Oklahoma Panhandle
Research & Extension Center

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http://oaes.pss.okstate.edu/goodwell

★ **OPREC, Goodwell**

- Animal Waste Management
- Bermuda Grass
- Corn
- Cotton
- Crop Rotation
- Sorghum
- Irrigation
- Soil Fertility
- Soybeans
- Sunflowers
- Weed Management
- Wheat

2006 Research Highlights

Oklahoma State University
Division of Agricultural Sciences and Natural Resources
Field and Research Services Unit
Oklahoma Cooperative Extension
Oklahoma Ag Experiment Station
Oklahoma Panhandle Research and Extension Center
Department of Animal Science
Department of Plant and Soil Sciences
Department of Biosystems and Agricultural Engineering

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 was established at Goodwell 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 the 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 for 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 Director of OPREC, Rick Kochenower as Area Crop-Soil Research/Extension Specialist, Britt Hicks as Area Livestock Extension Specialist, and Lawrence Bohl as Senior Station Superintendent are addressing critical production issues that face Oklahoma producers. Other essential OPREC personnel include Donna George (Senior Administrative Assistant), Craig Chesnut (Field Foreman), Matt Lamar (Field Assistant/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 use 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 made in development of research and education programs adapted to the panhandle area has been significant since establishment of OPREC in 1994. All involved recognize the importance of agriculture in the Oklahoma Panhandle and are dedicated to the continued success and development of OPREC. Your continued support of our research and extension programs will help us to better serve the clientele of the panhandle area.

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.

Bayer Crop Sciences
Dow Agro Sciences (Jodie Stockett)
DuPont (Jack Lyons and Robert Rupp)
Farm Credit of Western Oklahoma
Frontier Hybrids (Dan Ryan)
Golden Harvest (Bart Arbuthnot)
Hitch Farms
Steve Kraich
Liquid Control Systems (Tim Nelson)
Monsanto (Mike Marlow, Ben Mathews, T. K. Baker, Bob Klein)
NC+ Hybrids (Ron Joiner)
Rick Nelson
GM Northwest Cotton Growers Co-op
Oklahoma Wheat Growers
OPSU
Orthman Manufacturing
Panhandle Implement (Jr. Allard, Kevin Allard)
Pioneer Seed (Ramey Seed)
Seed Resource (Chick Childress)
Sorghum Partners
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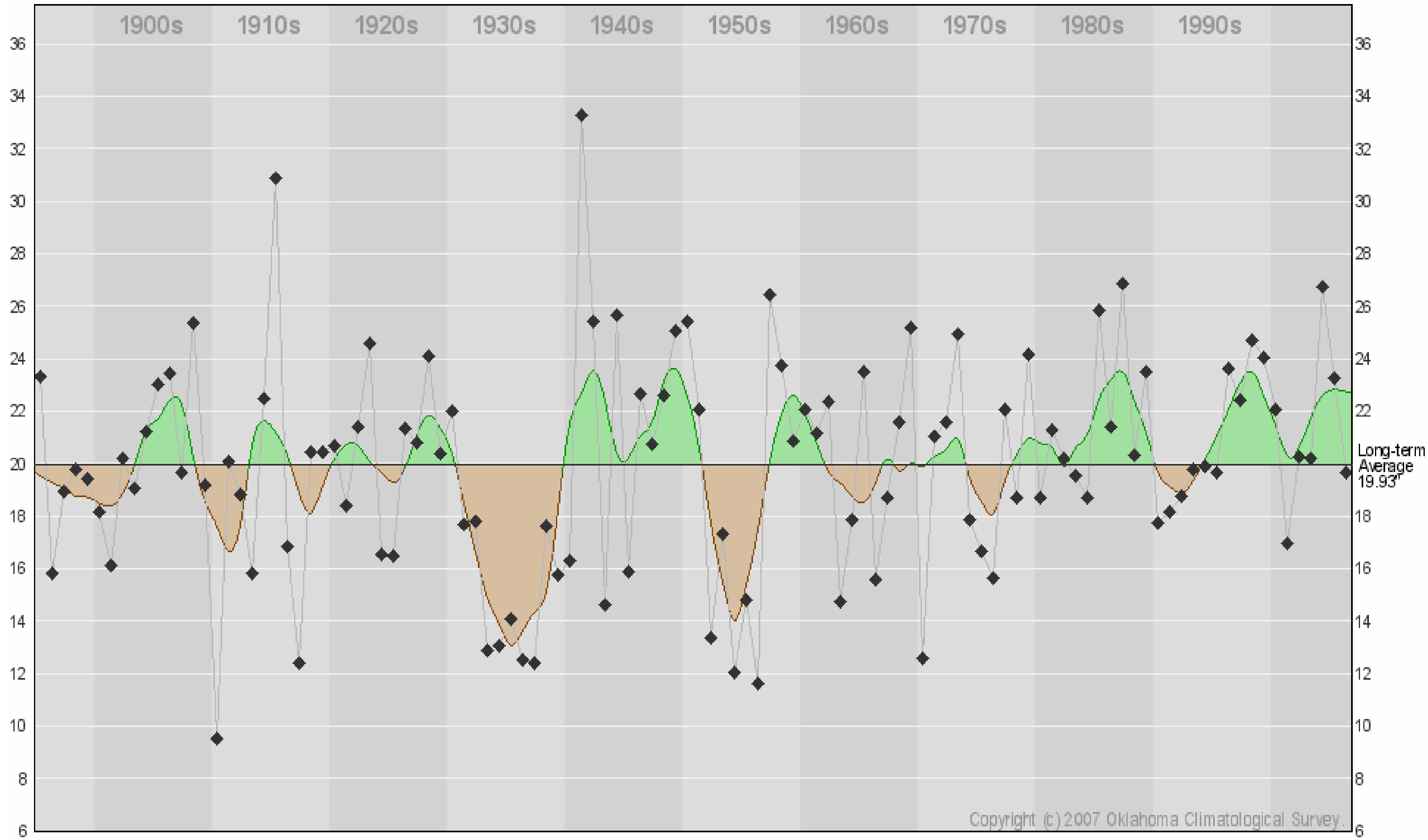


OKLAHOMA CLIMATOLOGICAL SURVEY

Annual Rainfall History with 5-yr Weighted Trends

Climate Division OK-1 (Oklahoma Panhandle): 1895-2006

Wetter historical periods

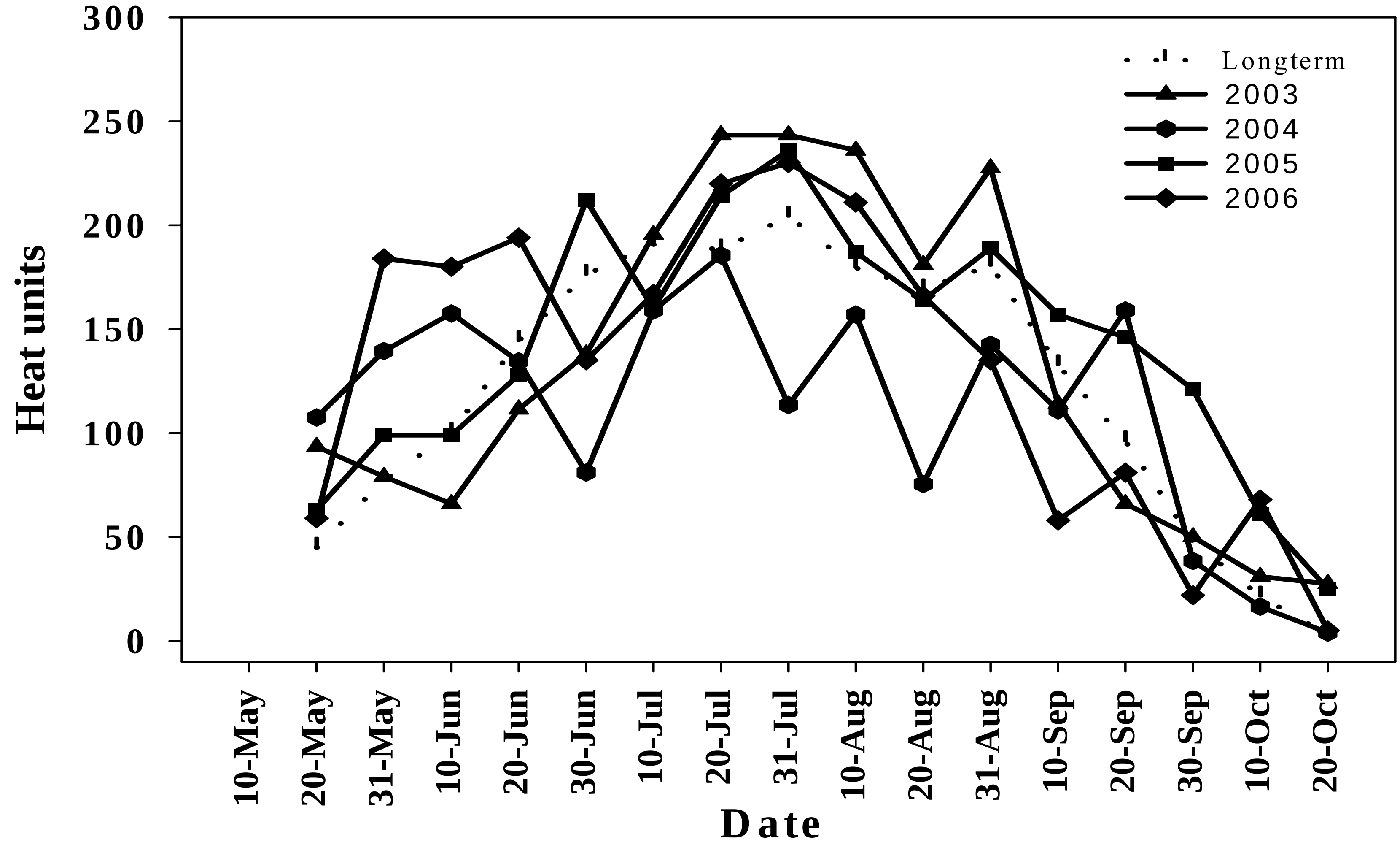
Drier historical periods

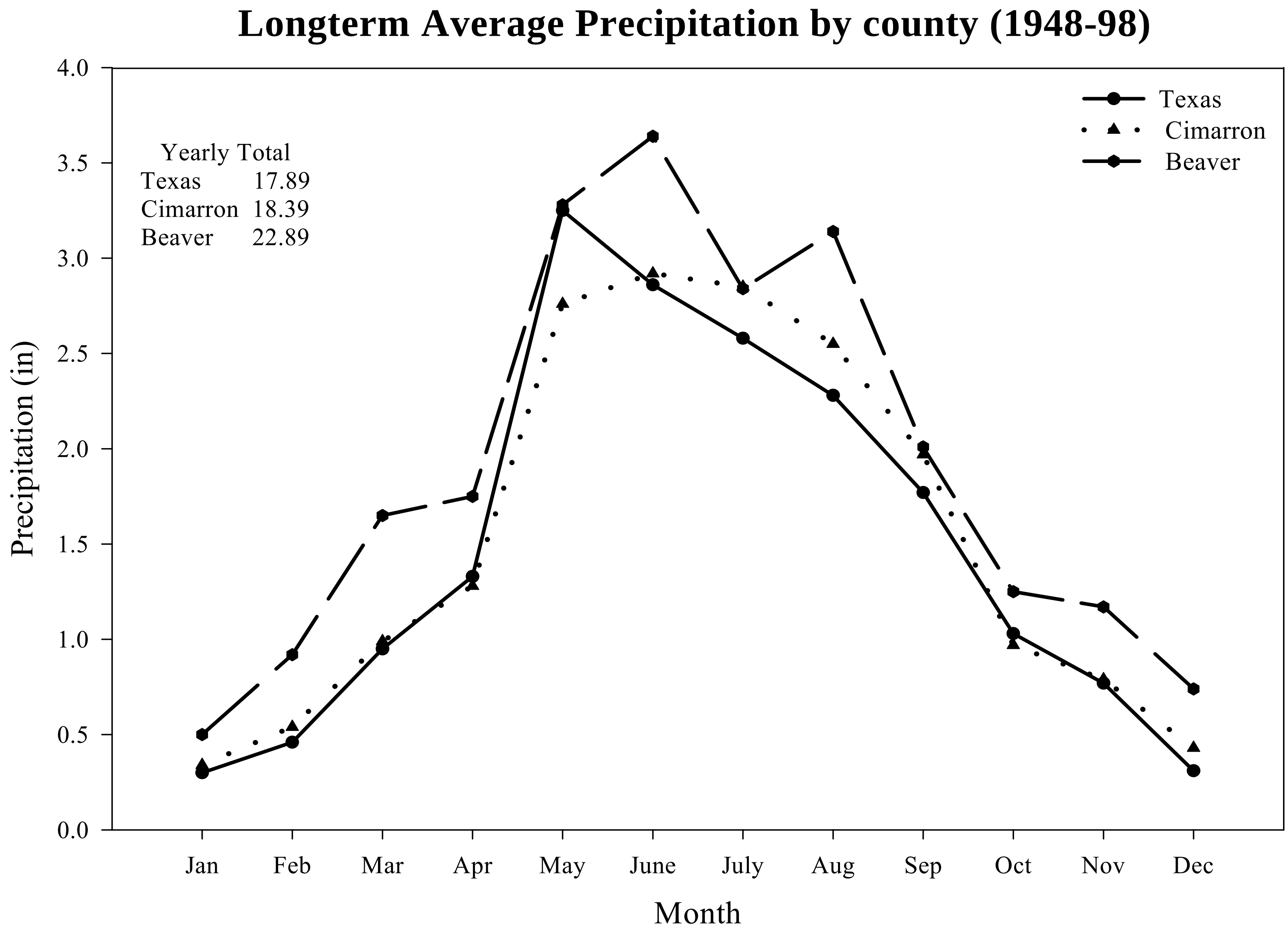
Climatological data for Oklahoma Panhandle Research and Extension Center, 2006.

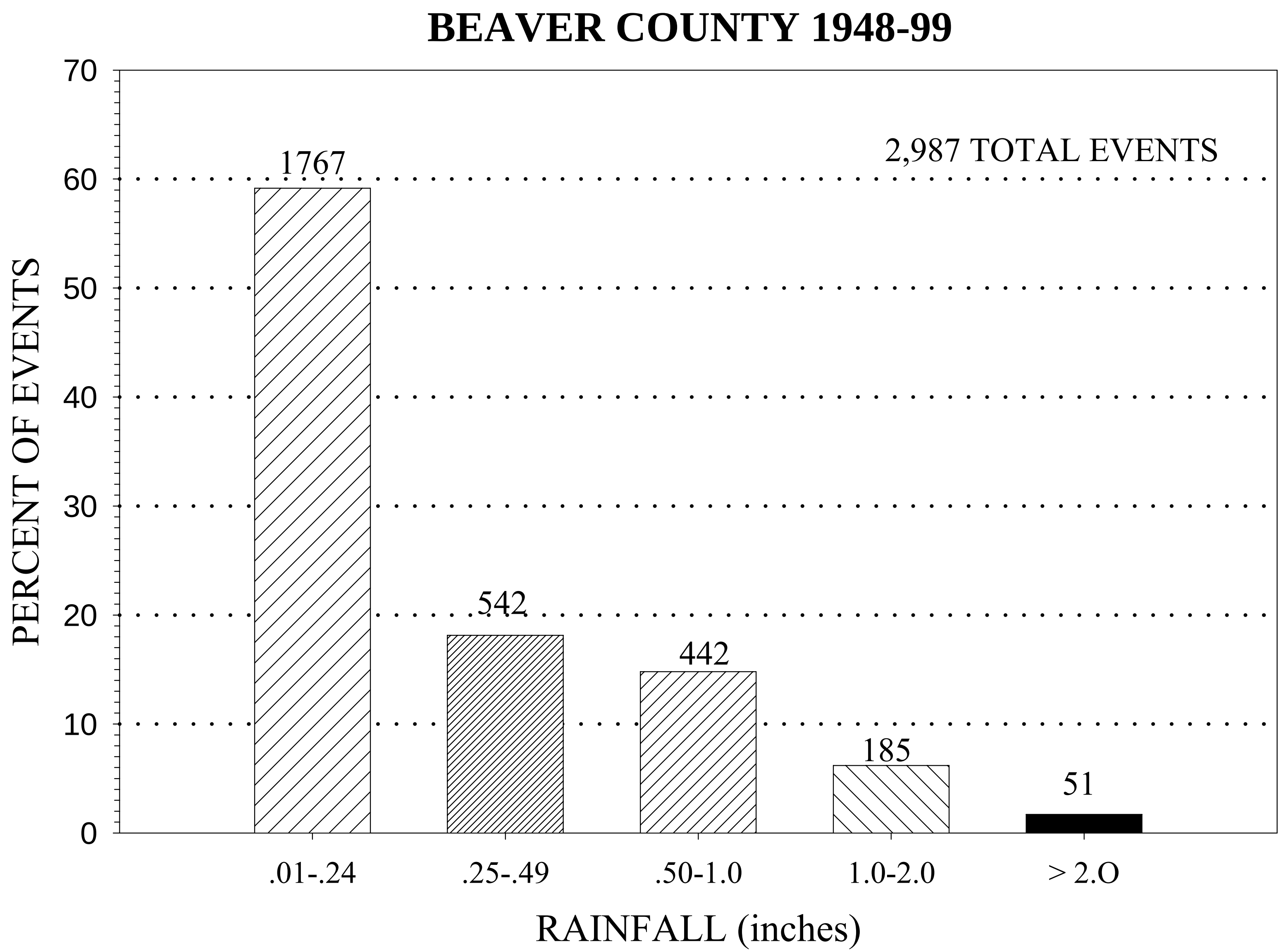
	Temperature				Precipitation			Wind	
Month	Max	Min	Max. mean	Min. mean	Inches	Long term mean	One day total	AVG mph	Max mph
Jan	80	12	59	25	0.10	0.30	0.03	13.0	47.5
Feb	86	1	55	20	0.00	0.46	0.00	12.5	50.6
March	82	15	61	32	1.04	0.95	0.57	14.1	62.8
April	94	25	77	43	0.24	1.33	0.22	15.2	57.0
May	100	37	83	52	2.19	3.25	0.79	12.1	47.6
June	104	52	93	62	2.34	2.86	1.16	14.4	71.4
July	104	56	94	66	2.05	2.58	0.69	11.4	46.1
Aug	100	52	89	65	4.06	2.28	1.49	10.2	67.8
Sept	90	37	77	52	1.19	1.77	0.53	11.1	65.3
Oct	94	24	70	42	2.02	1.03	1.18	11.5	51.8
Nov	86	9	62	29	0.00	0.77	0.00	12.2	66.6
Dec	69	11	48	23	3.70	0.31	2.10	10.5	43.6
Annual total			70.8	42.9	18.93	17.9	NA	NA	NA

