Guymon, OK.

Pedigree Classes

Recommended classes of seed production are Breeder, Foundation, Registered, and Certified.

Proposed Method of Release

A non-public release under licensing agreement with an organization capable of identity preservation throughout the delivery chain is recommended. This may require an organization with financial resources to ensure segregation of HW wheat and with the marketing experience and commitment to ensure adequate delivery to customers. Application for plant variety protection (Title V) will be filed in 2008-2009.

Cooperating Scientists

Identification of OK00611W as a candidate cultivar was accomplished through OSU's Wheat Improvement Team, as well as breeders throughout the Great Plains associated with the Hard Winter Wheat Performance Nursery Program. They represent state Agricultural Experiment Stations, the USDA-ARS, and private companies. David Worrall is credited with producing the hybrid cross and early-generation bulk materials from which OK00611W was eventually selected. Special assistance was provided by Richard Chen and Brad Seabourn with the Hard Winter Wheat Quality Laboratory, Guihua Bai with the Plant Science and Entomology Unit, and Floyd Dowell with the Engineering Research Unit (USDA-ARS-GMPRC, Manhattan, KS), and Mary Sorenson with ConAgra Foods, Inc. (Omaha, NE).

Table 1. Grain yield comparisons from the 2006 and 2007 OET2 in six to eight environments per year.

Year	Entry	Marshall late-sown	Marshall early-sown	Enid - low pH dual-purpose	Lahoma	Ft. Cobb	Altus	**Across sites**
		--- bu/ac --						
2006	**OK00611W**	**20**	***22***	**25**	***64***	***31***	**44**	**35**
	OK00611W reseln	**25**	***22***	***29***	***63***	***29***	**40**	**35**
	OK Bullet	*30*	*23*	*34*	*62*	*36*	*56*	*40*
	Guymon	16	*19*	*29*	57	*35*	*51*	35
	Danby	16	15	*29*	*62*	*35*	*60*	*36*
	Intrada	17	13	25	55	25	45	30
	Trial mean	**21**	**19**	**28**	**59**	**31**	**49**	**34**
	LSD (0.05)	**5**	**6**	**8**	**5**	**6**	**10**	**4**

Year	Entry	Goodwell irrigated	Goodwell dryland	El Reno dual-purpose	Cherokee	Ft. Cobb dual-purpose	Hobart	Sweetwater dual-purpose	Walsh	**Across sites**
2007	**OK00611W**	***96***	***76***	**15**	**35**	***46***	***46***	***35***	***55***	***51***
	OK00611W reseln	***108***	**70**	**17**	**32**	**39**	***46***	***33***	**46**	***49***
	OK Bullet	91	70	15	32	37	*46*	31	*51*	47
	Guymon	85	70	14	23	14	24	24	*50*	38
	Danby	79	72	16	28	27	33	27	*51*	42
	Trial mean	**90**	**71**	**17**	**32**	**35**	**41**	**32**	**51**	**46**
	LSD (0.05)	**12**	**11**	**5**	**3**	**6**	**6**	**7**	**8**	**5**

Top LSD (0.05) group of varieties appear in italics for each site.

Table 2. Test weight comparisons from the 2006 and 2007 OET2 in nine environments, listed from lowest to highest test weight within years.

	2006								2007		
Entry	EN	MA late	MA early	ST	AL	LA	FC	Across sites	GD-I	GD-D	Across sites
	---------- lb/bu ----------										
OK00611W	**60**	**58**	**59**	**60**	**60**	**62**	**61**	**59.8**	**61**	**61**	**61.1**
OK00611W reseln	**59**	**59**	**59**	**60**	**60**	**61**	**61**	**59.8**	**62**	**60**	**60.9**
OK Bullet	61	60	61	62	61	62	63	*61.5*	63	63	*62.8*
Guymon	62	60	61	63	62	62	65	*62.2*	62	63	*62.4*
Danby	60	62	62	62	63	64	63	*62.1*	61	63	*62.3*
Trial mean	**60**	**60**	**60**	**61**	**61**	**62**	**62**	**60.9**	**61**	**62**	**61.4**
LSD (0.05)						*<1*		**0.8**	**1**	**1**	**1.4**

Top LSD (0.05) group of varieties appear in italics for the means across sites.

Location abbreviations are translated as EN (Enid), MA (Marshall, early and late sowing), ST (Stillwater), Altus (AL), LA (Lahoma), Ft. Cobb (FC), GD-I (Goodwell irrigated), GD-D (Goodwell dryland).

Table 3. Pre-harvest sprouting tolerance based on three independent tests of percentage germination of seed harvested in the field at physiological maturity in 2006, germination index for seed harvested at physiological maturity at Ft. Collins, CO, and percentage sprouted kernels (ruptured germ) on three post-harvest sampling dates.

Putative field sprouting tolerance	Entry	2006 – germination				2007 germination index[3]	2007 – Sprouted kernels[4]		
		Test 1 [1]	Test 2 [2]	Test 3	Mean		5 June	12 June	18 June
		- - - - - - - - - % - - - - - - - - -					- - - - - - - - - - % - - - - - - - - -		
Good	**OK00611W**	**17**	**34**	**50**	**34**	--	**19**	**11**	**36**
Good	**OK00611W reseln**	**38**	**52**	**71**	**54**	**0.03**	**11**	**2**	**7**
Good	OK Bullet	41	60	53	51	--	0	0	6
Good	Danby	13	30	17	20	0.04	--	--	--
Intermediate	Intrada	64	54	61	60	--	--	--	--
Poor	Guymon	87	85	95	89	0.48	--	--	--
Good	Avalanche	--	--	--	--	0.07	--	--	--
Intermediate	Trego	--	--	--	--	0.11	--	--	--
Unknown	NuDakota	--	--	--	--	0.29	--	--	--
Intermediate	RonL	--	--	--	--	0.30	--	--	--
Unknown	NuHills	--	--	--	--	0.35	--	--	--
Poor	Platte	--	--	--	--	0.36	--	--	--
	Trial mean	**45**	**54**	**63**	**54**	**0.25**	**13**	**10**	**22**

[1] Percentage germination on day 4 in petri dishes for seed harvested at physiological maturity in Stillwater

[2] Percentage germination on day 3 in petri dishes for seed harvested at physiological maturity in Stillwater

[3] Lower values of index indicate greater pre-harvest sprout tolerance; trait measured in Ft. Collins, CO

[4] Percentage sprouted kernels from field samples collected at post-harvest maturity on the given days at Stillwater, with very high rainfall frequency

EFFECT OF PLANTING DATE ON YIELD AND TEST WEIGHT OF DRY-LAND WHEAT IN THE OKLAHOMA PANHANDLE

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Dryland wheat producers in the panhandle region often plant wheat when soil moisture is adequate regardless of calendar date. In the fall of 2004 a study was initiated at OPREC to determine the effect of planting date and variety on dryland wheat grain yield and test weight. Hard red winter wheat (HRW) and hard white winter wheat (HWW) were sown the first and fifteenth of September, October, and November 2004. Seeding rates were consistent with standard practice of most producers in the high plains and were 45 lb/ac for September dates, 60 lbs/ac for October 1, and 90 lb/ac for the last three dates. A HRW and a HWW variety were chosen because they consistently have high yields and test weights in the panhandle wheat variety trials. Plot size was 5 feet wide by 35 feet long planted with a Great Plain no-till plot drill.

Results

No data collected in 2006 due to a hail storm.

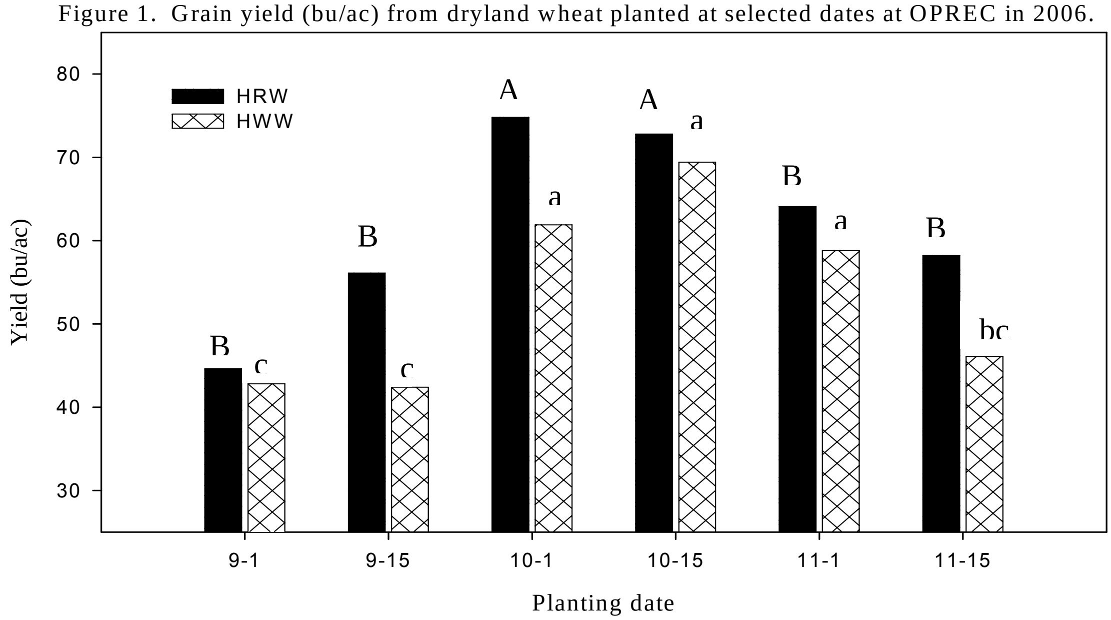
Grain yields for this and other studies in 2007 were some of the highest obtained at OPREC in the last 10 years. As in 2005 the September dates yielded less than October planting dates. This was true in two very different grain production years. The 2005 harvest year was marked by heavy stripe rust pressure and reduced yields. As mention earlier the 2007 harvest year say abnormally high dryland yields. In both of these environments, though, October-sown wheat out yielded September-sown wheat. While not as large as planting date differences reported by Texas A&M for the region, but this can be explained by the amount of rainfall received during planting season and early winter (Table 1). In 2007 the HRW was overall the higher yielding variety across all dates by 8.2 bu/ac. The highest yields were observed for both varieties in October with the HRW on October 1 and the HWW on the October 15 planting date (Figure 1). The two-year data suggest (Figure 2) that October 1 is the optimum planting date. While no grain yield data was collected in 2006 due to a hailstorm, visual estimation

Table 1. Long-term (51 years) mean and 2004 and 2006 rainfall (inches/month) for September through December at OPREC.

Year	Sept	Oct	Nov	Dec	Total
Mean	1.77	1.03	0.77	0.31	3.88
2004	2.56	0.64	3.51	0.16	6.87
2006	1.19	2.02	0.00	3.70	6.91

indicated a 15 to 20 bu/ac yield difference was realistic for the October 1 planting date when compared to later plantings. The reason for the October 1 planting date yielding that much greater is that was dusted in and emerged after rainfall on October 9th. Those few days more of moisture allowed the plants to develop a crown root system that later plantings did not develop until spring when rainfall was received.

Figure 1. Grain yield (bu/ac) from dryland wheat planted at selected dates at OPREC in 2006.



Yields with same letter are not significantly different not between variety just date

Planting date has an effect on test weight with a 3.0 lb/bu difference observed between the September 1 planting date and the November 1 date in 2007. Planting in September negatively affects test weights of both varieties. Looking at the two-year data it is apparent that later planting tends to producer higher test weights (Table 2.) Also variety selection plays and important role in test weight and as has been observed and reported in other sections of this report. More years of data are needed before final conclusions can be reached, but it appears that October 1 is the optimum planting date for dryland wheat in this region. A good suggestion may be to start dusting in wheat on September 20th if precipitation is not received. As observed in the fall of 2005 when the October 1 planting date developed a crown root system that fall the later plantings did not.

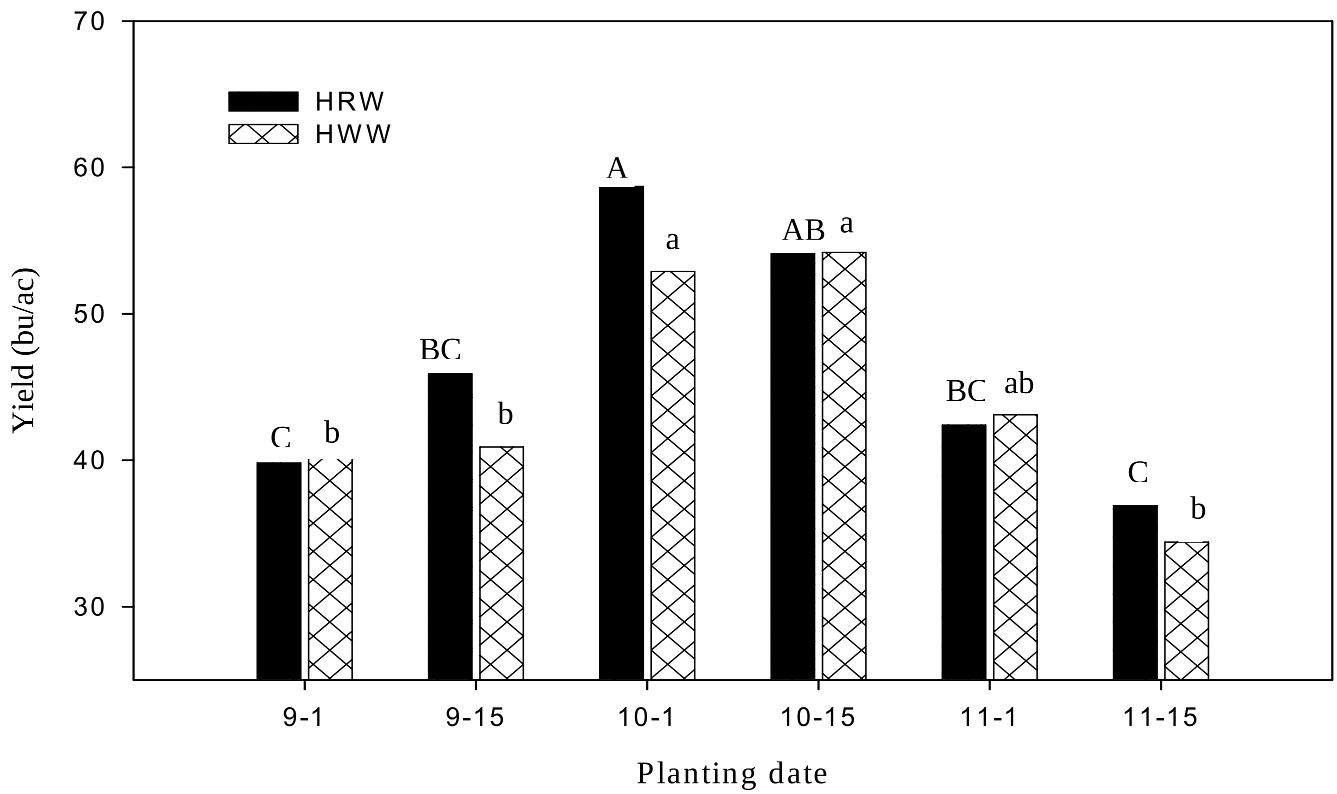
Table 2. Test weight for HWW and HRW hard red winter wheat planted at different dates at OPREC in 2004 and 2006.

Planting date	HRW	Planting date	HRW

September 1	57.3 b	September 1	56.2 b
September 15	57.5 b	September 15	57.1 ab
October 1	59.2 a	October 15	57.1 ab
October 15	59.4 a	November 15	57.3 a
November 1	60.4 a	November 1	58.3 a
November 15	59.5 a	October 1	58.1 a

Yields with same letter are not significantly different

Figure 2. Grain yield (bu/ac) for dryland wheat planted at six different dates at OPREC in 2004 and 2006.



EFFECT OF SEEDING RATE ON YIELD AND TEST WEIGHT OF DRY-LAND WHEAT IN THE OKLAHOMA PANHANDLE

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When adequate fall moisture is present, dry-land wheat producers in the southern high plains region utilize wheat for both cattle grazing and grain production (dual-purpose). In the fall of 2001 a dry-land seeding rate study was established near Keyes, to determine the effect of seeding rate on dual-purpose wheat grain yield. The most widely grown dry-land wheat variety in the area (TAM 110) was planted at rates of 30, 45, 60, 90, of 120 pounds per acre. The 30 and 45 pounds per acre rates represent standard practices for the region. The 60, 90, and 120 pounds per acre rates were used to determine if higher forage production associated with increased seeding rates in irrigated systems, would also be exhibited in a dry-land system. Due to differences in fall precipitation collecting reliable, accurate dryland fall forage data has been difficult in this and other studies in the panhandle region; therefore, due to differences in fall precipitation and in adequate forage growth data are not reported. Since forage data collection was not feasible the focus of the study was changed in 2004 to determine if increased seeding rates were required for higher grain yields when October planting dates were used. With the change in emphasis varieties were changed and a hard white winter wheat (HWW) and a hard red winter wheat (HRW) were planted. Plot size was 5 feet wide by 35 feet long and all plots planted with a Great Plain no-till plot drill.

Results

Wheat yields averaged 75 bu/ac across all varieties and seeding rates, which was outstanding for the panhandle. As in 2005 the HRW yields were higher than for the HWW. In 2007 the difference was 12.5 bu/ac compared to 10.4 in 2005. In 2007 there was an 8.9 bu/ac yield difference between the lowest (30 lb/ac) and highest (120 lb/ac) seeding rates (table 1). This differential was greater for the HRW than the HWW at 10.1 and 7.4 bu/ac, respectively. While not statistically significant the 30 lb/ac rate also yielded lass than higher seeding rates in, 2005. The difference in yield as a function of seeding rate was observed in the HRW however not in the HWW (Fig. 1 and 2). Finding no difference in HWW may be explained by a difference in seed size. The HWW has much smaller seed size than does the HRW; therefore when planting on a lb/ac basis a larger number of plants is obtained with the HWW with the same weight of seed. In the future planting by number of seeds per acre may be a better system than pounds/ac to determine optimum seeding rates.

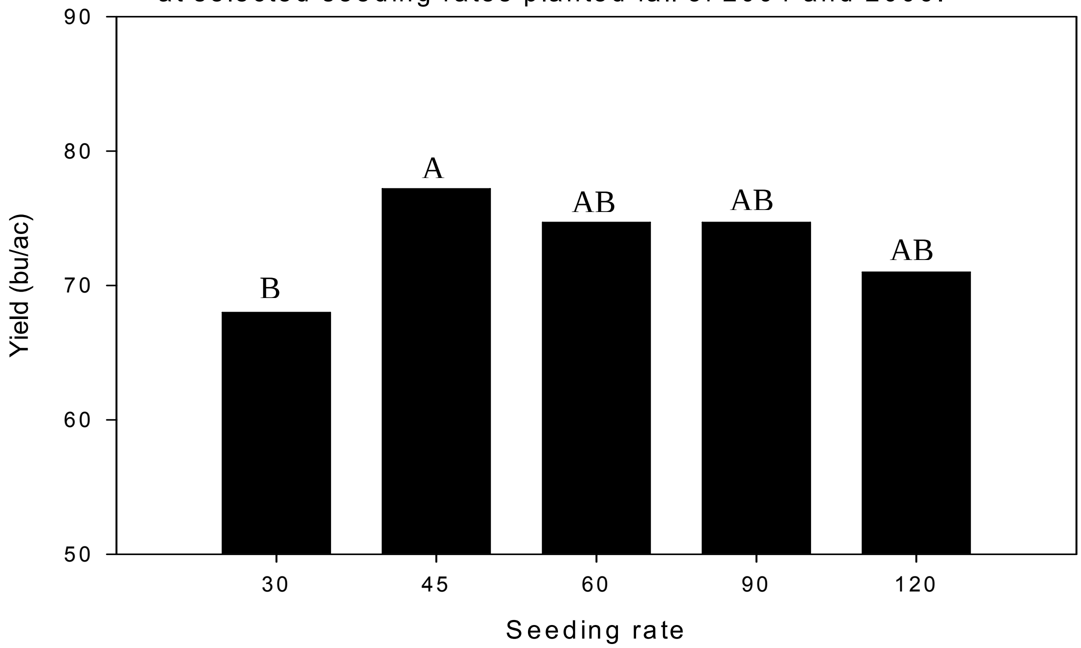
No difference was observed between the other seeding rates except for the 60 lb/ac and 120 lb/ac seeding rate again which is explained by no difference being observed in the HWW. As in all years no difference was observed in test weights in 2007 among any of the seeding rates, but a difference was observed between varieties. Generally HWW have had a higher test weight than the HRW in this experiment. This demonstrates that weather and variety selection has a much large impact on test weights than does seeding rate.

Table1. Grain yields for HRW and HWW for selected seeding rates planted in fall of 2006.

Seeding rate (lb/ac)	Grain Yield (bu/ac)	Test weight (lb/bu)
30	69.7 c	61.0
45	76.6 ab	61.0
60	72.9 bc	61.4
90	77.0 ab	61.1
120	78.6 a	61.0

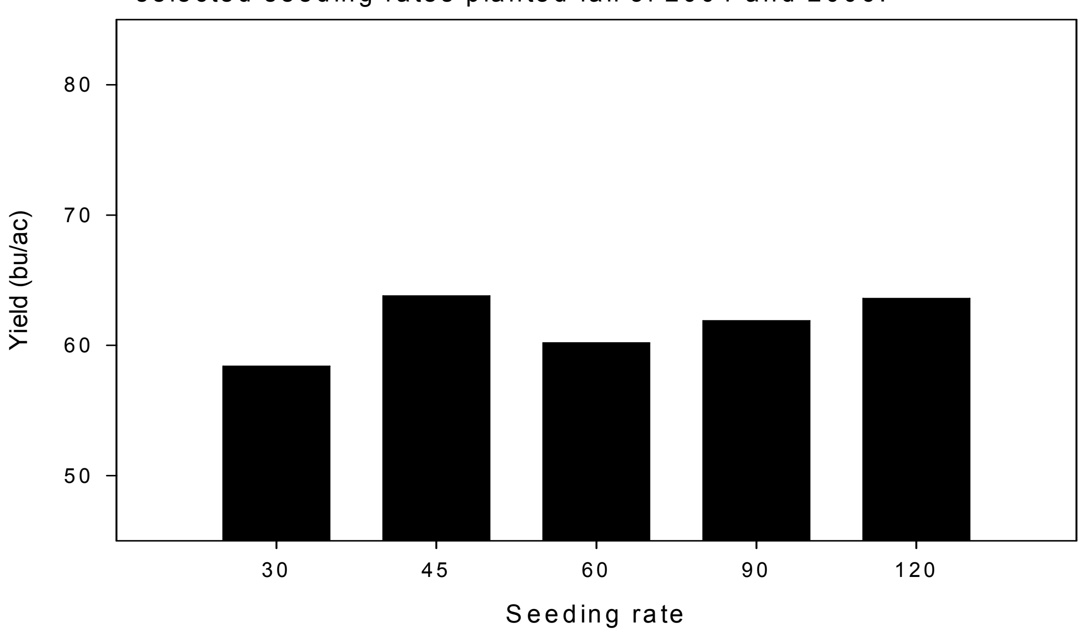
Producers seeding at too low of a rate in 2007 probably cost themselves some yield. Conversely grain yields and test weights in this experiment have never been reduced by the higher seeding rates. It appears that at least a 45 lb/ac seeding rate is required to achieve highest possible yields when conditions are excellent for grain production as they were in 2007. In the fall of 2004 a no-till dryland wheat planting date study, with wheat planted approximately every two weeks from September 1 until mid November was established at OPREC. This additional study will help determine the ideal planting date.

Figure 1. Grain yields for hard red winter wheat variety at selected seeding rates planted fall of 2004 and 2006.



Yields with same letter are not significantly different

Figure 2. Grain yield for hard white winter wheat variety selected seeding rates planted fall of 2004 and 2006.



No statistical differences were observed among seeding rates

Driving Accuracy for Strip Tillage Systems

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Strip tillage systems are gaining popularity in the Corn Belt and Great Plains. In typical strip tillage systems, fertilizer is placed below the soil surface in a tilled strip. Research by the Irrigation Research Foundation in Yuma, Colorado has shown an average increase of 16 bu/ac for strip tilled corn when compared to conventional tillage for years 2000-2004 (http://www.irf-info.com/). Gordon et al. (2005) also found greater yields with strip tillage. However, other research has shown mixed results regarding strip tillage and crop yield (Litch and Al-Kaisi, 2005; Sweeney et al., 2005; and Vetsch and Giles, 2002).

The spacing of tilled strips must match that of the row crop planter used in the spring. Success of this system depends on the ability to plant directly on top of the tilled strip where the fertilizer was placed. This is relatively simple when the strip is still visible. However, in some production systems the tilled strips are not clear at planting. The increased popularity of GPS guidance has allowed farmers to apply fertilizer and till strips in the fall and return to those same strips in the spring to plant even when the strips are not visible. Farmers are typically using RTK auto guidance systems for strip tillage applications. Normally, single frequency and WAAS differential corrections will likely not provide sufficient accuracy and precision for strip tillage applications; however recent improvements with dual frequency GPS receivers may make them feasible. Watson and Lowenberg-DeBoer (2004) evaluated GPS auto guidance on a simulated 1800 acre corn-soybean farm in the Corn Belt. Their analysis and assumptions found DGPS auto guidance was more profitable than light bar guidance and RTK auto guidance when expanding acreage beyond 1800 acres or controlling traffic on the 1800 acre farm.

As outlined above, one of the primary purposes of strip tillage is to create a tilled strip in which seed will be planted. Thus there is a desire to stay on this tilled strip when planting. Success of this system depends on the ability to plant directly on top of the tilled strip where the fertilizer was placed. There are two interrelated items to consider, matching rows on the strip till implement and planter and driving accuracy. If the implement widths match, any errors in the guess row will have less affect on planting in the strip. If they do not match, driving accuracy must be sufficient to avoid missing the strip with the planter. Conversely, if driving accuracy has minimal error, matching rows is not as important. Driving accuracy includes being able to return to the same path and minimizing overlap or skip. Returning to the strip is relatively simple when the strip is still visible. However, if enough time passes between when strips are made and planting, the tilled strips may not be as visible.

Though strip tillage can be successful without GPS based guidance, this is one instance where this technology can be beneficial. GPS guidance systems allow the operator to minimize driving error and return to the previous paths created by strip tillage. The increased popularity of GPS guidance has allowed farmers to apply fertilizer and till strips in the fall and return to those same strips in the spring to plant even when the strips are not visible. Farmers are typically using real-time kinematic (RTK) auto guidance systems for strip tillage applications. These systems are the most expensive and offer pass-to-pass accuracies of about 1 inch. The least expensive guidance systems with single frequency and WAAS differential corrections have pass-to-pass accuracies of 8-10 inches and will likely not provide sufficient accuracy and precision for strip tillage applications. However, dual frequency GPS receivers with pass-to-pass accuracies of about 4 inches may provide sufficient accuracy for strip tillage. The operator may need to use the 'shift track' feature periodically to make sure the planter stays near the center of the strip. Researchers at Purdue University evaluated GPS auto guidance on a simulated 1800 acre corn-soybean farm in the Corn Belt. Their analysis and assumptions found DGPS auto guidance was more profitable than light bar guidance and RTK auto guidance when expanding acreage beyond 1800 acres or controlling traffic on the 1800 acre farm.

The experimental objective is to determine the effect of driving accuracy on corn yield in a strip tillage system.

Methods

Three individual studies were conducted Irrigated corn was grown at the Oklahoma Panhandle Research and Extension Center in Goodwell, OK to determine the affect of driving accuracy on crop yield in a strip till system. Small plots (10' by 50') were established in a randomized complete block design with six replications. The treatments were 4 levels of driving error. The distance the crop was planted from the center of the strip was used to determine driving error. The target distances were 0, 2, 4, and 6 inches. The zero distance represents perfect conditions whereas the 6 inch error was considered a high error and was expected to be outside of the tilled strip.

Plots were strip tilled on April 10 to a depth of ten inches with a 4-row Redball Strip Till implement. Fertilizer was metered using a Raven 440 rate controller. Fertilizer was dual placed at 5 and 10 inch depths at a rate of 70 gpa. The mixture was 5/6 of 32% UAN and 1/6 10-34-0 for a total of 220 lbs/ac of nitrogen. A real-time kinematic GPS auto steer system (John Deere AutoTrac) on a John Deere 6420 MFWD tractor was used to establish the plots. Swath width was set at 10 feet (4 rows on 30 inch spacing). An A-B line was set in the south border area without operating the strip till implement. Once the line was established, 14 passes (two sets of 12 plots and 2 borders) were made with the strip till implement and fertilizer operating (Figure 1).

Corn was planted on April 10 at a seeding rate of 33000 seeds per acre with a 4 row John Deere 7200 planter using the same tractor and auto steer system. The shift track feature was used to create the driving errors. The small shift feature of the AutoTrac system was set at 2 inches. The track was shifted to the appropriate error before the tractor entered the first plot. As the tractor left the first plot the track was shifted to the appropriate error for the second plot in the alley as the tractor was still moving using the track shift arrows on the GreenStar2 display. All track shifts were to the North.

Row spacing was measured after the corn emerged to determine actual driving error. A tape measure was secured in border row and the distance of individual plant rows all the way across plots in three locations was measured. The distances for the four row spacings within a plot were averaged to determine the actual driving error for that plot. After emergence was complete, plant counts were taken in 20 feet of the two center rows of each plot to determine final stands. Yield was measured by combine harvesting the center two rows of each plot. Corn will be shelled and tested for moisture content to determine a moisture corrected yield.