Data from Mesonet Station at OPREC

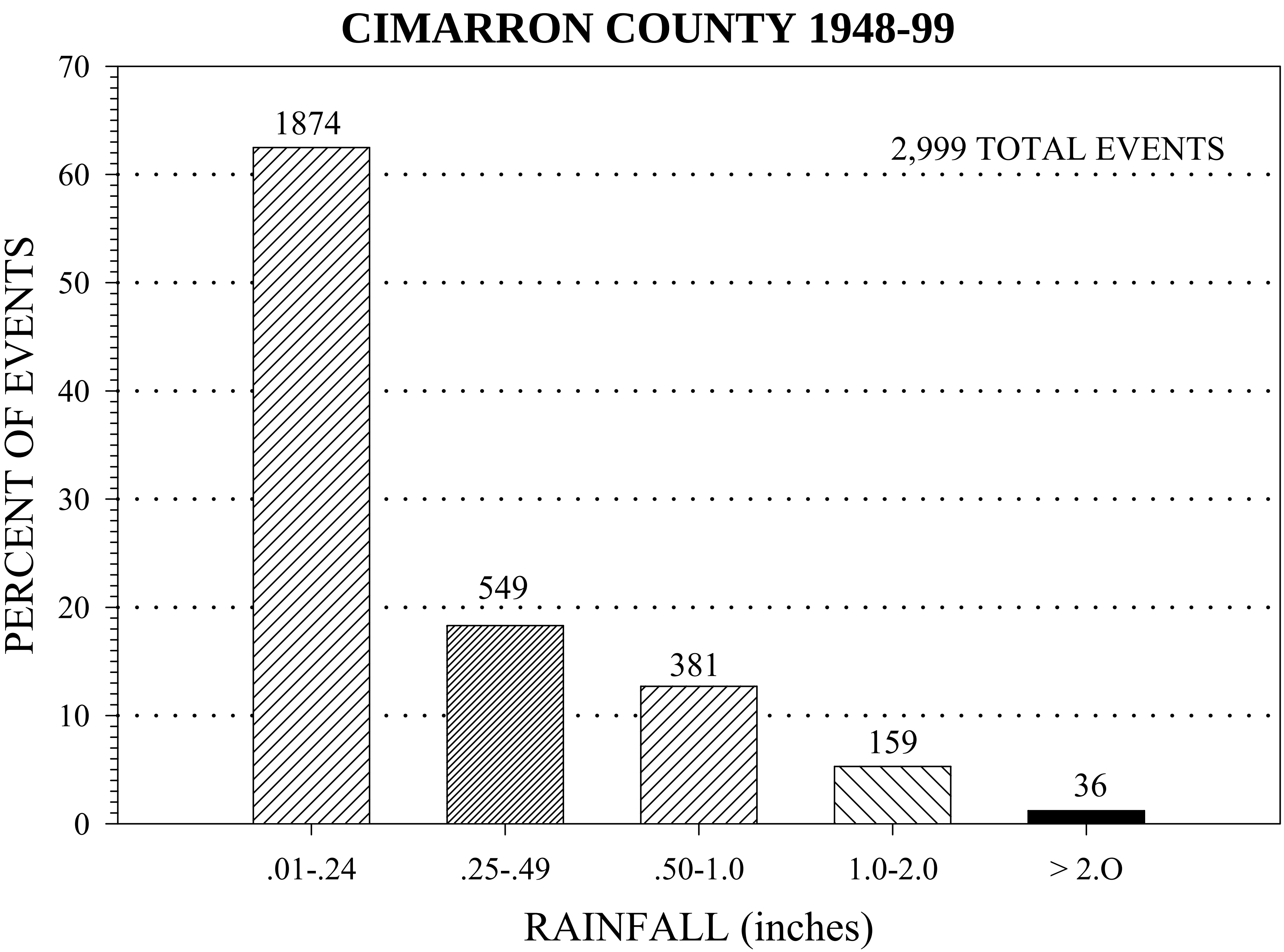
2003 - 2006 Heat Units

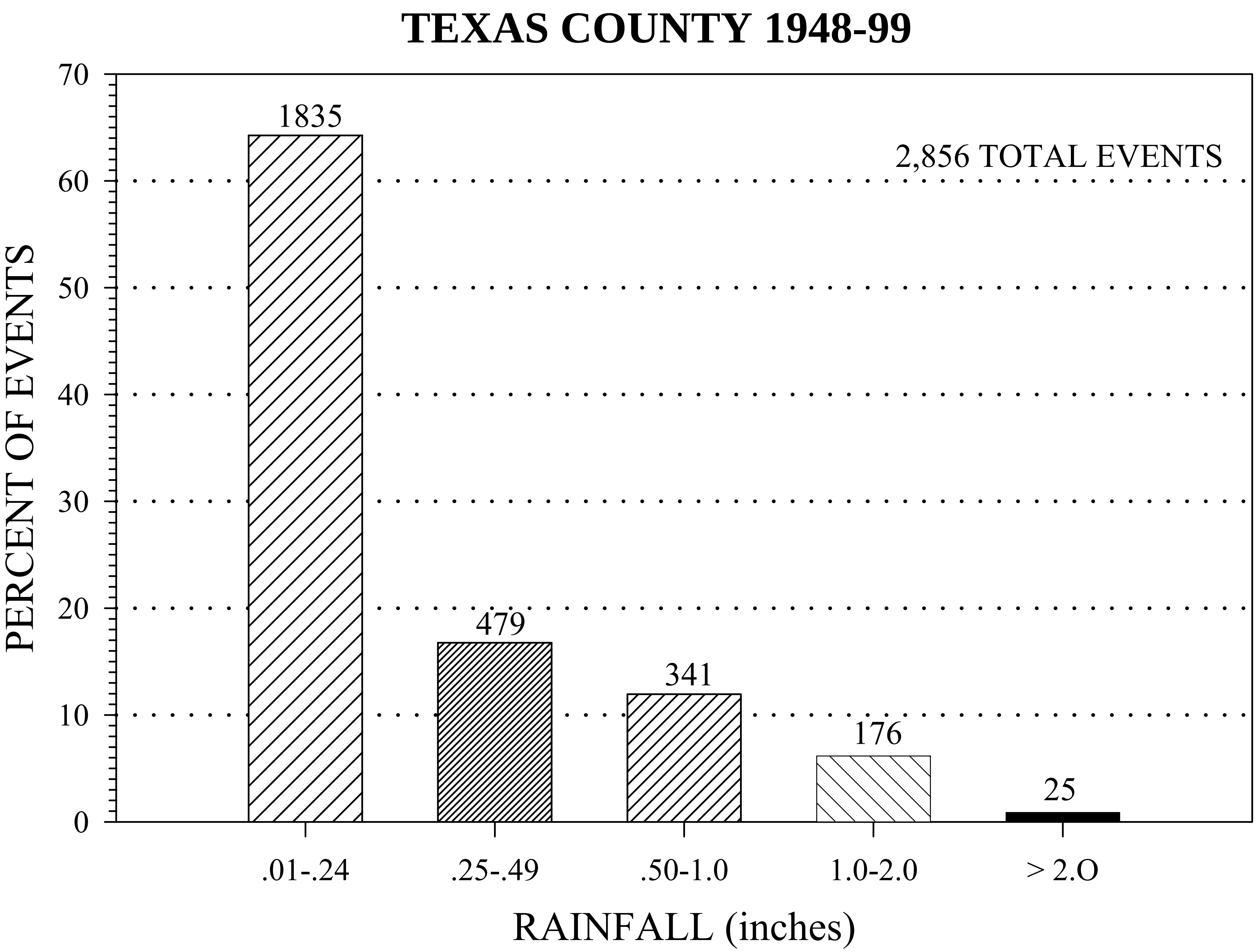



Longterm Average Precipitation by county (1948-98)
Precipitation (in)
Month
Yearly Total
Texas 17.89
Cimarron 18.39
Beaver 22.89
Texas
Cimarron
Beaver
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sep
Oct
Nov
Dec



BEAVER COUNTY 1948-99
2,987 TOTAL EVENTS
PERCENT OF EVENTS
0
10
20
30
40
50
60
70
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
2,856 TOTAL EVENTS
PERCENT OF EVENTS
0
10
20
30
40
50
60
70
1835
479
341
176
25
.01-.24
.25-.49
.50-1.0
1.0-2.0
> 2.O
RAINFALL (inches)

Oklahoma Panhandle Research & Extension Center
2006 Research Highlights

Crops

Appendix

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 anima 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 anhydrous ammonia (AA). In 1999 research plots were established to evaluate a no-till corn–wheat–sunflower–fallow crop rotation production system (E703); with which soil samples were collected prior to establishment and each annual fertilizer application. During the 2006 growing season N was applied at rates of 100, 200, and 400 lb N ac^{-1} as swine effluent (SE) or anhydrous ammonia (AA); 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.

RESULTS

Corn grain yields responded to N treatments when compared to the control for corn grain yields in 2006 in a continuously cropped, conventional cultivation production (E701) for eleven years ($Treatment_{9,26,\alpha=0.05}$; F = 2.88; Pr = 0.0169). However, two major hailstorms occurred at the V6 and V10 growth stages which reduced grain yields lower than regional averages. The median yield was 107.17±7.19 bu ac^{-1}, with lower and upper (95% confidence) levels at 92.57 and 121.78, respectfully (Table 2). Beef manure (BM) applied at 168 kg N ha^{-1} increased grain yields above the control (Table 2), although when applied at 504 kg N ha^{-1} rates tended to decreased yields for this harvest year. Swine effluent (SE) had a linear response to N applications; increasing yields at both the 150 and 450 kg N ha^{-1} loading rates when compared to the control. The corn grain yields were significantly greater for SE 504 and BM 150 kg N ha^{-1} application rates and were distinctly different than all other N loading rates (Figure 1). Swine effluent at the highest N loading rates produced the greatest yields (178 bu), followed by BM at the 150 N loading rate (160 bu). Corn grain yields from the high N loading rate from anhydrous ammonia (AA) were slightly increased above the control and were similar to the 150 SE N loading rate.

In 2006 corn harvested under no-till (E703) management practices did not yield greater quantities than the conventional tillage study (E701); overall yields averaged 75.03±3.91 bu ha^{-1} (Figure 2), with lower and upper (95% confidence) levels at 67.13 and 82.92, respectfully (Table 2). However, treatment differences in 2006 showed responses to method of N application ($Treatment_{12,29,\alpha=0.05}$; F = 3.38; Pr = 0.0036; Table 2). The increased corn grain yields due to method of application were greatest in the sprinkler and surface applications; increases of 53 bu ac^{-1} were observed in surface applied low N loading rate. 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, generally, were not greater than the control or tillage check for this harvest year. Damage to the plant at the V6 and V10 growth stages from hailstorms greatly contributed the reduced corn grain production in this experiment; perhaps the storm intensity was greater. 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.

Results of wheat (*Triticum aestivum* L.) grain (E703) yields in 2006 are not available due to late planting and cold temperatures that subsequently came later.

Sunflower yields from the no-till study (E703) again in 2006 had no significant treatment effects ($Treatment_{12,28,\alpha=0.05}$; F = 0.52; Pr = 0.8837; Table 2); overall yields averaged 567.5±35.2 kg ha^{-1} (Figure 2), with lower and upper (95% confidence) levels at 496.45 and 638.68, 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. Yields this year are markedly lower than 2005 yields, however this may be attributed to reduced kernel per head count from birds, insects, wind, etc and overall plant populations that were not measured or recorded in this harvest year.

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 2006 for a continuously cropped corn system under conventional tillage (E701) using applications of anhydrous ammonia (AA), 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‡ lb N ac-1	Yield	Std Err§	DF	T Value	Pr > |t|
			——Bu ac^{-1}——				
2006	CONTROL	0	82.41	11.82	26	6.974	<.0001
	BM	50	98.20	20.47	26	4.798	0.0001
		150	159.75	20.47	26	7.805	<.0001
		450	100.67	20.47	26	4.919	<.0001
	SE	50	86.90	20.47	26	4.246	0.0002
		150	113.08	20.47	26	5.525	<.0001
		450	178.25	20.47	26	8.710	<.0001
	AA	50	82.92	20.47	26	4.052	0.0004
		150	106.09	20.47	26	5.184	<.0001
		450	112.99	20.47	26	5.521	<.0001

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

Table 2 Grain yields in 2006 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		
2006	1	SPR	0.5	78.70	11.23	***	–	–	–	572.06	138.59	***
	2		1	90.54	11.23	***	–	–	–	431.18	138.59	**
	3		2	97.61	11.23	***	–	–	–	626.20	138.59	***
	4	SUR	0.5	111.67	11.23	***	–	–	–	477.59	138.59	**
	5		1	94.74	11.23	***	–	–	–	760.31	138.59	***
	6		2	97.67	11.23	***	–	–	–	717.12	138.59	***
	7	INJ	0.5	52.06	11.23	***	–	–	–	474.64	138.59	**
	8		1	59.54	11.23	***	–	–	–	536.27	138.59	**
	9		2	57.54	11.23	***	–	–	–	650.29	138.59	***
	12	AA	1	74.41	11.23	***	–	–	–	723.23	138.59	***
	13		2	58.72	11.23	***	–	–	–	661.30	138.59	***
	10	CHK	0	58.52	7.94	***	–	–	–	605.59	138.59	***
	14	TCHK	0	60.12	11.23	***	–	–	–	671.09	138.59	***

*, **, *** 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 3 The Standard Error of Differences (SED) in a corn-wheat-sunflower-fallow study (E703) in 2006. 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	20.18	13.76	NS[§]	–	–	–	-33.53	179.33	NS
2	32.02	13.76	NS	–	–	–	-174.40	179.33	NS
3	39.09	13.76	NS	–	–	–	20.61	179.33	NS
4	53.15	13.76	**	–	–	–	-128.00	179.33	NS
5	36.22	13.76	NS	–	–	–	154.70	179.33	NS
6	39.15	13.76	NS	–	–	–	-144.17	179.33	NS
7	-6.46	13.76	NS	–	–	–	-130.95	179.33	NS
8	1.02	13.76	NS	–	–	–	-69.32	207.07	NS
9	-0.98	13.76	NS	–	–	–	44.70	179.33	NS
12	15.89	13.76	NS	–	–	–	117.64	179.33	NS
13	0.20	13.76	NS	–	–	–	55.71	179.33	NS
14	1.60	13.76	NS	–	–	–	65.51	179.33	NS

** Significant at the 0.01 probability level. § not significant.

† Data unavailable; climatic conditions and late planting prevented adequate growth.

‡ Treatment number, refer to Table 2 for a more complete explanation.

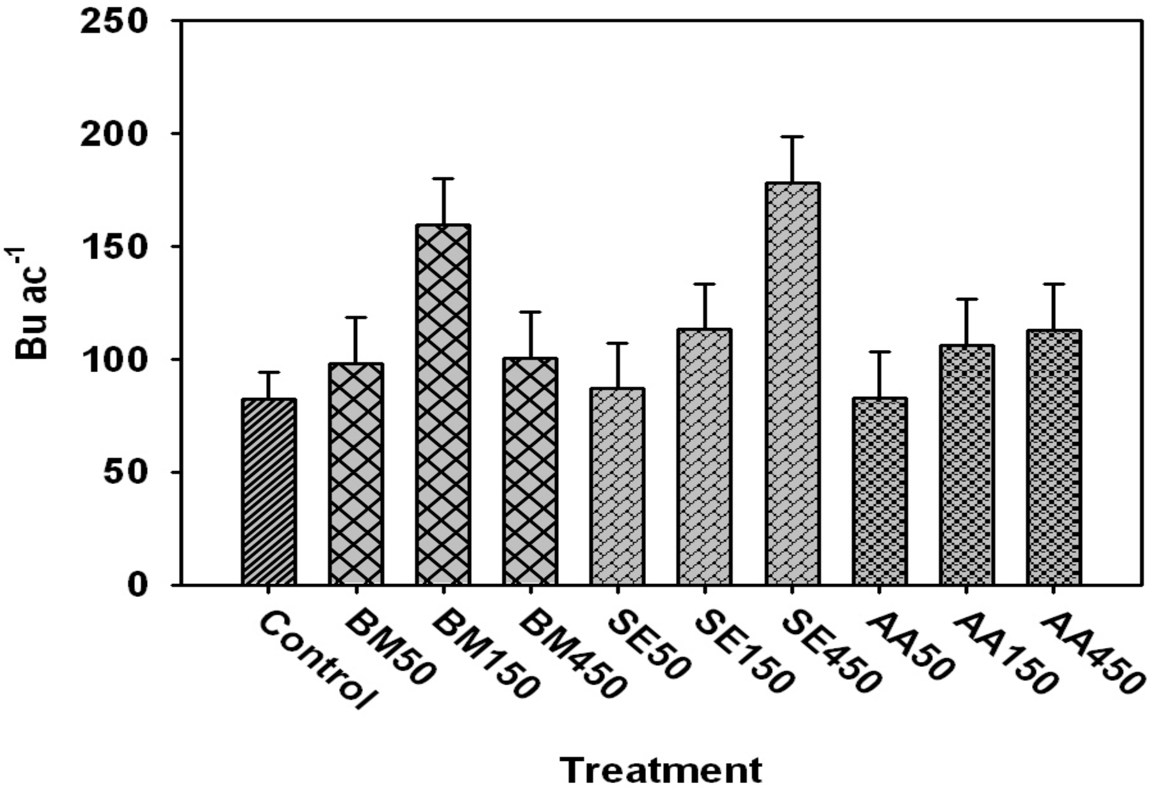


Figure 1 Corn grain yields in 2006 for a continuously cropped corn system under conventional tillage (E701) using applications of anhydrous ammonia (AA), beef manure (BM), and swine effluent (SE) at N loading rates of 0, 50, 150, and 450 lb N ac^{-1}. Study is located at OPREC, Goodwell, OK. Control has 0 N applied. BM150 and SE450 are significantly different.

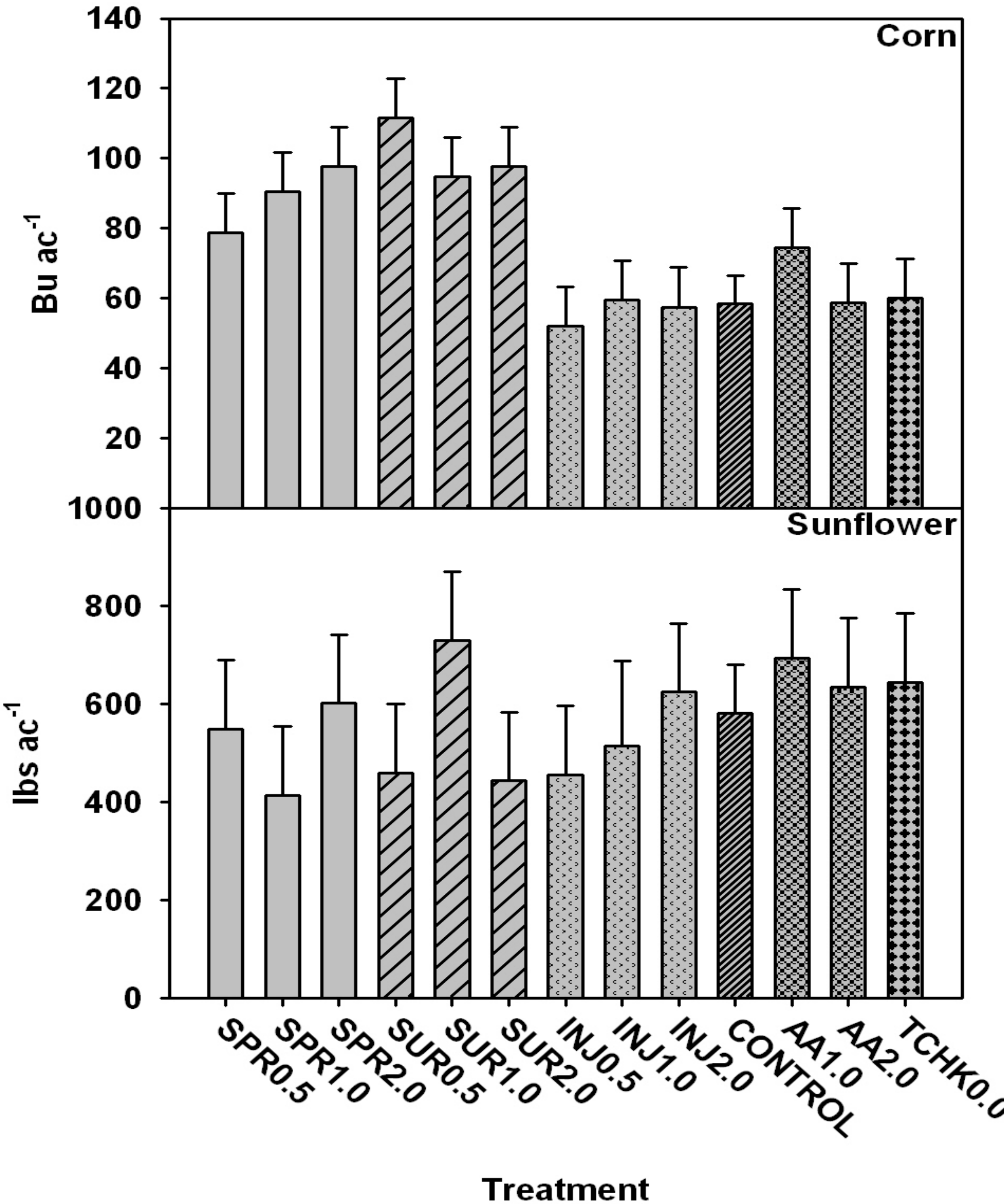


Figure 2 Grain yields in 2006 from a No-Till Corn-Wheat-Sunflower-Fallow rotation (E703) evaluating surface (SUR), sprinkler (SPR), and injection (INJ) applications of SE; these are compared to anhydrous ammonia (AA), a control (0 N rate), and tillage control (TCHK, with 0 N applied). N rates are 0.5X, 1X, and 2X, where X=200 lb N ac^{-1}. Study is located at OPREC, Goodwell, OK.

APPLICATION OF SWINE EFFLUENT THROUGH SUBSURFACE DRIP IRRIGTAION AND CHANGES IN NUTRIENT CONCENTRATIONS

Lisa M. Fultz and Jeff Hattey, Department of Plant and Soil Sciences;
Mike Kizer Biosystems, Engineering
Oklahoma State University, Stillwater

Irrigation is an important component in the management toolbox for many producers in the southern High Plains region which receives on average 15 to 22 in of precipitation per year making water a limiting resource for agricultural production. Continual withdrawal of groundwater is cause for concern as there is little to no recharge to replace the dwindling supply of water therefore increasing water use efficiency becomes more important. In addition many production operations are integrated crop-livestock systems therefore application of animal waste needs to be included in the irrigation management plan. The animal manure must be applied in a manner that supports crop production but limits negative impacts to the environment. Producers who have liquid forms of animal waste to utilize have two reasons to desire to improve irrigation methodologies in the southern Great Plains. The purpose of this research is the examination of nutrient distribution and movement away from the subsurface application of swine effluent through a drip emitter system.

Solution samples were obtained through lysimeters using ceramic cups purchased from SoilMoisture. Several alternatives were examined to determine the most suitable medium for the lysimeters. Ceramic cups were chosen for their ability to withstand freezing temperatures and their durability as these fields are actively used for agricultural production. Lysimeters were constructed from ¾ inch PVC cut to the correct length based on the desired depth, ceramic cups, ¼ X ¼ MIP to Barb adapters, PVC caps, and a length of polyethylene tubing which ran through the interior of the lysimeter. Before the pipe could be attached three layers of epoxy supplied by the manufacturer were applied to the open end of the cup to ensure a tight seal would be obtained. The top of the lysimeter consists of a PVC cap with a hole drilled in it to allow an elbow fitting to screw into the cap. The length of polyethylene tubing runs from the bottom of the fitting through the PVC pipe to the inside of the ceramic cup which allows the solution to be removed from the lysimeter. Attached to the barb fitting is a length of tubing which remained clamped off except during extraction to hinder any foreign objects attempting to use the sampler as a home as well as allowing a vacuum to remain within the lysimeter (Figure 1). Following collection, samples were examined for concentrations of nitrate-nitrogen, ammonia-nitrogen, orthophosphates, calcium, copper, and zinc.

It was determined that a total of sixteen lysimeters would be used for each rep, with a total of 32 lysimeters for each treatment. Samples will be obtained from depths of 15.24, 30.48, 45.72, and 60.96 cm (6, 12, 18, and 24 inches) and located between two adjacent emitters along a single lateral. It was determined that to obtain a representative sample, the depths and locations of each lysimeter would follow a set pattern in which the depths would be randomized to ensure that each depth was located at all possible locations between the emitters and away from the lateral. Each lysimeter is located at an equal distance away from the lateral and between each of the emitters. Solution samples were collected from the inlet and distal ends of fields 49-50 and 53. Field 49-50 and 53 contain laterals buried to a depth of approximately 30.48 cm (12 inches), spaced 1.52 meters (60 inches) apart. The emitter spacing for fields 49-50 and 53 are 60.96 and 45.72 cm (24 and 18 inches) respectively. Field 49-50 utilizes emitters with a drip rate of 2.38 L h^{-1} (0.63 gallons per hour). Field 53 utilizes a slower drip rate of approximately 0.72 L h^{-1} (0.19 gallons per hour).

The first row of samplers was placed in line with an emitter located within the area of planting to ensure any removal via vegetation is accounted for. Lysimeters were placed in field in October, 2005. The Lysimeters were allowed to soak in distilled water for at least 12 hours before placement using a Giddings Hydraulic Probe with a diameter of two inches attached to a tractor was used to drill the hole to the requisite depth. The soil cores were placed in a bucket, mixed and wetted to ensure a homogenous slurry. The mixture was then placed in the hole, followed by the lysimeter and filled in with any remaining dry soil from the hole. Once a row of lysimeters were completed a cover (consisting of a piece of two inch PVC sliced in half and painted orange) was placed over them to protect the lysimeters and mark their location. To "pull" samples a vacuum was attached to a manifold to allow for up to 10 samples at a time. The manifold allowed for suction to be created within the sample bottles which then creates suction within the sampler pulling the sample to the surface. Following sample collection, the suction was removed and the sampler sealed.

The first attempt to pull samples occurred in January 2006 at which time it was determined that one of the laterals was perforated. This attempt, while not producing any samples, did provide information to insure a higher rate of success on the next attempt. The main factors in obtaining samples in the future would be the moisture content of the soil at the time of sampling and time. It was determined that due to low moisture content in the soil irrigation prior to sampling would be required to obtain any background samples. In February 2006 the four samplers removed to repair the lateral had been replaced to the correct depth. However, field 53 then required repairs due to freezing temperatures which caused a riser on the distal end of the field to crack. It was also determined that a falling vacuum procedure would produce a more consistent sampling. This is done by applying a vacuum when the effluent application begins, sealing off the lysimeter, and allowing it to draw solution for approximately 24 hours. The lysimeter will continue to draw in solution until the internal pressure is equal to the soil around it. A second vacuum is then used to remove the solution collected within the sampler. The first background samples were pulled in May 2006 and effluent application began on June 6th. A total of four effluent applications occurred throughout the summer, with an average of two weeks between each application. In July 2006, a problem with a solenoid on the subsurface irrigation filter forced the third application back by two weeks. Samples were also taken during the period between effluent applications in an attempt to determine if there was any change due to further irrigation.

Samples were analyzed for concentrations of orthophosphate, calcium, copper, and zinc using a Lachat auto flow injection analyzer and inductively couple argon plasma. Initial results indicate that the moisture content at the distal end of field 49-50 may be too low allow for excess water for extraction. This is due to the inability to remove solution for all but one of the samplers on most occasions. It is hypothesized that due to the high application rates of the emitters most of the application occurs at the inlet end. While there is enough water for plant growth at the distal end, there does not seem to be enough for surfacing to occur. This is supported by the drop in pressure experienced from the inlet to distal end of the field. Personal observation also supplies some support due the presence of surfacing which occurs at the inlet end and decreases down the lateral. However, the emitter flow rate in field 53 appears to offer a more uniform application during irrigation and effluent irrigation events. Little surfacing is observed at this site and pressure from inlet to distal end are fairly consistent. Orthophosphate concentrations appear to decrease marginally with depth, although it does not appear to change drastically. This goes against expectations that orthophosphate concentrations would increase in close proximity to the emitter. It appears that with increased moisture orthophosphate concentrations remain fairly constant within the area examined (Figure 2). Initial concentrations indicate that copper is not typically found in soil solution at this site. However following the first effluent application the copper concentration increases and continues to increase following each application.

Overall, analysis indicates that concentrations of all constituents in soil solution are relatively constant during the time of application. In respect to plant growth, this would indicate the presence of consistent nutrient availability throughout the profile. However, the potential for nutrients to be moved with the irrigation application may be problematic in case of high water tables. As subsurface drip irrigation is not suggested for use in the presence of a high water table, this should not be cause for concern in most cases. Further data is required to determine if any significant changes occur in soil concentrations as a result of continued applications.

Figure 1. Lysimeters used to collect irrigation and swine effluent samples from subsurface irrigation systems at Oklahoma Panhandle Research and Extension Center.

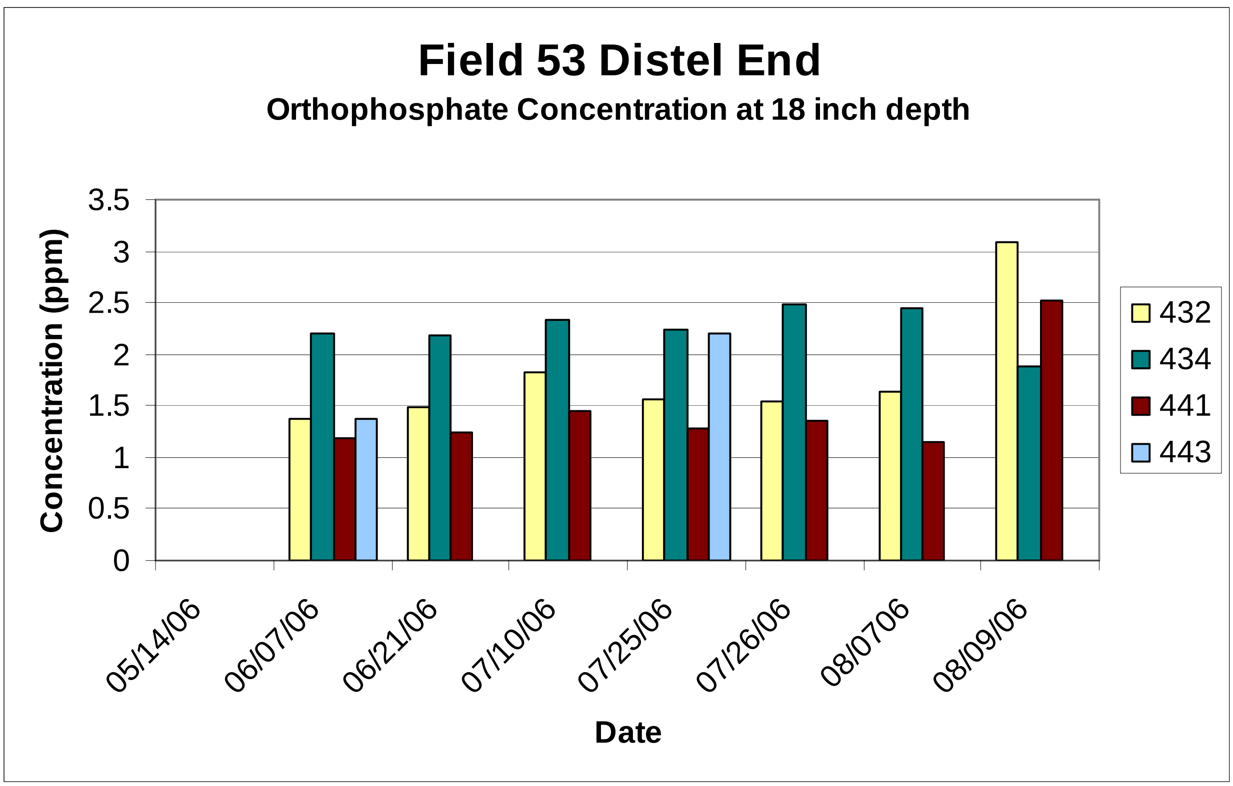


Figure 2. Phosphate solution concentrations following swine effluent applications via subsurface irrigation at four sampling locations through the growing season at the Oklahoma Panhandle Research and Extension Center.

Bermudagrass for the High Plains

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
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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 bermudagrass for grazing. 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 was first collected in 2004 for all varieties except Midland and OSU Greenfield. Plots of those two varieties had to be re-established in 2004. Forage yield data for all varieties in 2006 are given in Table 1. Forage yield data for varieties other than Midland and OSU Greenfield for 3-years (2004, 2005, and 2006) are given in Table 2. Table 3 gives average yield data for all varieties for the years 2005 and 2006.

In May of 2004, a half circle of LCB 84X 16-66 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 LCB 84X 16-66 in May 2005. The experimental LCB 84X 16-66 had demonstrated early greenup, good cold tolerance, and high yield performance in the 1997 trial at OPREC. The half a circle 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. 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 2007.

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

Variety	Harvest Date			Seasonal Total
	6/6/06	7/17/06	8/16/06	
	---------------- Dry tons/acre ----------------------			
LCB84X 16-66	2.53	6.95	4.28	13.75
Ozark	1.30	7.19	4.74	13.22
Midland 99	0.91	7.44	4.29	12.63
Midland	1.11	7.99	3.21	12.31
Tifton 44	0.83	6.88	3.98	11.69
A-12245	1.02	6.05	4.47	11.54
OSU Greenfield	0.72	5.68	2.68	9.06
Vaughns # 1	0.48	5.02	3.39	8.89
World Feeder	0.70	5.29	2.03	8.82
Shrimplin	0.81	4.84	2.01	7.65
Seay Greenfield	0.75	4.50	2.26	7.51
Mean	1.01	6.16	3.74	10.64
CV (%)	36.98	27.33	14.07	17.33
5% LSD	0.54	2.43	0.70	2.66

Table 2. Forage yields of bermudagrass varieties in Test 2003-1, Oklahoma Panhandle Research & Extension Center, Goodwell, OK. 2004-2006.