Results

The underlying assumption to driving accuracy in strip tillage is that yield will decrease as you plant further from center of the strip. Research in Oklahoma has found some potential benefits. Measured driving errors for irrigated corn at the Goodwell location ranged from <0.5 to 8.75

inches. Figure 4 shows a graph of irrigated corn yield versus driving error for strip tillage plots at the Panhandle Research and Extension Center in Goodwell. This data show that there is no significant yield decrease with driving error less than 4.5 inches from the center of the strip. Since the strips were about 8-9 inches wide, there was no penalty until the planter was no longer inside the strip tilled area. Once driving error exceeds 4.5 inches, a yield reduction of 6 bu/ac was found for every inch of driving error.

When the planter moves off the strip it is in a no-till environment and if it is not adjusted correctly for no-till stands may not be as good. The data from Goodwell supports this observation in that final stands for the plots with driving errors greater than 4.5 inches were lower than those with errors less than 4.5 inches. This stand reduction could have caused the yield difference. There was some wind damage to corn late in the growing season, but it was unlikely that it affected yield. However, the wind damage could be responsible for some of the variability in the data.

This data support that DGPS auto steer systems capable of pass-to-pass accuracies of 2-4 inches should be sufficient for strip tillage systems. Though these systems do not provide the repeatability of RTK systems, the operator could use the shift track feature to align the planter on the initial pass. WAAS corrected auto steer systems with pass to pass accuracies of 8-10 inches are likely not capable of providing the driving accuracy necessary for strip tillage systems.

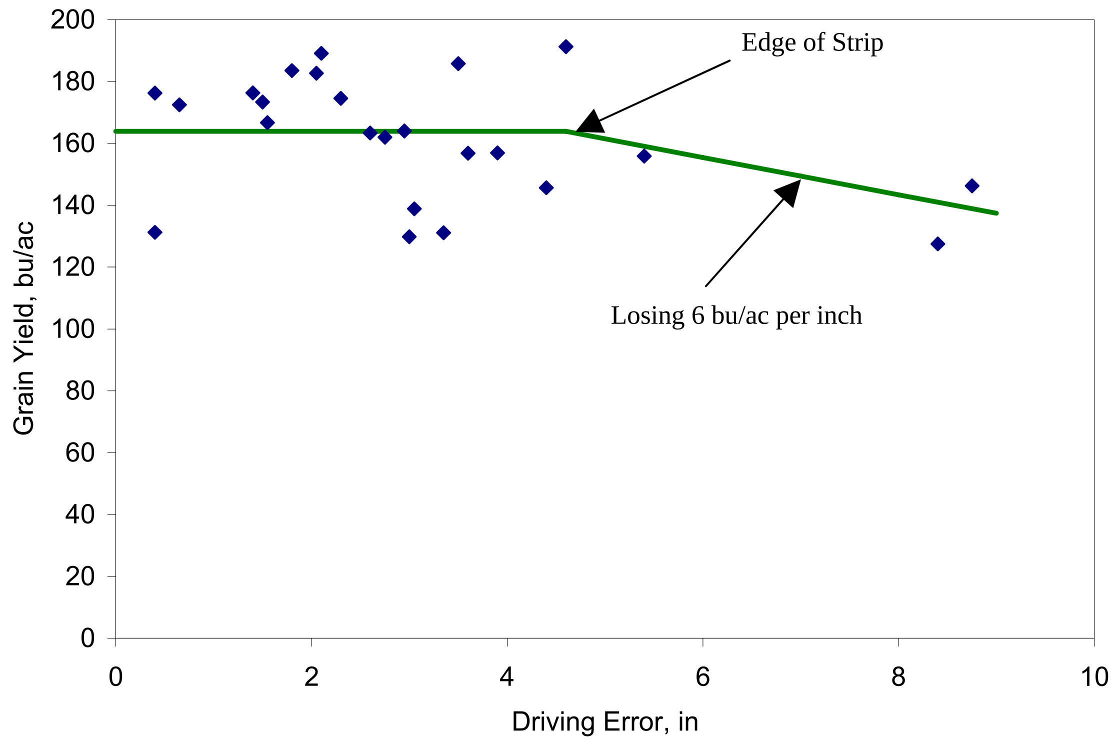

Figure 4. Grain yield versus driving error for irrigated corn at the Panhandle Research and Extension Center for the 2007 production year.

Conclusion

The underlying assumption to driving accuracy in strip tillage is that yield will decrease as you plant further from center of the strip. Research in Oklahoma has found some potential benefits. Data collected for this study found that there was no significant yield decrease for corn planted within 4.5 inches of the center of the strip. Since the strips were about 8-9 inches wide, there was no penalty until you planted outside the strip. This data show that every inch of driving error away from the edge of the strip resulted in a yield loss of 6 bu/ac.

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UTILIZING STRIP-TILLAGE FOR DRY-LAND CROP ROTATIONS IN THE HIGH PLAINS

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Producer interest is growing in the high plains for a dryland crop rotation system that utilizes strip-tillage. Many producers have concerns with applying N fertilizer on the surface in no-till systems because this increases the opportunity for volatilization or N becoming tied up in surface residue. In the fall of 2003, a study was initiated at OPREC to determine the effect of strip-till timing alone (no fertilizer applied) has on yield. After one year of the strip-till alone study a study where fertilizer was applied with the strip-tiller was began. In 2005 a study with three treatments, no-till, strip-till, and strip-till with fertilizer applied (banded below the surface) was started. The fertilizer rate was the same for all treatments. Fertilizer was surface broadcast in the no-till and strip-till (without fertilizer) treatments. Both strip-till treatments and all the fertilizer was applied in mid March. This date was picked because no differences were observed among dates of the timing study in year one although in the future the strip-till will be done in the summer following wheat harvest. In 2006, two more treatments were added to the study which where no-till and strip-till without any fertilizer applied, also strip-till was done at planting. Grain sorghum was selected as the crop to be grown because it is the most widely grown dryland summer crop in the high plains. Plots are four rows wide and 50 ft long and strip-tilled with an Orthman four-row one-tripper at a depth of 8 inches.

Results

There have been no differences in yield or test weight among the treatments in the duration of this study (Table 1 and 2). Although the no-till had higher yields in 2006 no statistical difference was found. No response to N fertilizer has been observed in the first three years and is difficult to explain. Also, no difference was observed at other locations (Cherokee and Blackwell) in 2005 where yields were higher at 112.9 and 68.2 bu/ac, respectively. It appears from observations from 2006 and 2007 that strip-till for dryland grain sorghum production maybe an option for producers. With no difference observed in yields when strip-till and planting are done at same time. Data from this study initiated further evaluation of the effects of timing of strip-till. In the summer of 2007 a new experiment was initiated to evaluate 4 dates of strip-till and will be reported in the 2008 research highlights.

Table 1. Grain sorghum yield and test weight in 2005 from strip-till fertility study at OPREC.

Treatment	Grain Yield bu/ac	Test weight lb/bu
Strip-till only	43.4	57.4
Strip-till with fertilizer	41.9	57.4
No-till	41.0	57.1

Table 2. Grain sorghum yield from strip-till fertility study at OPREC, in 2006 and 2007.

Treatment	2006	2007	Two-year
No-till no fertilizer	77.3	52.9	65.1
No-till with fertilizer	74.9	47.3	61.1
Strip-till surface fertilizer	65.6	52.3	58.9
Strip-till applied fertilizer	60.3	46.3	53.4
Strip-till no fertilizer	59.9	48.7	54.0

Use of Distiller's Grains (Wet & Dry) in Flaked Corn Diets for Finishing Beef Cattle

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Abstract

One hundred and eighty mixed steer calves (898 ± 62 lb) were blocked by weight (six blocks) and randomly allotted into six head pens to evaluate inclusion of distillers grain in flaked corn finishing diets. Treatments were: 1) steam flaked corn control finishing diet, or inclusion of 2) 10% dry distillers grains, 3) 10% wet distiller's grains, 4) 20% wet distiller's grains, or 5) 30% wet distiller's grains. All diets contained 8.0% chopped alfalfa and inclusions replaced flaked corn. Cattle averaged 123 days on feed with a range of 101 to 143. There was no difference ($P > 0.11$) in final body weight, average daily gain, or dry matter intake which averaged 1365.4 lb, 3.83 lb/d, and 23.01 lb, respectively. There was no difference ($P > 0.12$) in carcass weight, dressing percentage, fat thickness, kidney pelvic heart fat, rib eye area, or yield grade which averaged 887 lb, 64.96%, o.52 in, 2.36%, 14.01 sq in, and 3.15, respectively. Feed efficiency calculated with final live weights shrunk 4% resulted in a treatment tendency ($P = 0.06$) with a linear decrease ($P = 0.05$) as level of wet distillers grains increased. Feed efficiency calculated with carcass adjusted final weights resulted in no treatment affect ($P = 0.32$) with an average of 6.02 lb of DMI per lb of gain. Marbling score resulted in a treatment difference ($P = 0.03$) where the contrast of control diet (384) vs. inclusion of 10% dry distillers grain (416) was significant ($P < 0.02$). For marbling score, contrast of inclusion of 10% dry vs. 10% wet distillers grains, linear wet distillers grain level and quadratic wet distillers grain level were not significant ($P > 0.23$). The average marbling score was 392. This experiment indicates that inclusion of up to 10% dry or 30% wet distillers grains into steam flaked corn finishing diets did not result in any consistently detectable influence on animal performance or carcass characteristics. However, numerical trends were similar to results observed by other researchers. These data suggest that distiller's grains contain approximately 86% the energy of steam flaked corn.

Key Words: cattle, feedlot, flaked corn, wet distiller's grains, dry distiller's grains

Introduction

As the U.S. ethanol industry continues to expand, the availability of by-products generated from milling processes will increase. Current and planned ethanol plant constructions within about 100 miles of the Oklahoma panhandle could eventually produce about 500 million gallons of ethanol per year. Along with ethanol, about 5 million tons of wet distiller's grains (33% dry matter) will be produced per year (~13,700 tons/day). Therefore, there will be tremendous opportunity for Oklahoma cattle feeders to take advantage of and use this by-product in their operations. The majority of the research evaluating the use of distiller's grains in feedlot rations has been done with dry-rolled corn (DRC) or high-moisture corn (HMC) based diets in the northern Great Plains, whereas, most feedyards in the southern Great Plains feed steam-flaked corn (SFC) based diets. In Nebraska research, Vander Pol et al. (2006b) fed yearling steers (773 lb initial weight) 0, 10, 20, 30, 40, or 50% (DM basis) of corn wet distiller's grains plus solubles (WDGS) in DRC/HMC (1:1 ratio) based diets. WDGS improved performance at all inclusion levels with the optimum response occurring with 30 to 40% WDGS which improved feed efficiency 11 to 13%. In an additional experiment, Vander Pol et al. (2006a) evaluated the effects of six corn processing methods in feedlot diets containing 30% WDGS (DM basis) fed to yearling steers (701 lb initial weight). Treatments consisted of whole corn, DRC, DRC/HMC mix, SFC and fine ground corn. Results indicated that there was a performance advantage when feeding WDGS with corn processed as either dry-rolled or high-moisture. In contrast, cattle fed SFC did not gain or convert as well as expected.

Some evidence suggests that the optimum inclusion level is considerably lower than 40% for diets based on SFC. Daubert et al. (2005, Kansas State University) fed heifers (849 lb initial weight) 0, 8, 16, 24, 32 or 40% sorghum WDGS in diets based on SFC. Although heifers were only fed for 58 days, feed efficiency was improved 9% for heifers fed 16% WDGS and efficiency became similar to the control heifers after diets contained more than approximately 24% WDGS. In the southern Plains (Texas Tech University), Vasconcelos et al. (2007) fed feedlot steers (889 lb initial weight) diets containing 0, 5, 10, or 15% sorghum WDGS or 10% corn WDGS (DM basis) in SFC based diets. In contrast to previous studies which reported improved daily gains and feed efficiency in cattle fed WDGS, there was a linear decrease in both gain and efficiency with increasing sorghum WDGS concentration. There was no difference in performance between steers fed 10% sorghum WDGS or 10% corn WDGS.

Additional Nebraska research (Corrigan et al., 2007) fed feedlot steers (692 lb initial weight) WDGS at 0, 15, 27.5, or 40% of the diet (DM basis) in DRC, HMC and SFC based diets. Optimal feedlot performance was observed with 40%, 27.5%, and 15% WDGS in DRC, HMC, and SFC based diets, respectively. These researchers concluded that a greater response to WDGS was observed with less intensely processed corn. Additional Kansas research (May et al., 2007) evaluated feeding feedlot steers (997 lb initial weight) WDGS at levels of 0, 10, 20, or 30% (DM basis) in DRC and SFC based diets. In this trial, adding WDSG to DRC based diets improved performance, whereas, adding WDSG to SFC based diets appeared to reduce performance.

In summary, data evaluating the use of corn WDGS in SFC based feedlot diets suggest that the optimal inclusion level may be less than that observed with other forms of processed corn. With the anticipated construction of primarily corn ethanol plants in the southern Great Plains and thus, increased availability of distiller's grains, additional research evaluating the use of increasing levels of corn WDGS in SFC diets is needed. In addition, since feedyards in the Southern Great Plains tend to be larger than yards in the Northern Great Plains, management concerns with the feeding of WDGS may differ.

The objectives of this experiment were to determine effects of feeding high levels of WDGS in SFC diets and compare a lower level of WDGS to a similar level of dry distiller's grains plus solubles (DDGS) that is representative of current feeding practices in the region.

Material and Methods

On April 17 and 21, 2007, 157 crossbred yearling steers (initial BW = 886 ± 59.9 lb) and 50 crossbred yearling steers (869 ± 63.2 lb), respectively, were received at the Henry C Hitch feedyard in Guymon, OK. On arrival, each animal was individually weighed, ear tagged, and treated for internal and external parasites with Dectomax Injectable (Pfizer Animal Health, Exton, PA), vaccinated with Bovi-Shield Gold 5(IBR, BVD Types 1 and 2, PI3, BRSV; Pfizer Animal Health, Exton, PA) and 7 Gauge (*Clostridium chauvoei-septicum-novyi-sordellii-perfringens* types C & D bacterin toxoid; Boehringer Ingelheim Vetmedica Inc.; St. Joseph, MO for Walco International), and implanted with Component TE-S with Tylan (120 mg of trenbolone acetate and 24 mg of estradiol with 29 mg of tylosin tartrate; manufactured for VetLife by Ivy Laboratories, Overland Park, KS). All cattle were placed in a single pen and fed a diet containing 29.4% HMC, 19.6%

SFC, 20% chopped alfalfa, 15% corn silage, 9.7% DDGS, 4.3% pelleted supplement, and 2% fat (DM basis).

On April 30, 2007, 180 steers were sorted off from the original 207 head based on initial weight, behavior, and health to be used in this trial. These 180 steers were shipped to the Oklahoma Panhandle State University farm at Goodwell, OK on May 3, 2007. The steers were weighed on two successive days (May 3 and 4; 898 ± 59.7 lb, 3% pencil shrink), blocked by weight and randomly allotted to 30 pens (six hd/pen). Five treatments were randomly assigned to pens within each block. The five dietary treatments (Table 1) were: 1) steam flaked corn control finishing diet (CON), or inclusion of 2) 10% dry distillers grains (D10%), 3) 10% wet distillers grains (W10%), 4) 20% wet distillers grains (W20%), or 5) 30% wet distillers grains (W30%). All diets contained 8.0% chopped alfalfa and inclusions replaced SFC. All diets were balanced to contain a minimum of 13 percent crude protein and meet 105% of the estimated degradable intake protein requirement. The WDGS was obtained from an ethanol plant in Oakley, KS and stored in plastic silage bags for the duration of the experiment. At the time the WDGS was produced, the plant was receiving about 70% corn and 30% sorghum. The SFC (28 lb/bu) was picked up two to three times per week at the Henry C Hitch feedyard and stored in a commodity bay.

On the first two days of the trial (May 4 and 5), the cattle were fed the same diet that they were fed at the feedyard. On day 3, the cattle were adapted to the final diets by sequentially feeding 32, 24, and 16% alfalfa diets for five days each. Cattle were fed twice daily (0630 and 1430) in quantities sufficient to ensure ad libitum consumption. Feed bunks were evaluated visually each day of the experiment at 0630 to determine the quantity of feed to offer each pen. The bunk management strategy was designed to allow for 0 to 2 lb of feed remaining at the time of evaluation.

Cattle were weighed individually (full weights) at 28-d intervals. All weights are presented with a 4% pencil shrink. Four steers were removed from the trial during the feeding period for reasons unrelated to the experimental treatments (two cripples and two hard breathers). When the block was expected to have an average backfat thickness of 0.5 inches based on visual appraisal, cattle were shipped approximately 134 miles to an Excel Beef slaughter facility in Dodge City, KS. The trial ended on d 101 for two blocks, d 130 for three blocks and d 143 for the last block. On each of these days, the cattle were shipped to the slaughter facility. Carcass data were obtained by personnel from Oklahoma State University. Carcass measurements included hot carcass weight (HCW), longissimus muscle (LM) area, marbling score of the LM, percentage of kidney, pelvic and heart fat (KPH), backfat thickness, calculated USDA yield grade, and USDA quality grade. Dressing percent (average = 64.96%) was used to calculate carcass-adjusted final body weight from HCW and to subsequently calculate carcass-adjusted ADG and feed/gain ratio (F:G).

The quantity of feed offered was recorded daily throughout the trial. At the end of each weigh period, feed bunks were swept, and any remaining feed was weighed and subtracted from the total quantity of feed offered to the pen. Pen records for average body weight and feed consumption were used to calculate ADG, DMI, and F:G for each weigh interval and for the total duration of the trial.

Statistical Analysis

Data were analyzed as a randomized complete block design using the MIXED procedure of SAS (SAS Institute Inc., Cary, NC). Variables included were BW, DMI, ADG, F:G, HCW, carcass adjusted variables (calculated using carcass-adjusted final BW which is equal to HCW divided by the average dressing percent), and other carcass traits. Pen was the experimental unit for all analyses. The model statements included the fixed effect of treatment and the random effect of block. Data for steers not completing the trial were removed prior to analyses. The following pre-planned contrasts were evaluated: 1) response to increasing levels of WDGS (linear and quadratic), 2) comparison of D10% vs. W10%, and 3) CON vs. D10%.

Results and Discussions

The effects of feeding distiller's grains on steer performance are presented in Table 2. Final body weight averaged 1365 lb. Body weight on d 84 decreased linearly with increasing levels of WDGS (P = 0.03). Feed treatment tended to effect final body weight (P = 0.11) with body weight tending to decrease linearly as level of WDGS increased (P = 0.09). No differences in carcass adjusted final body weight were observed. Feed treatment tended to effect overall ADG on a live BW basis (P = 0.15) with a tendency for ADG to decrease linearly as level of WDGS increased P = 0.14). Overall ADG averaged 3.83 lb/d. Treatment did not affect DMI (overall DMI averaged 23.01 lb/d).   Feed efficiency over the first 84 d on feed was altered by treatment (P = 0.01) with a linear decrease as level of WDGS increased (P = 0.005). Feed conversion calculated with final live weights resulted in a linear increase in the amount of feed required per pound of gain (P = 0.05) as level of WDGS increased (average of 6.02 lb of DMI per lb of gain). Feed conversion calculated with carcass adjusted final weights resulted in no treatment effect.

The effects of feeding distiller's grains on carcass characteristics are presented in Table 3. There was no treatment difference in HCW, dressing percentage, fat thickness, KPH, or USDA yield grade. Treatment tended to affect LM area (P = 0.12) with a linearly tendency for LM area to decrease with increasing levels of WDGS (P = 0.05). The average LM was 14.05 sq in. Marbling score resulted in a treatment difference (P = 0.03) where the contrast of CON (384) vs. D10% (416) was significant (P<0.02). For marbling score, contrast of D10% vs. W10%, linear WDGS level and quadratic WDGS level were not significant. The average marbling score was 392. The percent of carcasses grading USDA choice tended to be influenced by treatment (P = 0.06) with the comparisons of D10% vs. W10% (P = 0.08: 59.4 vs. 38.9%) and CON vs. D10% (P = 0.05: 36.1 vs. 59.4%) approaching significance. Level of WDGS had no effect on the percent of carcasses grading choice.

The effects of feeding distiller's grains on net energy values of the diet are shown in Table 4. Net energy values of each diet were calculated from actual performance data and intakes using generalized quadratic formulas based on Beef NRC (2000) equations. Using the calculated net energy values of the control diet and book values for energy for the alfalfa and the supplement, net energy values for the SFC were determined by difference. The net energy values for the SFC calculated in this manner were 1.041 and 0.720 Mcal/lb for NEm and NEg, respectively. These values are similar to those reported in the Beef NRC (2000) of 1.057 and 0.735 Mcal/lb for NEm and NEg, respectively. These calculated net energy values for the SFC and the book values for the alfalfa and the supplements were then used to calculate the energy contents of the various diets excluding the distiller's grains. The difference between these energy values excluding distiller's grains and the previously calculated energy values (based on performance and NRC equations) was then divided by the proportion of distiller's grain in the diet to determine the energy content of the distiller's grains. These data suggest that the NEg content of distiller's grains is approximately 86% that of SFC. This value is similar to that observed by Texas researchers. Texas A&M data from Bushland (MacDonald, 2008) suggest the NEg content of WDGS is 99.8% of SFC when 20% WDGS is fed in SFC based diets. Data from West Texas A& M University (Brown and Cole, 2008) suggest the NEg content of WDGS 81% of SFC when 15% sorghum WDGS is fed in SFC based diets. In contrast, Nebraska research (Vander Pol, et al., 2006) suggested the energy value of

WDGS relative to HMC/DRC (1:1 ratio) was 121 to 178% when fed at levels of 0, 10, 20, 30, 40, or 50% (DM basis). In this research, the energy value of WDGS decreased as dietary inclusion rate increased from 10 to 50%. These data clearly suggest that the value of WDGS is considerably lower when fed in SFC based diets as compared to DRC or HMC based diets.

In summary, significant differences in performance were not observed. However, the observed numerical trends in ADG, DMI, and feed efficiency were similar to that observed by other researchers (Figure 1 to 3). These data and other data suggest that the optimal level of WDGS in steam flaked corn based is about 10 to 15%. Feeding increasing levels of WDGS appear to reduce the performance of feedlot cattle (ADG and feed efficiency). In this experiment, feeding 10% DDGS appeared to improve marbling scores and thus, increase the percent of carcasses grading USDA choice compared to the control treatment. Feeding levels of WDGS up to 30% had no effect on marbling or resulting USDA quality grade. These data suggest that distiller's grains contain approximately 86% the energy of SFC.

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Table 1. Composition and formulated nutrient content of diets (DM basis).

	Treatment[1]				
Item	CON	D10%	W10%	W20%	W30%
Ingredient					
Steam-flaked corn	84.50	74.50	74.00	64.50	54.50
Alfalfa	8.00	8.00	8.00	8.00	8.00
DDGS	---	10.00	---	---	---
WDGS	---	---	10.00	20.00	30.00
Pelleted supplement	7.50	7.50	7.50	7.50	7.50
Supplement Composition, % of DM					
Wheat middlings	13.59	64.02	64.08	68.92	73.56
Cottonseed meal	41.97	---	---	---	---
Urea	13.34	7.12	6.87	4.00	1.33
Limestone	19.54	20.39	20.39	20.24	20.06
Dicalcium phosphate	1.44	---	---	---	---
Potassium chloride	5.88	4.21	4.40	2.59	0.79
Salt	3.33	3.33	3.33	3.34	3.34
Trace mineral premix[2]	0.33	0.33	0.33	0.33	0.33
Rumensin 80	0.25	0.25	0.25	0.25	0.25
Vitamin premix[3]	0.17	0.17	0.17	0.17	0.17
Tylan 40	0.17	0.17	0.17	0.17	0.17
Thiamine[4]	0.01	0.01	0.01	0.01	0.01
Nutrient Composition					
DM, %	83.13	84.06	73.17	65.34	59.02
CP, %	13.00	13.01	13.01	14.56	16.15
Ca, %	0.74	0.74	0.75	0.75	0.75
P, %	0.30	0.35	0.35	0.41	0.46
K, %	0.74	0.74	0.73	0.73	0.72
S, %	0.15	0.21	0.21	0.27	0.33
Fat, %	3.70	4.46	4.58	5.33	6.08
DIP, % of DM	7.92	6.75	6.89	6.95	7.04

[1]Treatments were as follows: CON = control; D10% = 10% dried distiller's grains with solubles; W10% = 10% wet distiller's grains with solubles; W20% = 20% wet distiller's grains with solubles; and W30% = 30% wet distiller's grains with solubles.
[2]Contained 0.12% cobalt, 3.6% copper, 2% iron, 0.5% magnesium, 15% manganese, 0.132% selenium, 20% zinc, and 0.23% iodine.
[3]Contained 2,000,000 IU/lb vitamin A; 20,000,000 IU/lb vitamin D; and 50,000 IU/lb vitamin E.
[4]Formulated to provide 60 mg/hd/d.

Table 2. Effects of wet distiller's grains and dried distiller's grains on performance of feedlot steers.

	Treatment[1]							Contrast[2]		
	CON	D10%	W10%	W20%	W30%	SE	TRT[2]	D vs. W	Linear	Quad
Body Weights, lb[3]										
Initial	901.8	897.7	898.9	897.2	897.6	1.83	0.393			
d 28	1018.4	1024.8	1026.2	1014.1	1010.3	6.50	0.389			
d 56	1130.8	1136.1	1130.1	1113.6	1119.8	8.21	0.328			
d 84	1243.2	1248.8	1238.5	1217.5	1221.5	7.16	0.052	0.381	0.029	0.598
Final[4]	1370.5	1381.5	1375.0	1347.5	1352.5	10.06	0.114	0.651	0.085	0.983
Adj. Final[5]	1382.0	1374.8	1371.2	1348.6	1351.4	13.35	0.330			
ADG, lb										
d 0 to d 28	4.16	4.54	4.55	4.18	4.04	0.218	0.364			
d 0 to d 56	4.09	4.26	4.13	3.87	3.98	0.146	0.410			
d 0 to d 84	4.06	4.18	4.04	3.81	3.86	0.100	0.095	0.346	0.077	0.735
d 0 to end	3.85	3.96	3.90	3.69	3.74	0.082	0.154	0.641	0.141	0.972
Adj. d 0 to end[5]	3.93	3.90	3.87	3.69	3.74	0.111	0.474			
DMI, lb/d										
d 0 to d 28	21.37	22.10	22.16	22.12	21.74	0.402	0.595			
d 0 to d 56	22.31	22.75	22.82	22.57	22.45	0.426	0.912			
d 0 to d 84	22.59	23.34	23.05	22.83	22.70	0.413	0.720			
d 0 to end	22.71	23.46	23.19	23.01	22.68	0.380	0.573			
F:G										
d 0 to d 28	5.17	4.94	4.89	5.43	5.41	0.215	0.272			
d 0 to d 56	5.47	5.38	5.55	5.87	5.65	0.148	0.218			
d 0 to d 84	5.57	5.60	5.71	6.00	5.88	0.089	0.010	0.410	0.005	0.168
d 0 to end	5.90	5.94	5.94	6.25	6.08	0.088	0.061	0.954	0.047	0.243
Adj. d 0 to end[5]	5.79	6.03	6.00	6.25	6.09	0.152	0.324			

[1]Treatments were as follows: CON = control; D10% = 10% dried distiller's grains with solubles; W10% = 10% wet distiller's grains with solubles; W20% = 20% wet distiller's grains with solubles; and W30% = 30% wet distiller's grains with solubles.
[2]Observed significance level for treatment and contrasts: D vs. W = D10% vs. W10%; Linear = Linear for WDGS treatments; Quad = Quadratic for WDSG treatments.
[3]Initial weight is presented with a 3% pencil shrink. All body weights after initial are presented with a 4% pencil shrink.
[4]Cattle were on feed an average of 123 d.
[5]Adjusted final weight was calculated from hot carcass weight divided by the average dressing percent (64.96%) of all the cattle after which ADG and F:G values were recalculated using the adjusted final weight.

Table 3. Carcass characteristics of steers fed wet distiller's grains and dried distiller's grains.

	Treatement[1]							Contrast[2]		
	CON	D10%	W10%	W20%	W30%	SE	TRT[2]	D vs. W	Linear	Quad
Hot carcass weight, lb	897.8	893.1	890.8	876.0	877.9	8.67	0.330			
Dressing percent	65.5	64.6	64.8	65.1	64.8	0.37	0.502			
Fat thickness, in	0.53	0.50	0.51	0.54	0.52	0.029	0.874			
% KPH	2.36	2.48	2.15	2.36	2.46	0.094	0.146	0.022	0.235	0.121
LM area, in^2	14.24	14.10	14.62	13.59	13.70	0.289	0.121	0.218	0.053	0.648
Yield grade	3.15	3.13	2.91	3.30	3.27	0.143	0.347			
Marbling score[3]	384	416	400	381	378	8.8	0.031	0.222	0.368	0.271
USDA choice, %	36.1	59.4	38.9	25.0	30.6	----	0.061	0.082	0.374	0.841

[1]Treatments were as follows: CON = control; D10% = 10% dried distiller's grains with solubles; W10% = 10% wet distiller's grains with solubles; W20% = 20% wet distiller's grains with solubles; and W30% = 30% wet distiller's grains with solubles.
[2]Observed significance level for treatment and contrasts: D vs. W = D10% vs. W10%; Linear = Linear for WDGS treatments; Quad = Quadratic for WDSG treatments.
[3]Marbling score: 300 = slight; 400 = small.