Variety	Year			Mean
	2004 3-harvests	2005 4 harvests	2006 3-harvests	
	------------------ Dry tons/acre -----------------			
LCB 84X 16-66	11.56	12.28	13.75	12.53
Ozark	10.48	12.66	13.22	12.12
Midland 99	10.32	10.12	12.63	11.02
A-12245	9.85	10.82	11.54	10.74
Tifton 44	10.15	10.25	11.69	10.69
Vaughn's #1	8.99	9.22	8.89	9.03
World Feeder	8.70	7.87	8.82	8.46
Seay Greenfield	8.90	7.14	7.51	7.85
Shrimplin	5.71	6.27	7.65	6.54
Mean	9.41	9.63	10.63	9.89
CV (%)	15.05	16.77	18.20	16.89
5% LSD	2.07	2.36	2.82	1.36

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 ------------		
LCB 84X 16-66	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.

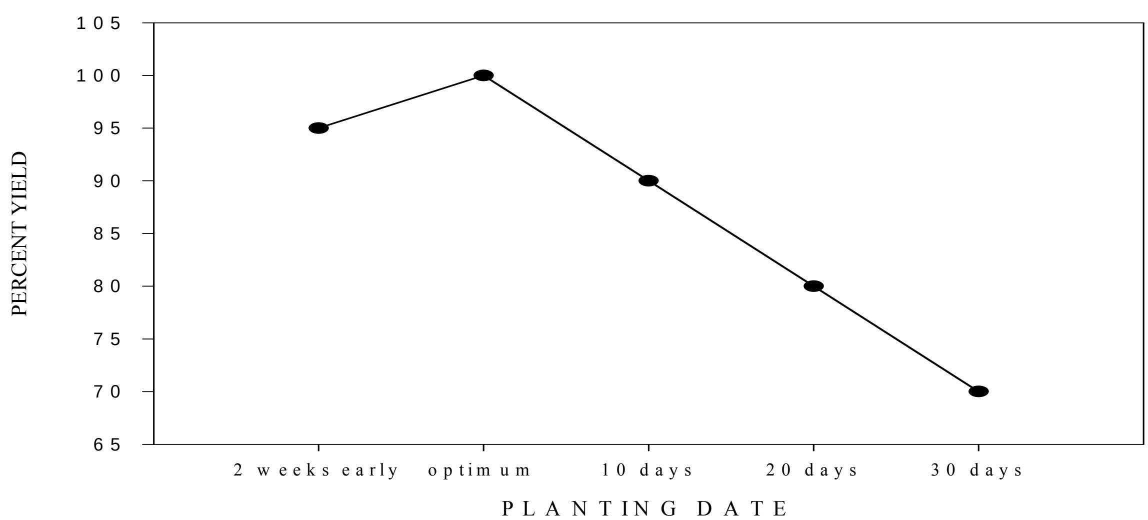


Figure 1. Ten years of grain yields at Lansing, Michigan. Source modern corn production

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.

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.

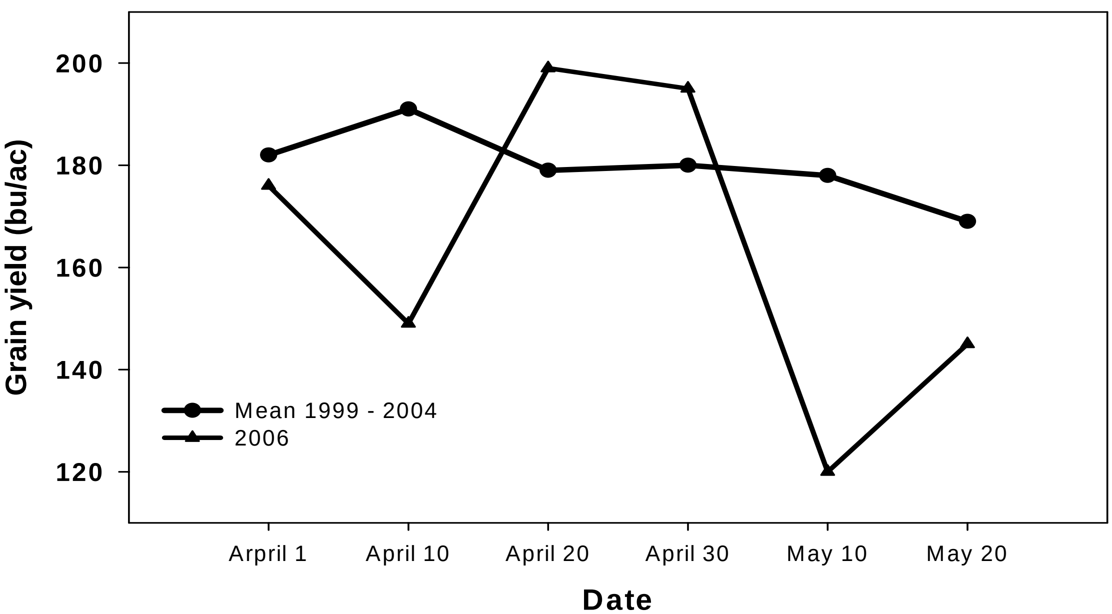


Figure 2. Mean corn grain yields bu/ac from 1999 through 2004 compared to 2006, which demonstrates the yield loss due to hail storms in early June 2006.

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

Curtis N. Bensch

A research study was conducted to evaluate the affect of corn maturity on yield under limited irrigation. Interest in limited irrigation is increasing due to the high energy cost of pumping irrigation water and reduced well output. Four Dekalb corn varieties were selected with relative maturities ranging from 92-day to 116-day. DK4295 (92-day), DK5020 (100-day), DK5819 (108-day), and DK6623 (116-day) corn varieties were planted April 17, 2006 using a John Deere 4-row planter at the rate of 27,000 seeds per acre. The site was fertilized in March with 200 lb N/acre and 20 lb P_2O_5/acre. The experiment was established as a randomized complete block design with four replications. The plot size was 10 feet by 35 feet. The sprinklers were designed with shut off valves to control whether plots were irrigated or not. Irrigation was limited early in the growing season for the 50% and 75% treatments and irrigation applied primarily during pollination and seed development. Season total irrigation amounts applied were 50% of normal (8.5 inches), 75% (13.8 inches) and 100% (17.5 inches). At each irrigation event 1.25 inches of water was applied.

Results

A hail storm in June partially defoliated the emerged corn reducing the total yield potential of the experiment. Corn yield increased as irrigation amount increased (averaged across all varities (Table 1). The corn averaged 91 bushels/acre at the 100% irrigation (17.5 inches). When evaluating the affect of maturity (averaged across all irrigation treatments) the 108-day variety yielded the best (81.6 bushels/acre). Also, test weight increased with irrigation and with maturity (Table 2). It is generally thought that corn with relative maturities of about 108-days are best adapted for the Oklahoma panhandle. This data suggests that even under reduced irrigation 108-day maturity will perform better than earlier or later maturing varieties.

Table 1. Corn yield (bu/acre) as affected by maturity and limiting irrigation.

Variety	50% irrig.	75% irrig.	100% irrig.	*Mean*
92-day variety	42.4	76.1	84.1	*67.6*
100-day variety	35.1	65.9	85.5	*65.1*
108-day variety	55.6	90.9	98.3	*81.6*
116-day variety	51.9	84.1	95.9	*77.3*
Mean	*48.5*	*79.3*	*91.0*	

Table 2. Corn test weight as affected by maturity and limiting irrigation.

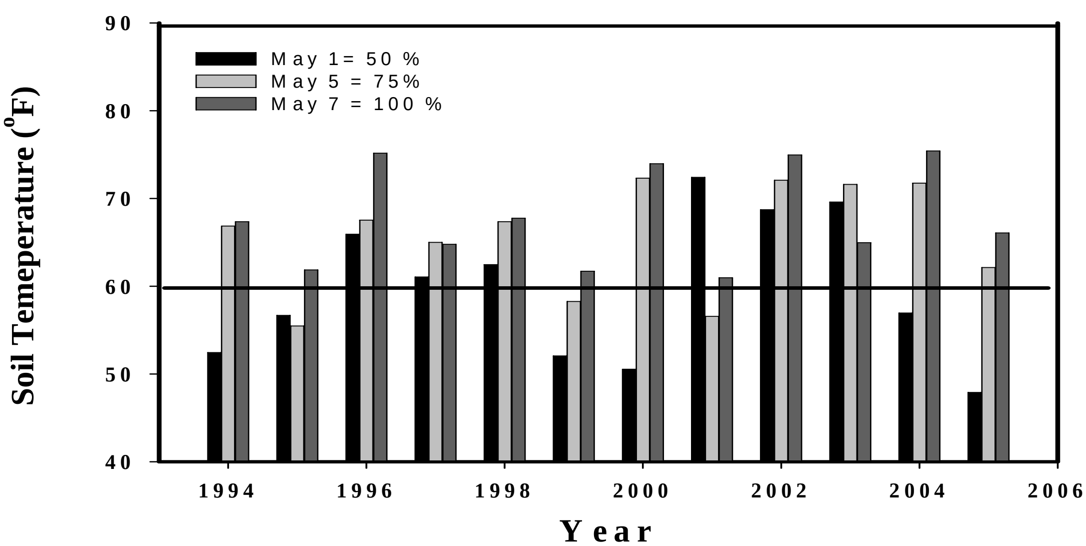
Variety	50% irrig.	75% irrig.	100% irrig.	*Mean*
92-day variety	55.1	55.4	55.8	*55.4*
100-day variety	43.7	55.1	56.5	*55.4*
108-day variety	55.9	55.8	56.8	*56.1*
116-day variety	56.4	57.4	57.0	*56.9*
Mean	*52.2*	*55.9*	*56.5*	

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

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 and varieties were again changed, (May 1, 10, 20, and 30) were selected with two varieties PM 2145 and PM 2140 B2RF. 2140 B2RF was selected because of the ability to spray roundup later and to determine if yield and quality would be consistent with PM 2145 RR (the most widely grown variety in the region). 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 last 12 years at OPREC.



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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. The lint yields for the May 10 date were reduced for PM 2145 by 600 lbs/ac when compared to previous years. Yields for the May 30 date are nearly the same as in years past for PM 2145. PM 2140 B2RF may be a good fit for this region, with yields nearly the same or higher than PM 2145 for all dates (Table 1). 2006 is the first year of the trial that the highest yields were obtained with later planting dates, but again the hail-storms affected the yields for the earlier planted cotton.

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. From the last three years data, it appears as if PM 2145 R maybe the best variety to plant for the region. PM 2145 R has had the highest yield for all three years of the study at each date (Table 1and 2.)

Table 1. Cotton lint yield lb/ac for selected dates at OPREC in 2006

Variety	May 1	May 10	May 20	May 30
PM 2140 B2RF	502.4 a†	822.9 a†	1103.5 a†	1023.8 a†
PM 2145 RR	416.5 a	518.1 a	797.4 a	737.3 a

†Yields with same letter not significantly different

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

This report also contains the loan rates for all varieties at each planting date in 2005 (Table 3). The loan rate is a reflection of quality, the higher the rate, the higher the lint quality. The difference in loan rate was also affected by planting date more than variety selection in 2004 (data not shown). In 2005 no difference was found in loan rate between May 7 and 15, but both dates were of higher than for May 30. The loan rates in 2005 were significantly higher than 2004 approximately 4 cents per pound (2004 data no shown). Also included is gross value of lint per acre, with PM 215 R also having the highest gross in 2004 at $517.57/ac.

In 2006 quality data could not be obtained, therefore not reported.

Table 2. Gross returns for cotton varieties and planting date in 2005 at OPREC.

Variety	Planting Date	2005 yield (lb/ac)	Loan Value	Dollars/ac
PM 2145 R	5/7	1,064	0.487	518.19
PM 2167 RR	5/7	958	0.497	475.88
PM 2280 B/R	5/7	889	0.479	425.73
PM 2266 RR	5/7	952	0.440	419.47
ST 2454 R	5/7	673	0.519	351.02
DP 555 B/R	5/7	534	0.480	256.19
PM 2167 RR	5/15	780	0.489	382.04
PM 2145 R	5/15	787	0.485	381.90
PM 2280 B/R	5/15	739	0.463	342.21
PM 2266 RR	5/15	713	0.476	339.08
ST 2454 R	5/15	651	0.480	311.98
DP 555 B/R	5/15	424	0.479	202.95
PM 2145 R	5/30	646	0.429	277.20
PM 2280 B/R	5/30	618	0.434	268.29
PM 2167 RR	5/30	546	0.441	240.91
PM 2266 RR	5/30	568	0.423	240.31
ST 2454 R	5/30	407	0.451	183.41
DP 555 B/R	5/30	272	0.429	116.51

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

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In 1999, a study was initiated to evaluate four different dry-land cropping rotations and two tillage systems for their long-term sustainability 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 never successful in this 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. Beginning in 2004 one half of the no-till plots was strip-tilled for planting of summer crops. Beginning in 2007 strip-till will be removed as a treatment until more investigation is done to determine proper timing. 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

No corn or soybean data was collected in 2001 – 03.

Data from the Oklahoma Climatological Service indicated the summers (June – August) of 1999 through 2002 were some of the driest in the last 53 years. Precipitation for these years has averaged 43% of the long-term mean, with 2001 at 16.5% (Table 1). In 2003, 2004, 2005, and 2006 precipitation was 107%, 118%, 86%, and 109% of the long-term mean respectively. One-half of the rainfall in the summer of 2006 was received in August and delayed maturity of grain sorghum grown with either strip-till or 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. In 2005, higher than normal rainfall late in the fall of 2004 and winter allowed for summer crops to be planted into the best soil moisture profile in the previous 7 years.

Table 1. Summer growing season precipitation at OPREC

Month	1999	2000	2001	2002	2003	2004	2005	2006	Long-term mean
June	2.85	2.29	0.61	1.32	5.26	3.82	2.01	2.34	2.86
July	0.20	0.76	0.00	2.52	1.87	2.43	1.40	2.05	2.58
August	0.75	1.09	0.66	0.27	1.19	2.87	3.21	4.06	2.28
Total	3.80	4.14	1.27	4.11	8.32	9.12	6.62	8.45	7.72

Wheat

No wheat harvested in 2006 due to drought.

In 2005, a difference in tillage treatments was observed in wheat yields for the first time. No-till wheat yielded 15.5 bu/ac more than conventional till when rotated with corn and grain sorghum. In 2003 and 2004 no biomass was grown on the soybean plots the previous summer, therefore tillage treatment differences were most likely masked. In 2003, differences were observed in wheat yield, with the WBF rotation having the highest yield at 66.1 bu/ac (Table 2). The WBF rotation yield increase may be attributed to having no biomass grown in the summer of 2001, while corn and grain sorghum both had significant biomass. Consequently, more soil moisture was stored in the soil profile. In 2004, wheat yields were reduced by a freeze on April 13. May of 2004, was also one of the driest on record with only 0.15 inches of rainfall. There was no difference in wheat yields in 2000 and 2001 (data not shown) among rotations or tillage treatments with a yield of 27 and 40 bushel per acre, respectively.

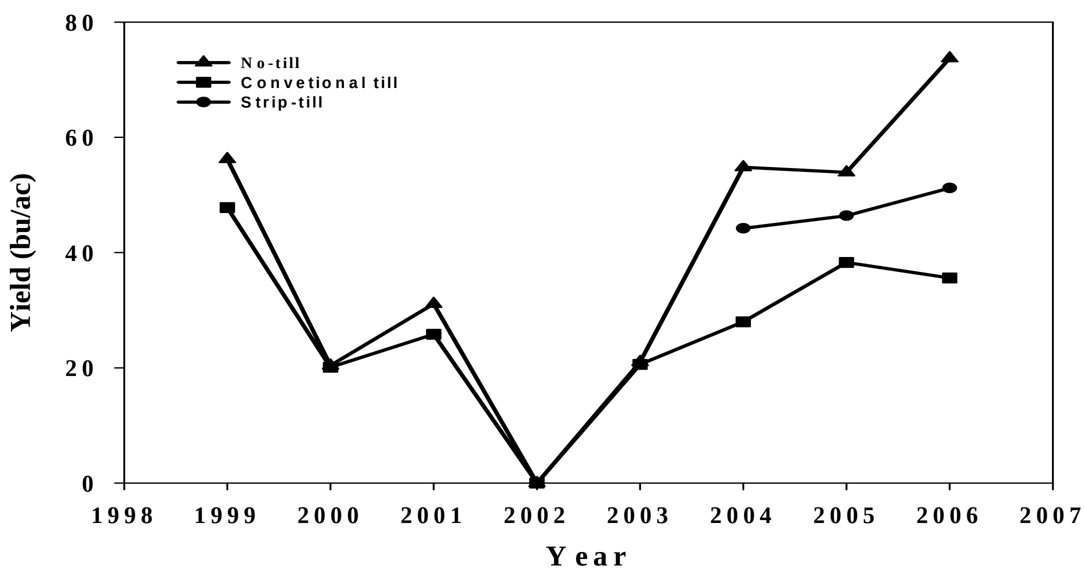
Table 2. Wheat yields (bu/ac) dry-land tillage and crop rotation study at OPREC.