Table 4. Effect of distiller's grains on net energy values of the diets.[1]

	Treatment[2]				
	CON	D10%	W10%	W20%	W30%
Diet NEm, Mcal/lb[3]	0.957	0.948	0.947	0.916	0.936
Diet NEg, Mcal/.lb[3]	0.653	0.645	0.645	0.618	0.635
NE Values of Distiller's Grains					
NEm, Mcal/lb[4]		0.910	0.900	0.801	0.939
NEg, Mcal/lb[4]		0.621	0.620	0.527	0.643
NEm, % of SFC[5]		86.3	86.5	77.0	90.2
NEg, % of SFC[6]		86.3	86.1	73.2	89.3

[1]Used following NEm and NEg values (Mcal/lb) for SFC, alfalfa and supplements:

SFC – 1.041 and 0.720
Alfalfa – 0.560 and 0.309
Control supplement – 0.427 and 0.272
D10% supplement – 0.489 and 0.291
W10% supplement - 0.489 and 0.291
W20% supplement – 0.526 and 0.313
W30% supplement – 0.562 and 0.334

[2]Treatments were as follows: CON = control; D10% = 10% dried distiller's grains with solubles; W10% = 10% wet distiller's grains with solubles; W20% = 20% wet distiller's grains with solubles; and W30% = 30% wet distiller's grains with solubles.

[3]Calculated based on actual performance and intakes using NRC equations.

[4]Example calculation: (Diet NEm of D10% - Diet NEm excluding DDGS)/level of DDGS in diet

(0.948 – 0.857)/0.1 = 0.910

[5]NEm of distiller's grains/1.041 X 100

[6]NEg of distiller's grains/0.720 X 100

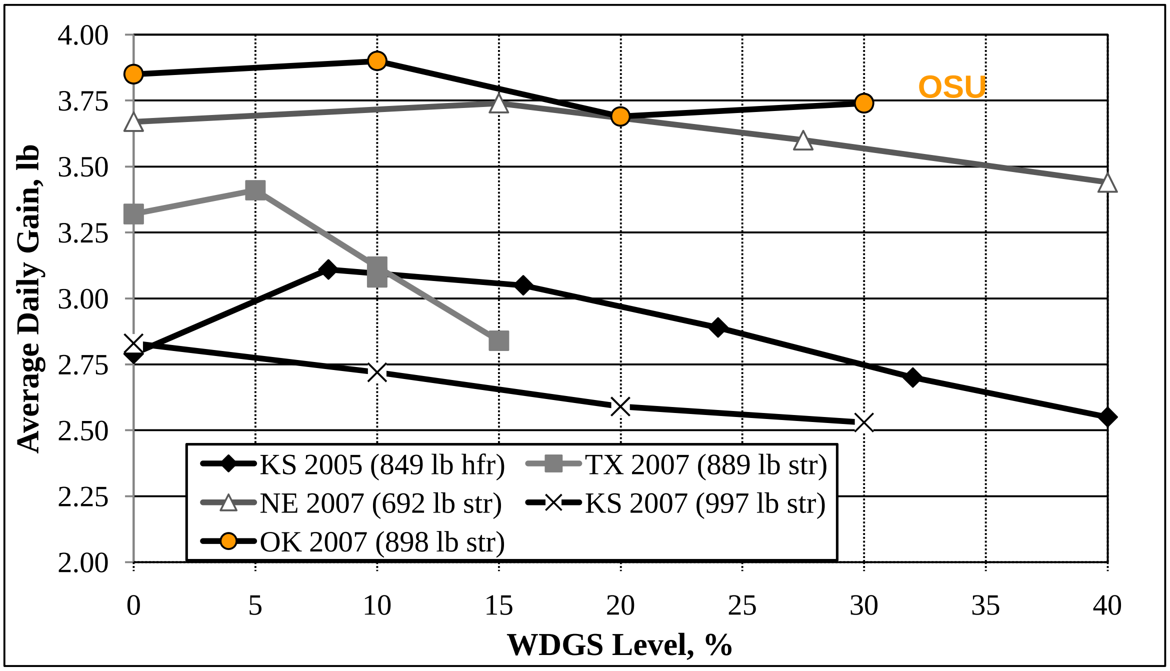

Figure 1. Effect of WDGS inclusion level on ADG in published research.

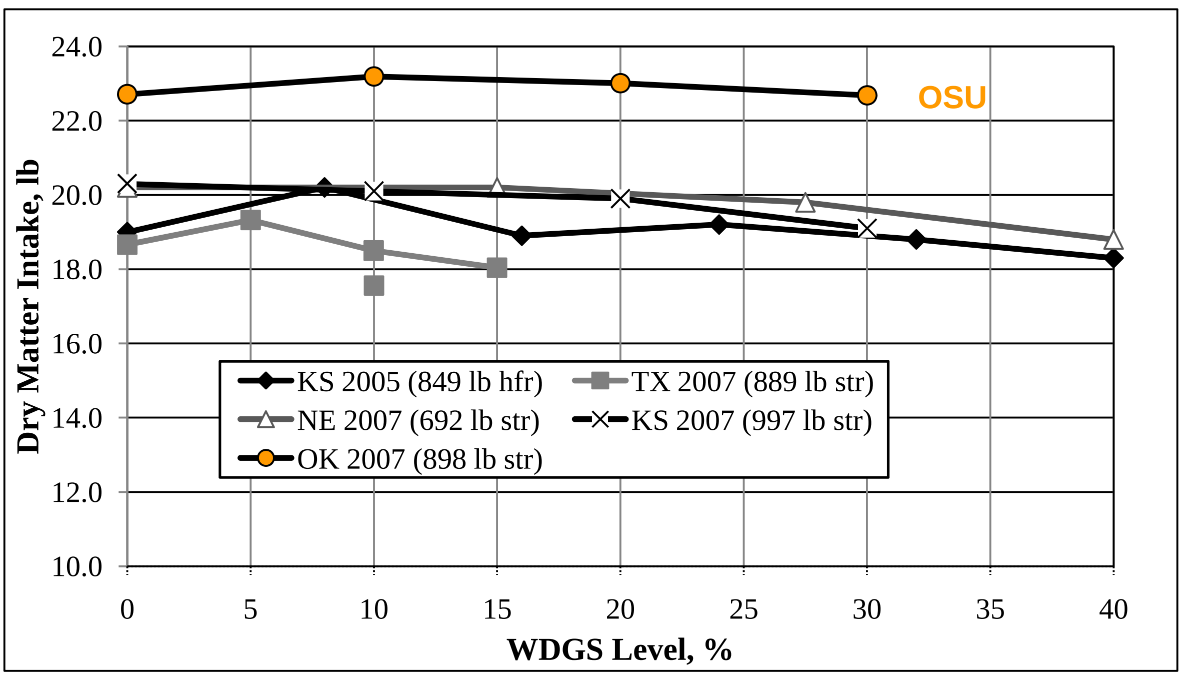

Figure 2. Effect of WDGS inclusion level on DMI in published research.

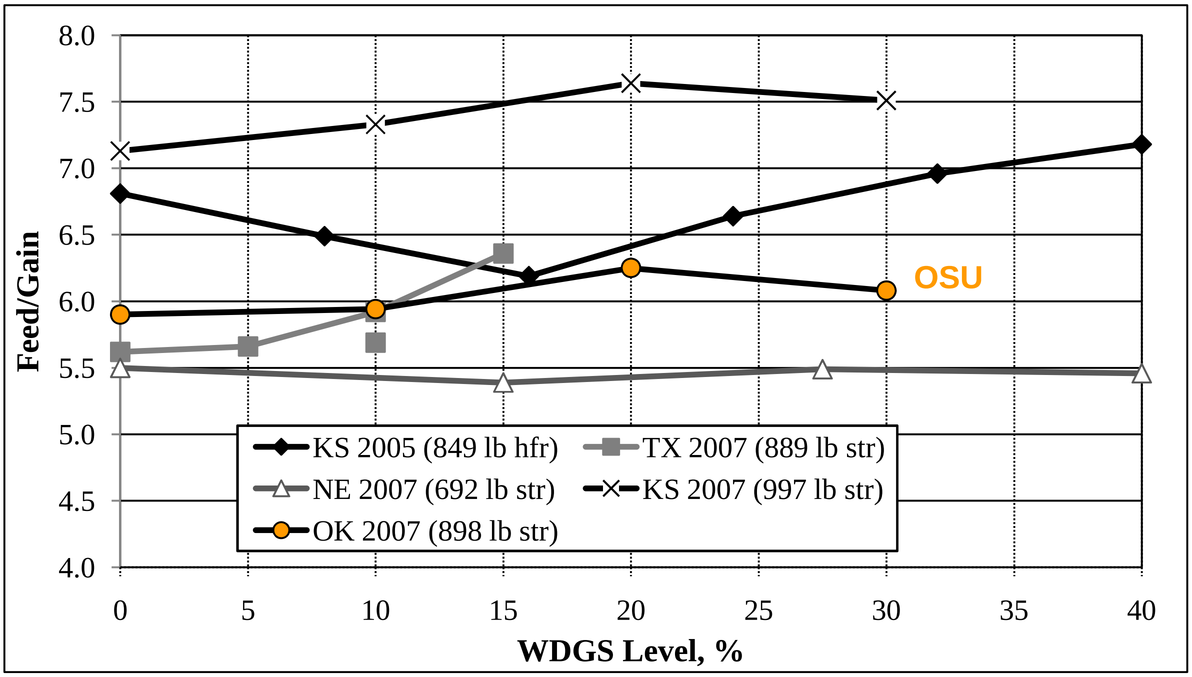

Figure 3. Effect of WDGS inclusion level on feed efficiency in published research.

Extension Reports

Oklahoma Small Grains Variety Performance Tests 2006-2007

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CONTENTS

This and other wheat-related publications can be found at:

www.wheat.okstate.edu

2007 WHEAT CROP OVERVIEW

The weather pendulum swung from one extreme to another during the 2006-2007 wheat production season. Most of the state was very dry during wheat sowing in the fall of 2006. In contrast, the 2007 harvest will go down as one of the wettest in history.

Wheat sowing generally went according to schedule in north-central Oklahoma. Crop emergence, however, did not. The majority of fields in this area of the state did not receive enough rainfall to induce wheat germination until January of 2007. As a result, grazing was not an option for most north-central Oklahoma wheat farmers.

Southwest Oklahoma wheat farmers were also hampered by dry conditions early in the fall of 2007. A few timely rainfalls in November and plenty of carryover soil nitrogen, though, helped salvage wheat forage production in this region of the state. In fact, wheat forage production at our El Reno test site was well over 1 ton per acre.

Eastern Oklahoma farmers had adequate moisture last fall and generally obtained a satisfactory stand of wheat. Fields in this region and most of northern Oklahoma were snow and/or ice covered during late December and early January. The moisture from these ice and snow events outweighed any tissue damage resulting from the cold temperatures. In fact, the snow and ice probably reduced the amount of tissue damage to wheat by insulating the crop from cold, blowing winds.

Ice and snow gave way to warmer-than-average temperatures during late winter and early spring. For example, average temperature for the month of March in Alfalfa and Kay counties was 9° F above the 35-year average. This, along with adequate moisture, allowed the late-emerging wheat in north-central Oklahoma to tiller much better than expected. This breathed new life into some fields that had been written off as non-salvageable.

Warm temperatures also advanced phenological development of the 2006-2007 wheat crop. By the time April 1 rolled around all but the latest-emerging fields in southwest and northeast Oklahoma were nearing or past the boot stage and many fields were partially headed. Freeze could not have hit at a worse time.

Temperatures the weekend of April 5 dipped well below freezing across much of the state. Hardest hit was northeastern Oklahoma where temperatures dropped well into the teens and stayed there for several hours. The vast majority of wheat in this part of the state was a total loss.

Initial evaluation of wheat in central and northern Oklahoma indicated that these areas had largely escaped freeze injury. Some fields of early varieties such as Overley displayed significant injury, but wheat heads and flag leaves in most fields remained green and showed little evidence of freeze injury.

The only symptomology observed in many of these fields was swollen or bent nodes a few centimeters above the soil surface. This stem injury appeared benign at first but later proved to be the downfall for much of the Oklahoma wheat belt. Fields that displayed this type of injury in mid-April were severely lodged by late-May. Many were never harvested. Those that were harvested produced low test weights and poor kernel size.

Wet conditions prevailed during the entire harvest season of 2007. Many fields that showed great promise earlier in the year were never harvested due to wet soil conditions and poor test weight.

The one bright spot in 2006-2007 was the Oklahoma Panhandle. With the exception of a few weeks in May, this region had adequate moisture during the entire growing season.

The leaf rust that devastated much of the Oklahoma crop did not appear in the Panhandle until late in the growing season and did not affect yield much. Nitrogen limited production in some fields, as yields were almost double what they have been the past couple of years and most farmers have become accustomed to fertilizing for lower yield potential.

Hessian fly was a major issue for many wheat producers again in 2006-2007. The common thread among several of the Hessian fly-infested fields was proximity to no-till continuous wheat. Other insect problems in 2006-2007 included fall armyworm, aphids, and true armyworm. Wheat farmers in the Panhandle also had to contend with Russian Wheat Aphid in a few fields.

Barley yellow dwarf virus was commonly observed in many wheat fields in the spring of 2007. There were also many look-alike symptoms in fields that laboratory analysis proved not to be barley yellow dwarf related. Some of these symptoms were probably caused by wet, cool conditions-others perhaps by heavy foliar disease pressure. The exact cause for yellowing in many of these fields, however, was never positively identified.

Foliar disease was present during much of the production season. Powdery mildew was present in susceptible varieties such as Jagger and Jagalene. Leaf rust was observed in many wheat fields as early as November of 2006. Leaf rust remained a major foliar disease problem throughout the production season and many fields were treated with a fungicide after flag leaf emergence. The variety Jagger, which was resistant to leaf rust when originally released, was hit hard by the disease in 2007. Newer varieties such as Overley and OK Bullet resisted the disease for much of the season but were showing some active rust pustules by mid May.

Black chaff was present in some Oklahoma wheat fields in 2007, which is a rare occurrence in Oklahoma. Likewise black (sooty) head mold was observed in Oklahoma wheat fields. Subsequent infection of maturing and mature grains resulted in black point in the grain harvested from many of these fields.

Methods

Locations. The OSU small grains research crew beat the weather and harvested several locations literally just before it rained. Unfortunately some locations never dried and could not be harvested. These included Apache, Homestead, Lahoma, Lamont, and Kildare. Similarly, our plots at Haskell were devastated by the April freeze and any hopes of harvesting were dashed by persistent rain.

Cultural Practices. Conventional plots were eight rows wide with six-inch row spacing. No-till plots were seven rows wide with 7.5 inch row spacing. Plots were either 20 or 40 feet long depending on location. Conventional till plots received 50 lb/ac of 18-46-0 in-furrow at planting. No till plots received 5 gal/ac of 10-34-0 at planting. The El Reno, Marshall DP, Frederick, and Cherokee locations were sown at 120 lb/ac and all other locations were sown at 60 lb/ac. Grazing pressure, nitrogen fertilization, insect and weed control decisions were all made on a location-by-location basis and reflect standard management practices for the area.

Additional information on the Web

A copy of this publication as well as additional variety information and more information on wheat management can be found at

www.wheat.okstate.edu

Table 1. Fall forage production by winter wheat varieties sown in 2006 at El Reno and Stillwater, OK.

Seed source	Variety	Location: Stillwater	El Reno Conv. Till	El Reno No Till	No-till diff†	Average
		lb/ac				
Oklahoma	Duster	2400‡	3650	2790	-860	2950
Oklahoma	Okfield	2480	3470	2590	-880	2850
Oklahoma	Centerfield	2380	3580	2420	-1160	2790
AgriPro	Fannin	2460	3590	2120	-1470	2720
Kansas	Fuller	2450	3410	2210	-1200	2690
Westbred	Shocker	2210	3310	2520	-790	2680
Oklahoma	2174	2420	3530	2080	-1450	2680
Oklahoma	Deliver	2530	3390	2060	-1330	2660
Johnstons	JEI 110	2350	3240	2330	-910	2640
AgriPro	Doans	2400	3330	2170	-1160	2630
Kansas	Danby	2380	3460	2020	-1440	2620
Oklahoma	OK Bullet	2270	3070	2430	-640	2590
Kansas	Overley	2210	3200	2350	-850	2590
Oklahoma	Endurance	2240	3290	2190	-1100	2570
AgriPro	Cutter	2200	3320	2160	-1160	2560
Agseco	Protection CL	2310	3250	2080	-1170	2550
AgriPro	Jagalene	2310	3240	2080	-1160	2540
Westbred	Santa Fe	2020	3300	2230	-1070	2520
AgriPro	TAM 111	2290	2970	2150	-820	2470
Kansas	Jagger	2200	2940	2190	-750	2440
	Average	2330	3330	2260	-1070	2640
	LSD	310	490	490	500	330

† No-till difference = no-till forage minus conventional-till forage

‡ Shaded numbers are not statistically different from the highest-yielding variety within a column

Table 2. Fall forage production by winter wheat varieties sown in 2004, 2005, and 2006 at El Reno, OK.

Seed source	Variety	2006	2-Year Average	3-Year Average
		lb/ac		
Oklahoma	Deliver	3390†	2870	2860
Johnstons	JEI 110	3240	2980	2800
Oklahoma	Endurance	3290	2840	2800
AgriPro	Cutter	3320	2690	2760
Oklahoma	2174	3530	2860	2750
AgriPro	Jagalene	3240	2650	2580
Kansas	Overley	3200	2500	2460
Kansas	Jagger	2940	2580	2430
AgriPro	Fannin	3590	3140	-
Oklahoma	OK Bullet	3070	2960	-
AgriPro	TAM 111	2970	2430	-
	Average	3330	2770	2680
	LSD	490	410	390

† Shaded numbers are not statistically different from the highest-yielding variety within a column

Table 3. Occurrence of first hollow stem (day of year) for winter wheat varieties sown in 2006 at El Reno and Stillwater, OK.

Seed source	Variety	Stillwater	El Reno Conv. Till	El Reno No Till	No-till diff†
		DOY‡			
Oklahoma	Duster	64	68	72	4
Oklahoma	Okfield	71	72	71	-1
Oklahoma	Centerfield	74	57	65	8
AgriPro	Fannin	57	75	75	0
Kansas	Fuller	57	57	65	8
Westbred	Shocker	59	57	65	8
Oklahoma	2174	74	75	75	0
Oklahoma	Deliver	71	75	75	0
Johnstons	JEI 110	71	70	72	2
AgriPro	Doans	71	68	72	4
Kansas	Danby	74	57	60	3
Oklahoma	OK Bullet	68	70	70	0
Kansas	Overley	57	57	65	8
Oklahoma	Endurance	74	68	72	4
AgriPro	Cutter	57	69	74	5
Agseco	Protection CL	54	57	59	2
AgriPro	Jagalene	57	57	66	9
Westbred	Santa Fe	57	59	61	2
AgriPro	TAM 111	71	72	75	3
Kansas	Jagger	57	68	69	1
	Average	65	65	69	4

† No-till difference = no-till DOY minus conventional till DOY

‡ DOY = Day Of Year; for example, March 1 is DOY # 60

Wheat Variety Comparison Chart

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Source	Entry	Lodging	First Hollow Stem	Maturity	High-temp germ. sensitivity	Coleoptile Length	Acid Soil Tolerance	Hessian Fly	Wheat Streak Mosaic†	Septoria	Soil- borne Mosaic	Leaf Rust	Stripe Rust	Powdery Mildew	Tan Spot	Variety Protection
HARD RED WINTER WHEAT VARIETIES																
AgriPro	AP502 CL	3	VE	VE	2	1	4	S	-	3	3	4	4	1	2	P-94
AgriPro	Cutter	4	VE	M	4	3	1	S	3	3	1	4	1	4	4	P-94
AgriPro	Doans	2	M	M	-	-	2	S	-	2	2	1	1	2	-	P-94
AgriPro	Dumas	1	E	E	2	4	4	S	-	3	4	3	-	3	2	P-94
AgriPro	Fannin	2	VE	VE	3	1	1	-	-	-	1	1	1	2	-	P-94
AgriPro	Jagalene	2	E	E	3	2	2	S	3	2	1	4	1	4	3	P-94
AGSECO	7853	3	VE	M	3	4	2	-	-	2	1	3	-	2	-	N
CSU	Above	2	VE	VE	2	2	4	-	3	3	4	4	4	1	2	P-94
CSU	Hatcher	3	-	M	-	2	3	-	-	-	-	3	2	-	-	P-94
CSU	Ripper	1	-	VE	-	2	4	S	-	-	-	4	4	-	-	P-94
KSU	Karl 92	3	E	E	2	4	3	-	-	2	1	4	-	1	2	P
KSU	2137	1	L	L	3	4	1	S	3	3	2	3	4	2	3	P-94
KSU	2145	2	E	E	2	2	3	PR	4	2	1	1	2	3	4	P-94
KSU	Fuller	2	VE	E	-	-	3	-	3	3	1	1	1	3	3	A-94
KSU	Ike	3	VL	L	2	2	4	PR	-	1	4	4	-	2	-	P-94
KSU	Jagger	3	VE	VE	1	2	1	S	3	1	1	4	1	4	2	P-94
KSU	Overley	1	VE	VE	4	3	2	S	3	2	1	3	1	4	2	A-94
NE	Scout 66	4	-	L	-	1	4	-	-	3	4	4	-	3	-	N
OSU	Triumph 64	4	L	M	4	1	4	-	-	4	4	4	-	3	1	N
OSU	2174	1	VL	L	4	3	3	PR	4	2	1*	2	2	1	4	P-94
OSU	Chisholm	2	L	E	3	3	3	PR	-	3	4	4	1	3	4	N
OSU	Centerfield	2	L	M	4	3	3	PR	-	-	2	2	2	1	4	A-94
OSU	Custer	2	E	E	1	3	4	-	-	3	4	3	4	1	3	N
OSU	Deliver	3	L	M	2	4	4	-	-	2	1	1	1	1	3	A-94
OSU	Duster	3	M	M	1	3	1	R	-	3	1	1	2	2	4	A-94
OSU	Endurance	2	VL	M	1	2	1	S	4	3	2*	2	2	2	3	A-94
OSU	OK Bullet	1	E	E	1	2	2	S	3	2	2	3	1	3	3	A-94
OSU	Ok101	2	E	VE	1	4	1	S	-	3	2	3	3	4	4	N
OSU	Ok102	1	VL	L	4	1	3	PR	-	3	1	2	4	2	4	N
OSU	Okfield	2	M	L	4	1	3	PR	-	3	4	3	3	1	3	A-94
TX	Lockett	4	E	VL	1	-	2	S	-	-	4	2	3	-	-	P-94
TX	TAM 107	3	E	M	3	2	4	-	-	3	4	4	-	1	-	P
TX	TAM 110	2	VE	VE	2	1	4	S	3	3	4	4	4	1	4	P-94
TX	TAM 111	3	M	M	3	1	3	S	3	2	3	3	4	4	3	P-94
TX	TAM 112	4	-	E	-	1	1	S	3	-	-	3	4	1	-	P-94
TX	TAM 303	2	-	E	-	1	-	S	-	-	-	1	3	1	-	A-94
WestBred	Shocker	2	VE	E	4	3	2	S	4	2	1	1	2	2	2	P-94
WestBred	Santa Fe	2	VE	E	1	2	2	S	3	1	1	1	2	3	2	P-94
HARD WHITE WHEAT VARIETIES																
KSU	Danby	3	VL	M	4	3	3	-	3	4	4	4	1	4	4	A-94
KSU	Heyne	3	VE	M	1	-	1	-	-	2	1	1	-	2	-	P-94
KSU	Lakin	2	VL	M	1	4	3	-	-	4	2	3	4	4	3	P-94
KSU	RonL	3	L	M	-	3	4	S	1	4	1	3	1	2	4	P-94
KSU	Trego	4	L	M	2	3	4	S	3	3	2	4	4	3	4	P-94
OSU	Guymon	3	VE	L	1	4	3	S	-	2	1	3	4	3	3	A-94
OSU	Intrada	4	E	E	1	3	3	S	-	3	2	3	3	4	2	N

General:
1 = Excellent
4 = Poor

Maturity & First Hollow Stem
VE = Very Early
E = Early
M = Medium
L = Late
VL = Latest

Coleoptile:
1 = Longest
4 = Shortest

Hessian Fly
S = Susceptible
PR = Partially resistant
R = Resistant

Variety Protection:
N = Not protected
P = Protected PVPA - 1970
P - 94 = Protected PVPA - 1994
A-94 = PVPA - 1994 applied for

* reaction presented is to soilborne mosaic; reaction to spindle streak is a '3'

† Ratings for wheat streak mosaic virus adapted from K-STATE publication MF-991, Erick De Wolf author.

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Jeff Edwards - Small Grains Extension; Bob Hunger - Plant Pathology Extension; Brett Carver - Wheat Breeding; and Tom Royer - Extension Entomologist

2007 Oklahoma Wheat Variety Trial Summary

Variety	Alva	Balko	Buffalo	Cherokee	Cimarron County	Elk City	El Reno Conv Till DP	El Reno Conv Till GO	El Reno No-Till DP	El Reno No-Till GO	Frederick	Gage	Goodwell Irrigated	Goodwell Non-irr.	Hooker	Kingfisher	Marshall DP	Marshall GO	Olustee
			-----------	-----------	-----------	-----------	-----------	-----------	-----------	----------bu/ac----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------		
2174	30	82	55	36	-	45	11	16	14	15	35	38	61	70	-	39	11	23	47
Avalanche (W)	-	81	-	-	70	-	-	-	-	-	-	-	64	67	59	-	-	-	-
Centerfield	36	83	56	34	-	46	15	12	12	13	44	40	66	58	-	33	9	25	47
Cutter	23	86	48	19	-	36	12	21	14	23	41	37	64	76	-	42	14	21	48
Danby (W)	29	98	57	26	81	48	20	23	17	20	41	53	73	73	62	47	15	23	46
Deliver	36	84	64	34	-	63	19	22	17	20	44	49	66	72	-	40	20	32	48
Doans	34	84	62	28	-	58	23	21	30	28	53	42	66	64	-	40	20	36	51
Duster	35	93	65	28	78	44	19	27	18	26	47	50	69	84	72	52	22	32	48
Endurance	34	94	65	40	75	53	19	25	20	25	45	52	68	77	70	45	20	29	50
Fannin	31	85	57	30	-	54	7	19	8	21	49	37	66	75	-	42	14	32	51
Fuller	32	88	65	35	-	61	17	26	20	30	54	55	76	78	-	52	19	40	60
Guymon (W)	-	89	-	-	-	-	-	-	-	-	-	-	67	68	-	-	-	-	-
Ike	-	78	-	-	-	-	-	-	-	-	-	-	60	71	-	-	-	-	-
Intrada (W)	-	91	-	-	65	-	-	-	-	-	-	-	65	73	60	-	-	-	-
Jagalene	19	87	49	18	73	35	8	18	12	20	34	40	69	75	58	42	11	21	50
Jagger	21	84	51	20	67	40	8	19	11	22	39	38	68	67	61	40	9	22	54
JEI 110	29	87	57	27	-	50	12	22	12	15	51	44	64	73	-	47	12	31	55
Lakin (W)	-	94	-	-	-	-	-	-	-	-	-	-	66	68	-	-	-	-	-
Neosho	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OK Bullet	33	92	63	29	77	59	17	22	19	28	45	49	73	78	67	50	21	37	59
Okfield	25	83	54	32	-	38	16	16	13	15	40	43	62	65	-	43	12	24	44
Overley	35	92	62	31	-	55	15	32	19	32	53	43	72	77	-	50	16	28	64
ProtectionCL	19	80	50	22	-	37	7	19	9	20	42	36	68	71	-	44	13	26	56
Santa Fe	33	92	64	33	-	56	14	22	14	28	47	43	77	71	-	49	20	32	59
Shocker	34	80	58	34	-	56	15	22	13	24	45	38	64	67	-	46	21	29	54
Stanton	-	83	-	-	-	-	-	-	-	-	-	-	62	78	-	-	-	-	-
TAM 110	-	89	-	-	72	-	-	-	-	-	-	-	60	68	58	-	-	-	-
TAM 111	28	98	60	-	72	43	13	24	14	18	40	49	74	75	65	48	18	28	45
TAM 112	-	97	-	-	76	-	-	-	-	-	-	-	73	72	75	-	-	-	-
Trego (W)	-	91	-	-	76	-	-	-	-	-	-	-	61	70	60	-	-	-	-
OK Bullet 06ERU	30	89	61	29	-	55	13	-	-	-	45	49	67	71	-	51	20	37	56
OK00611W	32	-	-	-	-	-	-	-	-	-	-	-	64	76	-	-	-	-	-
OK02125	28	-	-	29	-	-	16	-	-	-	48	-	65	-	-	44	17	31	-
OK02522W	31	91	62	30	-	63	18	-	-	-	51	47	66	75	-	51	19	37	58
OK03305	-	-	-	-	-	56	-	-	-	-	-	-	-	-	-	-	-	-	61
OK03522	-	-	60	-	-	-	-	-	-	-	-	-	-	-	-	51	-	-	-
OK04505	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OK05737W	-	92	63	32	-	61	15	-	-	-	44	-	71	70	-	53	20	33	-
OK05905C	26	-	-	-	-	-	-	-	-	-	33	41	-	-	-	-	-	-	-
Mean	**30**	**88**	**59**	**29**	**74**	**51**	**15**	**21**	**15**	**22**	**44**	**44**	**67**	**72**	**64**	**46**	**16**	**30**	**53**
LSD $_{(0.05)}$	**3**	**9**	**9**	**5**	**5**	**4**	**4**	**3**	**3**	**3**	**7**	**6**	**10**	**14**	**6**	**6**	**4**	**4**	**3**

Partial financial support provided by the Oklahoma Wheat Commission

Alva Variety Trial

Cooperator: Wes Mallory	**Tillage: Conventional till**
Soil type: Grant silt loam	**Management: Grain only**
Planting date: 10-26-06*	**Soil test information: pH = 5.3, P = 84, K = 623**

		Grain Yield			Test Weight
Source	Variety	2006-07	2-Year	3-Year	2006-07
		-----bu/ac----			---lb/bu---
Oklahoma	Centerfield	36	-	-	52
Oklahoma	Deliver	36	30	34	53
Oklahoma	Duster	35	31	-	52
Kansas	Overley	35	33	41	53
WestBred	Shocker	34	-	-	52
AgriPro	Doans	34	-	-	53
Oklahoma	Endurance	34	30	37	51
WestBred	Santa Fe	33	31	-	53
Oklahoma	OK Bullet	33	31	35	54
Kansas	Fuller	32	-	-	53
AgriPro	Fannin	31	29	36	55
Oklahoma	2174	30	27	31	53
Johnstons	JEI 110	29	27	-	50
Kansas	Danby (W)	29	-	-	54
Texas	TAM 111	28	28	-	53
Oklahoma	Okfield	25	26	30	51
AgriPro	Cutter	23	25	32	50
Kansas	Jagger	21	26	32	48
Agseco	Protection CL	19	-	-	45
AgriPro	Jagalene	19	24	30	49
Experimentals					
	OK00611W	32	30	-	53
	OK02522W	31	28	-	53
	OK Bullet 06ERU	30	-	-	54
	OK04505	29	-	-	52
	OK02125	28	-	-	51
	OK05905C	26	-	-	52
	Mean	30	29	34	52
	LSD $_{(0.05)}$	3	2	3	1

(W) = Hard white wheat variety

* Due to extremely dry soil conditions, wheat did not emerge until early 2007.