Rotation	Tillage	2005	2004	2003	5-year
WBF	Tilled	44.8	22.1	63.8 ab	42.4
WBF	No-till	43.4	13.9	66.1 a	39.5
WCF	No-till	49.9	26.9	51.8 bc	42.7
WCF	Tilled	33.7	29.2	44.5 cd	37.2
WSF	No-till	48.6	23.2	48.8 c	40.4
WSF	Tilled	33.8	25.2	31.7 d	33.3
	Mean	42.4	23.4	51.1	35.4
	L.S.D.	8.6	NS	13.6	NS

Grain Sorghum

From 1999 – 2003 grain sorghum was the only summer crop successfully harvested. No-till yields tended to be higher during the period but no statistical difference was observed (Figure 1). With producer interest growing in strip-till in irrigated systems one half of each no-till plot was converted to strip-till for the 2004 crop season, but will be discontinued in 2007. This study was just looking at the affect of strip-till; therefore, all fertilizer was applied with sprayer on the soil surface. Since 2004, grain sorghum yields have been significantly higher for no-till than either strip-till or 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. In both 2004 and 2006, 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 both strip-till and minimum till grain sorghum adversely affected the test weights. In 2005, no difference was observed between tillage treatments, although yields for no-till were higher than for either strip till or minimum till.

Figure 1. Grain yields of grain sorghum (bu/ac) for dry-land tillage and crop rotation study at OPREC.



The difference in yield for strip-till vs. minimum till was greater than the difference between no-till and strip-till in 2004. This difference may indicate that when fertilizer is applied by strip-till that it will compare to no-till. Another study was initiated in 2005 to more effectively compare strip-till with fertilizer applied vs. fertilizer applied on surface. 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.

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

Tillage	2004	2005	2006	Three-year
No-till	54.8	53.9	73.7	60.8
Strip-till	44.2	46.4	51.2	44.6
Minimum till	28.0	38.3	35.6	36.7
Mean	42.3	46.2	53.5	47.4
CV %	6.4	13.6	19.0	20.1
L.S.D.	6.1	NS	24.2	9.9

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

Tillage	2004	2005	2006	Three-year
No-till	56.5	57.8	56.8	57.0
Strip-till	56.7	57.0	52.9	55.5
Minimum till	55.8	56.9	49.6	54.1
Mean	56.3	57.2	53.1	55.6
CV %	0.8	1.6	4.2	3.7
L.S.D.	NS	NS	5.0	2.0

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 were not adjusted for reduced population fruit set. Yields may have been higher with adequate stands. There was no difference in yields between tillage treatments (Table 5). Although yields were substantially higher in 2005 than 2004, no difference was observed in yield or quality between tillage treatments. In 2006 the hail storms in June affected yields and data was so variable it cannot be reported.

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

Tillage	2004	2005	Two year
Minimum till	196.3	594.2	395.2
No-till	165.6	585.0	375.3
Strip-till	193.9	505.8	349.8
Mean	185.2	561.7	373.4
CV %	17.4	13.7	NA
L.S.D.	NS	NS	NA

Sunflower

Due to planter and herbicide problems, no sunflowers were harvested in 2004. In 2005 and 2006 there was a perfect stand but two days later jackrabbits ate all of the plots. Due to lack of soil moisture we were unable to replant.

WHEAT VARIETY DEVELOPMENT AND BREEDING RESEARCH
Brett F. Carver and the OSU Wheat Improvement Team

The Oklahoma State University Wheat Improvement Team, the Oklahoma Agricultural Experiment Station, and the USDA-ARS announced the release of **'Duster'** and **'Centerfield'** HRW wheat cultivars in late 2006.

Centerfield has the pedigree, (TXGH12588-105*4/FS4)/2*2174. The germplasm indicated by FS4 originated with BASF Corporation (formerly American Cyanmid)and provides tolerance to imazamox herbicide. Centerfield is resistant to *Wheat spindle streak mosaic virus* and to *Wheat soilborne mosaic virus* and should exhibit insignificant losses to these viral diseases. Though susceptible in the seedling stage, Centerfield shows moderate to high adult-plant resistance to wheat leaf rust caused by races of *P. triticina* present in Oklahoma and Texas from 2004 to 2006. It appears to be at least moderately resistant to stripe rust (caused by *Puccinia striiformis* f. sp. *tritici*) in the field. Seedling tests in the greenhouse indicate a susceptible reaction to tan spot (caused by *Pyrenophora tritici-repentis*) and to septoria leaf blotch (caused by *Septoria tritici*) and a moderately susceptible reaction to powdery mildew (caused by *Blumeria graminis* f. sp. *tritici*). Centerfield shows a heterogeneous reaction (46% resistant:54% susceptible) to biotype E greenbug (*Schizaphis graminum* Rondani). Field ratings in Oklahoma indicate a tolerant reaction to Hessian fly (*Mayetiola destructor*) that is similar to Chisholm, 2174, and Ok102, though its seedling reaction in the greenhouse is heterogeneous. Early seeding of Centerfield is not recommended due to its heat-sensitive germination response. Milling and baking characteristics are an improvement over Okfield and AP502CL, current imazamox-tolerant cultivars grown in Oklahoma, with above-average kernel size and grain-volume weight, good dough strength, and moderately high wheat protein content of (13.0%, 12% m.b.).

Wheat producers in the southern Plains who are shifting to conservation-tillage practices while planting early for forage production in a graze-plus-grain (dual-purpose) management system are increasingly challenged by Hessian fly (Hf) infestations. The majority of cultivars grown in this area possess no Hf resistance genes. A driving force in the release of Duster was its resistance to the Great Plains biotype of Hessian fly. As a high-tillering cultivar, it also exhibits excellent biomass accumulation prior to fall grazing and canopy regeneration during grazing, and exceptional recovery from grazing. These are characteristics we continue to emphasize in our ***GRAZE*****n*****GRAIN*** breeding system. Hence, it is positioned for all areas inclusive of and immediately adjacent to Oklahoma, particularly those featuring a dual-purpose management system. Duster originated from the cross, W0405/NE78488//W7469C/TX81V6187, that was produced in the HRW wheat breeding program of Pioneer Hi-Bred International, Inc. Duster is resistant to *Wheat spindle streak mosaic virus* and to *Wheat soilborne mosaic virus*. Though susceptible to leaf rust in the seedling stage, Duster exhibited a resistant adult-plant reaction in the field in Oklahoma and Texas during the three crop seasons of 2004-2006. Reaction to stripe rust has varied from intermediate to moderately susceptible in the Great Plains. Thus, reaction to stripe rust may be highly dependent on the environment and/or races of the pathogen present. Based on combined greenhouse and field observations, Duster is moderately susceptible to tan spot but shows an intermediate reaction to septoria leaf blotch and an intermediate to moderately resistant reaction to powdery mildew. Aside from kernel size being average (kernel diameter of 2.2 mm), Duster shows excellent mixing tolerance at an intermediate protein level (statewide wheat protein, 12.4%, 12% m.b.), and it exhibits a unique but desirable farinograph pattern of short peak time (<5 min) and long stability time (>15 min).

Two experimental hard white (HW) winter wheat lines are under breeder-seed production in the 2006-2007 crop season, OK00514W and OK00611W. The former is a reselection of OK Bullet (HRW cultivar) with agronomic and quality characteristics almost identical to OK Bullet. OK00611W was a sister selection to OK Bullet and features a moderately high level of pre-harvest sprouting tolerance and post-harvest seed dormancy that is accentuated by high soil temperature. With their foliar disease resistance and ability to tolerate acid soils, both lines may be positioned for the Central Plains, offering a HW alternative in an area dominated heavily by HRW cultivars. A release decision for one of these will be made in June 2007. Currently, we allocate 80% of our resources in the latter stages of selection to HRW line development, although 50% of the crosses made each year involve HW parentage to varying degrees. About 20% of the crosses made each year involve strictly HW parentage.

Marker-assisted selection is playing an increasing role in our wheat improvement program, primarily for the purpose of gene enrichment in early segregating generations. This activity is tied directly to participation in the multi-institutional CAP project funded by USDA-

CSREES (award no. 2006-55606-16629), in conjunction with the Hard Winter Wheat Genotyping Laboratory (USDA-ARS, Manhattan, KS). Target traits currently under watch are Hessian fly resistance, acid-soil tolerance, pre-harvest sprouting tolerance, resistance to leaf rust, *Wheat streak mosaic virus*, and *Barley yellow dwarf virus.*

The Wheat Improvement Team at OSU currently has ten members: Brett Carver (team leader), Liuling Yan (molecular genetics), Bob Hunger (pathology), David Porter (USDA-ARS; aphid resistance), Tom Royer and Kris Giles (Hessian fly resistance), Art Klatt (prebreeding and germplasm development), Jeff Edwards (extension, management), Patricia Rayas-Duarte (cereal chemistry), and Bjorn Martin (physiology). **Dr. Yan** is our newest addition to the team, having recently moved from a postdoctoral position in wheat molecular genetics at the University of California-Davis. His research will focus on identification and cloning of genes responsible for agronomically and economically important traits in wheat and other cereal crops. Projects already in progress include genetic analysis of variation in vernalization requirement and duration among winter wheat cultivars and establishment of a genome-scale gene network for flowering time in wheat and barley. Molecular markers will be developed to assist breeding programs to select gene combinations that maximize plant adaptation to different environments.

PLANTING DATE FOR DRY-LAND WHEAT IN THE OKLAHOMA PANHANDLE

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Jeff Edwards, Dept. of Plant and Soil Sciences, Oklahoma State University, Stillwater

Dryland wheat producers in the panhandle region often plant wheat when soil moisture is adequate whether that be the first of September or late October. In the fall of 2004 a study was initiated at OPREC to determine the effect of planting date on dryland wheat grain yield and test weight. Wheat planting dates were the first and fifteenth of September, October, and November 2004. Seeding rate 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. Two varieties were planted at each date. Varieties selected were TAM 110, one of the most widely grown hard red winter wheat varieties in the high plains, and Intrada a variety that consistently has one of the highest 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 two hail storms in early June. From observation wheat dusted in before the rainfall on October 9 and 10 would have out yielded wheat planted into moisture on October 15 by 15 – 20 bu/ac.

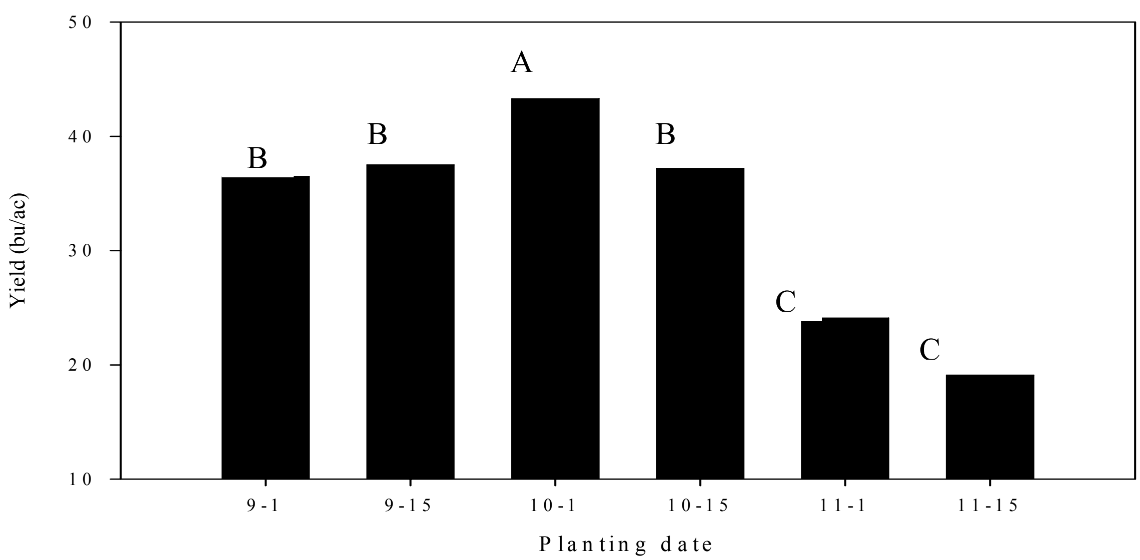
Yields were reduced at OPREC in 2005 due to stripe rust that affected the high plains region. Although yields were reduced the October 1 was the best planting date in 2005 at 43.3 bu/ac (Figure 1). Although differences were found, they were not as significant as previously reported results at Texas A&M for the region, this can be explained by the amount of rainfall received during planting season and early winter (Table 1). No differences in grain yield between varieties were observed for the September through October 15 planting date. Likewise there was no difference in grain yields for the September 1, 15, and October 15 dates. There was a variety-by-planting date interaction for the November 1 and 15, with Intrada yielding 6.7 and 7 bu/ac higher than TAM 110. As would be expected varieties differed in test weight. Intrada had an

Table 1. Long-term mean and yearly 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
2005	0.35	1.06	0.12	0.11	1.64

average test weight 2.5 lb/bu higher than TAM 110, with test weights of 59.0 and 56.5 lb/bu respectively. Planting date had an effect on test weight, but differences among planting dates were larger for Intrada (3.3 lb/bu between highest and lowest), than for TAM 110 (1.4 lb/bu between highest and lowest) (Table 2). In terms of test weight November 1 was the optimal planting date for Intrada, while only the November 1 and September 1 differed for TAM 110. While differences in test weight among planting dates was greater for Intrada than TAM 110, Intrada still had higher test weight than TAM 110, regardless of planting date. Therefore, our data suggest that growers who are concerned with test weights may have more leeway when planting Intrada as compared to TAM 110. However, more years of data with different climatic and disease conditions are needed before any final conclusions should be made from this study.

Figure 1. Grain yield (bu/ac) for dryland wheat planted at six different dates at OPREC in 2004



Yields with same letter are not significantly different

Table 2. Test weight for Intrada and TAM 110 hard red winter wheat planted at different dates at OPREC in 2004

Planting date	Intrada	Planting date	TAM 110
November 1	60.8 a	November 1	57.2 a
November 15	59.9 b	October 1	56.8 a
October 15	59.5 bc	November 15	56.8 a
October 1	58.8 c	September 15	56.4 ab
September 15	57.7 d	September 1	56.0 ab
September 1	57.5 d	October 15	55.8 b

Yields with same letter are not significantly different

SEEDING RATE FOR DRY-LAND WHEAT IN THE OKLAHOMA PANHANDLE

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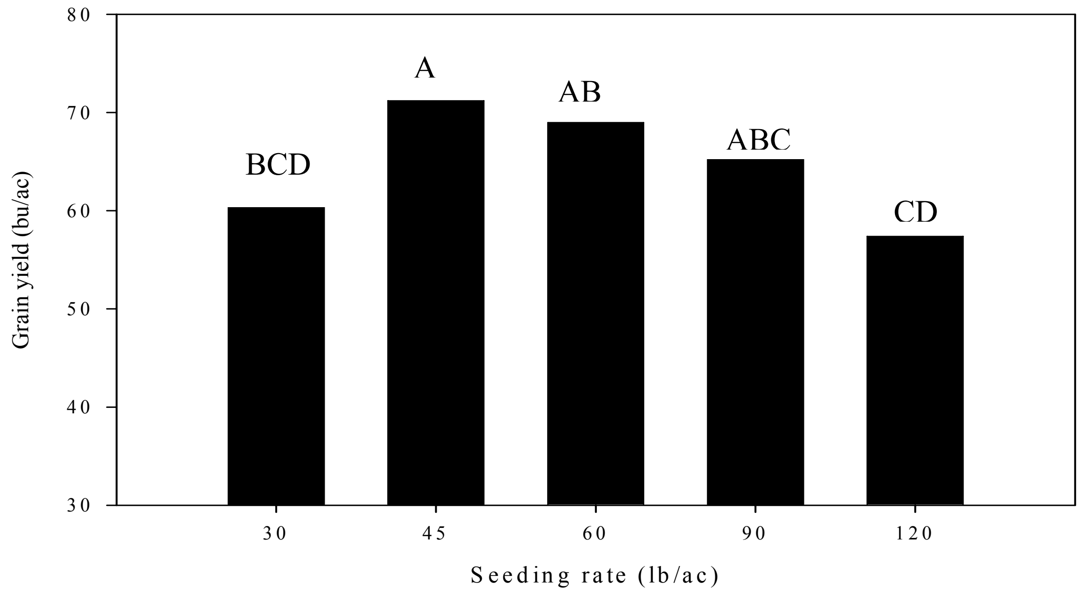
When adequate fall moisture is present, dry-land wheat producers in the southern high plains region utilize wheat for both cattle grazing and grain production (dual-purpose). In the fall of 2001 a dry-land seeding rate study was established near Keyes, to determine the effect of seeding rate on dual-purpose wheat grain yield. The most widely grown dry-land wheat variety (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. 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 is not reported. Since forage data collection was not feasible the focus of the study was changed in 2004 to determine if increased seeding rate were required for higher grain yields when October planting dates were used. In addition another Variety (Intrada) was included in the fall of 2004. Plot size was 5 feet wide by 35 feet long and all plots planted with a Great Plain no-till plot drill.

Results

No data collected in 2006 plots not harvested due to drought

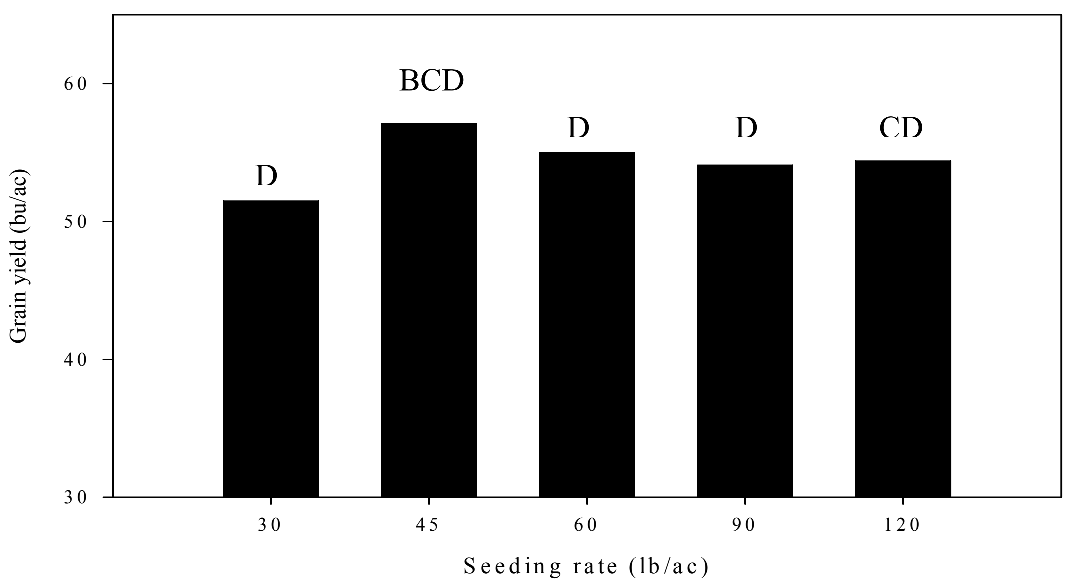
Stripe rust affected grain yields in 2005 for most producers except except those that sprayed with fungicide for control. In response to stripe rust, the producer sprayed the field were experiment was located with fungicide and the reward was the highest grain yields of any Oklahoma panhandle experiments. Average grain yield was 59.7 bu/ac, and TAM 110 averaged 10.4 bu/ac more than Intrada (64.9 and 54.5 bu/ac respectively). The 30 and 120 lb/ac seeding rates for TAM 110 were significantly lower than for the highest yielding rate of 45 lb/ac, although no difference was observed between 45, 60, and 90 lb/ac rates (Fig. 1). For Intrada no difference was found at any seeding rate, but the 30 lb/ac rate was the lowest yielding (Fig. 2). Seeding rate had no effect on test weight of either variety, with Intrada and TAM 110 averaging 64.3 and 61.8 respectively.

Figure 1. Grain yields for TAM 110 at selected seeding rates planted fall of 2004.



Yields with same letter are not significantly different

Figure 2. Grain yield for Intrada at selected seeding rates planted fall of 2004.



Yields with same letter are not significantly different

Wheat grain yields in 2003 and 2004 were low with the highest yield obtained from a mid October planting in 2003 of 17.6 bu/ac. More data is needed in years with favorable conditions for grain production before any conclusions can be determined. 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.

WHEAT LIGHT INTERCEPTION

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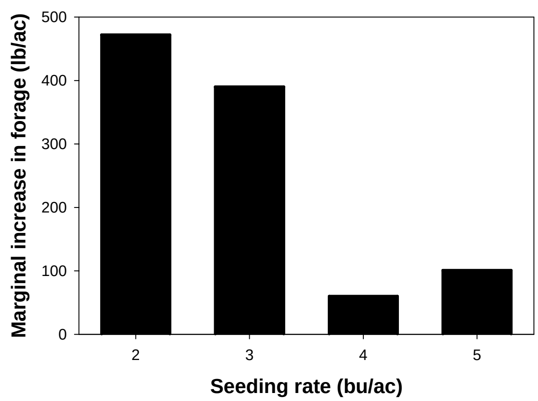
Research conducted in the Panhandle region of Oklahoma over the past few years has indicated that fall forage production is significantly increased by increasing seeding rate (PT 2003-2). The highest seeding rate used in prior experiments, however, was 3 bu/ac; therefore, a study was initiated in 2004 to determine the response of fall wheat forage to increased seeding rates up to 5 bu/ac. The trial was planted September 4 at Goodwell, OK using the variety Intrada

Results from the fall of 2004 indicate that significant marginal increases in total fall forage production can be obtained by increasing seeding rates up to 3 bu/ac, but the feasibility of increased seeding rate depends entirely upon seed costs. For example, if we assume a value of $0.03/lb for forage production, the marginal return for increasing seeding rate from 1 to 2 bu/ac was roughly $14/ac. An additional $12/ac was gained by increasing the seeding rate from 2 to 3 bu/ac, and would likely be feasible using most seed sources in Oklahoma. Marginal returns past this point, however, were less than $4/ac and would have, at best, been a break-even proposition.

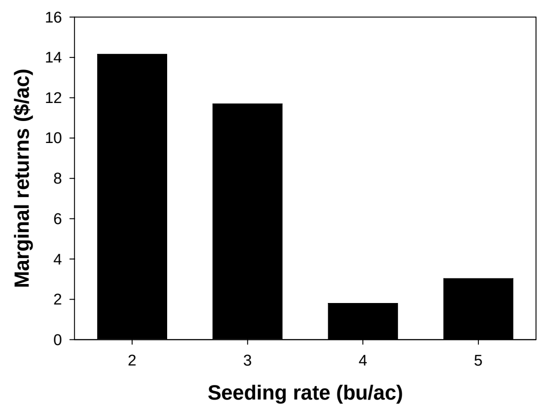
No harvest data collected in 2006 due to hail storm. Forage data from fall of 2006 was to variable to be reported

More data is needed to determine if these results are applicable across a wide range of environments and varieties, but the response of increased forage production for seeding rates up to 3 bu/ac look promising for dual-purpose wheat farmers.

Marginal Response of Fall Forage Production to Increased Seeding Rate at Goodwell in 2004



Marginal Return to Increased Seeding Rate at Goodwell in 2004



TILLAGE SYSTEM/NITROGEN MANAGEMENT FOR IRRIGATED CORN

Randy Taylor, Department of Biosystems and Agricultural Engineering, Oklahoma State University
Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Chad Godsey, Department of Plant and Soil Sciences, Oklahoma State University

Strip tillage systems are gaining popularity in the Corn Belt and Great Plains as an alternative tillage system, specifically as a substitute for no-till. In typical strip tillage systems, fertilizer is placed below the soil surface in a tilled strip either in the late fall or early spring. The subsequent crop, usually corn or cotton, is then planted directly into the tilled strip. Research by the Irrigation Research Foundation in Yuma, Colorado has shown an average increase of 16 bu ac^{-1} for strip tilled corn when compared to conventional tillage for years 2000-2004 (http://www.irf-info.com/). Gordon and Lamond (2005) and Janssen et al. (2005) also found greater yields with strip tillage in Kansas when compared to no-till using similar nitrogen fertilizer. However, other research has shown mixed results regarding strip tillage and crop yield (Licht and Al-Kaisi, 2005; Sweeney et al., 2006; and Vetsch and Randall, 2002). Strip tillage yield and nitrogen recovery for dryland corn in southern Minnesota were not significantly different than that observed for other tillage systems in a three year study (Vetsch and Randall, 2002).

Objective

The objective of this research was to evaluate the relationship between tillage systems (strip and no-till) and nitrogen fertilizer rates.

Procedures

Research plots were established at the OPREC in Goodwell, OK. Plots were 10 feet wide (4 – 30” rows) and 50 feet long. Treatments included two tillage systems (no-till and strip till) and five nitrogen rates in a randomized factorial experiment. The nitrogen rates were 0, 75, 150, 225, and 300 lbs N ac^{-1}. A Redball strip till implement was used to subsurface apply 32% nitrogen in a band six inches deep in the strip till plots on March 9. Urea was broadcast on the surface of the no-till plots. Corn was planted at 33,000 seeds ac^{-1} on April 13 and plots were sprayed with cinch atz lite at 2 qts ac^{-1}. Five gallons of 10-34-0 was applied in the seed trench at planting. Accent Gold was applied on May 22 at 3.5 oz ac^{-1} to control sunflowers. Irrigation was scheduled as is typical for the Oklahoma Panhandle. Plots were harvested on September 19, 2006.

Results

A Greenseeker hand held sensor was used to assess yield potential of a few plots on June 14, 2006 when corn was at the at the seven leaf stage. The intention was to determine in season nitrogen needs for a few of the plots. The 300 lb/ac rate was used as the nitrogen rich treatment. The normalized difference vegetative index (NDVI) values for six plots are shown in table 1. Greater NDVI values indicate greater vegetative growth and thus yield potential. As expected the 300 lb N ac^{-1} plots had the greatest NDVI in both tillage systems. However, the NDVI for the strip till plot with no nitrogen was unexpectedly greater than the plot with 75 lbs N ac^{-1}.

Table 1. Normalized Difference Vegetative Indices (NDVI) for six plots.

Tillage	Nitrogen Rate, lbs ac^{-1}	NDVI
Strip Till	0	.680
Strip Till	75	.635
Strip Till	300	.760
No Till	0	.650
No Till	75	.640
No Till	300	.765

The research plots were hailed shortly after these readings were taken and yield potential was greatly reduced. Yield data are shown in table 2. There was no interaction or significant differences among treatments. Average moisture content was 18.3% and average test weight was 57.7 lbs bu^{-1}. Individual plot yields were extremely variable for some treatments. Yields were also lower than expected. Thus this study will be repeated in 2007.

Table 2. Grain yield (bu ac^{-1}) for tillage system study at OPREC, Goodwell.

Nitrogen Rate, lbs ac^{-1}	No Till	Strip Till
0	109.29	125.44
75	123.85	109.06
150	131.19	133.27
225	129.11	128.85
300	128.28	108.39

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TIMING OF DRY-LAND STRIP-TILLAGE IN THE HIGH PLAINS

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

With the growing interest in strip-till throughout the high plains, a study was initiated in the fall of 2003 to determine if timing of strip-till would affect yield of dryland summer row crops. Producer interest in strip-till is growing because fertilizer can be applied at the same time that tillage is done. One of the concerns many producers have with no-till is that nitrogen (N) is tied-up in the crop residue when surface applied. Nitrogen tie-up is greatly reduced with strip-till due to the N being placed below (generally 3 – 8 inches) seeding depth. Many irrigated producers in the region are doing strip-till from late fall to early spring. This study was designed to determine what the affect of strip-till (no fertilizer applied) at different dates would have on grain sorghum yield. Fertilizer for all treatments was applied on the surface with a sprayer. Grain sorghum was selected as the crop to be grown, because it is the most widely grown summer row crop in the region. Four dates were selected for strip-till September, November, January, and March. No-till was also included as the control. Plots were four rows wide by 50 foot long and strip-tilled with an Orthman two-row one-tripper at a depth of 7 inches.

Results

No differences in grain yield were observed between any strip-till treatments in 2004, therefore only (fall and spring) strip-till, and no-till treatments were tested in 2005 and 2006. Similar to 2004, in 2006 the no-till plots had significantly higher grain yields than either fall or spring strip-till, with an increase of 29.5 % (Table 1). Grain yields for the duration of the study were 21% higher for no-till when compared to either strip-till treatment. The increase in grain yields for no-till maybe due an increase in soil moisture. Although grain yields where higher for no-till during the study, in 2005 no difference was observed between no-till and strip-till. This was most likely due to higher than average rainfall for November of 2004 with 3.51 inches, which was 4.5 times higher than the long-term average. Strip-till appears to diminish moisture in the soil profile both after strip-tilling and during the growing season. The reduced soil moisture is evident by the reduced yields of strip-till in 2 of the 3 years. Also during 2006 test weights for strip-till were lower than for no-till at 52.4 and 56.8 respectively. The strip-till plots exhibited drought stress during late July and early August that was never observed in the no-till plots. The drought stress led to later head exertion and flowering, therefore test weights were affected.

Yields may be increased in other strip-till studies in the future when fertilizer is applied with strip-till. Another study was initiated in 2005 to determine if applying fertilizer when strip-tilled had an effect on yield and is reported elsewhere in the highlights book. More years of data will need to be collected before it can be determined if strip-till will benefit dryland producers in the high plains region. This was the last year for this experiment, but starting in 2007 a study will be initiated to determine what the effect of strip-till immediately after harvest would have compared to (fall and day of planting) strip-till and not-till. Strip-tilling earlier may allow for producers to utilize this technology and apply N without sacrificing soil moisture.

Table 1. Grain sorghum yield (bu/ac from timing of dryland strip-till experiment at OPREC.

Timing	2004	2005	2006	Two-year
No-till	62.5 a†	81.7 a	80.1 a	74.8 a
March (spring)	47.6 b	77.6 a	54.1 b	59.1 b
September (fall)	45.5 b	66.9 a	56.6 b	57.9 b
January	42.1 b			
November	37.9 b			

†Yields with same letter not significantly different

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

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

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 timing of strip-till 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 was started. The fertilizer rate was the same for all treatments with the no-till and strip-till applied on surface with a sprayer. 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. 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 50 ft long and strip-tilled with an Orthman two-row one-tripper at a depth of 7 inches.

Results

There were no differences in yield or test weight among the treatments in either 2005 or 2006 (Table 1 and 2). Although the no-till had higher yields in 2006 no statistical difference was found. No response to N fertilizer was observed in 2006 which had higher yields than 2005 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. More years of data are needed before we can determine if producers in the high plains will utilize strip-till in dryland systems.

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 and test weight in 2006 from strip-till fertility study at OPREC.

Treatment	Grain Yield bu/ac	Test weight lb/bu
No-till no fertilizer	77.3	55.8
No-till with fertilizer	74.9	55.4
Strip-till surface fertilizer	65.6	52.6
Strip-till applied fertilizer	60.3	53.2
Strip-till no fertilizer	59.9	52.6

RATE AND TIMING OF HERBICIDES FOR THE CONTROL OF INVASIVE OLD WORLD BLUESTEM

S. Robertson, K. Hickman, T. O'Connell, C. Bensch, and D. Leslie, Jr

Old World Bluestem (*Bothriochloa ischaemum*) is an invasive perennial warm season grass, introduced as a forage crop, and in the Conservation Reserve Program (CRP) throughout in the southern Great Plains. Monocultures of OWB provide limited value for wildlife habitat, and there is interest in converting OWB to more beneficial native warm season grasses. The study was conducted at the Marvin Klemme Research Station in western Oklahoma. Roundup Weathermax (*glyphosate*) and Liberty (*glufosinate*) were applied postemergent to control OWB (Table 1). The timing of application was May, June, or May and June for each herbicide. Visual control estimates were recorded, at 2, 4, and 8 weeks after treatment to determine the most effective method of control. All herbicide and date treatments were significant compared to the control (Table 1). Glyphosate 3.8 lb ai/ac had greatest control, while the combination of May and June was the most effective application time for control. Two applications of herbicide are needed for effective control OWB.

Table 1. Old World bluestem control 12 and 20 weeks after treatment (WAT).

Herbicide	Rate	Application date	Percent control 12 WAT	Percent control 20 WAT
Glyphosate	1.9 lb ai/ac	May	78	13
		June	82	91
		May/June	98	86
	3.8 lb ai/ac	May	81	11
		June	72	41
		May/June	95	64
Glufosinate	0.5 lb ai/ac	May	67	7
		June	61	6
		May/June	90	35
	1.0 lb ai/ac	May	59	5
		June	61	6
		May/June	89	17

Appendix

OKLAHOMA PANHANDLE CORN PERFORMANCE TRIALS, 2006

PRODUCTION TECHNOLOGY CROPS

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

PT 2006-12 November 2006 Vol. 18, No.12

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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 was not validated by OSU; therefore, we strongly recommend consulting company representatives for more detailed information regarding these traits and disease resistance ratings (Table 2).

Irrigated test plots were established at the Oklahoma Panhandle Research and Extension Center (OPREC), near Goodwell and the Joe Webb farm, near Guymon. Fertility levels, herbicide use, and soil series (when available) are listed with data. Trials were two 25-foot rows seeded at a target population of 32,000 plants/ac. 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. The experimental design was a randomized complete block with four replications. Grain yields are 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 65.3% and production is reported as tons/ac adjusted to 65% moisture.

GROWING CONDITIONS

The planting period was characterized by a lack of soil moisture due to inadequate rainfall received throughout the winter and spring. Most producers used pre-irrigation to obtain desired surface and subsoil moisture levels. Soil temperature of 61° F on April 1 at the two-inch depth was consistent with observations in previous years. During the growing season rainfall was below the long-term average from April through late July (Table 1), but rainfall in late July and August reduced late season irrigation when compared to 2005. Rainfall at OPREC (10.88 inches) was less than most locations in the panhandle, with rainfall amounts east of Guymon totaling near 19 inches from late June through August. The panhandle region had several yield reducing hailstorms from mid May until early July. The hailstorms in May led to some acres being replanted. OPREC received two hail and windstorms in June which dramatically reduced the yield for corn planted around April 10 (Fig. 1). This is in contrast to previous years data from the planting date experiment, as the highest yields in the previous 6 years were obtained on the April 10 planting date. High moisture corn was cut with short delays due to rainfall in late August and early September, but there were no major delays for dry corn harvested from mid September to mid October.

RESULTS

Grain yield, test weight, harvest moisture, and plant populations for OPREC and Webb trials are presented (Tables 3-4). Ensilage yields are reported in Table 5. Acid Detergent Fiber (ADF) and Total Digestible Nutrients (TDN), however are not reported, because no significant differences existed among hybrids. Averages were 33.4, and 64.0%, for ADF and TDN respectively. Similarly, there were no differences among hybrids in net energy values for maintenance, lactation, and gain values with averages of 0.64, 0.65, and 0.37 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; Donna George, Lawrence Bohl, Matt LaMar, Eddie Pickard, Justin Stauffer, Tony Mills, and Craig Chesnut. Their efforts are greatly appreciated.

Figure 1. Planting date effects on corn grain yields at OPREC from 1999 to 2006. Note the much lower grain yield for the April 10 planting date in 2006 relative to grain yields obtained with the same planting date in 1999 – 2005. Reduced grain yields in 2006 were the result of two hailstorms during the month of June.