Partial financial support provided by the Oklahoma Wheat Commission

Balko Variety Trial

Cooperator: Kenton Patzkowsky | **Tillage: No-till**
Soil type: Ulysses-Richfield complex | **Management: Grain only**
Planting date: 10-03-06 | **Soil test information: pH = 7.8, P = 119, K = 1642**

		Grain Yield			Test Weight
Source	Variety	2006-07	2-Year	3-Year	2006-07
		-----bu/ac----			-----lb/bu-----
Kansas	Danby (W)	98	59	-	62
Texas	TAM 111	98	59	56	60
Texas	TAM 112	97	-	-	61
Oklahoma	Endurance	94	53	48	57
Kansas	Lakin	94	54	45	59
Oklahoma	Duster	93	56	-	58
Oklahoma	OK Bullet	92	56	52	60
Kansas	Overley	92	54	50	58
WestBred	Santa Fe	92	54	-	58
Oklahoma	Intrada (W)	91	53	48	60
Kansas	Trego (W)	91	56	50	59
Oklahoma	Guymon (W)	89	53	48	59
Texas	TAM 110	89	53	47	58
Kansas	Fuller	88	-	-	58
AgriPro	Jagalene	87	53	49	58
Johnstons	JEI 110	87	51	-	58
AgriPro	Cutter	86	53	49	59
AgriPro	Fannin	85	49	46	60
Oklahoma	Deliver	84	48	46	59
AgriPro	Doans	84	-	-	60
Kansas	Jagger	84	50	48	56
Oklahoma	Centerfield	83	-	-	57
Oklahoma	Okfield	83	51	47	58
Kansas	Stanton	83	50	46	58
Oklahoma	2174	82	48	44	59
Colorado	Avalanche (W)	81	52	44	59
Agseco	Protection CL	80	-	-	56
WestBred	Shocker	80	-	-	58
Kansas	Ike	78	48	-	59
Experimentals					
	OK05737W	92	-	-	59
	OK02522W	91	-	-	59
	OK Bullet 06ERU	89	-	-	59
	Mean	88	53	48	59
	LSD $_{(0.05)}$	9	5	3	1

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Buffalo Variety Trial

Cooperator: NRCS | **Tillage: Conventional till**
Soil type: St. Paul silt loam | **Management: Grain only**
Planting date: 10-23-06 | **Soil test information: pH = 5.3, P = 84, K = 623**

Source	Variety	Grain Yield 2006-07	Grain Yield 2-Year	Grain Yield 3-Year	Test Weight 2006-07
		-----bu/ac----			-----lb/bu-----
Oklahoma	Duster	65	50	-	56
Oklahoma	Endurance	65	49	46	55
Kansas	Fuller	65	-	-	56
Oklahoma	Deliver	64	48	47	56
WestBred	Santa Fe	64	-	-	55
Oklahoma	OK Bullet	63	48	-	58
AgriPro	Doans	62	-	-	58
Kansas	Overley	62	48	44	57
Texas	TAM 111	60	46	-	56
WestBred	Shocker	58	-	-	56
Kansas	Danby (W)	57	-	-	57
AgriPro	Fannin	57	41	41	56
Johnstons	JEI 110	57	46	-	55
Oklahoma	Centerfield	56	-	-	55
Oklahoma	2174	55	43	40	56
Oklahoma	Okfield	54	42	-	53
Kansas	Jagger	51	42	42	54
Agseco	Protection CL	50	47	-	53
AgriPro	Jagalene	49	41	41	54
AgriPro	Cutter	48	39	40	54
Experimentals					
	OK05737W	63	-	-	57
	OK02522W	62	-	-	57
	OK Bullet 06ERU	61	-	-	58
	OK03522	60	-	-	56
	Mean	59	45	43	56
	LSD $_{(0.05)}$	9	5	3	1

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Cherokee Variety Trial

Cooperator: Kenneth Failes **Tillage: Conventional till**
Soil type: Dale silt loam **Management: Grain Only***
Planting date: 10-17-06 **Soil test information: pH = 5.9, P = 63, K = 639**

		Grain Yield**			Test Weight
Source	Variety	2006-07	2-Year	3-Year	2006-07
		-----bu/ac----			-----lb/bu-----
Oklahoma	Endurance	40	22	30	51
Oklahoma	2174	36	20	26	51
Kansas	Fuller	35	-	-	52
Oklahoma	Deliver	34	18	23	53
Oklahoma	Centerfield	34	-	-	50
WestBred	Shocker	34	-	-	50
WestBred	Santa Fe	33	21	-	52
Oklahoma	Okfield	32	20	24	50
Kansas	Overley	31	22	30	52
AgriPro	Fannin	30	17	24	52
Oklahoma	OK Bullet	29	20	28	53
AgriPro	Doans	28	-	-	55
Oklahoma	Duster	28	18	-	50
Johnstons	JEI 110	27	18	-	49
Kansas	Danby (W)	26	-	-	53
Agseco	Protection CL	22	-	-	45
Kansas	Jagger	20	20	30	47
AgriPro	Cutter	19	14	25	47
AgriPro	Jagalene	18	16	25	47
AgriPro	Neosho	16	10	-	47
Experimentals					
	OK05737W	32	-	-	50
	OK02522W	30	17	-	52
	OK Bullet 06ERU	29	-	-	52
	OK02125	29	-	-	48
	Mean	29	18	27	50
	LSD $_{(0.05)}$	5	3	3	2

(W) = Hard white wheat variety

*Management was dual-purpose in 2005-06 and 2004-05

** All plots were severely lodged ($\geq$ 60%) prior to harvest

Cimarron County Variety Trial

Cooperator: J.B. Stewart

Tillage: No-till

Management: Grain only

Planting date: 9-29-06

Soil test information: Not Available

Source	Variety	Grain Yield 2006-07	Test Weight 2006-07
		-----bu/ac----	-----lb/bu-----
Kansas	Danby (W)	81	61
Oklahoma	Duster	78	60
Oklahoma	OK Bullet	77	61
Texas	TAM 112	76	60
Kansas	Trego (W)	76	61
Oklahoma	Endurance	75	59
AgriPro	Jagalene	73	61
Texas	TAM 110	72	58
Texas	TAM 111	72	60
Colorado	Avalanche (W)	70	62
Kansas	Jagger	67	59
Oklahoma	Intrada (W)	65	62
	Mean	74	60
	LSD $_{(0.05)}$	5	1

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Elk City Variety Trial

Cooperator: Carl Simon | **Tillage: Conventional till**
Soil type: Grandfield sandy loam | **Management: Dual purpose***
Planting date: 09-27-06 | **Soil test information: pH = 5.1, P = 48, K = 334**

		Grain Yield			Test Weight
Source	Variety	2006-07	2-Year	3-Year	2006-07
			-----bu/ac----		-----lb/bu-----
Oklahoma	Deliver	63	46	46	59
Kansas	Fuller	61	-	-	60
Oklahoma	OK Bullet	59	50	50	61
AgriPro	Doans	58	-	-	61
WestBred	Santa Fe	56	44	-	60
WestBred	Shocker	56	35	-	60
Kansas	Overley	55	43	45	60
AgriPro	Fannin	54	42	45	58
Oklahoma	Endurance	53	42	42	56
Johnstons	JEI 110	50	38	50	55
Kansas	Danby (W)	48	-	-	59
Oklahoma	Centerfield	46	-	-	56
Oklahoma	2174	45	37	32	58
Oklahoma	Duster	44	37	-	55
Texas	TAM 111	43	-	-	55
Kansas	Jagger	40	38	42	55
Oklahoma	Okfield	38	35	35	53
Agseco	Protection CL	37	-	-	53
AgriPro	Cutter	36	36	41	53
AgriPro	Jagalene	35	35	39	55
Experimentals					
	OK02522W	63	-	-	60
	OK05737W	61	-	-	59
	OK03305	56	-	-	60
	OK Bullet 06ERU	55	-	-	61
	Mean	51	39	41	58
	LSD $_{(0.05)}$	4	3	2	1

* Grazing pressure was very light in 2006-07 and 2005-06

Partial financial support provided by the Oklahoma Wheat Commission

El Reno Variety Trial

Cooperator: Bornemann Farms
Soil type: Pond creek silt loam
Planting date: 9-12-06

Tillage: Conventional till and No-till
Management: Dual purpose
Soil test information: pH = 6.0, P = 120, K = 355

		Conventional Till							No-till				
		2006-07			Multi-year		Test weight		2006-07			Test weight	
Source	Variety	Dual-purpose	Grain-only	***Diff.***	2-Year	3-Year	Dual-purpose	Grain-only	Dual-purpose	Grain-only	***Diff.***	Dual-purpose	Grain-only
		-----bu/ac----					--lb/bu--		-----bu/ac----			--lb/bu--	
AgriPro	Doans	23	21	***-2***	-	-	54	56	30	28	***-2***	56	57
Kansas	Danby (W)	20	23	***3***	-	-	52	55	17	20	***3***	49	52
Oklahoma	Deliver	19	22	***3***	27	36	52	54	17	20	***3***	51	54
Oklahoma	Duster	19	27	***8***	28	28	50	51	18	26	***8***	47	51
Oklahoma	Endurance	19	25	***6***	26	36	50	56	20	25	***5***	51	54
Kansas	Fuller	17	26	***9***	-	-	50	54	20	30	***10***	51	54
Oklahoma	OK Bullet	17	22	***5***	29	29	52	55	19	28	***9***	51	56
Oklahoma	Okfield	16	16	***0***	26	26	48	50	13	15	***2***	44	48
Oklahoma	Centerfield	15	12	***-3***	-	-	49	51	12	13	***1***	47	50
Kansas	Overley	15	32	***17***	28	35	50	54	19	32	***13***	52	55
WestBred	Shocker	15	22	***7***	-	-	49	51	13	24	***11***	46	51
WestBred	Santa Fe	14	22	***8***	24	-	49	51	14	28	***14***	48	51
Texas	TAM 111	13	24	***11***	25	-	48	53	14	18	***4***	46	49
AgriPro	Cutter	12	21	***9***	24	32	48	52	14	23	***9***	49	51
Johnstons	JEI 110	12	22	***10***	20	12	47	50	12	15	***3***	44	46
Oklahoma	2174	11	16	***5***	21	29	48	52	14	15	***1***	47	51
AgriPro	Jagalene	8	18	***10***	22	30	48	50	12	20	***8***	49	51
Kansas	Jagger	8	19	***11***	21	30	44	49	11	22	***11***	47	51
AgriPro	Fannin	7	19	***12***	15	25	52	54	8	21	***13***	50	55
Agseco	Protection CL	7	19	***12***	-	-	43	46	9	20	***11***	42	48
Experimentals													
	OK02522W	18	-	-	27	-	50	-	-	-	-	-	-
	OK02125	16	-	-	-	-	50	-	-	-	-	-	-
	OK05737W	15	-	-	-	-	48	-	-	-	-	-	-
	OK Bullet 06ERU	13	-	-	-	-	47	-	-	-	-	-	-
	Mean	14	21	***7***	24	29	49	52	15	22	***7***	48	52
	LSD $_{(0.05)}$	4	3	***4***	5	5	2		3	3	***4***	2	2
	LSD (CT vs. NT) = 4												

* Dual-purpose plots were grazed from 21 November 2006 to 20 February 2007 for a total of 92 days. Stocking rate was 1.18 head per acre. Average daily gain was 2.39 lb/hd/day for a total average gain of 220 lb per head.

Partial financial support provided by the Oklahoma Wheat Commission

Frederick Variety Trial

Cooperator: Cassidy Farms
Soil type: Tillman & Foard Silt Loam
Planting date: 10-03-06

Tillage: No till
Management: Grain only
Soil test information: pH = 6.9, P = 33, K = 546

		Grain Yield		Test Weight
Source	Variety	2006-07	2-Year*	2006-07
		-----bu/ac----		-----lb/bu-----
Kansas	Fuller	54	-	58
AgriPro	Doans	53	-	61
Kansas	Overley	53	38	57
Johnstons	JEI 110	51	-	58
AgriPro	Fannin	49	34	59
Oklahoma	Duster	47	-	58
WestBred	Santa Fe	47	-	56
Oklahoma	Endurance	45	34	59
Oklahoma	OK Bullet	45	-	61
WestBred	Shocker	45	-	57
Oklahoma	Centerfield	44	-	60
Oklahoma	Deliver	44	33	60
Agseco	Protection CL	42	-	55
AgriPro	Cutter	41	30	58
Kansas	Danby (W)	41	-	62
Oklahoma	Okfield	40	-	58
Texas	TAM 111	40	-	59
Kansas	Jagger	39	30	55
Oklahoma	2174	35	31	60
AgriPro	Jagalene	34	28	58
Experimentals				
	OK02522W	51	-	60
	OK02125	48	-	58
	OK Bullet 06ERU	45	-	60
	OK05737W	44	-	58
	OK05905C	33	-	60
	Mean	44	32	59
	LSD $_{(0.05)}$	7	5	1

* Variety trial was abandoned in 2005-06 due to extreme drought. 2-Year data is an average of 2004-05 and 2006-07 data

Partial financial support provided by the Oklahoma Wheat Commission

Gage Variety Trial

Cooperator: Curtis Torrance
Soil type: St. Paul silt loam
Planting date: 9-14-06

Tillage: Conventional till
Management: Grain only*
Soil test information: pH = 7.1, P = 56, K = 623

Source	Variety	Grain Yield 2006-07	2-Year*	3-Year*	Test Weight 2006-07
		-----bu/ac----			-----lb/bu-----
Kansas	Fuller	55	-	-	58
Kansas	Danby (W)	53	-	-	59
Oklahoma	Endurance	52	32	38	59
Oklahoma	Duster	50	31	-	58
Oklahoma	Deliver	49	31	35	59
Oklahoma	OK Bullet	49	34	34	59
Texas	TAM 111	49	32	38	58
Johnstons	JEI 110	44	28	-	56
Oklahoma	Okfield	43	27	27	56
Kansas	Overley	43	27	35	59
WestBred	Santa Fe	43	28	-	58
AgriPro	Doans	42	-	-	60
Oklahoma	Centerfield	40	26	34	58
AgriPro	Jagalene	40	25	33	57
Oklahoma	2174	38	24	28	58
Kansas	Jagger	38	25	32	57
WestBred	Shocker	38	-	-	59
AgriPro	Cutter	37	-	-	58
AgriPro	Fannin	37	22	30	59
Agseco	Protection CL	36	-	-	56
Experimentals					
	OK Bullet 06ERU	49	-	-	59
	OK02522W	47	-	-	57
	OK05905C	41	-	-	57
	Mean	44	26	31	58
	LSD $_{(0.05)}$	6	3	3	1

*Plots were grazed in 2005-06

Partial financial support provided by the Oklahoma Wheat Commission

Goodwell Irrigated Variety Trial

Cooperator: Oklahoma Panhandle Research & Extension Center
Tillage: No-till
Soil type: Richfield clay loam
Management: Grain only*
Planting date: 9-29-06
Soil test information: Not Available

Source	Variety	Grain Yield 2006-07	Grain Yield 2-Year*	Test Weight 2006-07
		-----bu/ac----		-----lb/bu-----
WestBred	Santa Fe	77	-	61
Kansas	Fuller	76	-	61
Texas	TAM 111	74	84	62
Kansas	Danby (W)	73	-	63
Oklahoma	OK Bullet	73	79	62
Texas	TAM 112	73	-	62
Kansas	Overley	72	82	62
Oklahoma	Duster	69	-	62
AgriPro	Jagalene	69	75	62
Oklahoma	Endurance	68	70	61
Kansas	Jagger	68	81	61
Agseco	Protection CL	68	-	60
Oklahoma	Guymon (W)	67	67	63
Oklahoma	Centerfield	66	-	60
Oklahoma	Deliver	66	71	61
AgriPro	Doans	66	-	63
AgriPro	Fannin	66	74	62
Kansas	Lakin	66	57	61
Oklahoma	Intrada (W)	65	67	64
Colorado	Avalanche (W)	64	65	63
AgriPro	Cutter	64	74	62
Johnstons	JEI 110	64	-	60
WestBred	Shocker	64	-	61
Oklahoma	Okfield	62	65	60
Kansas	Stanton	62	53	61
Oklahoma	2174	61	56	62
Kansas	Trego (W)	61	54	62
Kansas	Ike	60	60	61
Texas	TAM 110	60	63	60
Experimentals				
	OK05737W	71	-	62
	OK Bullet 06ERU	67	-	62
	OK02522W	66	-	61
	OK02125	65	-	61
	OK00611W	64	-	61
	Mean	67	61	61
	LSD $_{(0.05)}$	10	6	1

*Plots were lost due to hail damage in 2005-06; therefore, 2-Year average is the average of 2006-07 and 2004-05

Partial financial support provided by the Oklahoma Wheat Commission

Goodwell Nonirrigated Variety Trial

Cooperator: Oklahoma Panhandle Research & Extension Center
Soil type: Richfield clay loam
Planting date: 9-26-06
Tillage: No-till
Management: Grain only*
Soil test information: pH = 7.6, P = 51, K = 1121

Source	Variety	Grain Yield 2006-07	Grain Yield 2-Year*	Test Weight 2006-07
		-----bu/ac----		-----lb/bu-----
Oklahoma	Duster	84	-	60
Kansas	Fuller	78	-	60
Oklahoma	OK Bullet	78	61	61
Kansas	Stanton	78	52	60
Oklahoma	Endurance	77	57	59
Kansas	Overley	77	59	59
AgriPro	Cutter	76	58	60
AgriPro	Fannin	75	59	61
AgriPro	Jagalene	75	55	60
Texas	TAM 111	75	62	59
Kansas	Danby (W)	73	-	61
Oklahoma	Intrada (W)	73	55	62
Johnstons	JEI 110	73	-	59
Oklahoma	Deliver	72	55	57
Texas	TAM 112	72	-	59
Kansas	Ike	71	55	59
Agseco	Protection CL	71	-	57
WestBred	Santa Fe	71	-	58
Oklahoma	2174	70	52	60
Kansas	Trego (W)	70	47	60
Oklahoma	Guymon (W)	68	51	61
Kansas	Lakin	68	46	58
Texas	TAM 110	68	58	58
Colorado	Avalanche (W)	67	53	61
Kansas	Jagger	67	56	58
WestBred	Shocker	67	-	58
Oklahoma	Okfield	65	49	58
AgriPro	Doans	64	-	61
Oklahoma	Centerfield	58	-	59
Experimentals				
	OK00611W	76	-	61
	OK02522W	75	-	60
	OK Bullet 06ERU	71	-	60
	OK05737W	70	-	60
	Mean	72	52	60
	LSD $_{(0.05)}$	14	9	2

*Plots were lost due to hail damage in 2005-06; therefore, 2-Year average is the average of 2006-07 and 2004-05

Partial financial support provided by the Oklahoma Wheat Commission

Hooker Variety Trial

Cooperator: Ernest Herald
Soil type: Dalhart fine sandy loam
Planting date: 10-02-06

Tillage: Conventional till
Management: Grain only
Soil test information: Not available

Source	Variety	Grain Yield 2006-07	Grain Yield 2-Year	Test Weight 2006-07
		-----bu/ac----		-----lb/bu-----
Texas	TAM 112	75	-	62
Oklahoma	Duster	72	-	62
Oklahoma	Endurance	70	52	62
Oklahoma	OK Bullet	67	53	62
Texas	TAM 111	65	47	62
Kansas	Danby (W)	62	-	62
Kansas	Jagger	61	47	59
Oklahoma	Intrada (W)	60	44	62
Kansas	Trego (W)	60	48	62
Colorado	Avalanche (W)	59	-	62
AgriPro	Jagalene	58	46	62
Texas	TAM 110	58	48	61
	Mean	64	48	62
	LSD $_{(0.05)}$	6	4	1

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Kingfisher Variety Trial

Cooperator: Rodney Mueggenborg | **Tillage: Conventional till**
Soil type: Renfro clay loam | **Management: Grain only**
Planting date: 10-06-06 | **Soil test information: pH = 5.8, P = 36, K = 454**

		Grain Yield			Test Weight
Source	Variety	2006-07	2-Year	3-Year	2006-07
		-----bu/ac----			-----lb/bu-----
Kansas	Fuller	52	-	-	62
Oklahoma	Duster	52	36	-	61
Kansas	Overley	50	41	45	61
Oklahoma	OK Bullet	50	39	-	62
WestBred	Santa Fe	49	40	-	60
Texas	TAM 111	48	34	-	61
Johnstons	JEI 110	47	38	-	59
Kansas	Danby (W)	47	-	-	63
WestBred	Shocker	46	-	-	61
Oklahoma	Endurance	45	38	43	62
Agseco	Protection CL	44	-	-	57
Oklahoma	Okfield	43	37	-	60
AgriPro	Jagalene	42	36	42	60
AgriPro	Fannin	42	32	38	63
AgriPro	Cutter	42	39	43	61
Kansas	Jagger	40	38	44	58
AgriPro	Doans	40	-	-	63
Oklahoma	Deliver	40	32	36	62
Oklahoma	2174	39	33	37	61
Oklahoma	Centerfield	33	30	-	60
Experimentals					
	OK05737W	53	-	-	59
	OK03522	51	-	-	62
	OK02522W	51	39	-	59
	OK Bullet 06ERU	51	-	-	61
	OK02125	44	-	-	61
	Mean	46	36	41	61
	LSD $_{(0.05)}$	6	4	5	1

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Marshall Variety Trial

Cooperator: Henry Fuxa
Soil type: Kirkland silt loam
Planting date: Dual purpose = 09-05-06; Grain only = 10-09-06
Tillage: Conventional till
Management: Grain only and Dual purpose
Soil test information: pH = 5.1, P = 60 , K = 384

		Grain Yield									Test Weight	
		2006-07			2-Year*			3-Year			2006-07	
Source	Variety	Dual-purpose	Grain-only	***Diff.***	Grazed	Non-grazed	***Diff.***	Grazed	Non-grazed	***Diff.***	Dual-purpose	Grain-only
		--bu/ac--									--lb/bu---	
Oklahoma	Duster	22	32	***10***	24	34	***10***	-	-	-	49	51
WestBred	Shocker	21	29	***8***	-	-	-	-	-	-	45	51
Oklahoma	OK Bullet	21	37	***16***	26	34	***8***	-	-	-	51	55
WestBred	Santa Fe	20	32	***12***	20	33	***13***	-	-	-	48	50
Oklahoma	Endurance	20	29	***9***	22	31	***9***	18	31	***13***	51	53
AgriPro	Doans	20	36	***16***	-	-	-	-	-	-	55	59
Oklahoma	Deliver	20	32	***12***	18	25	***7***	18	31	***13***	46	48
Kansas	Fuller	19	40	***21***	-	-	-	-	-	-	49	53
Texas	TAM 111	18	28	***10***	18	22	***4***	-	-	-	44	46
Kansas	Overley	16	28	***12***	19	31	***12***	18	35	***17***	48	56
Kansas	Danby (W)	15	23	***8***	-	-	-	-	-	-	47	47
AgriPro	Fannin	14	32	***18***	14	30	***16***	13	30	***17***	52	55
AgriPro	Cutter	14	21	***7***	19	28	***9***	18	29	***11***	42	44
Agseco	Protection CL	13	26	***13***	-	-	-	-	-	-	40	46
Oklahoma	Okfield	12	24	***12***	16	26	***10***	-	-	-	44	48
Johnstons	JEI 110	12	31	***19***	13	29	***16***	-	-	-	42	49
AgriPro	Jagalene	11	21	***10***	16	29	***13***	17	28	***11***	45	46
Oklahoma	2174	11	23	***12***	16	26	***10***	15	28	***13***	47	51
Kansas	Jagger	9	22	***13***	15	29	***14***	14	29	***15***	45	49
Oklahoma	Centerfield	9	25	***16***	-	-	-	-	-	-	46	48
Experimentals												
	OK05737W	20	33	***13***	-	-	-	-	-	-	47	52
	OK Bullet 06ERU	20	37	***17***	-	-	-	-	-	-	51	54
	OK02522W	19	37	***18***	20	31	***11***	-	-	-	48	53
	OK02125	17	31	***14***	-	-	-	-	-	-	48	50
	Mean	16	30	***13***	18	29	***11***	16	30	***14***	47	51
	LSD $_{(0.05)}$		4			4			3		4	2

* Due to insect damage and overall poor growth, the early-sown (normally dual-purpose) plots were not grazed in 2005-06.
(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Olustee Variety Trial

Cooperator: Larry Bassel | **Tillage: Conventional till**
Soil type: Foard silt loam | **Management: Grain only**
Planting date: 10-24-06 | **Soil test information: pH = 6.5, P = 52, K = 1115**

Source	Variety	Grain Yield 2006-07	Grain Yield 2-Year	Test Weight 2006-07
		-----bu/ac----		-----lb/bu-----
Kansas	Overley	64	61	60
Kansas	Fuller	60	-	60
Oklahoma	OK Bullet	59	-	62
WestBred	Santa Fe	59	-	59
Agseco	Protection CL	56	-	57
Johnstons	JEI 110	55	-	58
Kansas	Jagger	54	56	58
WestBred	Shocker	54	-	60
AgriPro	Doans	51	-	62
AgriPro	Fannin	51	46	61
Oklahoma	Endurance	50	51	60
AgriPro	Jagalene	50	54	60
AgriPro	Cutter	48	50	60
Oklahoma	Deliver	48	46	61
Oklahoma	Duster	48	-	58
Oklahoma	2174	47	43	61
Oklahoma	Centerfield	47	-	60
Kansas	Danby (W)	46	-	61
Texas	TAM 111	45	-	59
Oklahoma	Okfield	44	-	57
Experimentals				
	OK03305	61	-	61
	OK02522W	58	-	59
	OK Bullet 06ERU	56	-	61
	Mean	53	51	60
	LSD $_{(0.05)}$	3	3	1

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Plant height, lodging score, and heading date for selected variety trials in Oklahoma in 2007

	Lodging						Shattering		Plant Height			Heading date*						
	Alva	Balko	Buffalo	Elk City	Marshal GO	Marshall DP	Balko	Buffalo	Buffalo	Kingfisher	Balko	El Reno GO	El Reno DP	El Reno NT GO	El Reno NT DP	Lahoma	Stillwater early-sown	Stillwater late-sown
Variety	0 - 10 scale**								inches									
2145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/18	4/18
2174	1	0	0	6	4	1	0	0	31	35	39	4/21	4/21	4/21	4/21	5/1	4/24	4/24
Avalanche	-	0	-	-	-	-	0	-	-	-	42	-	-	-	-	-	4/24	4/23
Centerfield	3	0	2	4	5	0	1	0	28	36	40	4/20	4/19	4/20	4/18	4/30	4/23	4/23
Custer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/18	4/7
Cutter	8	0	4	9	10	10	1	0	33	41	42	4/20	4/20	4/20	4/21	5/2	4/24	4/23
Danby	6	0	0	7	10	3	0	0	32	35	43	4/21	4/20	4/21	4/22	5/1	4/23	4/20
Deliver	5	0	4	8	6	0	0	1	28	37	40	4/19	4/17	4/19	4/19	4/28	4/22	4/22
Doans	6	0	1	6	2	0	0	0	31	37	42	4/19	4/17	4/19	4/18	4/27	4/22	4/21
Duster	4	0	2	9	9	2	0	0	31	35	39	4/18	4/17	4/18	4/19	4/29	4/21	4/7
Endurance	3	0	1	7	7	3	0	0	30	38	39	4/20	4/19	4/20	4/18	4/27	4/21	4/18
Fannin	2	0	2	7	9	2	1	5	29	36	38	4/7	4/16	4/16	4/19	4/24	4/5	4/4
Fuller	2	0	1	5	9	0	1	0	30	37	38	4/16	4/17	4/16	4/19	4/30	4/18	4/18
Guymon	-	0	-	-	-	-	0	-	-	-	39	-	-	-	-	-	4/23	4/23
Ike	-	0	-	-	-	-	0	-	-	-	41	-	-	-	-	-	4/30	5/1
Intrada	-	2	-	-	-	-	0	-	-	-	38	-	-	-	-	-	4/22	4/22
Jagalene	6	0	1	8	10	8	0	0	31	36	40	4/18	4/20	4/18	4/21	5/1	4/22	4/21
Jagger	5	1	1	6	9	4	0	0	29	34	39	4/5	4/17	4/5	4/20	4/29	4/18	4/6
JEI 110	2	0	2	7	2	1	0	0	27	33	36	4/21	4/19	4/22	4/21	5/1	4/22	4/21
Lakin	-	0	-	-	-	-	0	-	-	-	40	-	-	-	-	-	4/22	4/18
Neosho	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5/1	4/23	4/23
OK Bullet	1	0	0	1	3	2	0	0	33	39	43	4/19	4/20	4/20	4/21	5/1	4/21	4/21
Ok101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/22	4/22
Ok102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/21	4/23
Okfield	4	0	1	7	8	3	0	0	34	42	43	4/21	4/21	4/21	4/21	5/2	4/22	4/20
Overley	2	0	1	1	2	1	1	6	30	38	41	4/5	4/17	4/5	4/20	4/22	4/5	4/4
Protection CL	4	0	1	6	6	4	1	3	31	38	41	4/5	4/18	4/5	4/19	4/24	4/5	4/3
Santa Fe	3	0	0	4	10	5	0	3	30	37	39	4/17	4/19	4/5	4/18	4/29	4/16	4/6
Shocker	2	0	1	6	3	3	0	4	31	36	38	4/5	4/17	4/5	4/20	4/27	4/5	4/4
Stanton	-	0	-	-	-	-	0	-	-	-	44	-	-	-	-	-	4/21	4/21
TAM 110	-	2	-	-	-	-	0	-	-	-	41	-	-	-	-	-	4/6	4/3
TAM 111	1	0	0	7	9	8	0	0	32	40	42	4/21	4/20	4/21	4/21	-	4/24	4/23
TAM 112	-	0	-	-	-	-	0	-	-	-	39	-	-	-	-	-	4/6	4/4
Trego	-	0	-	-	-	-	0	-	-	-	40	-	-	-	-	-	4/23	4/22
OK Bullet 06ERU	1	0	0	1	7	1	0	0	33	37	43	-	4/21	-	4/21	4/29	4/22	4/20
OK00611W	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/21	4/18
OK02125	2	-	-	-	9	6	-	-	-	39	-	-	4/18	-	-	-	4/18	4/7
OK02522W	1	0	0	0	0	0	1	0	32	39	41	-	4/20	-	-	4/29	4/21	4/18
OK03305	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	4/30	4/21	4/18
OK03522	-	-	3	-	-	-	-	0	28	38	-	-	-	-	-	-	4/5	4/5
OK04505	2	-	-	-	-	-	-	-	-	-	-	-	4/20	-	-	4/30	4/21	4/21
OK05737W	-	0	0	2	3	0	0	0	31	37	43	-	-	-	-	-	4/17	4/18
OK05905C	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/21	4/21

*A heavy freeze occurred the weekend of 5 April 2007. Phenological development was very slow during the two weeks following the freeze, which resulted in a larger-than-normal interval between heading of early and late-maturing varieites.

** Scale of 0-10 with 0 representing no lodging or shattering and 10 representing 100 % lodging or shattering

OKLAHOMA PANHANDLE CORN PERFORMANCE TRIALS, 2007

PRODUCTION TECHNOLOGY CROPS

OKLAHOMA COOPERATIVE EXTENSION SERVICE
DEPARTMENT OF PLANT AND SOIL SCIENCES
DIVISION OF AGRICULTURAL SCIENCES & NATURAL RESOURCES
OKLAHOMA STATE UNIVERSITY

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TRIAL OBJECTIVES AND PROCEDURES

Each year the Oklahoma Cooperative Extension Service conducts corn performance trials in the Oklahoma panhandle. These trials provide producers, extension educators, industry representatives, and researchers with information on corn hybrids marketed in Oklahoma. Company participation was voluntary, so some hybrids marketed in Oklahoma were not included in the test. Company or brand name, entry designation, plant characteristics, and maturity information, were provided by the companies and were not validated by OSU; therefore, we strongly recommend consulting company representatives for more detailed information regarding these traits and disease resistance ratings (Tables 3 and 4).

Irrigated test plots were established at the Oklahoma Panhandle Research and Extension Center (OPREC) near Goodwell and the Joe Webb farm near Guymon. The dryland trial in Garfield county was located on the Rodney Timms farm SE of Enid. Fertility levels, herbicide use, and soil series (when available) are listed with data. Individual plots were two 25-foot rows seeded at a target population of 32,000 plants/ac for irrigated and 22,000 plants/ac for the dryland location at Enid. Plots were trimmed to 20 feet prior to being harvested to determine grain yield. The ensilage trial was seeded the same as grain trial with 10 feet of one row harvested to determine yield. Experimental design for all locations was a randomized complete block with four replications. Grain yield is reported consistent with U.S. No. 1 grade corn i.e. 56 lbs/bu and adjusted to moisture content of 15.5%. Corn ensilage was harvested at the early dent stage with average moisture content of 59 % and production is reported as tons/ac adjusted to 65% moisture.

GROWING CONDITIONS

There were two distinct rainfall seasons for Oklahoma in 2007, with wide variation among regions of the state. The body of the state was dry throughout the winter period while the panhandle received record rainfall for the month of December (3.75 inches in 2007 vs. the old record of 2.75, set in 1913). During the growing season, however, the situation was reversed. Near record rainfall was received in the body of the state while the panhandle baked (Tables 1 and 2). The 7.46 inch rainfall total at OPREC was similar to that of 1998 (7.3 inches) and 2000 (7.09 inches) which is below the long-term mean of 12.3 inches. Also the total for 2007 can be somewhat misleading in that the 2 inch total in July was received in one event of approximately 45 minutes; therefore much of that rainfall was not effective.

The OPREC soil temperature of 61° F on April 1 at the two-inch depth was consistent with observations in previous years. A freeze event on Easter weekend, however, cooled soil temperatures for a short period and many producers in the body of the state were forced to replant corn. We followed suit, replanting the trial at Enid on April 27th. Growing condition through early July were excellent with almost ideal temperatures for corn. No 100 ºF days were recorded in June and the mean high temperature of 85, was 2.8 degrees below the long-term mean at OPREC. Although the temperatures were almost perfect, wind conditions were not. In June the region had two periods when sustained winds were above 50 mph for over an hour with gusts above 70 mph. The June event was early in the month and resulted in green snap of corn in many instances, specifically on the earlier planted corn. The second event was in late August and resulted in significant lodging prior to harvest, again the earlier planted corn at OPREC was affected much more than corn planted later in April. There were no major hailstorms in the region in 2007. Although corn was replanted yields for dryland corn in the body of the state were excellent due to the large amount of rainfall received, the most limiting factor for corn grain yields for most of Oklahoma was nitrogen fertilizer. Harvesting of corn was not delayed due to weather in any region in 2007.

RESULTS

Grain yield, test weight, harvest moisture, and plant populations for OPREC and Webb trials are presented (Tables 5-8). Ensilage yields are reported in Table 8. Protein, Acid Detergent Fiber (ADF) and Total Digestible Nutrients (TDN), however are not reported, because no significant differences existed among hybrids. Averages were 7.3, 30.5, and 65.1 %, for Protein, ADF and TDN respectively. Similarly, there were no differences among hybrids in energy values for, maintenance, lactation, and gain values with averages of 0.67, 0.67, and 0.40 MCal/lb respectively. Least Significant Differences (L.S.D.) are shown at the bottom of each table. Unless two entries differ by at least the L.S.D. shown, little confidence can be placed in one being superior to another. The coefficient of variation (C.V.) is provided as an estimate of the precision of the data with respect to the mean. To provide some indication of yield stability, 2-year means are also provided in tables producers interested in comparing hybrids for consistency of yield should consult these.

The following people have contributed to this report by assisting in crop production, data collection, and publication; Roger Gribble, Bart Cardwell, Donna George, Lawrence Bohl, Matt LaMar, Eddie Pickard, Tony Mills, and Craig Chesnut. Their efforts are greatly appreciated.

Table 1. Rainfall and irrigation for irrigated corn performance trial locations in Texas County.

Location	April	May	June	July	Aug	Total
Long-term mean	1.33	3.25	2.86	2.58	2.28	12.30
2007	2.10	1.48	1.62	2.00	0.26	7.46
Irrigation						
OPREC	2.5	2.5	5.0	6.25	2.5	18.75
Joe Webb	3.0	3.0	6.0	6.0	2.0	20.00

Table 2. Rainfall for dryland corn performance trial in Garfield County.

Location	March	April	May	June	July	Aug	Total
Long-term mean	2.34	2.99	4.86	4.26	2.89	3.35	20.69
2007	6.06	2.92	5.21	12.81	2.92	0.86	30.78

Table 3. Characteristics of Corn Hybrids in Panhandle Corn Performance Trials, 2007.

Company Brand Name	Hybrid	Plant Characteristics				Maturity Days
		SV	SS	SG	EP	
Garst Seed Company	8313 CB/LL	1	4	3	M	114
Garst Seed Company	8249 YG1/RR	2	4	3	M	117
DEKALB	DKC 61-73 (RR2/YGCB)	3	4	3	M	111
DEKALB	DKC 62-33 (RR2/YGCB)	3	3	4	M	112
DEKALB	DKC 64 -18 (RR2/YG CB)	3	5	5	M	114
DEKALB	DKC 65 - 47 (RR2)	2	3	3	M	115
DEKALB	DKC 67 - 87 (RR2/YGCB)	2	4	3	MH	117
Triumph Seed Co., Inc	1977 CbRR	3	2	2	H	119
Triumph Seed Co., Inc	1608 VT3	3	4	4	M	115
Triumph Seed Co., Inc	1706VT3	2	2	3	M	117
NC+ Hybrids	5392B	3	4	4	M	112
NC+ Hybrids	5223RBD	3	3	2	M	112
NC+ Hybrids	5453VT3	3	3	2	H	114
NC+ Hybrids	5556HLR	3	3	2	H	115
NC+ Hybrids	5402RB	3	4	3	M	113
NC+ Hybrids	4251RB	3	3	1	M	107
NC+ Hybrids	3611RB	2	4	4	H	105
Triumph Seed Co., Inc	1866Bt	2	2	2	H	116
NC+ Hybrids	6122 RB	2	3	2	M	116

Table 4. Characteristics of Corn Hybrids in the Enid Corn Performance Trials, 2007.

Company Brand Name	Hybrid	Plant Characteristics				Maturity Days
		SV	SS	SG	EP	
DEKALB	DKC 51 - 39 (RR2/YGPL)	2	3	3	M	101
DEKALB	DKC 52 - 63 (RR2/YGCB)	2	4	3	M	102
NC+ Hybrids	1773RB	2	3	4	M	97
NC+ Hybrids	3611RB	2	4	4	H	105
NC+ Hybrids	4251RB	3	3	1	M	107
NC+ Hybrids	4947RB	2	3	4	M	110
NC+ Hybrids	6122 RB	2	3	2	M	116
DEKALB	DKC 61-73 (RR2/YGCB)	3	4	3	M	111

* Plant Characteristics: SV - Seedling Vigor; SS - stalk strength; SG - stay green; EP - ear placement (Low, Medium, High)
Rating scale for above characteristics except ear placement 1 = excellent - 9 = poor

Table 5 . Grain Yield and Harvest Parameters Enid location, Oklahoma Corn Performance Trials, 2007.

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Test weight Lb/bu 2007	Plant Population plants/ac	Harvest Moisture
NC+ Hybrids	1773RB	148.1	58.8	16,300	13.0
NC+ Hybrids	6122 RB	137.8	54.2	15,500	17.6
DEKALB	DKC 61-73 (RR2/YGCB)	137.1	55.7	16,100	13.8
DEKALB	DKC 52 - 63 (RR2/YGCB)	132.3	56.9	15,100	13.4
NC+ Hybrids	4251RB	132.1	56.2	15,800	13.6
DEKALB	DKC 51 - 39 (RR2/YGPL)	130.0	56.8	17,100	12.6
NC+ Hybrids	3611RB	119.9	57.3	16,600	13.6
NC+ Hybrids	4947RB	105.4	56.6	14,500	15.7
	Mean	129.2	56.6	15,900	14.2
	C.V.%	10.3	2.1	11.8	7.1
	L.S.D.	19.6	1.7	NS	1.5

Cooperator: Rodney Timms
Soil Series: Bethany Silt Loam
Forage sorghum in 2006
Soil Test: N: NA P: NA K: NA pH: NA
Fertilizer: N: 135 lbs/ac P: 20 lbs/ac P_2O_5 5 gal 10-34-0 K: 0
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)
Planting Date: March 16, 2007 replanted April 27, 2007
Harvest Date: August 27, 2007

Table 6. Grain Yield and Harvest Parameters Joe Webb location, Oklahoma Corn Performance Trials, 2007.

Company Brand Name	Entry Designation	Grain Yield Bu/ac	Test Weight Lb/bu	Harvest Moisture	Plant Population plants/ac	Lodging %
Garst Seed Company	8313 CB/LL	213.5	58.2	15.6	29,200	0
DEKALB	DKC 67 - 87 (RR2/YGCB)	205.8	59.5	16.2	32,000	10
NC+ Hybrids	5556HLR	203.6	57.8	15.5	31,000	10
Garst Seed Company	8249 YG1/RR	200.7	58.9	17.2	30,400	0
NC+ Hybrids	5453VT3	197.6	59.4	15.1	31,600	0
DEKALB	DKC 65 - 47 (RR2)	197.1	59.4	16.2	31,600	10
Triumph Seed Co., Inc	1608 VT3	194.1	57.4	14.5	31,200	0
DEKALB	DKC 62-33 (RR2/YGCB)	193.6	59.3	15.7	31,600	0
NC+ Hybrids	6122 RB	187.0	57.5	15.2	30,700	10
NC+ Hybrids	5402RB	180.6	58.7	15.7	32,600	10
Triumph Seed Co., Inc	1706VT3	172.5	55.6	12.3	30,200	0
Triumph Seed Co., Inc	1866Bt	166.7	58.6	15.6	35,500	10
NC+ Hybrids	5392B	164.8	58.4	14.2	32,400	10
NC+ Hybrids	3611RB	163.4	60.0	13.8	29,000	0
NC+ Hybrids	4251RB	155.4	58.9	14.2	32,500	10
DEKALB	DKC 64 -81 (RR2/YG CB)	154.2	59.3	15.0	32,000	0
NC+ Hybrids	5223RBD	153.3	59.1	15.8	30,500	20
DEKALB	DKC 61-73 (RR2/YGCB)	139.0	58.4	15.1	30,500	10
Triumph Seed Co., Inc	1977 CbRR	137.2	57.6	16.2	30,600	20
	Mean	177.9	58.5	15.2	31,300	
	CV%	15.7	2.1	6.1	6.9	
	L.S.D.	39.6	1.8	1.3	3,000	

Cooperator: Joe Webb
Soil Series: Richfield Clay Loam
Strip-Till: Following wheat and sunflowers in 2006
Soil Test: N: NA P: NA K: NA pH: NA
Fertilizer: N: 230 lbs/ac P: 50 lbs P2O5/ac K: 0
Herbicide: 1.5qt/ac Harness Extra (Preemergence) + 3/4 oz/ac Balance
Planting Date: April 24, 2007
Harvest Date: September 7, 2007

Table 7. Grain Yield and Harvest Parameters OPREC location, Oklahoma Corn Performance Trials, 2007.

Company Brand Name	Entry Designation	Grain Yield Bu/ac	Test Weight Lb/bu	Harvest Moisture	Plant Population plants/ac	Lodging %
Garst Seed Company	8313 CB/LL	180.8	59.1	13.2	29,900	40
NC+ Hybrids	4251RB	179.8	58.4	12.2	28,800	30
Triumph Seed Co., Inc	1866Bt	177.7	59.5	13.3	30,300	60
NC+ Hybrids	5453VT3	177.2	60.2	12.8	32,900	30
Triumph Seed Co., Inc	1706VT3	176.8	57.9	13.1	33,600	60
Garst Seed Company	8249 YG1/RR	174.9	58.4	14.3	28,000	30
DEKALB	DKC 64 -81 (RR2/YG CB)	174.2	59.7	12.7	32,400	40
DEKALB	DKC 61-73 (RR2/YGCB)	163.7	58.6	12.5	30,300	10
NC+ Hybrids	5402RB	163.6	61.0	13.0	30,600	30
DEKALB	DKC 65 - 47 (RR2)	161.7	60.5	13.7	30,200	20
NC+ Hybrids	6122 RB	160.2	57.9	13.3	31,600	50
DEKALB	DKC 62-33 (RR2/YGCB)	159.7	59.3	13.3	32,600	40
NC+ Hybrids	5392B	158.0	58.4	12.6	32,600	70
NC+ Hybrids	5556HLR	157.3	58.7	12.7	32,700	70
DEKALB	DKC 67 - 87 (RR2/YGCB)	155.3	58.9	13.7	30,600	40
Triumph Seed Co., Inc	1608 VT3	152.1	59.0	12.8	28,700	70
Triumph Seed Co., Inc	1977 CbRR	149.3	57.4	12.7	32,800	30
NC+ Hybrids	3611RB	148.3	59.8	12.2	30,400	60
NC+ Hybrids	5223RBD	143.6	60.8	12.9	30,800	40
	Mean	163.9	59.1	13	31000	43
	CV%	14.9	0.9	2.3	10.3	
	L.S.D.	NS	0.7	0.4	NS	

Cooperator: OPREC
Soil Series: Richfield Clay Loam
Strip-till: wheat double crop sunflower in 2006
Soil Test: N: 41 P: 18 K: 890 pH: 7.8
Fertilizer: N: 180 lbs/ac P: 50 lbs/ac P_2O_5 K: 0
Herbicide: 1.5 qt/ac Cinch ATZ Lite (Preemergence) + .75 oz Balance
Planting Date: April 11 2007
Harvest Date: September 12, 2007

Table 8. Ensilage Yields and Quality Panhandle Corn Performance Trial, 2007.

Company Brand Name	Entry Designation	YIELD Tons/ac	Plant Population plants/ac	Harvest Moisture %
Triumph Seed Co., Inc	1706VT3	34.2	31,500	60
NC+ Hybrids	5453VT3	30.4	32,600	55
NC+ Hybrids	6122 RB	30.4	30,000	61
Triumph Seed Co., Inc	1866Bt	29.5	31,800	59
NC+ Hybrids	5402RB	28.1	31,800	60
NC+ Hybrids	5556HLR	27.8	29,700	60
Triumph Seed Co., Inc	1608 VT3	27.4	29,800	53
Garst Seed Company	8249 YG1/RR	26.9	29,000	60
DEKALB	DKC 61-73 (RR2/YGCB)	26.7	29,200	57
NC+ Hybrids	5392B	26.2	31,900	57
DEKALB	DKC 64 -81 (RR2/YG CB)	26.1	31,100	64
Garst Seed Company	8313 CB/LL	25.8	30,100	61
DEKALB	DKC 62-33 (RR2/YGCB)	25.7	33,200	58
DEKALB	DKC 67 - 87 (RR2/YGCB)	25.3	32,900	58
NC+ Hybrids	5223RBD	25.2	32,600	59
DEKALB	DKC 65 - 47 (RR2)	24.6	30,600	62
Triumph Seed Co., Inc	1977 CbRR	22.1	28,400	59
	Mean	27.2	31,000	59
	CV%	12.5	9	9
	L.S.D.	5.7	NS	NS

Cooperator: OPREC
Soil Series: Richfield Clay Loam
Strip-tillage wheat double crop sunflower in 2006
Soil Test: N: 41 P: 18 K: 890 pH: 7.8
Fertilizer: N: 180 lbs/ac P: 50 lbs/ac P_2O_5 K: 0
Herbicide: 1.5 qt/ac Cinch ATZ Lite (Preemergence) + .75 oz Balance
Planting Date: April 11 2007
Harvest Date: August 14, 2007

GRAIN SORGHUM PERFORMANCE TRIALS IN OKLAHOMA, 2007

PRODUCTION TECHNOLOGY CROPS

OKLAHOMA COOPERATIVE EXTENSION SERVICE
DEPARTMENT OF PLANT AND SOIL SCIENCES
DIVISION OF AGRICULTURAL SCIENCES & NATURAL RESOURCES
OKLAHOMA STATE UNIVERSITY

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TRIAL OBJECTIVES AND PROCEDURES

Each year, performance trials for hybrid grain sorghum are conducted by the Oklahoma Cooperative Extension Service to provide producers, extension educators, industry representatives, and researchers with information for hybrid grain sorghums marketed in Oklahoma.

Performance trials are conducted at eight locations in Oklahoma: Altus, Blackwell, Cherokee, Enid, Goodwell, Homestead, Keyes, and Tipton. Dryland trials are conducted at all locations, with an additional limited irrigation trial at Goodwell. The Cherokee and Homestead locations are uniquely designed trials to evaluate certain hybrids (generally early and medium maturity) for planting in late April. In 2004 a trial was established at Enid to evaluate hybrids for use as a double crop. Due to rainfall, the Enid trial was not planted in 2007. **All trial locations also have DK-44 and KS 585 planted with and without (WO) seed applied insecticide to determine the effect of these treatments on grain yield.**

Grain sorghum hybrids entered (Table 1) were assigned by companies to their respective maturity groups (early, medium, and late) and trial locations therefore, all hybrids were not entered at all locations. Hybrids tested at the Cherokee, Homestead, and Enid locations were determined by Oklahoma State University. Companies submitted all hybrid characteristics presented in Table 1. This information was not determined or verified by Oklahoma State University. Company participation was voluntary therefore some hybrids marketed in Oklahoma were not included in the test. Each maturity group was tested in a randomized complete block design with four replications. Plots were two 30-inch rows by 25 feet. Plots were trimmed to 20 feet prior to harvest. Tractor powered cone planters were used to plant all trials with seeding rates adjusted for trial location. Trials were harvested with a Massey-Ferguson model, 8 plot combine.

Target populations, cooperating producers, fertilization, cultural practices, soil series, and herbicide use on all trials are listed individually in the results tables. Rainfall data from the nearest Mesonet site are also listed. Some trials are long distances from the nearest Mesonet site; therefore rainfall could be greater or less than reported. This year we only reported in-season rainfall, as compared to yearly totals, in previous reports.

Highlights

Exceptional grain yields (140 bu/ac or higher) were reported by producers for grain sorghum that was planted in late April or early May in north central Oklahoma. The yields for the Cherokee and Homestead trials were the highest in the last 10 years. In fact, hybrids that have been in the Cherokee trial a minimum of four years averaged over 100 bu/ac. In the panhandle yields were near 60 bu/ac for most producers due to lack of rain fall after the middle of July.

GROWING CONDITIONS

Moisture

Soil moisture conditions were excellent for planting at all April planted trials. In fact, excess moisture through the body of the state prevented many producers from planting in a timely fashion. In the Panhandle moisture from rainfall in May and June was timely for planting. Likewise, rainfall for the body of the state was near record for the months of May through July. As a result excellent grain yields were obtained at most locations. Grain yields at the Cherokee and Homestead trials for example, were the highest in the last ten years of trials. Producers reported yields greater than 140 bu/ac when adequate N fertilizer was applied. Yields were equally as good in the southwest region of the state, but the Altus trial had at least a 20% reduction in yield due to bird damage.

Rainfall in the panhandle was not uniform across the area late in the growing season. Grain yields for dry-land grain sorghum (most producer reported yields of 60 bu/ac) in the region were attained mainly from stored soil moisture from winter precipitation. Record precipitation was received in December (2007 3.75 inches vs. old record 2.75 inches). Some producers in Beaver county had yields of over 80 bu/ac from rainfall received in late August that was not received in Cimarron or Texas county.

RESULTS

As mentioned previously, yields in 2007 were the highest in the last 10 years of trials and some producers reported their highest grain yields ever. Lack of nitrogen fertilizer probably had the largest impact on lower yields for some producers. There were no major harvest delays at trial locations or for producers with early-planted grain sorghum. Grain sorghum in the panhandle was harvested earlier than normal due to dry conditions.

Grain yields are reported bushel per acre of threshed grain, adjusted to a moisture content of 14.0% (Tables 2-8). Test weight, plant population, and the number of heads per acre at harvest are reported. Bird damage and lodging are also reported when present at a location.

Different plant populations at each location prevent accurate comparison between locations. Also comparisons across maturity groups were not conducted. Producers should note that late maturing hybrids will generally yield more than early and medium maturity hybrids. However, the availability of moisture at critical crop development periods often influences yield more than the yield differences associated with maturity groups.

When choosing a maturity group, the type of cropping system, planting date, planting rate and potential moisture should be taken into consideration. For more information consult **Fact Sheet No. 2034** Grain Sorghum Planting Rates and Dates, and **Fact Sheet No. 2113** Grain Sorghum Production Calendar.

Least Significant Difference (L.S.D.) is a statistical test of yield differences and is shown at the bottom of each table. Unless two hybrids differ by at least the L.S.D. shown, little confidence can be placed in one hybrid being superior to another and the difference is probably not real.

The coefficient of variation (C.V.) is provided as an estimate of the precision of the data with respect to the mean for that location and maturity group. To provide some indication of yield stability, 2-year and 3-year means for yield and test weight are provided where trials have been conducted for more than one year with more than three entries per maturity group Producers interested in comparing hybrids for consistency of yield in a specific area should consult these tables.

The following people have contributed to this report by assisting in crop production, data collection, and publication: Donna George, Lawrence Bohl, Rocky Thacker, Eddie Pickard, Chad Otto, Jeff Bedwell, Bart Cardwell, and Tony Mills. Their efforts are greatly appreciated. Also would like to thank the ***Oklahoma Grain Sorghum Commission*** *for their financial support.*

Table 1. Seed source and hybrid characteristics of grain sorghum in the Oklahoma Grain Sorghum Performance Trials, 2007. All hybrids are susceptible to birds and are single cross.

Company Brand Name	Hybrid	Seed Color	Endo-sperm	Days to Mid-bloom	Greenbug Resistance
		Early Maturity			
NC+ Hybrids	5B89	Bz	Na	59	C
NC+ Hybrids	5B37	Bz	Na	58	C
Sorghum Partners Inc	KS 310	Bz	HY	57	C,E
Walter Moss Seed Co. LTD	M-927-ER	Red	Na	59	None
Asgrow Seed	Pulsar	Bz	HY	60	C,E,I
DEKALB.	DKS 37-07	Bz	HY	60	C,E,I
DEKALB.	DKS 29-28	Bz	HY	58	C,E
		Medium Maturity			
DEKALB.	DKS 36-16	BZ	HY	61	NA
NC+ Hybrids	7C22	Cream		69	None
Garst Seed Company	5750	BZ	HY	62	C, E
Sorghum Partners Inc	KS 585	Bz	HY	67	C, E
Garst Seed Company	5401	R	HY	68	E
Sorghum Partners Inc	NK4420	Bz	HY	62	C,E
NC+ Hybrids	6B50	Bz	HY	62	None
Sorghum Partners Inc	NK5418	Bz	HY	67	C,E
Walter Moss Seed Co. LTD	M-929-MB	Bz	Na	65	None
DEKALB.	DKS 42-20	Bz	Hy	62	C, E
DEKALB.	DK 44	Bz	HY	67	C, E
		Late Maturity (Full season)			
NC+ Hybrids	7R34	R	NA	70	None
Sorghum Partners Inc	NK7633	Bz	HY	73	C
Sorghum Partners Inc	NK7829	Bz	HY	71	C
DEKALB.	DKS 54-00	Bz	HY	72	C,E,I
Walter Moss Seed Co. LTD	M-1024-DPW	W	NA	75	None

Seed Color: Br – Brown; W – White; Y – Yellow; Bz – Bronze; R – Red; C – Cream
Endosperm: HW – heterowaxy; W – waxy; HY – Heteroyellow; Y – Yellow; N – Non-waxy
Maturity group: Early (less than 60 days to mid-bloom); Medium (60 – 70 days to mid-bloom); Late – (70+ days to mid-bloom)
Greenbug Resistance: Biotype hybrid is resistance too

Table 2. Results from Altus grain sorghum performance trial, 2007.