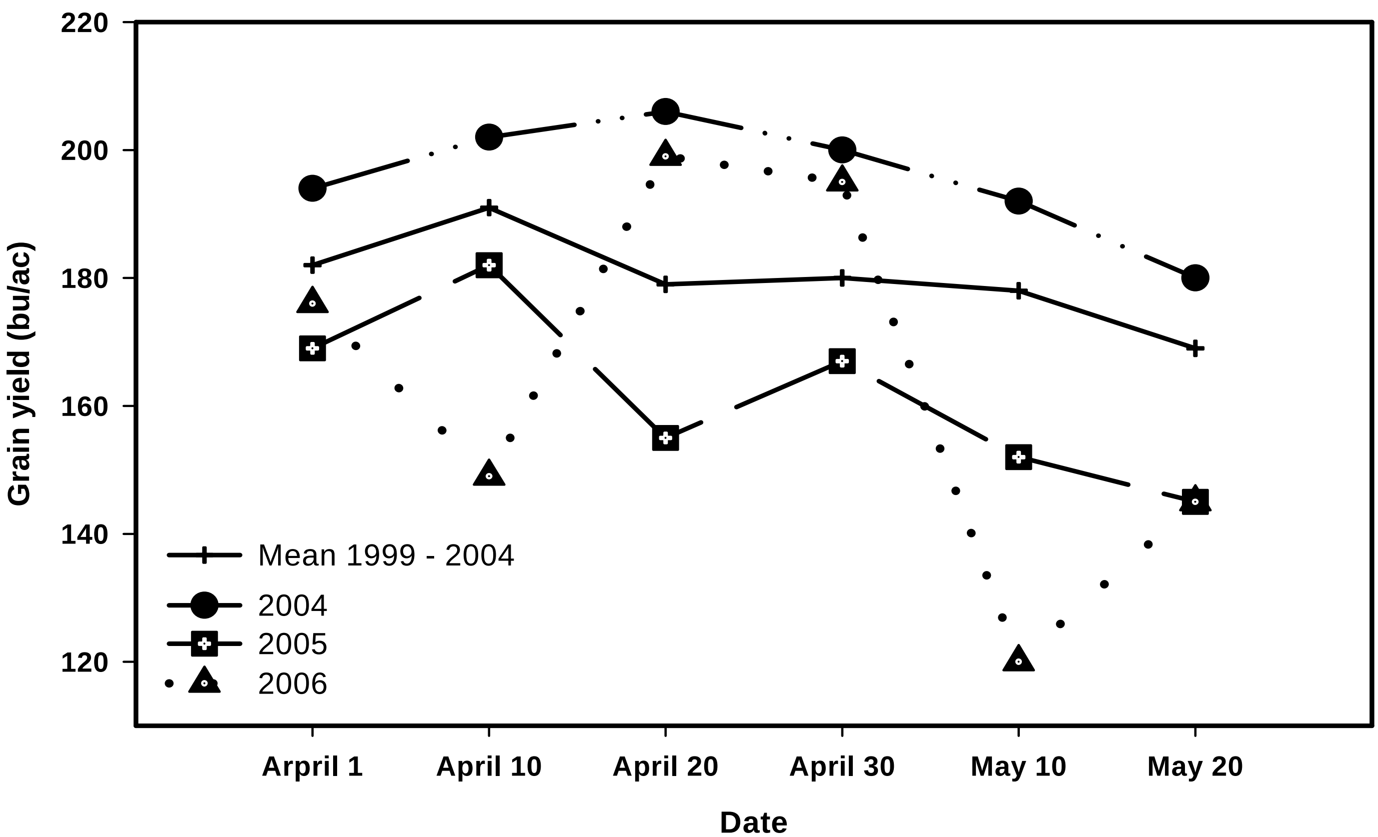

Table 1. Rainfall and irrigation for irrigated corn performance trial locations in Texas county.

Location	April	May	June	July	Aug	Total
Long-term mean	1.33	3.25	2.86	2.58	2.28	12.30
2006	0.24	2.19	2.34	2.05	4.06	10.88
2005	0.93	2.85	2.01	1.40	3.21	10.04
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. Characteristics of Corn Hybrids in Panhandle Corn Performance Trials, 2006.

Company Brand Name	Entry Designation	Plant Characteristics				MATURITY Days
		SV	SS	SG	EP	
Asgrow Seed	RX 674 RR 2	3	4	2	M	109
Asgrow Seed	RX 752 RR2/YGPL	3	4	5	M	112
Dekalb Genetics	DKC 60-18 (RR2/YGPL)	3	3	5	ML	110
Dekalb Genetics	DKC 66-23 (RR2/YGCB)	3	4	4	M	116
Dekalb Genetics	DKC 64-81 (YGCB)	3	5	5	M	114
Garst Seed Company	8295 YG1/RR	2	3	2	H	117
Garst Seed Company	8247 YG1	2	2	2	M	117
Garst Seed Company	8313 CB/LL	1	4	3	M	114
Garst Seed Company	8377YGI/RR	2	4	3	M	115
Garst Seed Company	8378 YG1	2	4	3	M	114
Garst Seed Company	8270 RR	3	2	2	H	118
Triumph Seed Co., Inc	1756 CbRR				M	116
Triumph Seed Co., Inc	1866Bt	2	2	2	H	116
Triumph Seed Co., Inc	1536 CbRR	2	2	2	M	112
Triumph Seed Co., Inc	1416 Bt	2	2	2	M	114
NC+ Hybrids	6122 RB	2	3	2	M	116
NC+ Hybrids	6361 RB	2	3	3	M	116
NC+ Hybrids	7373 RB	4	1	2	H	120
NC+ Hybrids	7402 R	4	2	2	H	120

* 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 3. Grain Yield and Harvest Parameters OPREC location, Oklahoma Corn Performance Trials, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test Weight lb/bu		Harvest Moisture	Plant Population plants/ac
		2006	Two year	2006	Two year		
Triumph Seed Co., Inc	1866Bt	206.5	188.7	56.6	56.7	22.2	31,100
Garst Seed Company	8313 CB/LL	185.9	185.5	57.2	55.8	18.7	29,800
Triumph Seed Co., Inc	1416 Bt	165.6	184.6	56.3	56.6	18.9	31,900
Garst Seed Company	8270 RR	174.7	179.7	56.4	56.3	21.0	28,700
Triumph Seed Co., Inc	1536 CbRR	167.9	179.3	57.0	56.1	18.5	21,900
Garst Seed Company	8377YGI/RR	155.9	170.3	56.5	56.1	17.7	30,600
Garst Seed Company	8378 YG1	206.0	----	57.5	----	19.6	29,600
Triumph Seed Co., Inc	1756 CbRR	197.6	----	55.0	----	19.3	28,400
NC+ Hybrids	6122 RB	197.4	----	55.5	----	20.1	28,700
Dekalb Genetics	DKC 64-81 (YGCB)	190.5	----	58.7	----	18.0	27,800
Dekalb Genetics	DKC 66-23 (RR2/YGCB)	180.8	----	57.7	----	19.0	31,200
Garst Seed Company	8247 YG1	177.5	----	26.1	----	21.5	28,800
NC+ Hybrids	6361 RB	172.4	----	57.2	----	16.7	27,500
Dekalb Genetics	DKC 60-18 (RR2/YGPL)	161.0	----	57.0	----	17.3	29,500
Garst Seed Company	8295 YG1/RR	153.3	----	56.2	----	21.2	29,800
Asgrow Seed	RX 752 RR2/YGPL	152.9	----	56.6	----	19.7	29,000
Asgrow Seed	RX 674 RR 2	142.5	----	57.5	----	16.8	29,300
	Mean	175.8	181.3	56.8	56.3	19.2	29,600
	CV%	12.2	13.6	1.3	2.0	6.0	10.3
	L.S.D.	30.5	NS	1.1	NS	1.6	4,300

Cooperator: OPREC
Soil Series: Richfield Clay Loam
Strip-tillage wheat double crop sunflower in 2005
Soil Test: N: 38 P: 14 K: 936 pH: 7.6
Fertilizer: N: 200 lbs/ac P: 50 lbs/ac P_2O_5 K: 0
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)
Planting Date: April 14, 2006
Harvest Date: September 20, 2006

Table 4. Grain Yield and Harvest Parameters Joe Webb location, Oklahoma Corn Performance Trials, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test Weight lb/bu		Harvest Moisture	Plant Population plants/ac
		2006	Two year	2006	Two year		
Garst Seed Company	8313 CB/LL	214.7	206.8	58.9	57.8	17.0	26,200
Triumph Seed Co., Inc	1866Bt	176.8	198.1	59.5	58.7	17.4	26,500
Garst Seed Company	8270 RR	184.2	190.4	58.7	57.3	16.9	24,300
Garst Seed Company	8377YGI/RR	166.9	184.7	58.5	57.7	16.3	28,400
Triumph Seed Co., Inc	1416 Bt	166.7	182.0	58.1	57.5	17.3	27,500
Triumph Seed Co., Inc	1536 CbRR	155.5	174.4	59.0	57.7	16.8	28,400
Dekalb Genetics	DKC 64-81 (YGCB)	220.6	----	59.6	----	16.1	27,800
Garst Seed Company	8295 YG1/RR	216.8	----	58.3	----	19.0	29,200
NC+ Hybrids	6122 RB	211.7	----	56.2	----	16.7	27,900
Garst Seed Company	8247 YG1	210.7	----	59.1	----	18.1	31,400
Triumph Seed Co., Inc	1756 CbRR	207.6	----	56.5	----	17.0	29,400
Dekalb Genetics	DKC 60-18 (RR2/YGPL)	189.5	----	59.3	----	15.9	28,000
Garst Seed Company	8378 YG1	189.3	----	59.3	----	16.9	31,000
NC+ Hybrids	6361 RB	173.4	----	57.9	----	15.7	28,500
Dekalb Genetics	DKC 66-23 (RR2/YGCB)	160.7	----	58.8	----	16.2	32,000
Asgrow Seed	RX 752 RR2/YGPL	136.4	----	59.5	----	15.9	25,000
Asgrow Seed	RX 674 RR 2	121.7	----	58.4	----	15.5	28,600
	Mean	182.5	189.4	58.6	57.7	16.7	28,200
	CV%	14.4	14.5	1.1	1.1	2.9	10.1
	L.S.D.	37.2	NS	0.9	0.7	0.7	4,000

Cooperator: Joe Webb
Soil Series: Richfield Clay Loam
Strip-Till: Following wheat and sunflowers in 2005
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 12, 2006
Harvest Date: September 20, 2006

Table 5. Ensilage Yields and Quality Panhandle Corn Performance Trial, 2006.

Company Brand Name	Entry Designation	YIELD Tons/ac		Plant Population plants/ac	CP%
		2006	Two-year		
Triumph Seed Co., Inc	1866Bt	24.6	25.1	29,500	7.9
Triumph Seed Co., Inc	1536 CbRR	24.8	24.7	31,600	9.8
Garst Seed Company	8377YGI/RR	25.0	24.5	30,500	8.4
Triumph Seed Co., Inc	1416 Bt	25.0	24.3	30,200	8.2
Garst Seed Company	8270 RR	22.6	23.1	30,400	9.8
Garst Seed Company	8313 CB/LL	23.6	21.4	32,400	7.5
Dekalb Genetics	DKC 64-81 (YGCB)	27.4	----	31,200	8.2
NC+ Hybrids	7402 R	27.2	----	27,000	7.9
Triumph Seed Co., Inc	1756 CbRR	25.6	----	29,500	9.6
Asgrow Seed	RX 674 RR 2	25.1	----	30,300	9.8
NC+ Hybrids	6361 RB	23.7	----	30,600	8.9
Garst Seed Company	8247 YG1	23.0	----	31,200	10.0
Garst Seed Company	8295 YG1/RR	22.1	----	30,200	8.4
Asgrow Seed	RX 752 RR2/YGPL	21.9	----	30,200	8.0
Dekalb Genetics	DKC 60-18 (RR2/YGPL)	21.8	----	33,000	7.5
NC+ Hybrids	7373 RB	21.3	----	28,600	8.8
Dekalb Genetics	DKC 66-23 (RR2/YGCB)	20.1	----	28,700	8.7
NC+ Hybrids	6122 RB	19.9	----	23,400	7.8
Garst Seed Company	8378 YG1	18.6	----	28,600	9.4
	Mean	23.3	23.8	29,800	8.7
	CV%	14.2	11.0	10.1	9.5
	L.S.D.	NS	NS	NS	1.7

Cooperator: OPREC
Soil Series: Richfield Clay Loam
Strip-tillage wheat double crop sunflower in 2005
Soil Test: N: 38 P: 14 K: 936 pH: 7.6
Fertilizer: N: 200 lbs/ac P: 50 lbs/ac P_2O_5 K: 0
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)
Planting Date: April 14, 2006
Harvest Date: August 25, 2006

GRAIN SORGHUM PERFORMANCE TRIALS IN OKLAHOMA, 2006

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 sorghums 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 unique 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. **All trial locations also have DK-44 and KS 585 planted with and without (WO) seed applied insecticide to determine the affect of these treatments on grain yield.**

Highlights

The drought that reduced wheat yields in 2006 also affected yields of summer crops. The only dryland trial in the state with high yields was the no-till trial at Cherokee, with an average yield of 91.0 bu/ac.

The yield for the limited irrigation trial at OPREC was higher than expected. The full season hybrids averaged 142.5 bu/ac with only 5 inches of irrigation. Producers also reported yields of 180 bu/ac with irrigation amounts of 5 – 6 inches.

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 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.

GROWING CONDITIONS

Moisture

Soil moisture conditions were adequate for planting at all trials planted in April except for Homestead, which was dusted in and received adequate moisture for emergence 10 days later. In the panhandle, May and early-June rains provided adequate moisture for planting in Texas and Beaver counties. Cimarron county, however did not receive adequate rainfall for planting until late June. Most areas of the state had visible drought stress during some point of the growing season. Rainfall was variable with some areas receiving adequate precipitation and other areas none during June and July. The panhandle region had more than adequate rainfall from late June through September. Although adequate rainfall was received, later planting did delay grain sorghum maturity. With the delay in maturity test weights were negatively affected, and test weights near 40 lbs/bu were common. There were yields of double crop sorghum near 60 bu/ac reported in central Oklahoma, but the trial at Enid was abandoned due to lack of rainfall. The Tipton and Altus locations were affected by drought stress throughout the growing season which explains the low yields at Tipton and the trial being abandoned at Altus.

RESULTS

Yields in 2006 were lower than those from 2005 at most locations. Also more trials were abandoned or not planted due to drought stress than in 2005. There were no major harvest delays at trial locations or for producers with early-planted grain sorghum. Due to the delay in maturity of grain sorghum in the panhandle, harvest was delayed until temperatures were low enough to kill the plant.

Grain yields are reported bushel per acre of threshed grain, adjusted to a moisture content of 14.0% (Tables 2-7). 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 precluded 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 are 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, Toby Kelly, Alton Young, Eddie Pickard, Chad Otto, Jeff Bedwell, Bart Cardwell, Justin Stauffer, and Tony Mills. Their efforts are greatly appreciated. Also would like to thank the ***Oklahoma Grain Sorghum Commission*** *for their financial support.*

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Table 1. Seed source and hybrid characteristics of grain sorghum in the Oklahoma Grain Sorghum Performance Trials, 2006. 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					
Frontier Hybrids	F 222 E	R	Y	52	E
Frontier Hybrids	F 270 E	Bz	Y	54	E
Frontier Hybrids	F 303 C	Cr	Y	59	E
Sorghum Partners Inc	KS 310	BZ	HY	57	C,E
Sorghum Partners Inc	NK 3303	W	Y	57	NA
Asgrow Seed	Pulsar	Bz	HY	60	C,E,I
Dekalb Genetics Corp.	DKS 37-07	Bz	HY	60	C,E,I
Dekalb Genetics Corp.	DKS 29-28	Bz	HY	58	C,E
Frontier Hybrids	F 305	Cr	Y	60	E
Medium Maturity					
Garst Seed Company	5360	R	HY	69	NA
Dekalb Genetics Corp.	DKS 36-16	BZ	HY	61	NA
Garst Seed Company	5750	BZ	HY	62	C, E
Sorghum Partners Inc	KS 585	Bz	HY	67	C, E
Sorghum Partners Inc	KS 585				
Garst Seed Company	5401	R	HY	68	E
NC+ Hybrids	6B50	Bz	HY	62	None
Dekalb Genetics Corp.	DKS 42-20	Bz	Hy	62	C, E
Dekalb Genetics Corp.	DK 44	Bz	HY	67	C, E
Dekalb Genetics Corp.	DK 44				
Seed Resource	SR 421	R	HY	62	None
Seed Resource	SR 254	R	HY	62	None
NC+ Hybrids	6C21	Cr	NA	62	C
NC+ Hybrids	7R34	R	NA	70	None
Sorghum Partners Inc	X505	Bz	HY	67	E
Late Maturity					
Asgrow Seed	A567	Bz	Hy	71	None
Dekalb Genetics Corp.	DKS 54-00	Bz	HY	72	C,E,I
Walter Moss Seed Co. LTD	M-1024-DPW	W		S	75
Asgrow Seed	A571	Bz	HY	72	NONE
Dekalb Genetics Corp.	DKS 53-11	Bz	HY	S	71

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 Blackwell grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac	Head Population heads/ac
		2006	Two-year	2006	Two-year		
Early							
Dekalb Genetics Corp.	DKS 37-07	58.2	61.5	57.9	56.0	30,000	1.24
Asgrow Seed	Pulsar	59.8	56.9	55.2	54.0	32,600	1.22
Dekalb Genetics Corp.	DKS 29-28	53.7	56.7	52.9	53.8	34,100	1.24
Frontier Hybrids	F 303 C	46.8	53.9	56.0	54.4	40,300	0.94
Frontier Hybrids	F 222 E	44.6	50.3	55.6	54.5	28,800	0.97
Sorghum Partners Inc	KS 310	50.4	----	55.6	----	34,000	0.97
Frontier Hybrids	F 270 E	48.5	----	55.3	----	30,000	1.00
Frontier Hybrids	F 305	45.9	----	56.4	----	29,300	0.97
	Mean	51.0	55.8	55.6	54.6	32,400	1.07
	C.V.%	9.9	16.5	0.9	4.1	12.2	10.60
	L.S.D.	7.4	NS	0.8	NS	5,800	0.17