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Test weight Lb/bu 2007	Plant Population plants/ac	Head Population heads/ac
		Early			
DEKALB	DKS 37-07	92.4	58.2	43,100	1.19
Asgrow Seed	Pulsar	87.7	57.5	44,800	1.20
NC+ Hybrids	5B89	87.1	56.9	46,900	1.18
NC+ Hybrids	5B37	81.5	52.5	50,300	1.15
DEKALB	DKS 29-28	78.9	55.5	44,400	1.17
Sorghum Partners Inc	KS 310	70.7	54.1	43,600	1.16
	Mean	83.0	55.8	45,500	1.18
	C.V.%	8.7	3.7	6.6	5.6
	L.S.D.	10.9	3.1	NS	NS

Note: 20% bird damage on all hybrids in 2007.

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Test weight Lb/bu 2007	Plant Population plants/ac	Head Population heads/ac
		Medium			
NC+ Hybrids	6B50	108.7	56.0	46,200	1.32
NC+ Hybrids	7R34	100.7	60.1	40,900	1.41
Garst Seed Company	5401	98.5	59.3	45,700	1.31
Sorghum Partners Inc	KS 585 wo	97.2	58.0	48,200	1.30
Dekalb	DKS 36-16	92.9	57.5	46,000	1.29
Sorghum Partners Inc	KS 585	91.3	58.1	45,300	1.27
DEKALB	DK 44 wo	89.4	58.3	41,500	1.12
DEKALB	DKS 42-20	89.3	56.4	49,100	1.21
DEKALB	DK 44	88.2	57.8	40,300	1.18
Sorghum Partners Inc	NK5418	87.0	57.1	38,300	1.52
Garst Seed Company	5750	86.6	56.4	47,300	1.26
Sorghum Partners Inc	NK4420	83.8	56.9	43,000	1.29
NC+ Hybrids	7C22	75.1	57.2	47,300	1.07
Sorghum Partners Inc	NK7829	69.6	57.3	45,000	1.11
	Mean	89.9	57.6	44,600	1.26
wo: no insecticide treatment	C.V.%	6.3	2.3	8.5	9.6
	L.S.D.	8.1	1.9	5,400	0.17

Cooperator: Southwest Research and Extension Center
Conventional Tillage Practices: Sorghum-fallow-sorghum rotation
Fertilizer: N: 74 lbs/ac P: 0 K: 0
Planting Date: April 27 , 2007 Target Population: 45,000 plants/ac
Harvest Date: August 31, 2007

Soil Series: Tillman Hollister Clay Loam
Soil Test: N: 28 P: 77 K: 1205 pH: 6.1
Herbicide: 2 qt/ac Cinch ATZ Lite Preemergence

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2007:	1.34	2.73	5.35	1.38*	3.23	**14.03**
Long term mean:	1.92	4.23	3.51	1.76	2.45	**13.87**

Table 3. Results from Cherokee grain sorghum performance trial, 2007.

Company Brand Name	Entry Designation	Days To Midbloom	Grain Yield bu/ac			Test weight lb/bu			Plant Population plants/ac	Head Population heads/ac
			2007	Two-year	Four-year	2007	Two-year	Four-year		
Sorghum Partners Inc	KS 585	67	141.2	115.3	106.7	60.9	60.1	59.3	37,800	1.91
DEKALB	DK 44	67	127.0	111.9	101.6	58.3	57.1	57.3	31,100	1.81
DEKALB	DKs 37-07	60	126.6	116.1	101.0	60.8	58.8	58.5	30,000	2.09
DEKALB	DKS 42-20	65	119.4	103.0	100.5	60.0	57.8	57.7	33,700	1.79
Sorghum Partners Inc	KS 585 wo	67	116.8	109.3	69.8	60.1	59.1	NA	34,200	1.97
DEKALB	DK 44 wo	67	115.5	99.2	64.6	59.3	57.2	NA	28,400	1.82
NC+ Hybrids	6B50	62	140.3	120.0	------	58.4	56.7	------	41,300	1.67
Garst Seed Company	5750	62	134.0	116.1	------	59.7	58.3	------	41,200	2.12
Sorghum Partners Inc	KS 310	58	88.5	88.7	------	58.1	55.8	------	36,200	1.75
DEKALB	DKS 36-16	61	145.0	------	------	58.6	------	------	38,100	1.90
NC+ Hybrids	5B89	59	133.1	------	------	57.5	------	------	36,000	1.89
NC+ Hybrids	5B37	58	110.1	------	------	60.3	------	------	35,100	2.03
wo: no insecticide treatment		Mean	124.8	108.8	90.7	59.3	57.9	------	35,200	1.89
		C.V.%	10.2	11.8	30.5	2.4	2.0	------	9.4	11.4
		L.S.D.	18.3	12.9	19.5	2.1	1.2	------	4,800	NS

Note: CV% high for 4 year because in 2005 hybrids without seed insecticide treatment never emerged

Cooperator: Doug McMurtrey
Soil Series: Pond Creek Silt Loam
No-till Practices: fallowed after wheat in 2006
Soil Test: N: 6 P: 22 K: 271 pH: 6.1
Fertilizer: N: 135 lbs N/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 21, 2007 Target Population: 45,000 plants/ac
Herbicide 2 qt/ac Atrazine pre-plant
Harvest Date: August 29, 2007

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2006:	0.99	1.06	2.97	0.70	3.67	**16.88**
2007:	3.32	6.39	10.56	2.22	0.90	**23.39**
Long term mean:	3.28	5.83	4.05	2.68	3.19	**19.03**

Table 4. Results from Homestead grain sorghum performance trial, 2007.

Company Brand Name	Entry Designation	Days To Midbloom	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac	Head Population heads/ac
			2007	Two-year	2007	Two-year		
NC+ Hybrids	6B50	62	146.1	95.6	59.8	56.5	36,400	1.69
Garst Seed Company	5750	62	138.2	94.0	60.5	58.4	36,800	1.89
Sorghum Partners Inc	KS 585 wo	67	136.2	92.7	61.4	58.7	35,400	1.78
Sorghum Partners Inc	KS 585	67	137.1	90.1	62.0	59.8	34,000	1.85
DEKALB	DKS 42-20	65	131.3	87.8	61.4	57.7	28,800	1.93
DEKALB	DK 44	67	133.8	83.7	60.2	57.3	28,100	1.86
DEKALB	DK 44 wo	67	126.0	82.9	60.2	58.5	26,100	1.81
DEKALB	DKs 37-07	60	104.1	72.6	60.8	58.9	24,900	1.97
Sorghum Partners Inc	KS 310	58	65.5	49.0	58.3	53.9	29,800	1.90
DEKALB	DKS 36-16	61	148.1	------	60.0	------	36,200	1.65
NC+ Hybrids	5B89	59	128.4	------	60.7	------	32,100	1.85
NC+ Hybrids	5B37	58	92.2	------	59.0	------	31,200	1.94
		Mean	123.9	83.2	60.4	57.7	31,600	1.84
wo: no insecticide treatment		C.V.%	7.8	16.9	0.8	2.6	14.0	13.10
		L.S.D.	13.9	14.1	0.7	1.5	6,400	NS

Note: KS 310 was only hybrid with damage due to deer in 2007

Cooperator: Brook Strader
Soil Series: Pratt Loamy Fine Sand
No-till tillage Practices: Fallowed since wheat harvest of 2006
Soil Test: N: 3 P: 30 K: 243 pH: 6.0
Fertilizer: N: 140 lbs N + 5 gal/ac 10-34-0 with planter
Herbicide: Cinch ATZ Lite 1.5 qts/ac (Preemergence)
Planting Date: April 21, 2007 Target Population: 45,000 plants/ac
Harvest Date: August 29, 2007

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2006:	1.47	1.64	2.39	3.42	3.33	**12.25**
2007:	2.46	5.18	11.87	3.79	1.55	**24.85**
Long term mean:	2.50	4.20	3.20	2.70	2.80	**15.40**

Table 5. Results from Keyes dryland grain sorghum performance trial, 2007.

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Grain Yield bu/ac Two-year	Test weight lb/bu 2007	Test weight lb/bu Two-year	Plant Population plants/ac	Head Population heads/ac
			Early				
NC+ Hybrids	5B89	54.4	74.2	60.9	57.7	22,800	1.62
DEKALB	DKS 29-28	52.7	70.8	60.1	57.8	24,200	1.72
DEKALB	DKS 37-07	62.8	70.3	61.2	58.3	21,200	1.61
Asgrow Seed	Pulsar	54.7	63.3	60.0	58.2	19,100	1.96
NC+ Hybrids	5B37	59.3	------	60.5	------	32,600	1.27
Sorghum Partners Inc	KS 310	50.4	------	61.0	------	22,100	1.41
	Mean	55.7	69.7	60.6	58.0	23,600	1.59
	C.V.%	7.3	11.2	1.2	1.7	16.3	13.0
	L.S.D.	7.4	8.8	NS	1.1	7,000	0.38

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Grain Yield bu/ac Two-year	Test weight lb/bu 2007	Test weight lb/bu Two-year	Plant Population plants/ac	Head Population heads/ac
			Medium				
Sorghum Partners Inc	KS 585	49.6	98.6	61.2	58.6	21,100	1.31
DEKALB	DKS 42-20	56.8	86.4	61.5	58.0	19,600	1.51
Sorghum Partners Inc	NK5418	58.2	84.0	61.0	58.0	19,800	1.69
Sorghum Partners Inc	KS 585	46.5	82.2	60.8	58.6	19,000	1.47
DEKALB	DK 44	50.6	80.3	61.0	57.2	22,200	1.37
Sorghum Partners Inc	NK4420	55.5	------	59.1	------	21,300	1.41
DEKALB	DKS 36-16	54.6	------	60.9	------	21,300	1.57
NC+ Hybrids	7R34	52.9	------	60.0	------	20,100	1.49
NC+ Hybrids	7C22	52.7	------	61.0	------	21,400	1.29
Sorghum Partners Inc	NK7829	50.6	------	59.1	------	20,800	1.27
NC+ Hybrids	6B50	49.0	------	61.3	------	21,100	1.41
DEKALB	DK 44	44.5	------	60.9	------	20,700	1.34
	Mean	51.8	86.3	60.7	58.1	20,700	1.42
	C.V.%	9.1	12.5	0.7	2.0	10.0	14.0
	L.S.D.	8.0	11.9	0.7	1.3	3,500	0.34

Note: two-year means are from 2005 and 2007

Cooperator: J.B. Stewart
Conventional Tillage Practices: Sorghum-fallow-sorghum rotation
Fertilizer: N: 100 lbs/ac P: 0 K: 0
Planting Date: June 8 , 2007 Target Population: 22,000 plants/ac
Harvest Date: November 2, 2007

Soil Series: Richfield Clay Loam
Soil Test: N: NA P: NA K: NA pH: NA
Herbicide: 1 qt/ac Cinch ATZ Lite + 1 Qt Atrazine Preemergence

Monthly Rainfall (in.)

	May	June	July	Aug.	Sep.	**Total**
	1.00	0.90	2.38	0.93	0.35	**5.56**
Long term mean:	2.76	2.92	2.85	2.55	1.97	**13.05**

Table 6. Results from OPREC dryland grain sorghum performance trial, 2007.

Company Brand Name	Entry Designation	Grain Yield bu/ac			Test weight lb/bu			Plant Population plants/ac	Head Population heads/ac	Lodging
		2007	2-year	3-year	2007	2-year	3-year			
Early										
Asgrow Seed	Pulsar	54.8	59.0	59.9	57.5	53.7	55.1	17,000	2.50	25
DEKALB	DKS 37-07	58.6	54.0	57.2	59.4	51.7	54.0	19,100	1.99	20
DEKALB	DKS 29-28	57.5	59.6	56.4	57.7	55.2	55.9	21,200	2.23	10
Sorghum Partners Inc	KS 310	58.3	64.3	------	58.5	55.7	------	20,300	1.91	5
NC+ Hybrids	5B37	58.6	------	------	58.0	------	------	24,500	1.86	15
NC+ Hybrids	5B89	46.8	------	------	57.5	------	------	22,900	1.75	50
	Mean	55.8	59.2	57.8	58.1	54.1	55.0	20,800	2.03	------
	C.V.%	15.6	19.6	18.2	1.4	5.2	5.1	9.8	7.4	------
	L.S.D.	NS	NS	NS	NS	2.9	2.4	3,100	0.23	------

Cooperator: OPREC

Soil Series: Richfield Clay Loam

No-till Practices: Planted following wheat in 2006

Soil Test: N: 51 lbs/ac P: 27 K: 949 pH: 7.8

Fertilizer: N: 50 lbs N/ac + 5 gal/ac 10-34-0 with planter

Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)

Planting Date: May 31, 2007 Target Population: 22,000 plants/ac

Harvest Date: September 20, 2007

Table 6. Continued

Company Brand Name	Entry Designation	Grain Yield bu/ac			Test weight lb/bu			Plant Population plants/ac	Head Population heads/ac	Lodging
		2007	2-year	3-year	2007	2-year	3-year			
					Medium					
Sorghum Partners Inc	KS 585	59.5	55.6	54.8	60.3	53.0	54.6	19,500	2.00	0
Sorghum Partners Inc	KS 585 wo	61.0	55.4	54.1	59.9	53.4	54.8	20,100	2.07	0
DEKALB	DK 44	59.9	46.9	46.6	58.7	50.4	53.0	19,400	1.90	10
DEKALB	DK 44 wo	48.7	40.3	43.4	59.1	50.9	53.4	18,600	1.65	10
NC+ Hybrids	6B50	64.5	------	------	56.9	------	------	22,900	1.75	15
NC+ Hybrids	7R34	58.9	------	------	59.3	------	------	23,900	1.78	0
DEKALB	DKS 36-16	56.6	------	------	57.7	------	------	22,100	1.98	10
Sorghum Partners Inc	NK5418	50.7	------	------	57.4	------	------	19,700	2.20	70
Sorghum Partners Inc	NK7829	48.1	------	------	56.5	------	------	20,100	1.55	35
DEKALB	DKS 42-20	47.7	------	------	56.9	------	------	22,500	1.79	55
NC+ Hybrids	7C22	43.3	------	------	57.8	------	------	23,200	1.71	60
Sorghum Partners Inc	NK4420	37.1	------	------	57.0	------	------	23,400	1.75	65
	Mean	53.0	49.5	49.7	58.1	51.9	53.9	21,300	1.84	------
wo: no insecticide treatment	C.V.%	12.8	15.5	16.0	1.9	2.9	2.9	13	10.6	------
	L.S.D.	9.8	8.0	6.6	1.6	1.6	1.3	NS	0.28	------

Monthly Rainfall (in.)

	May	June	July	Aug.	Sep.	**Total**
2006:	2.19	2.34	2.05	4.06	1.19	**11.83**
2007:	1.48	1.62	2.00	0.26	0.35	**5.71**
Long term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**

Table 7. Results from OPREC limited irrigation grain sorghum performance trial, 2007.

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac	Head Population heads/ac	Lodging
		2007	2-year	2007	2-year			
Early								
Asgrow Seed	Pulsar	91.4	112.2	59.1	59.8	45,700	1.52	10
DEKALB	DKS 37-07	84.1	105.9	59.7	60.0	46,600	1.27	15
DEKALB	DKS 29-28	83.3	100.6	58.2	59.0	47,200	1.45	15
Sorghum Partners Inc	KS 310	82.9	99.0	59.1	59.3	44,700	1.43	0
Walter Moss Seed Co. LTD	M-927-ER	83.2	------	58.4	------	46,200	1.32	35
NC+ Hybrids	5B37	82.2	------	58.7	------	50,400	1.37	0
NC+ Hybrids	5B89	80.0	------	59.5	------	47,900	1.36	5
	Mean	83.9	104.4	58.9	59.5	47,000	1.39	------
	C.V.%	16.6	12.1	1.3	1.4	7.1	12.6	------
	L.S.D.	NS	13.1	1.1	0.85	NS	NS	------

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac	Head Population heads/ac	Lodging
		2007	2-year	2007	2-year			
Early								
Sorghum Partners Inc	KS 585	108.8	121.0	61.6	60.7	53,300	1.31	0
Sorghum Partners Inc	KS 585	111.3	111.9	61.3	60.6	54,500	1.38	0
DEKALB	DK 44	93.4	106.7	60.0	59.5	48,000	1.38	0
DEKALB	DK 44	87.1	105.2	60.0	59.3	48,500	1.12	0
DEKALB	DKS 42-20	103.9	------	61.0	------	52,200	1.30	5
DEKALB	DKS 36-16	103.8	------	61.2	------	49,400	1.38	0
Sorghum Partners Inc	NK5418	98.8	------	59.5	------	48,100	1.43	0
NC+ Hybrids	6B50	98.1	------	59.4	------	47,900	1.37	0
Walter Moss Seed Co. LTD	M-929-MB	96.0	------	60.8	------	42,800	1.50	0
Sorghum Partners Inc	NK4420	90.0	------	60.7	------	52,800	1.24	5
NC+ Hybrids	7C22	81.4	------	59.5	------	47,200	1.24	45
	Mean	97.5	111.2	60.4	60.0	49,500	1.33	------
wo: no insecticide treatment	C.V.%	8.7	10.0	1.2	1.5	6.7	8.2	------
	L.S.D.	14.4	11.5	1.3	0.9	5,700	0.19	------

Table 7. Continued

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Test weight Lb/bu 2007	Plant Population plants/ac	Head Population heads/ac	Lodging
			Full			
NC+ Hybrids	7R34	101.6	61.4	49,800	1.38	0
Sorghum Partners Inc	NK7633	100.6	58.7	50,100	1.27	0
DEKALB	DKS 54-00	95.1	58.8	51,500	1.22	5
Sorghum Partners Inc	NK7829	71.7	58.4	46,800	1.22	30
	Mean	92.3	59.3	49,600	1.27	------
	C.V.%	7.8	0.7	5.1	9.1	------
	L.S.D.	11.5	0.7	NS	NS	------

Cooperator: OPREC

Soil Series: Richfield Clay Loam

Strip Tillage Practices: Planted following soybean in 2006

Soil Test: N: 34 lbs/ac P: 24 K: 868 pH: 8.0

Fertilizer: N: 150 lbs N/ac and 40 lbs/P_2O_5

Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)

Planting Date: June 13, 2007 Target Population: 50,000 plants/ac

Harvest Date: October 5, 2007

Monthly Rainfall (in.)

	May	June	July	Aug.	Sep.	**Total**
2006:	2.19	2.34	2.05	4.06	1.19	**11.83**
2007:	1.48	1.62	2.00	0.26	0.35	**5.71**
Long term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**

------- Irrigation (in.) -------

May	Jun.	Jul.	Aug.	Sept.
1.0	1.0	2.0	3.0	0.0

Table 8. Results from Tipton grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Grain Yield bu/ac Two-year	Test weight lb/bu 2007	Test weight lb/bu Two-year	Plant Population plants/ac	Head Population heads/ac
			Early				
Asgrow Seed	Pulsar	121.2	78.2	58.6	56.6	35,300	1.83
DEKALB	DKS 37-07	124.1	75.6	59.6	57.1	38,200	1.48
DEKALB	DKS 29-28	111.4	72.8	55.9	55.8	41,100	1.78
Sorghum Partners Inc	KS 310	81.4	57.1	56.6	57.4	43,900	1.34
NC+ Hybrids	5B89	119.5	------	58.1	------	44,100	1.65
NC+ Hybrids	5B37	89.9	------	54.6	------	38,900	1.57
	Mean	107.9	70.9	57.2	56.7	40,200	1.61
	C.V.%	8.1	19.0	2.7	3.9	8.2	8.6
	L.S.D.	13.2	14.0	2.4	NS	5,000	0.21

Company Brand Name	Entry Designation	Grain Yield bu/ac 2007	Grain Yield bu/ac Two-year	Test weight lb/bu 2007	Test weight lb/bu Two-year	Plant Population plants/ac	Head Population heads/ac
			Medium				
NC+ Hybrids	6B50	126.6	74.5	57.6	56.4	45,600	1.38
Sorghum Partners Inc	KS 585	117.3	73.9	60.6	58.9	42,100	1.59
Garst Seed Company	5750	112.4	73.3	58.9	57.6	45,800	1.52
DEKALB	DKS 42-20	112.1	66.9	59.7	56.9	42,300	1.52
Sorghum Partners Inc	KS 585 wo	104.3	64.6	59.4	57.4	34,300	1.74
DEKALB	DKS 36-16	108.7	63.4	58.9	56.4	44,500	1.42
DEKALB	DK 44 wo	105.8	62.4	58.7	57.2	38,500	1.32
DEKALB	DK 44	106.0	60.4	58.6	56.7	39,500	1.21
Garst Seed Company	5401	120.3	------	59.2	------	48,800	1.31
Sorghum Partners Inc	NK4420	116.4	------	58.1	------	45,700	1.42
NC+ Hybrids	7R34	113.4	------	60.3	------	42,800	1.50
NC+ Hybrids	7C22	110.5	------	58.5	------	45,500	1.23
Sorghum Partners Inc	NK5418	106.2	------	57.9	------	37,600	1.76
Sorghum Partners Inc	NK7829	90.4	------	58.2	------	40,700	1.12
wo: no insecticide treatment	Mean	110.7	67.4	58.9	57.2	42,400	1.43
	C.V.%	10.0	15.1	1.4	2.0	10.8	8.60
	L.S.D.	15.9	10.2	1.2	1.2	6,600	0.18

Cooperator: Southwest Research and Extension Center
Conventional Tillage Practices: Sorghum-fallow-sorghum rotation
Fertilizer: N: 69 lbs/ac P: 0 K: 0
Planting Date: April 27 , 2007 Target Population: 45,000 plants/ac
Harvest Date: August 30, 2007

Soil Series: Tipton Silt Loam
Soil Test: N: 34 P: 69 K: 790 pH: 6.5
Herbicide: 2 qt/ac Cinch ATZ Lite Preemergence

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug	**Total**
2006:	2.91	2.70	0.49	1.09	2.08	**7.19**
2007:	1.87	2.29	9.72	1.38	3.30	**18.56**
Long term mean:	2.30	4.30	3.45	2.08	2.71	**14.84**

OKLAHOMA PANHANDLE LIMITED IRRIGATION SORGHUM SILAGE PERFORMANCE TRIAL, 2007

PRODUCTION TECHNOLOGY CROPS

OKLAHOMA COOPERATIVE EXTENSION SERVICE
DEPARTMENT OF PLANT AND SOIL SCIENCES
DIVISION OF AGRICULTURAL SCIENCES & NATURAL RESOURCES
OKLAHOMA STATE UNIVERSITY

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TRIAL OBJECTIVES AND PROCEDURES

In the coming years with natural gas prices rising and the possibility of water supplies diminishing, sorghum silage may replace corn silage in the panhandle region. Sorghum requires less water than corn, therefore less irrigation is required. Many seed companies have increased efforts to bring higher quality sorghum silage hybrids to market. Among these are brown mid-rib, photoperiod sensitive, conventional forage sorghums, and sorghum/sudan hybrids. In 2006, the Oklahoma Cooperative Extension Service re-established a sorghum silage performance trial in the Oklahoma panhandle to evaluate sorghum silage with limited irrigation. Limited irrigation has many definitions, the most common being one-half of normal irrigation or less. For the purpose of this trial, eight inches of irrigation was defined as being the maximum to be applied.

This trial provides producers, extension educators, industry representatives, and researchers with information on silage sorghum hybrids marketed in Oklahoma. Company or brand name, entry designation, plant characteristics, and maturity information, were provided by the companies (Table 1). Oklahoma State University did not verify this information. Company participation was voluntary, therefore some hybrids marketed in Oklahoma were not included in the test.

Limited irrigated test plots were established at the Oklahoma Panhandle Research and Extension Center (OPREC), in Goodwell. Two rows (25 feet long) were seeded at a target population of 50,000 plants/ac for brown mid-rib, and a target of 70,000 plants/ac for all other entries. The lower population for brown midribs may help with lodging associated with these hybrids. Experimental design was a randomized complete block with four replications. Prior to harvest five-foot alleys were cut to facilitate harvest. Ten feet of one row was hand harvested, weighed and three plants were randomly selected to run through a chipper shredder. Samples where then dried at 65° C until weight was constant for two consecutive days. Maturity was checked periodically to monitor development so plots could be harvested when most entries were between soft and hard dough. Photoperiod sensitive hybrids were harvested on the last date. In 2007 all hybrids were harvested on the same date. Ensilage production is reported as tons/ac adjusted to 65% moisture (Table 2). This is consistent with current ensiling practices.

- Planting date: June 13, 2007
- Harvest date: October 8, 2007
- Previous crop: Soybean
- Soil type: Richfield Clay Loam
- Soil Test: N: 34 lbs/ac P: 24 K: 868 pH: 8.0
- Fertilizer applied: N: 170 lbs/ac P: 40 lbs P_2O_5/ac K: 0
- Herbicide: Cinch ATZ Lite @ 2.0 qt/ac (Preemergence)
- Tillage Strip-till
- Irrigation:

May	Jun.	Jul.	Aug.	Sept.
1.0	1.0	2.0	3.0	0.0

- Rainfall:

	May	June	July	Aug.	Sep.	Total
2006	2.16	2.34	2.05	4.06	1.19	**11.80**
2007	1.48	1.62	2.00	0.26	0.35	**5.71**

Data Collected

Lodging:	scale 1 – 4; 1-no lodging, 2-less than 25%, 3-25 – 50%, 4-greater than 50%
Plant population:	Plants/ac
Yield	Lbs/ac of Dry matter and tons/ac of silage

The silages were analyzed for the following nutrients and are reported on a dry mater basis in Tables 2 and 3.

- **Crude Protein**: The total protein in the sample including true protein and non-protein nitrogen (% Nitrogen X 6.25).
- **NDF (neutral detergent fiber)**: A measure of hemicellulose, cellulose and lignin representing the fibrous bulk of the forage. These three components are classified as cell wall or structural carbohydrates. They give the plant rigidity enabling it to support itself as it grows. Hemicellulose and cellulose can be broken down by microbes in the rumen to provide energy to the animal. NDF is negatively correlated with intake.
- **ADF (acid detergent fiber):** A measure of cellulose and lignin. Cellulose varies in digestibility and is negatively influenced by the lignin content. ADF is negatively correlated with overall digestibility.
- **Lignin:** Indigestible plant component. Lignin has a negative impact on cellulose digestibility. As lignin content increases, digestibility of cellulose decreases thereby lowering the amount of energy potentially available to the animal.
- **TDN (Total Digestible Nutrients):** Denotes the sum of the digestible protein, digestible non-structural carbohydrates (sugars and starch), digestible NDF and 2.25 X the digestible fat.
- **IVTD (In Vitro True Digestibility):** An anaerobic fermentation performed in the laboratory to simulate digestion as it occurs in the rumen. Rumen fluid is collected from ruminally cannulated high producing dairy cows consuming a typical total mixed ration. Forage samples are incubated in rumen fluid and buffer for a specified time period at 102.2°F (body temperature). During this time, the microbial population in the rumen fluid digests the sample as would occur in the rumen. Upon completion, the samples are extracted in neutral detergent solution to leave behind the undigested fibrous residue. The result is a measure of digestibility that can be used to estimate energy.
- **NEl (Net Energy for Lactation):** An estimate of the energy value of a feed used for maintenance plus milk production during lactation and for maintenance plus the last two months of gestation for dry, pregnant cows.
- **NEm (Net energy for Maintenance):** An estimate of the energy value of a feed used to keep an animal in energy equilibrium, i.e., neither gaining or losing weight.
- **NEg (Net Energy for Gain):** An estimate of the energy value of a feed used for body weight gain above that required for maintenance.

Results

The growing conditions in 2007 were less than ideal with very limited rainfall, therefore two more inches of irrigation was applied when compared to 2006. The total rainfall for May through September was 48% of the total for 2006. The reduced rainfall and limited irrigation reduced yields when compared to 2006, this is evident by hybrids having higher two-year average yields. Also the total for 2007 can be somewhat misleading in that the 2 inch total in July was received in one event of approximately 45 minutes; therefore much of that rainfall was not effective.

Yield data for the various hybrids are reported in Table 2. The silage yield in tons per acre is reported along with a yield expressed as lbs of dry matter (DM) per acre (measure of hay production). In addition a yield of digestible DM per acre is reported. This was calculated by multiplying lbs DM/acre and %IVTD. The nutrient profiles of the various hybrids are reported in Table 3.

Small differences in yield or other parameters should not be overemphasized. Least Significant Differences (L.S.D.) are shown at the bottom of each table. Unless two entries differ by at least the L.S.D. shown, little confidence can be placed in one being superior to another. The coefficient of variability (C.V.) is provided as an estimate of the precision of the data with respect to the mean.

The following people have contributed to this report by assisting in crop production, data collection, and publication; Donna George, Lawrence Bohl, Matt LaMar, Craig Chesnut, Tony Mills, and Eddie Pickard. Their efforts are greatly appreciated.

Table 1. Characteristics of Sorghum Silage Hybrids in OPREC Performance Trial, 2007.

Company Brand Name	Hybrid	Sorghum Type	Maturity (days)	Male Sterile	Brown Mid-rib
Walter Moss Seed Co., Ltd.	4Ever Green BMR	Forage	180	PS	Yes
Walter Moss Seed Co., Ltd.	SU-2-LM	Sudan	100	No	No
Walter Moss Seed Co., Ltd.	Mega Green	Sudan	180	No	No
Walter Moss Seed Co., Ltd.	38 Special BMR	Sudan	100	No	Yes
Walter Moss Seed Co., Ltd.	Millenium BMR	Forage	85	No	Yes
NC+ Hybrids	NC+ Nutri-Choice II	Forage	90	Fertile	No
Sorghum Partners Inc	Sordan Headless	Sorg X Sud	NA	Photo	No
Sorghum Partners Inc	Trudan Headless BMR	Hybrid Sud	NA	Photo	Yes
Sorghum Partners Inc	NK 300	Hybrid Forage	90	No	No
Sorghum Partners Inc	Trudan Headless	Hybrid Sud	NA	Photo	No
NC+ Hybrids	Nutri-Ton II	Forage	90	Fertile	no
NC+ Hybrids	BMR 77F	Forage	70	Fertile	Yes
Walter Moss Seed Co., Ltd.	4Ever Green	Forage	180	PS	No
Walter Moss Seed Co., Ltd.	Century BMR	Sudan	80	No	Yes

Table 2. Ensilage Yields and and harvest parameters for OPREC Sorghum Silage Performance Trial, 2007.

Company Brand Name	Hybrid	Digestible DM lbs/ac		DM Yield (lbs/ac)		Ensilage Yield (tons/ac)		Plant Population plants/ac	Harvest Moisture	Lodging %
		2007	2-year	2007	2-year	2007	2-year			
NC+ Hybrids	NC+ Nutri-Choice II	9,000	9,600	11,600	13,000	16.6	18.6	53,100	0.66	1
Sorghum Partners Inc	NK 300	9,000	9,300	11,700	12,400	16.7	17.7	51,400	0.61	3
Walter Moss Seed Co., Ltd.	Mega Green	8,200	9,000	11,300	13,200	16.1	18.9	54,300	0.73	2
Walter Moss Seed Co., Ltd.	SU-2-LM	8,100	8,300	10,900	11,800	15.6	16.8	55,500	0.68	1
Sorghum Partners Inc	Sordan Headless	6,900	7,600	9,500	11,000	13.6	15.7	51,400	0.74	1
Walter Moss Seed Co., Ltd.	4Ever Green BMR	7,500	7,200	9,700	9,300	13.9	13.2	47,200	0.74	1
Walter Moss Seed Co., Ltd.	Millenium BMR	5,200	6,800	6,700	8,800	8.5	12.6	42,400	0.64	2
Sorghum Partners Inc	Trudan Headless BMR	3,700	6,800	4,600	9,400	6.6	15.4	42,300	0.71	2
Walter Moss Seed Co., Ltd.	38 Special BMR	4,100	4,800	4,900	6,400	7.1	9.2	40,800	0.63	3
NC+ Hybrids	Nutri-Ton II	9,900	----	12,600	----	18.0	----	49,800	0.65	2
Walter Moss Seed Co., Ltd.	4Ever Green	6,900	----	9,200	----	13.1	----	47,500	0.75	2
Sorghum Partners Inc	Trudan Headless	6,000	----	8,200	----	11.7	----	60,100	0.71	1
NC+ Hybrids	BMR 77F	4,900	----	6,300	----	9.0	----	50,400	0.64	4
Walter Moss Seed Co., Ltd.	Century BMR	3,800	----	5,200	----	7.5	----	55,200	0.66	3
	Mean	6,700	7,700	8,700	10,600	12.5	15.4	50,100	0.68	----
	C.V.%	18.7	19.8	19.5	19.9	19.5	19.9	9.0	5.0	----
	L.S.D.	2,100	2,000	2,700	2,800	4.1	3.8	7,600	0.06	----

Table 3. Ensilage Quality OPREC Sorghum Silage Performance Trial, 2007.

Company Brand Name	Entry Designation	Lbs Milk/ ton DM	CP*	ADF * %	NDF * %	Lignin %	TDN %	Energy Values *Mcal/lb		
								Lact.	Maint.	Gain
Walter Moss Seed Co., Ltd.	4Ever Green BMR	2,400	7.3	36.7	57.3	5.0	61.7	0.57	0.57	0.32
Walter Moss Seed Co., Ltd.	SU-2-LM	2,240	6.5	32.3	51.5	5.6	57.7	0.56	0.53	0.27
Walter Moss Seed Co., Ltd.	Mega Green	2,160	8.0	35.0	55.5	6.2	57.3	0.54	0.52	0.26
Walter Moss Seed Co., Ltd.	38 Special BMR	2,660	7.5	59.7	48.6	4.0	64.7	0.64	0.64	0.37
Walter Moss Seed Co., Ltd.	Millenium BMR	2,700	7.8	28.0	46.2	4.9	65.0	0.66	0.64	0.38
NC+ Hybrids	NC+ Nutri-Choice II	2,460	8.3	32.6	54.2	6.1	61.5	0.59	0.58	0.33
Sorghum Partners Inc	Sordan Headless	2,362	8.0	35.9	54.0	5.9	60.3	0.57	0.56	0.31
Sorghum Partners Inc	Trudan Headless BMR	2,540	7.5	31.4	49.7	4.7	63.0	0.62	0.61	0.34
Sorghum Partners Inc	NK 300	2,390	8.0	33.0	49.1	5.6	61.0	0.60	0.58	0.32
Sorghum Partners Inc	Trudan Headless	2,150	7.2	36.1	53.0	5.3	57.0	0.55	0.51	0.26
NC+ Hybrids	Nutri-Ton II	2,470	6.7	32.8	50.6	4.6	61.7	0.61	0.59	0.30
NC+ Hybrids	BMR 77F	2,460	6.0	31.2	52.5	5.5	61.7	0.60	0.58	0.33
Walter Moss Seed Co., Ltd.	4Ever Green	2,330	8.4	32.8	53.6	5.3	60.3	0.58	0.56	0.30
Walter Moss Seed Co., Ltd.	Century BMR	2,130	7.2	35.6	57.7	6.3	57.0	0.53	0.51	0.26
	Mean	7.0	7.5	33.1	52.4	5.4	60.7	0.59	0.57	0.31
	C.V.%	2,390	10.4	7.5	5.7	19.0	4.3	5.9	7.3	12.1
	L.S.D.	280	1.3	4.2	5.0	NS	4.4	0.06	0.07	0.06

2007 Soybean Variety Performance

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Oklahoma State University
Department of Plant and Soil Sciences
Production Technology Report
PT 2007-12

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CONTENTS

Information on Soybean Variety Trials

Numerous soybean lines and varieties were evaluated in performance tests during 2007. Commercially available varieties, both public and private, and advanced experimental lines were included within the tests. Tests were designed to provide information to assist producers in identifying superior varieties and make crop management decisions. Tests include both early-season and full-season environments (Table 1). Early-season tests were planted during April and contained maturity group (MG) III and IV. Full-season test were planted during June and into the beginning of July and included varieties in MG IV, V, and VI. All varieties entered in 2007 were glyphosate resistant.

Public varieties included in tests are considered to be competitive for the region, and are represented by established varieties, new releases, and advanced experimental lines. Varieties of private seed company origin are submitted based on decisions by the respective company.

2007 Soybean Crop Overview

The 2007 soybean production season in Oklahoma was characterized as extremely wet. For many areas in Oklahoma this past soybean growing season will go down among the wettest in recorded history. Planted acreage of this year's soybean crop was measured at 190,000 acres and an estimated 170,000 acres were harvested. Average yield at the time of this report was estimated at 24 bushels per acre. Soybean acreage was down probably as a result of the wet conditions and producers were not able to plant. Although several producers had difficulty planting their soybean crop during recommended planting dates good yields were still realized due to good growing conditions in late summer and early fall. Even though 2007 was a challenging production year in some aspects for soybean producers, soybean remains a good cropping choice for most areas of Oklahoma.

Pest problems

Plant disease was extremely high during the 2007 growing season, mainly due to the wet growing conditions. Asian soybean rust was wide-spread in Oklahoma during the growing season from July on. Rust was detected in most of the Sentinel Plots OSU had throughout the state. Most fields, especially in the eastern part of the state were treated with fungicide to prevent the spread of rust. On most occasions fungicide application at the R3 growth stage reduced yield loss from foliar soybean diseases. For the most part no major widespread insect problems were observed during the 2006 growing season. Three-cornered alfalfa hoppers were observed in a few fields during the early part of the growing season.

Methods

Early-season test locations were near Chickasha, Haskell, Bixby, Lahoma, Stillwater, and Goodwell. The early-season test at Haskell was not harvested due to wet conditions that prevented a timely harvest. Full-season test locations were near Haskell, Bixby, Lahoma, Stillwater, Miami, and Goodwell. The Chickasha location was not planted due to wet conditions in June and July. All test plots were planted using four 30-inch rows that were 21 feet long. Plots were seeded at a rate of eight seeds per row foot (139,392 seeds per acre). At planting, *Bradyrhizobium japonicum* in a granular formulation was applied with the seed. Tests were conducted using randomized complete block design with three replications. All locations were conventionally tilled prior to seeding. Irrigation was used only at the Goodwell location. Three rows the entire length of the plot was harvested with a small plot combine to determine grain yield.

Interpreting Data

Details of establishment and management of each test are listed in footnotes below the tables. Least significant differences (LSD) are listed at the bottom of all but the Performance Summary tables. Differences between varieties are significant only if they are equal to or greater than the LSD value. If a given variety out yields another variety by as much or more than the LSD value, then we are 95% sure that the yield difference is real, with only a 5% probability that the difference is due to chance alone. For example, if variety X is 5 bushels/acre higher in yield than variety Y, then this difference is statistically significant if the LSD is 5 or less. If the LSD is

5 or greater, then we are less confident that variety X really is higher yielding than variety Y under the conditions of the test.

The CV value or coefficient of variation, listed at the bottom of each table is used as a measure of the precision of the experiment. Lower CV values will generally relate to lower experimental error in the trial. Uncontrollable or immeasurable variations in soil fertility, soil drainage, and other environmental factors contribute to greater experimental error and higher CV values.

Results reported here should be representative of what might occur throughout the state but would be most applicable under environmental and management conditions similar to those of the tests. The relative yields of all soybean varieties are affected by crop management and by environmental factors including soil type, summer conditions, soil moisture conditions, diseases, and insects.

Additional information on the Web

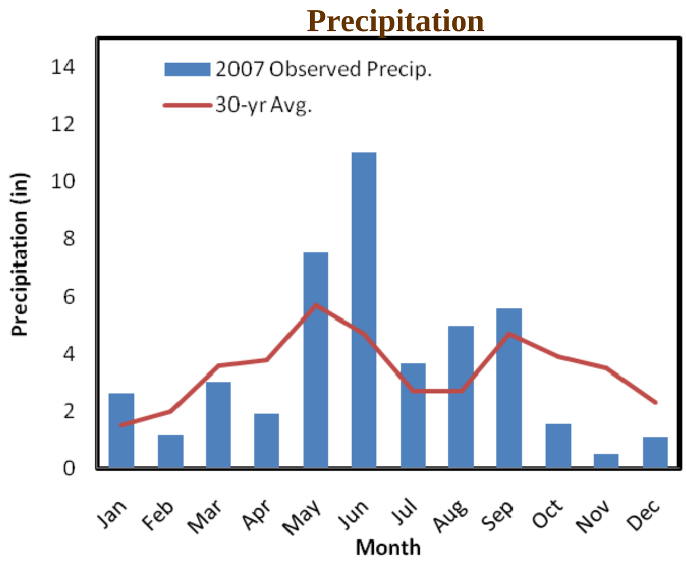
A copy of this publication as well as additional variety information and more information on soybean management can be found at

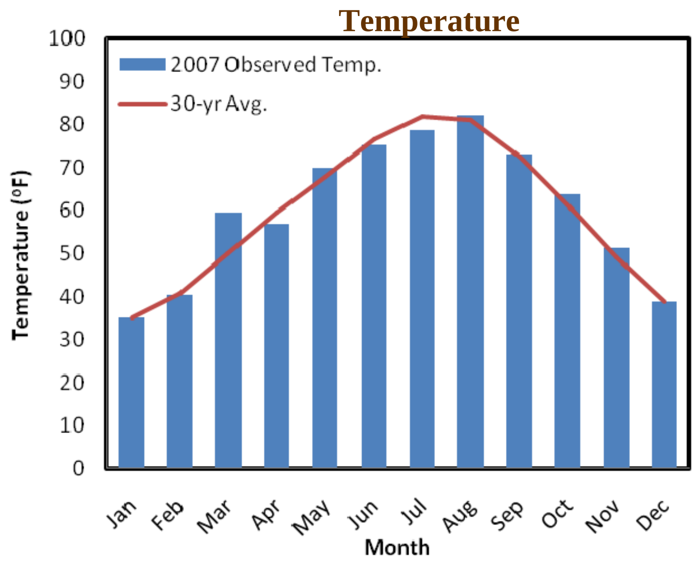
www.soybean.okstate.edu/

Sources of Seed for the 2007 Soybean Performance Tests

Dyna-Gro Seeds 101 East Corporate Dr. Suite 180 Lewisville, TX 75067	Telephone: 918-464-2012
Hornbeck Seed Co., Inc. PO Box 472 Dewitt, AR 72042	Telephone: 870-946-2087
Monsanto 102 W. Carol Ave. Cortland, IL 60112	Telephone: 815-754-4809
NK Brand Seeds 6711 Hare Hill Dr. Arlington, IN 38002	Telephone: 901-382-5265
NC+ 1551 Highway 210 Huxley, IA 50124	Telephone: 515-314-1003

2007 Bixby Trial Data





Growing conditions throughout the year at Bixby varied. In June, plots were saturated by the above normal rainfall which may have decreased plant growth and had a negative effect on yield. Plants were seldom stressed for moisture during the growing season. Grain yields of varieties included in the early-season test were lower than normal. This may have been due to the presence of soybean cyst nematodes (SCN). A soil test taken from the plot area indicated the presence of SCN. The results should be considered to be influenced by the presence of SCN. Varieties containing resistance to SCN would be expected to perform better in an environment such as this. Full-season grain yields were normal but also were planted in an area that tested positive for SCN. Presence of Asian soybean rust was observed but did not impact trial results.

Table 1. Information on soil chemical properties and management practices for the Soybean Production Test at Bixby, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	6.1	Planting Dates	4/20 and 6/6[1]
Soil Test P Index	95	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	257	Seeding Depth (in)	1.5
		Irrigation	none
		Harvest Dates	9/17 and 11/1[2]
		Soil Moisture at Planting	Good

[1]Planting dates for the early and full season tests, respectively.

[2]Harvest dates for the early and full season tests, respectively.

Table 2. Early-season glyphosate resistant soybean production variety trail Bixby, OK 2007.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
HBK R5123	Hornbeck Seed Co. Inc.	5.1	39	0	0	2900	22.6
AG 4103	Monsanto	4	29	0	0	3650	18.4
HBK R4527	Hornbeck Seed Co. Inc.	4.5	39	0	0	3250	18.4
HBK R4924	Hornbeck Seed Co. Inc.	4.9	38	0	0	3300	18.2
AG 3905	Monsanto	3	32	0	0	3600	16.3
HBK R4727	Hornbeck Seed Co. Inc.	4.7	37	0	0	3000	16.3
DG 33Y45	Dynagro Seed UAP	4.5	31	1	0	3650	14.2
HBK HX4843	Hornbeck Seed Co. Inc.	4.8	39	0	0	3150	13.7
HBK R3824	Pioneer Hi-Bred Intl.Inc.	3.9	32	0	0	3450	12.2
SXO 6545	Dynagro Seed UAP	4.5	31	0	0	3100	10.3
AG 3803	Monsanto	3	30	1	0	3700	9.6
DG 35D44	Dynagro Seed UAP	4.4	30	1	0	3250	9.4

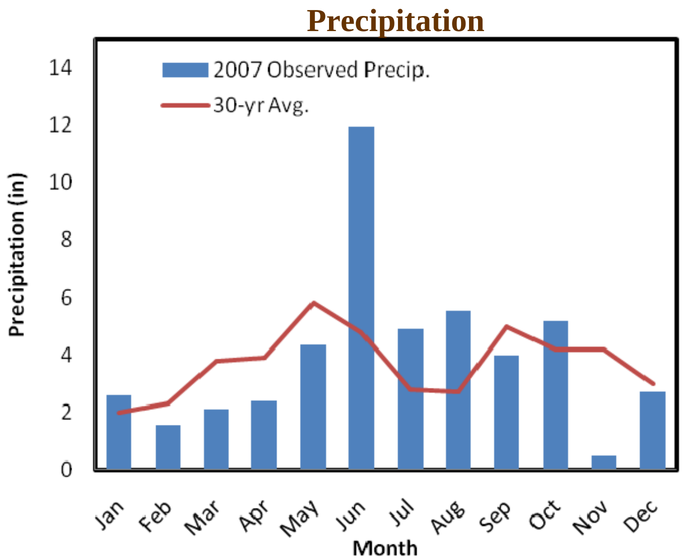
[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.
[2]**Mean yield = 15.0 Bu/Acre. LSD @.05 = 4.3 Bu/acre. C.V. = 12.5%.**

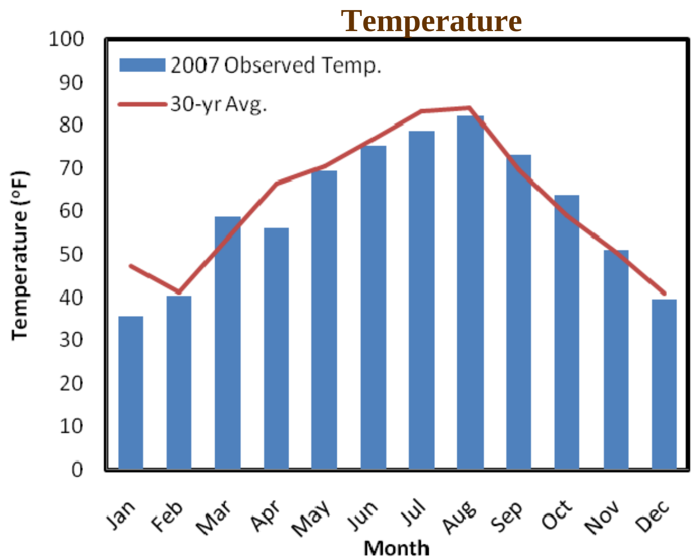
Table 3. Full-season glyphosate resistant soybean production variety trail Bixby, OK 2007.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
HBK R4924	Hornbeck Seed Co. Inc.	4.9	21	0	0	2900	37.7
DG 36T60	Dynagro Seed UAP	6	19	0	0	2900	37.3
DG 36N57	Dynagro Seed UAP	5.7	14	0	0	2800	37.1
HBK R5226	Hornbeck Seed Co. Inc.	5.2	20	0	0	2800	36.6
HBK R5425	Hornbeck Seed Co. Inc.	5.4	25	0	0	2750	34.6
DG 33C59	Dynagro Seed UAP	5.9	20	0	0	2700	34.6
DG 37C62	Dynagro Seed UAP	6.2	25	0	0	2850	33.6
XP 541-7	NC+	5.4	17	0	0	3050	33.3
HBK R5123	Hornbeck Seed Co. Inc.	5.1	24	0	0	2850	32.5
DG 31R54	Dynagro Seed UAP	5.4	25	0	0	2750	31.8
AG 4903	Monsanto	4	20	0	0	2550	31.4
DG 35Z49	Dynagro Seed UAP	4.9	24	0	0	2650	30.6
HBK R5525	Hornbeck Seed Co. Inc.	5.5	21	0	0	2700	29.3
DG 36Y48	Dynagro Seed UAP	4.8	20	0	0	2950	27.8
AG 5301	Monsanto	5	23	0	0	2900	27.5
XP 531-7	NC+	5.3	20	0	0	2700	26.8
DG 32B57	Dynagro Seed UAP	5.7	17	0	0	2900	26.6
DG 32A53	Dynagro Seed UAP	5.3	20	0	0	2700	26.0
DG 32R46	Dynagro Seed UAP	4.6	21	0	0	2750	24.9

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.
[2]**Mean yield = 31.6 Bu/Acre. LSD @ .05 =3.2 Bu/Acre. C.V. = 9.8%.**

2007 Haskell Trial Data





Growing conditions throughout the year at Haskell varied. In June, plots were saturated by the above normal rainfall which may have decreased plant growth and had a negative effect on yield. Plants were seldom stressed for moisture during the growing season. The early-season test could not be harvested in a timely manner due to the above normal precipitation in August. Plots were shattered excessively and reliable yield data was not determined. Average grain yield from the full-season test was 46.7 bu/ac. This is above the normal average and an indication of the excellent growing conditions for the full-season soybean. Fungicide was applied at the R3 growth stage. Presence of Asian soybean rust was observed but did not impact trial results.

Table 4. Information on soil chemical properties and management practices for the Soybean Production Test at Haskell, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	5.7	Planting Date	4/20 and 6/8[1]
Soil Test P Index	91	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	271	Seeding Depth (in)	1.5
		Irrigation	none
		Harvest Dates	10/29
		Soil Moisture at Planting	Good

[1]Planting dates for the early and full season tests, respectively.

[2]Harvest dates for full season test.

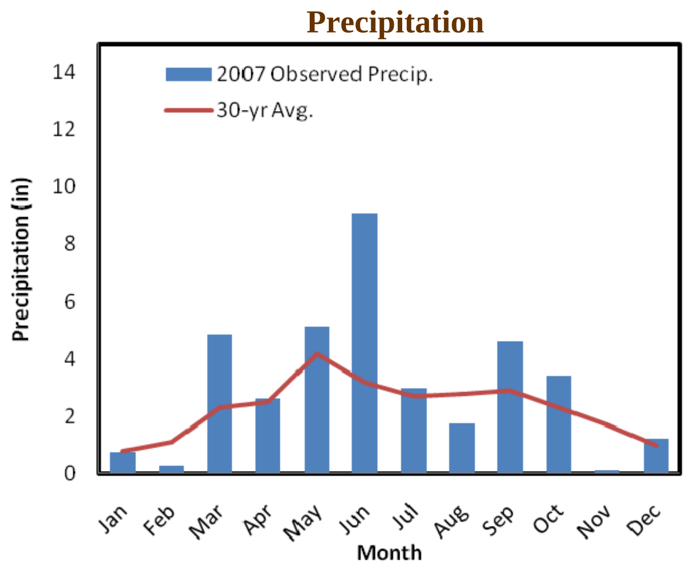
Table 5. Full-season glyphosate resistant soybean production variety trail Haskell, OK 2007.

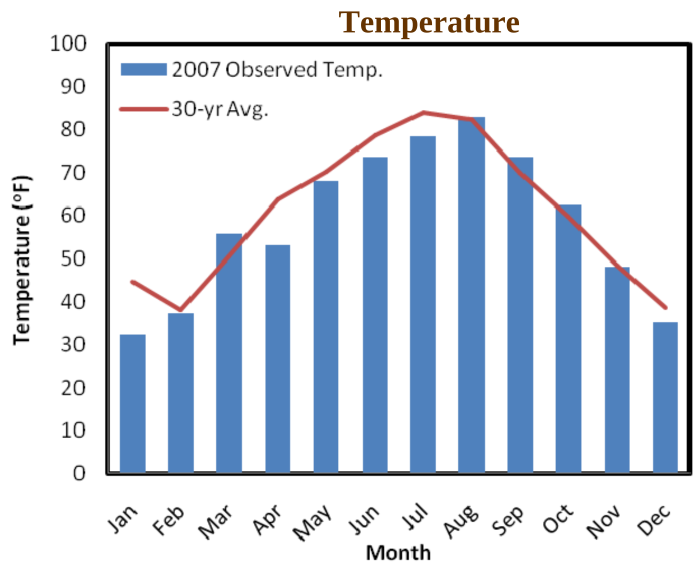
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
DG 36T60	Dynagro Seed UAP	6	24	0	0	2700	60.3
DG 33C59	Dynagro Seed UAP	5.9	23	0	0	2450	56.8
HBK R5226	Hornbeck Seed Co. Inc.	5.2	24	0	0	2650	53.4
HBK R5525	Hornbeck Seed Co. Inc.	5.5	25	1	0	2350	53.2
HBK R5425	Hornbeck Seed Co. Inc.	5.4	24	0	0	2750	49.9
DG 37C62	Dynagro Seed UAP	6.2	20	0	0	2750	49.8
DG 32B57	Dynagro Seed UAP	5.7	22	0	0	2650	49.6
DG 31R54	Dynagro Seed UAP	5.4	22	0	0	2700	49.4
AG 4903	Monsanto	4	23	0	0	2350	48.8
DG 36Y48	Dynagro Seed UAP	4.8	32	0	0	3000	47.3
DG 32R46	Dynagro Seed UAP	4.6	25	0	0	2650	46.8
XP 541-7	NC[+]	5.4	24	0	0	2800	46.8
AG 5301	Monsanto	5	29	0	0	2550	43.9
DG 35Z49	Dynagro Seed UAP	4.9	26	0	0	2650	42.2
HBK R4924	Hornbeck Seed Co. Inc.	4.9	24	0	0	2700	42.1
XP 531-7	NC[+]	5.3	26	1	0	2600	39.6
DG 36N57	Dynagro Seed UAP	5.7	19	0	0	2800	36.7
DG 32A53	Dynagro Seed UAP	5.3	25	0	0	2550	35.7
HBK R5123	Hornbeck Seed Co. Inc.	5.1	24	0	1	2650	34.0

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 46.7 Bu/Acre. LSD @ .05 = 5.4 Bu/Acre. C.V. =12.1 %.

2007 Lahoma Trial Data





Growing conditions throughout the year at Lahoma were good. In June, plots were saturated by the above normal rainfall which may have decreased plant growth and had a negative effect on yield. Plants were seldom stressed for moisture during the growing season. Yields for both the early- and full-season tests were average to above average. Average grain yield for the early-season test was 32.1 bu/ac and the full-season test had an average yield of 31.5 bu/ac when combining all varieties. Asian soybean rust was not observed at this location.

Table 6. Information on soil chemical properties and management practices for the Soybean Production Test at Lahoma, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	na[1]	Planting Date	4/26 and 6/25[2]
Soil Test P Index	na	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	na	Seeding Depth (in)	1.5
		Irrigation	none
		Harvest Dates	10/4 and 11/7[3]
		Soil Moisture at Planting	Good

[1]Not available.

[2]Planting dates for the early and full season tests, respectively.

[3]Harvest dates for the early and full season tests, respectively.

Table 7. Early-season glyphosate resistant soybean production variety trail Lahoma, OK 2007.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
HBK HX4843	Hornbeck Seed Co. Inc.	4.8	35	0	0	4300	37.1
HBK R4924	Hornbeck Seed Co. Inc.	4.9	34	0	0	3700	35.8
SXO 6545	Dynagro Seed UAP	4.5	31	0	0	4650	35.4
HBK R5123	Hornbeck Seed Co. Inc.	5.1	38	0	0	3100	34.1
AG 3905	Monsanto	3	29	0	0	4100	34
HBK R4527	Hornbeck Seed Co. Inc.	4.5	33	0	0	4300	33.8
HBK R4727	Hornbeck Seed Co. Inc.	4.7	31	0	0	4300	32.5
AG 3803	Monsanto	3	29	1	0	4750	31.5
DG 35D44	Dynagro Seed UAP	4.4	37	0	0	4550	29.5
DG 33Y45	Dynagro Seed UAP	4.5	30	0	0	4450	29.3
HBK R3824	Pioneer Hi-Bred Intl.Inc.	3.9	30	1	0	5000	28.8
AG 4103	Monsanto	4	27	0	0	5000	23.4

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 32.1 Bu/Acre. LSD @.05 = 7.9 Bu/acre. C.V. = 14.1

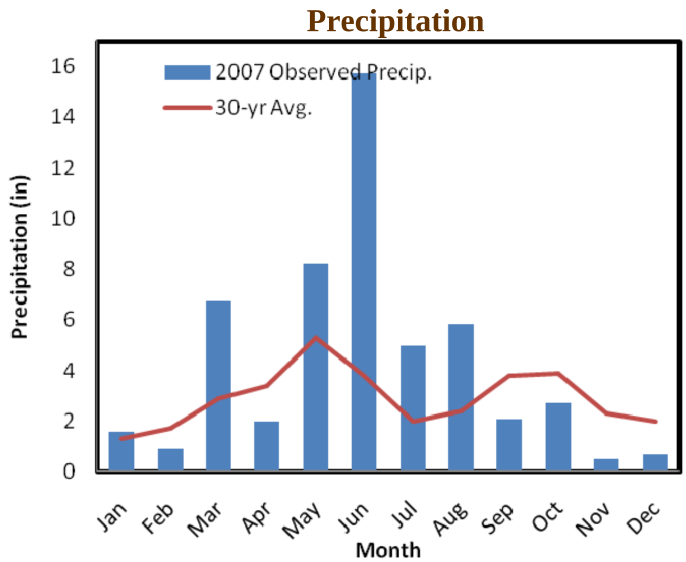
Table 8. Full-season glyphosate resistant soybean production variety trail Lahoma, OK 2007.

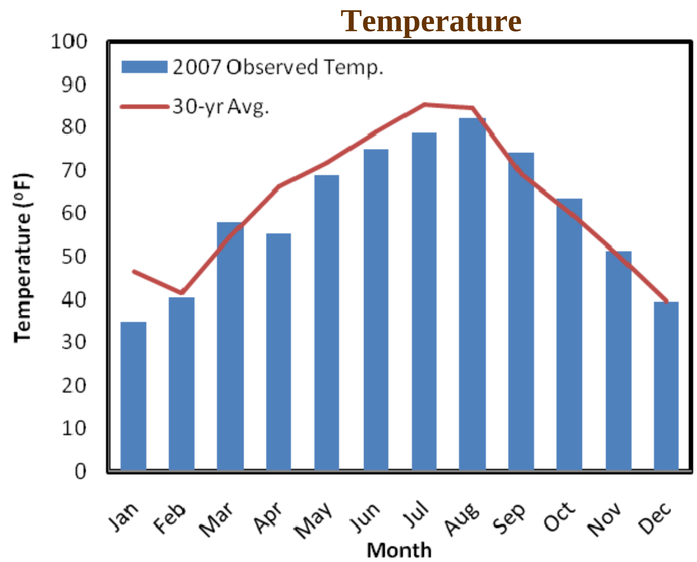
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
DG 36N57	Dynagro Seed UAP	5.7	22	0	0	2700	40.7
DG 31R54	Dynagro Seed UAP	5.4	22	0	0	2600	36.7
DG 33C59	Dynagro Seed UAP	5.9	25	0	0	2650	36.5
HBK R5123	Hornbeck Seed Co. Inc.	5.1	23	0	0	2800	36.3
HBK R5226	Hornbeck Seed Co. Inc.	5.2	25	1	0	2800	35.6
XP 541-7	NC+	5.4	22	1	0	3000	35.5
AG 4903	Monsanto	4	21	1	0	2550	33.9
DG 36T60	Dynagro Seed UAP	6	24	0	0	2900	32.1
DG 32A53	Dynagro Seed UAP	5.3	23	0	0	2550	32.0
XP 531-7	NC+	5.3	24	1	0	2700	31.3
HBK R5425	Hornbeck Seed Co. Inc.	5.4	23	0	0	2700	31.2
AG 5301	Monsanto	5	26	1	0	2950	31.0
DG 32B57	Dynagro Seed UAP	5.7	24	0	0	2900	30.1
HBK R4924	Hornbeck Seed Co. Inc.	4.9	21	1	0	2850	28.7
DG 37C62	Dynagro Seed UAP	6.2	21	0	0	2900	27.0
DG 35Z49	Dynagro Seed UAP	4.9	19	1	0	2650	26.8
HBK R5525	Hornbeck Seed Co. Inc.	5.5	26	1	0	2650	26.2
DG 32R46	Dynagro Seed UAP	4.6	18	2	0	2750	25.3
DG 36Y48	Dynagro Seed UAP	4.8	20	2	0	2950	20.6

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 31.5 Bu/Acre. LSD @ .05 = 5.6 Bu/Acre. C.V. = 12.5%.

2007 Chickasha Trial Data





Growing conditions for the early-season test at Chickasha were good. In June, plots were saturated by the above normal rainfall which may have decreased plant growth and had a negative effect on yield. Average grain yield across all varieties was 23.1 bu/ac, which is lower than average and may have been an indication plants were stressed when water logged. Presence of Asian soybean rust was observed but did not impact trial results.

Table 9. Information on soil chemical properties and management practices for the Soybean Production Test at Chickasha, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	6.1	Planting Date	April 30, 2007
Soil Test P Index	95	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	257	Seeding Depth (in)	1.5
		Irrigation	none
		Harvest Date	9/20
		Soil Moisture at Planting	Good

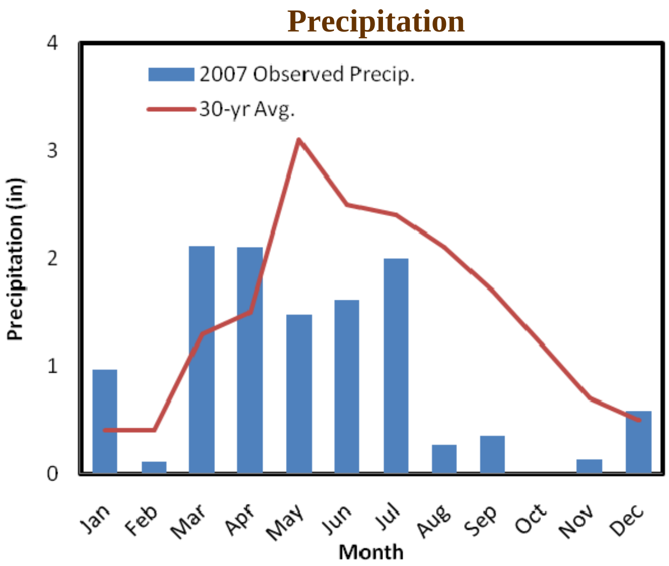
Table 10. Early-season glyphosate resistant soybean production variety trail Chickasha, OK 2007.

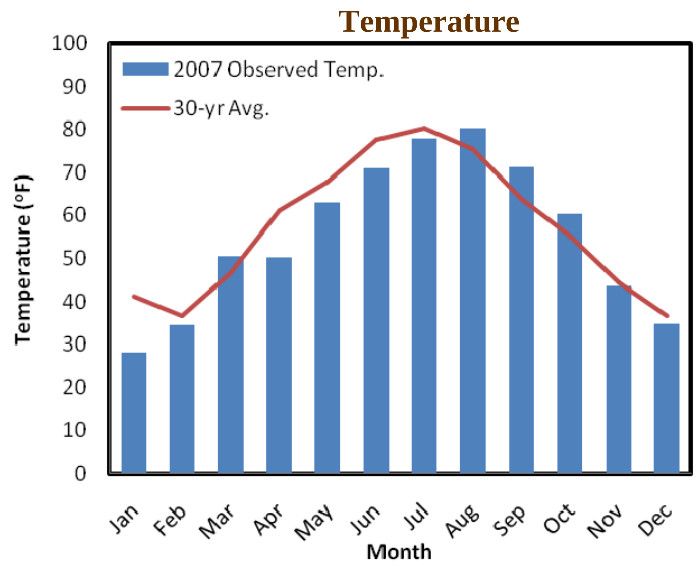
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
HBK HX4843	Hornbeck Seed Co. Inc.	4.8	35	0	0	4300	37.1
HBK R4924	Hornbeck Seed Co. Inc.	4.9	34	0	0	3700	35.8
SXO 6545	Dynagro Seed UAP	4.5	31	0	0	4650	35.4
HBK R5123	Hornbeck Seed Co. Inc.	5.1	38	0	0	3100	34.1
AG 3905	Monsanto	3	29	0	0	4100	34
HBK R4527	Hornbeck Seed Co. Inc.	4.5	33	0	0	4300	33.8
HBK R4727	Hornbeck Seed Co. Inc.	4.7	31	0	0	4300	32.5
AG 3803	Monsanto	3	29	1	0	4750	31.5
DG 35D44	Dynagro Seed UAP	4.4	37	0	0	4550	29.5
DG 33Y45	Dynagro Seed UAP	4.5	30	0	0	4450	29.3
HBK R3824	Pioneer Hi-Bred Intl.Inc.	3.9	30	1	0	5000	28.8
AG 4103	Monsanto	4	27	0	0	5000	23.4

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 23.1 Bu/Acre. LSD @.05 = 7.9 Bu/acre. C.V. = 14.1 %.

2007 Goodwell Trial Data





Growing conditions throughout the year at Goodwell were good. Grain yields for the early-season tests were excellent. Average grain yield for the early-season test was 46.7 bu/ac. Grain yields for the full-season test were low at 17.6 bu/ac when combining all varieties. Plots did experience some shattering and may have contributed to the lower yields in the full-season test.

Table 11. Information on soil chemical properties and management practices for the Soybean Production Test at Goodwell, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	na[1]	Planting Date	5/10 and 6/6[2]
Soil Test P Index	na	Seeding Rate (seeds/ foot of row)	8
Soil Test K Index	na	Seeding Depth (in)	1.5
		Harvest Dates	10/1 and 11/15[3]
		Irrigation	As needed

[1]Not available.

[2]Planting dates for the early and full season tests, respectively.

[3]Harvest dates for the early and full season tests, respectively.

Table 11. Early-season glyphosate resistant soybean production variety trail Goodwell, OK

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
SXO 6545	Dynagro Seed UAP	4.5	32	0	1	3500	54.6
AG 4103	Monsanto	4	32	0	0	3050	53.5
AG 3905	Monsanto	3	32	0	1	3050	52.9
AG 3803	Monsanto	3	29	0	0	2950	51.7
DG 33Y45	Dynagro Seed UAP	4.5	27	0	0	3000	49.3
HBK R4727	Hornbeck Seed Co. Inc.	4.7	35	0	2	3600	48.5
DG 35D44	Dynagro Seed UAP	4.4	30	0	1	3000	45.2
HBK R4527	Hornbeck Seed Co. Inc.	4.5	38	0	2	3800	44.9
HBK R3824	Pioneer Hi-Bred Intl.Inc.	3.9	28	0	3	3550	44.2
HBK HX4843	Hornbeck Seed Co. Inc.	4.8	37	0	1	3600	42.4
HBK R4924	Hornbeck Seed Co. Inc.	4.9	37	0	1	4000	41.8
HBK R5123	Hornbeck Seed Co. Inc.	5.1	38	0	2	4750	31.8

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 46.7 Bu/Acre. LSD @.05 = 9.3 Bu/acre. C.V. =

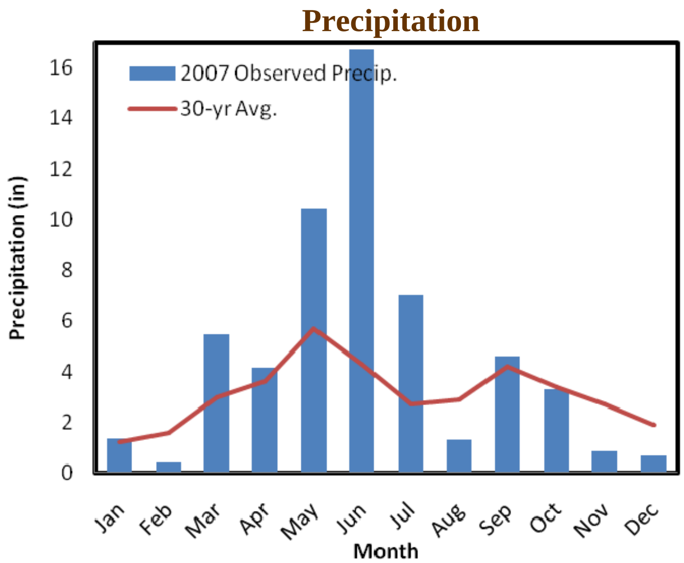
Table 12. Full-season glyphosate resistant soybean production variety trail Goodwell, OK 2007.

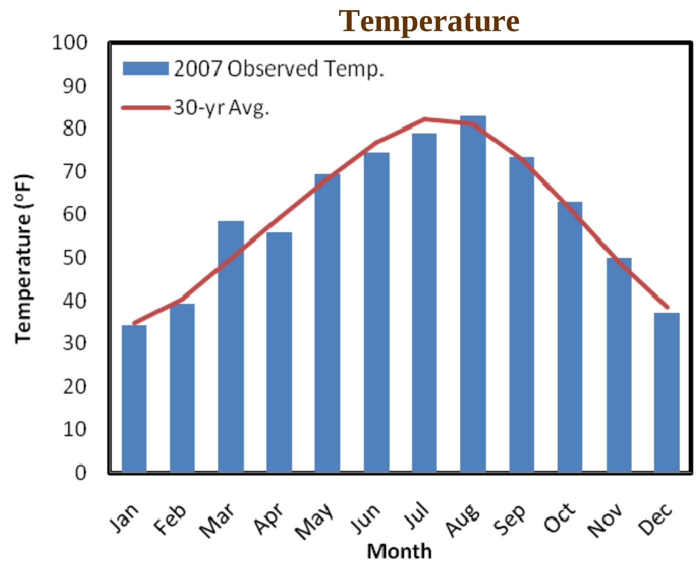
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
DG 32R46	Dynagro Seed UAP	4.6	31	2	0		28.8
DG 36Y48	Dynagro Seed UAP	4.8	40	1	2		26.6
DG 35Z49	Dynagro Seed UAP	4.9	44	1	2		23.7
AG 4903	Monsanto	4	38	1	1		23.4
HBK R4924	Hornbeck Seed Co. Inc.	4.9	41	1	1		20.1
DG 32B57	Dynagro Seed UAP	5.7	40	1	2		19.2
DG 33C59	Dynagro Seed UAP	5.9	44	1	1		18.8
XP 531-7	NC+	5.3	40	0	0		18.0
DG 36N57	Dynagro Seed UAP	5.7	40	1	1		16.6
DG 32A53	Dynagro Seed UAP	5.3	39	1	2		16.2
DG 31R54	Dynagro Seed UAP	5.4	40	1	2		15.1
HBK R5123	Hornbeck Seed Co. Inc.	5.1	43	1	2		14.3
AG 5301	Monsanto	5	41	1	1		14.2
DG 36T60	Dynagro Seed UAP	6	41	1	1		14.2
DG 37C62	Dynagro Seed UAP	6.2	42	1	1		14.1
XP 541-7	NC+	5.4	38	1	1		14.0
HBK R5226	Hornbeck Seed Co. Inc.	5.2	41	1	2		13.6
HBK R5525	Hornbeck Seed Co. Inc.	5.5	43	1	2		11.9
HBK R5425	Hornbeck Seed Co. Inc.	5.4	42	1	1		10.8

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 17.6 Bu/Acre. LSD @ .05 = 8.6 Bu/Acre. C.V. = 15.7%.

2007 Stillwater Trial Data





Growing conditions for the early-season test at Stillwater were excellent. Average grain yield across all varieties was 49.0 bu/ac, which is excellent. Presence of Asian soybean rust was observed but did not impact trial results.

Table 13. Information on soil chemical properties and management practices for the Soybean Production Test at Stillwater, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	na	Planting Date	4/23
Soil Test P Index	na	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	na	Seeding Depth (in)	1.5
		Irrigation	none
		Harvest Date	9/19
		Soil Moisture at Planting	Good

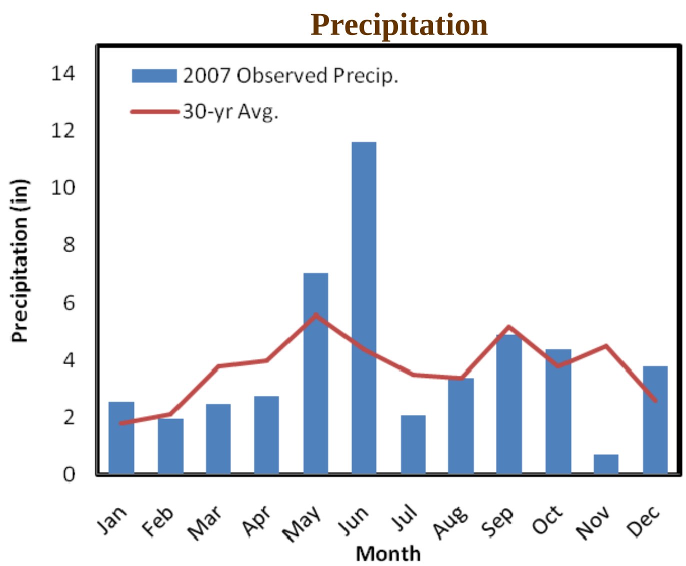
Table 14. Early-season glyphosate resistant soybean production variety trail Stillwater, OK 2007.

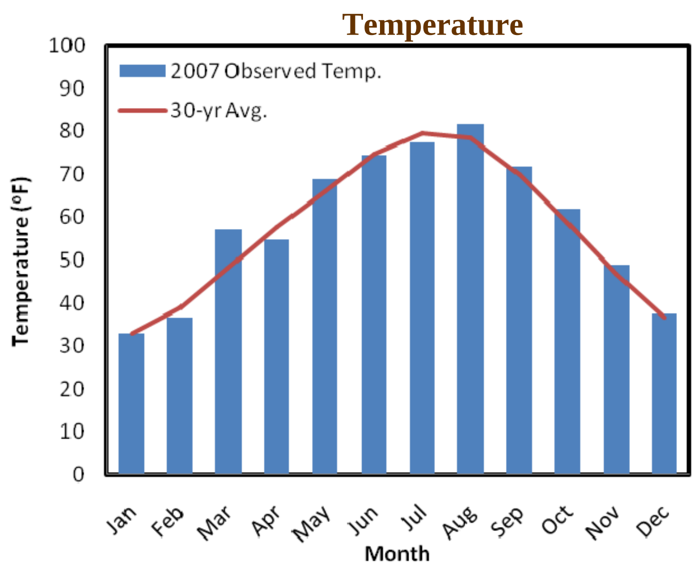
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
HBK R4924	Hornbeck Seed Co. Inc.	4.9	38	0	3	2750	68.8
HBK R5123	Hornbeck Seed Co. Inc.	5.1	38	0	3	2600	68.6
HBK HX4843	Hornbeck Seed Co. Inc.	4.8	35	0	1	2700	67.1
HBK R4527	Hornbeck Seed Co. Inc.	4.5	35	0	2	3000	65.8
HBK R3824	Pioneer Hi-Bred Intl.Inc.	3.9	32	0	1	2800	55.2
HBK R4727	Hornbeck Seed Co. Inc.	4.7	36	0	2	2650	46.7
DG 35D44	Dynagro Seed UAP	4.4	27	0	0	2250	44.1
DG 33Y45	Dynagro Seed UAP	4.5	30	0	0	2750	40.2
AG 3905	Monsanto	3	30	1	0	2850	37.6
SXO 6545	Dynagro Seed UAP	4.5	33	0	0	3450	33.5
AG 4103	Monsanto	4	29	1	0	3350	30.7
AG 3803	Monsanto	3	26	1	0	2700	29.0

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 49.0 Bu/Acre. LSD @.05 = 5.8 Bu/acre. C.V. =11 %.

2007 Miami Trial Data





Growing conditions for the full-season test at Miami were excellent considering the planting date. The test was not planted until July 9th which is a month later than recommended. This was a double -crop test planted after wheat. Average grain yield across all varieties was 26.7 bu/ac. Fungicide was applied at the R3 growth stage. Glyphosate was applied twice during the growing season and fungicide once around the R3 growth stage.

Table 15. Information on soil chemical properties and management practices for the Soybean Production Test at Miami, OK in 2007.

Soil Properties	Result	Cultural Practice	Information
pH	7.1	Planting Date	7/9
Soil Test P Index	23	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	140	Seeding Depth (in)	1.5
Soil test data is from 2005		Irrigation	none
		Harvest Date	11/6
		Soil Moisture at Planting	Good

Table 16. Full-season glyphosate resistant soybean production variety trail Miami, OK 2007.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
HBK R4924	Hornbeck Seed Co. Inc.	4.9	27	0	0	3050	29.7
HBK R5425	Hornbeck Seed Co. Inc.	5.4	19	0	0	2850	29.2
DG 37C62	Dynagro Seed UAP	6.2	20	0	0	3100	28.2
DG 36T60	Dynagro Seed UAP	6	19	0	0	2900	27.7
DG 32A53	Dynagro Seed UAP	5.3	16	0	0	2800	26.8
DG 31R54	Dynagro Seed UAP	5.4	23	0	0	3400	24.2
HBK R5226	Hornbeck Seed Co. Inc.	5.2	25	0	0	2650	23.8
XP 531-7	NC+	5.3	24	0	0	2700	23.8
HBK R5525	Hornbeck Seed Co. Inc.	5.5	23	0	0	2950	23.3
DG 35Z49	Dynagro Seed UAP	4.9	25	0	0	2650	23.1
AG 5301	Monsanto	5	22	0	0	3000	23.0
HBK R5123	Hornbeck Seed Co. Inc.	5.1	26	0	0	3000	22.6
DG 33C59	Dynagro Seed UAP	5.9	21	0	0	3300	19.5
DG 32B57	Dynagro Seed UAP	5.7	19	0	0	3450	19.2
DG 32R46	Dynagro Seed UAP	4.6	18	0	0	2900	19.0
XP 541-7	NC+	5.4	21	0	0	3050	18.1
AG 4903	Monsanto	4	21	0	0	2900	17.3
DG 36N57	Dynagro Seed UAP	5.7	20	0	0	3100	17.1
DG 36Y48	Dynagro Seed UAP	4.8	22	0	0	2850	14.9

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

[2]Mean yield = 26.7 Bu/Acre. LSD @ .05 = 6.5 Bu/Acre. C.V. = 13.2 %.

Sweet Sorghum Trials Across Oklahoma
Oklahoma State University

2/29/08

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Bobby Weidenmaier, Station Manager, Caddo Research Station, Fort Cobb
Eric Wehrenberg, Assistant Superintendent, Agronomy Research Station, Stillwater
Gary Strickland, Jackson County Extension Educator, Altus
Jim Vaughan, Station Superintendent, Wes Watkins Research Center, Lane

Long Term Goal

Sweet sorghum has the potential to be used as a renewable energy crop, becoming a viable candidate for ethanol production. Recent research at OSU has involved in-field production of ethanol from sweet sorghum. Due to seasonal production, it may be more cost effective to conduct ethanol fermentation in-field rather than transport the entire biomass to a central processing plant. The proposed process involves harvesting and pressing the stalks in the field using a new field harvester (patent pending) consisting of a multi-roller press and juice collection unit mounted on the harvester, developed by Mr. Lee McClune. The collected juice would then be fermented in the field using large bladders for storage. Distillation of the ethanol mixture (either full or partial) could be achieved at the farm level or a central location.

In order to develop a viable system for Oklahoma, the potential harvest window and expected yields are important pieces of information. The objectives of this project were to determine potential sweet sorghum yields across Oklahoma as affected by variety and to test a staggered planting scenario with multiple planting times. In some locations, juice extraction efficiency was tested, along with small juice fermentation trials (results not shown here.)

Production Yields Across Oklahoma

Several common varieties of sweet sorghum (Dale, M81-E, Topper, Theis) were planted at six different locations around the state in Spring 2007. Seeds were acquired from Mississippi State University Seed Foundation. Test plot locations included Goodwell, Lane, Haskell, Fort Cobb, Stillwater, and Altus. In general, plots consisted of four 30-40' rows, and four plots of each variety were randomly disbursed within the allocated space. Biomass yields were determined by hand-cutting a 10' section of one of the two middle rows and weighing using an electronic scale. Average yields for multiple harvest events at each location are shown in Tables 1-7. One plot in Stillwater also consisted of a nitrogen ramp (Table 7).

Table 1. Sweet sorghum biomass yields at Lane at three different planting dates, both irrigated and non-irrigated, with the last harvest date after a killing frost.

Location: Lane								
	Planted 4/17/07, Harvested 9/19/07							
	Non-Irrigated				**Irrigated**			
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Dale	18.80	11.76	6.17	3.86	20.10	7.22	6.59	2.37
M81	23.02	3.57	7.80	1.21	17.16	6.34	5.83	2.15
Topper	21.19	6.66	7.25	2.28	18.67	8.48	5.46	2.48
Theis	15.35	7.87	5.22	2.68	14.46	8.60	4.83	2.87
	Planted 5/22/07, Harvested 9/19/07							
	Non-Irrigated				**Irrigated**			
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Dale	26.57	4.43	6.67	1.11	26.57	8.81	5.14	1.71
M81	32.58	7.44	8.97	2.05	45.98	4.88	7.46	0.79
Topper	29.36	7.52	8.35	2.14	48.92	14.69	11.59	3.48
Theis	30.21	13.40			39.40	7.09	9.97	1.79
	Planted 7/17/07, Harvested 10/29/07							
	Non-Irrigated				**Irrigated**			
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Dale	27.29	8.72	8.16	2.61	29.10	5.30	7.68	1.40
M81	31.73	9.99	8.01	2.52	39.44	7.17	9.33	1.70
Topper	25.18	9.86	6.60	2.58	37.51	8.83	9.43	2.22
Theis	23.67	6.14	6.08	1.58	30.23	8.67	6.98	2.00
	Planted 7/17/07, Harvested 11/30/07 (After Frost)							
	Irrigated				**Non-Irrigated**			
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
M81	25.90	3.95	6.84	1.04	37.64	3.88	10.25	1.06
Topper	20.67	9.92	6.25	3.00	33.96	6.33	8.38	1.56

Table 2. Sweet sorghum biomass yields at Stillwater with two different planting dates, not irrigated.

Location: Stillwater				
Planted 4/23/07, Harvested 9/14/2007				
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
M81	36.66	0.42	14.46	0.16
Topper	35.31	7.26	12.78	2.63
Dale	36.05	2.53	12.80	0.90
Planted 5/14/07, Harvested 10/5/2007				
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
M81	35.52	5.18	10.93	1.59
Topper	29.36	2.82	8.70	0.83
Dale	31.62	9.44	11.80	3.52

Table 3. Sweet sorghum biomass yields at Haskell with three different planting dates, not irrigated.

Location: Haskell				
Planted 4/20/07, Harvested 9/21/2007				
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Topper	39.26	6.97	13.91	2.47
M81	37.69	2.09	7.93	0.44
Dale	33.08	11.60	10.24	3.59
Planted 5/16/07, Harvested 9/21/2007				
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Topper	27.42	7.53	6.48	1.78
M81	27.23	8.62	7.12	2.25
Dale	16.88	4.34	5.13	1.32
Planted 7/19/07, Harvested 11/19/2007				
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Topper	16.20	3.33	4.63	0.95
M81	30.06	3.14	8.78	0.92
Dale	25.12	1.12	7.63	0.34

Table 4. Sweet sorghum biomass yields at Goodwell with three different planting dates, all irrigated.

Location: Goodwell		
Planting Date: 5/10/07		
Variety	Wet Yield (tons/acre)	STDEV
Dale	31.69	2.09
Topper	27.28	6.25
M81-E	31.74	6.52
Theis	26.68	7.54
Planting Date: 6/1/07		
Variety	Wet Yield (tons/acre)	STDEV
Dale	26.19	1.27
Topper	29.35	6.06
M81-E	34.09	14.01
Theis	28.26	9.88
Planting Date: 6/15/07		
Variety	Wet Yield (tons/acre)	STDEV
Dale	25.21	4.34
Topper	25.81	2.66
M81-E	29.73	9.41
Theis	27.23	6.92

Table 5. Sweet sorghum biomass yields at Fort Cobb, at two different harvest dates, both irrigated and non-irrigated.

Ft. Cobb								
Planted 5/14/07, Harvested 9/24/2007								
	Irrigated				Non-Irrigated			
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Topper	18.33	2.43	5.39	0.71	13.20	6.97	4.76	2.51
M81	17.63	3.84	6.16	1.34	17.97	7.76	6.09	2.63
Theis	14.10	4.25	4.82	1.45	10.82	5.61	3.81	1.97
Dale	9.83	2.46	3.67	0.92	11.28	4.00	3.74	1.32
Planted 5/14/07, Harvested 10/31/2007								
	Irrigated				Non-Irrigated			
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Topper	29.23	2.37	8.56	0.69	16.62	4.83	4.48	1.30
M81	41.15	8.63	10.42	2.18	23.17	5.48	6.12	1.45
Theis	26.68	7.02	8.69	2.29	14.70	5.84	4.33	1.72
Dale	30.13	1.56	9.88	0.51	21.37	4.80	7.01	1.58

Table 6. Sweet sorghum biomass yields at Altus, not irrigated.

Location: Altus				
Planted 7/12/07, Harvested 11/2/2007				
Variety	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
Dale	14.11	3.34	4.10	0.97
Topper	14.98	4.77	4.95	1.58
M81	16.94	9.15	5.01	2.70
Theis	20.87	2.18	6.13	0.64

Table 7. Sweet sorghum biomass yields in Stillwater as affected by nitrogen application. Rates are in lbs of total N, where Pre N was broadcast with a sprayer and Top N was applied using syringes at the base of the row. Plot was not irrigated.

Location: Lake Carl Blackwell, Stillwater					
Dale Variety, Planted 6/5/07					
Harvest Date	Fertilizer Treatment	Wet Yield (tons/acre)	STDEV	Dry Yield (tons/acre)	STDEV
9/28/2007	Pre N: 0; Top N: 0	23.7	4.4	6.5	1.2
	Pre N: 0; Top N: 50	28.1	3.7	6.4	0.8
	Pre N: 50; Top N: 50	32.8	3.1	8.8	0.8
	Pre N: 50; Top N: 100	28.5	1.2	7.6	0.3
	Pre N: 100; Top N: 0	28.7	2.4	7.6	0.6
	Pre N: 100; Top N: 50	28.8	0.5	6.9	0.1
	Pre N: 150; Top N: 0	34.2	4.2	9.2	1.1
M 81 Variety, Planted 6/5/07					
10/10/2007	Pre N: 0; Top N: 0	29.3	6.3	7.9	1.7
	Pre N: 50; Top N:100	46.3	4.6	13.5	1.4
	Pre N: 50; Top N: 50	43.0	9.0	11.5	2.4
	Pre N:100; Top N: 0	43.9	5.7	13.1	1.7
10/23/2007	Pre N: 0; Top N: 0	30.2	0.9	9.4	0.3
	Pre N: 50; Top N:100	39.8	5.0	9.5	1.2
	Pre N: 50; Top N: 50	37.4	1.3	11.3	0.4
	Pre N:100; Top N: 0	47.5	5.8	14.8	1.8
11/5/2007	Pre N: 0; Top N: 0	30.8	10.3	9.5	3.2
	Pre N: 50; Top N:100	37.7	5.5	11.1	1.6
	Pre N: 50; Top N: 50	35.5	7.2	11.7	2.4
	Pre N:100; Top N: 0	32.8	3.7	9.3	1.1