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac	Head Population heads/ac
		2006	Two-year	2006	Two-year		
Medium and full							
Dekalb Genetics Corp.	DKS 42-20	68.3	67.5	56.0	55.5	22,900	1.81
Seed Resource	SR 421	49.0	63.6	57.1	55.2	36,000	0.96
NC+ Hybrids	6B50	53.9	62.3	55.8	54.6	38,600	1.05
Dekalb Genetics Corp.	DK 44	47.6	56.7	58.1	57.2	26,900	1.14
Walter Moss Seed Co. LTD	M-1024-DPW	41.5	53.8	56.5	55.7	27,200	1.04
Sorghum Partners Inc	KS 585	61.9	52.3	58.8	57.3	37,400	1.17
Dekalb Genetics Corp.	DK 44 WO	40.7	51.3	57.0	56.5	21,400	1.12
Sorghum Partners Inc	KS 585 WO	43.7	49.0	58.6	57.4	31,000	1.02
NC+ Hybrids	7R34	57.6	----	59.4	----	41,900	1.04
Garst Seed Company	5750	52.5	----	56.8	----	37,900	1.10
NC+ Hybrids	6C21	49.5	----	53.5	----	39,200	1.15
Dekalb Genetics Corp.	DKS 36-16	48.6	----	58.3	----	28,600	1.05
Seed Resource	SR 254	48.1	----	54.2	----	41,700	1.04
Sorghum Partners Inc	X505	44.4	----	55.5	----	37,200	0.91
	Mean	50.5	57.1	55.9	56.2	33,400	1.11
	C.V.%	14.0	19.4	1.7	1.4	14.7	9.80
	L.S.D.	10.1	11.1	1.2	0.8	7,000	0.16

Cooperator: Bill and Louise Rigdon   Soil Series: Kirkland Silt Loam   No-till Practices: Followed Soybean in 2005
Soil Test: N: 10 P: 52 K: 458 pH: 5.1   Fertilizer: N: 125 lbs/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 20, 2006 Target Population: 45,000 plants/ac   Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)
Harvest Date: September 8, 2006

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2006:	6.49	3.42	1.55	2.26	2.60	**16.32**
Long term mean:	3.28	5.83	4.05	2.68	3.19	**19.03**

Table 3. Results from Cherokee grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Days To Midbloom	Grain Yield bu/ac			Test weight lb/bu			Plant Population plants/ac	Head Population heads/ac
			2006	Two-year	Three-year	2006	Two-year	Three-year		
Sorghum Partners Inc	KS 585	65	101.8	108.7	95.2	58.0	58.1	58.8	40,600	1.73
Dekalb Genetics Corp.	DKS 42-20	65	86.5	102.9	94.2	55.5	55.6	56.9	37,000	1.76
Dekalb Genetics Corp.	DK 44	62	96.8	103.6	93.1	55.9	55.6	56.9	31,700	1.91
Dekalb Genetics Corp.	DKs 37-07	60	105.6	103.7	92.5	56.9	56.9	57.8	26,900	2.51
Sorghum Partners Inc	KS 310	57	88.8	112.7	92.5	53.5	53.5	55.2	32,800	1.92
Frontier Hybrids, Inc	F-303 C	59	71.5	77.1	68.6	54.4	53.8	55.3	32,900	1.66
Sorghum Partners Inc	KS 585 WO	65	89.5	50.9	54.2	59.2	57.2	58.2	33,400	1.93
Dekalb Genetics Corp.	DK 44 WO	62	82.9	41.5	47.6	55.1	55.3	56.6	27,500	2.06
NC+ Hybrids	6B50	62	99.8	----	----	55.1	----	----	38,100	1.69
Garst Seed Company	5750	62	98.2	----	----	56.8	----	----	34,500	1.90
Seed Resource	SR 421	64	87.7	----	----	55.3	----	----	37,900	1.61
Frontier Hybrids	F 305	60	87.3	----	----	54.1	----	----	29,000	1.86
Sorghum Partners Inc	X505	67	86.2	----	----	55.4	----	----	37,800	1.32
		Mean	91.0	87.6	79.7	55.8	55.7	57.0	33,900	1.84
		C.V.%	12.0	36.1	36.4	2.0	1.9	1.8	11.3	16.60
		L.S.D.	15.6	31.7	23.6	1.6	1.0	0.8	5,500	0.44

Note: CV% is high for two and three-year because plots without seed treatment never emerged in 2005 and means are figured with 0 yield for 2006.

Cooperator: Doug McMurtrey
Soil Series: Pond Creek Silt Loam
No-till Practices: fallowed after wheat in 2005
Soil Test: N: 16 P: 22 K: 271 pH: 6.1
Fertilizer: N: 120 lbs N/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 20, 2006 Target Population: 45,000 plants/ac
Herbicide 2 qt/ac Cinch ATZ Lite Preemergence
Harvest Date: September 8, 2006

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	Total
2006:	0.99	1.06	2.97	0.70	3.67	**16.88**
Long term mean:	3.28	5.83	4.05	2.68	3.19	**19.03**

Table 4. Results from Homestead grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Days To Midbloom	Grain Yield bu/ac 2006	Test weight Lb/bu 2006	Plant Population plants/ac	Head Population heads/ac
Garst Seed Company	5750	62	49.9	56.3	29,500	1.43
Frontier Hybrids	F 305	60	49.6	55.0	31,700	1.05
Sorghum Partners Inc	KS 585 WO	65	49.2	56.0	30,100	1.21
NC+ Hybrids	6B50	62	45.1	53.2	33,400	1.11
Dekalb Genetics Corp.	DKS 42-20	65	44.3	54.0	26,000	1.41
Frontier Hybrids, Inc	F-303 C	59	44.1	55.3	32,000	1.11
Sorghum Partners Inc	KS 585	65	43.2	57.6	30,900	1.23
Dekalb Genetics Corp.	DKs 37-07	60	40.9	57.0	28,700	1.11
Dekalb Genetics Corp.	DK 44 WO	62	39.8	56.9	29,400	1.03
Sorghum Partners Inc	X505	67	37.8	55.1	32,300	1.10
Seed Resource	SR 421	64	36.4	55.9	37,500	1.04
Dekalb Genetics Corp.	DK 44	62	33.7	54.5	32,600	1.04
Sorghum Partners Inc	KS 310	57	32.5	49.4	34,500	1.20
		Mean	42.0	55.1	31,400	1.16
		C.V.%	19.1	2.7	13.0	11.40
		L.S.D.	11.5	2.2	5,900	0.19

Cooperator: Brook Strader
Soil Series: Pratt Loamy Fine Sand
No-till tillage Practices: Wheat sprayed in April 2006
Soil Test: N: 66 P: 40 K: 448 pH: 5.3
Fertilizer: N: 70 lbs N + 5 gal/ac 10-34-0 with planter
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Planting Date: April 20, 2006 Target Population: 45,000 plants/ac
Harvest Date: September 7, 2006

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2006:	1.47	1.64	2.39	3.42	3.33	**12.25**
Long term mean:	2.50	4.20	3.20	2.70	2.80	**15.40**

Table 5. Results from OPREC limited irrigation grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac	Test weight Lb/bu	Plant Population plants/ac	Head Population heads/ac
Early					
Frontier Hybrids	F 303 C	138.6	60.8	50,900	1.26
Asgrow Seed	Pulsar	133.0	60.5	52,200	1.31
Dekalb Genetics Corp.	DKS 37-07	127.7	60.3	50,200	1.29
Frontier Hybrids	F 222 E	121.5	59.8	48,200	1.32
Dekalb Genetics Corp.	DKS 29-28	117.8	59.9	49,800	1.36
Frontier Hybrids	F 305	117.2	59.2	50,800	1.20
Sorghum Partners Inc	KS 310	115.1	59.5	50,400	1.33
Frontier Hybrids	F 270 E	114.6	59.1	44,800	1.28
Sorghum Partners Inc	NK 3303	88.3	59.6	41,700	1.35
	Mean	119.3	59.8	48.8	1.30
	C.V.%	13.1	1.7	8.6	8.7
	L.S.D.	19.1	NS	6,100	NS

Company Brand Name	Entry Designation	Grain Yield bu/ac	Test weight Lb/bu	Plant Population plants/ac	Head Population heads/ac
Medium					
Sorghum Partners Inc	KS 585 WO	141.3	60.8	52,700	1.30
Seed Resource	SR 421	134.4	58.3	49,500	1.17
Seed Resource	SR 254	131.9	58.2	54,300	1.19
Dekalb Genetics Corp.	DK 44	123.4	59.5	49,400	1.16
Sorghum Partners Inc	X505	123.4	59	52,600	1.13
Dekalb Genetics Corp.	DK 44 WO	122.1	59.2	46,300	1.20
Garst Seed Company	5360	119.6	58.6	53,900	1.06
Sorghum Partners Inc	KS 585	119.0	60.2	50,100	1.22
Garst Seed Company	5401	111.1	60.4	46,900	1.33
	Mean	125.1	59.3	50,600	1.20
	C.V.%	10.0	1.9	8.0	8.00
	L.S.D.	NS	0.5	NS	0.14

Table 5. Continued

Company Brand Name	Entry Designation	Grain Yield bu/ac	Test weight Lb/bu	Plant Population plants/ac	Head Population heads/ac
		Late			
Asgrow Seed	A571	151.2	58.2	50,000	1.12
Asgrow Seed	A567	149.6	60.2	46,300	1.21
Dekalb Genetics Corp.	DKS 53-11	146.6	60.3	47,300	1.10
Dekalb Genetics Corp.	DKS 54-00	145.7	60.0	48,200	1.28
Walter Moss Seed Co. LTD	M-1024-DPW	119.2	57.4	42,600	1.14
	Mean	142.5	59.2	46,900	1.17
	C.V.%	8.6	1.7	6.9	6.50
	L.S.D.	18.8	0.7	NS	NS

Cooperator: OPREC

Soil Series: Richfield Clay Loam

Strip Tillage Practices: Planted following Soybean in 2005

Soil Test: N: 25 lbs/ac P: 18 K: 978 pH: 7.8

Fertilizer: N: 200 lbs N/ac P: 40 lbs P_2O_5/ac K: 0

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

Planting Date: June 7, 2006 Target Population: 50,000 plants/ac

Harvest Date: November 6, 2006

Monthly Rainfall (in.)

	May	June	July	Aug.	Sep.	**Total**
2006:	2.19	2.34	2.05	4.06	1.19	**11.83**
Long term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**

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

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

Table 6. Results from Goodwell dryland grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac
		2006	Two-year	2006	Two-year	
Early						
Asgrow Seed	Pulsar	63.2	62.4	50.0	53.9	20,000
Dekalb Genetics Corp.	DKS 37-07	49.5	56.6	44.0	51.3	18,200
Dekalb Genetics Corp.	DKS 29-28	61.6	55.9	52.8	55.1	17,700
Sorghum Partners Inc	KS 310	70.3	----	52.9	----	20,800
Frontier Hybrids	F 303 C	60.6	----	45.7	----	20,100
Frontier Hybrids	F 222 E	58.7	----	51.2	----	19,500
Frontier Hybrids	F 270 E	57.2	----	46.2	----	19,000
Frontier Hybrids	F 305	55.3	----	46.9	----	20,000
Sorghum Partners Inc	NK 3303	53.9	----	49.7	----	16,600
	Mean	58.9	58.2	48.8	53.4	19,100
	C.V.%	17.6	19.8	3.2	5.6	12.1
	L.S.D.	NS	NS	2.3	3.2	NS

Note: no head counts for dryland trial, wind storm 3 days prior to harvest lodged all sorghum

Company Brand Name	Entry Designation	Grain Yield bu/ac		Test weight lb/bu		Plant Population plants/ac
		2006	Two-year	2006	Two-year	
Medium and full						
Sorghum Partners Inc	KS 585	51.7	52.5	45.7	51.7	18,000
Sorghum Partners Inc	KS 585	49.8	50.6	46.9	52.2	18,200
Seed Resource	SR 421	36.0	47.7	42.3	49.0	18,200
Dekalb Genetics Corp.	DK 44	33.9	42.8	42.0	50.1	17,400
Dekalb Genetics Corp.	DK 44	31.9	41.3	42.8	50.6	16,400
Seed Resource	SR 254	52.3	----	41.7	----	21,000
Sorghum Partners Inc	X505	33.7	----	41.9	----	21,000
Walter Moss Seed Co. LTD	M-1024-DPW	14.1	----	40.5	----	15,900
	Mean	37.9	46.9	42.9	50.7	18,300
	C.V.%	18.3	19.2	2.6	3.3	8.7
	L.S.D.	10.2	9.2	1.7	1.7	2,300

Cooperator: OPREC
Soil Test: N: 66 P: 29 K: 1,256 pH: 7.3
Herbicide 2 qt/ac Cinch ATZ Lite Preemergence
Target Population: 22,000 plants/ac

Soil Series: Richfield Clay Loam
Fertilizer: N: 50 lbs N/ac + 5 gal/ac 10-34-0 with planter
Planting Date: June 7, 2006, replanted June 29
Harvest Date: November 17, 2006

No-till Practices: Following wheat 2005

Monthly Rainfall (in.)

	May	June	July	Aug.	Sep.	**Total**
2006:	2.19	2.34	2.05	4.06	1.19	**11.83**
Long term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**

Table 7. Results from Tipton grain sorghum performance trial, 2006.

Company Brand Name	Entry Designation	Grain Yield bu/ac 2006	Test weight Lb/bu 2006	Plant Population plants/ac	Head Population heads/ac
Early					
Frontier Hybrids	F 222 E	19.6	57.2	32,100	1.05
Frontier Hybrids	F 270 E	25.3	56.7	34,800	1.09
Frontier Hybrids	F 303 C	26.8	55.8	35,800	1.06
Sorghum Partners Inc	KS 310	32.7	58.3	39,300	1.27
Asgrow Seed	Pulsar	35.2	54.6	35,600	1.41
Dekalb Genetics Corp.	DKS 37-07	27.1	54.8	37,200	0.98
Dekalb Genetics Corp.	DKS 29-28	34.3	55.7	40,000	1.17
Frontier Hybrids	F 305	30.5	55.5	35,300	1.11
	Mean	28.9	56.1	36,300	1.14
	C.V.%	18.3	1.8	9.2	13.5
	L.S.D.	7.8	1.5	NS	0.22

Note: Tipton medium and late hybrids were harvested, but data highly variable and not reported

Cooperator: Southwest Research and Extension Center
Conventional Tillage Practices: Sorghum-fallow-sorghum rotation
Fertilizer: N: 83 lbs/ac P: 0 K: 0
Planting Date: April 21 , 2006 Target Population: 45,000 plants/ac
Harvest Date: August 10, 2006

Soil Series: Tipton Silt Loam
Soil Test: N: 17 P: 85 K: 777 pH: 6.3
Herbicide: 2 qt/ac Cinch ATZ Lite Preemergence

Monthly Rainfall (in.)

	Apr.	May	June	July	**Total**
2006:	2.91	2.70	0.49	1.09	**7.19**
Long term mean:	2.30	4.30	3.45	2.08	**12.13**

OKLAHOMA PANHANDLE LIMITED IRRIGATION SORGHUM SILAGE PERFORMANCE TRIAL, 2006

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 being more drought tolerant than corn requires less water, 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 silages 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 2006 harvest for earlier hybrids was delayed due to rainfall, therefore 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 7, 2006
- Harvest dates: October 6, 2004
- Previous crop: Soybean
- Soil type: Richfield Clay Loam
- Soil Test: N: 25 lbs/ac P: 18 K: 978 pH: 7.8
- Fertilizer applied: N: 200 lbs/ac P: 40 lbs P_2O_5/ac K: 0
- Herbicide: Cinch ATZ Lite @ 2.0 qt/ac (Preemergence)
- Tillage Strip-till
- Irrigation: Sprinkler 1 inch in June and 2 inches in July and September
- Rainfall:

May	June	July	Aug.	Sep.	Total
2.16	2.34	2.05	4.06	1.19	11.80

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 or 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

In 2006 growing conditions were ideal with abundant rainfall, therefore only 5 inches of irrigation was required. This was less than that required by corn. All hybrids were harvested at the same time due to delays from rainfall and corn plots being harvested. Although harvest was delayed, none of the hybrids were too dry for the ensiling process to occur.

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 calculated by multiplying lbs DM/acre and %IVTD.

The nutrient profiles of the various hybrids are reported in Table 3. Crude protein, calcium, and phosphorus concentration are not reported, because no significant differences were found among hybrids. Crude protein ranged from 7.1 to 8.9%, with a mean of 7.8. Calcium and phosphorus concentrations ranged from 0.27 to 0.38% and 0.09 to 0.11% respectively. Mean concentrations for calcium and phosphorus were 0.31 and 0.10%, respectively.

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, Justin Stauffer, Tony Mills, and Eddie Pickard. Their efforts are greatly appreciated.

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Table 1. Characteristics of Sorghum Silage Hybrids in OPREC Performance Trial, 2006.

Company Brand Name	Hybrid Designation	Sorghum Type	Maturity Days	Males 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 BMR	Sudan	180	PS	Yes
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
Seed Resource	FS 515 HQ	Forage	107	No	No
Seed Resource	BMR 106	Forage	107	No	Yes
Seed Resource	SS 204 BMR	Sorg X Sud	87	No	Yes
Seed Resource	SS 206 BMR	Sorg X Sud	87	No	Yes
NC+ Hybrids	NC+ Nutri-Choice II	Forage	90	Fertile	No
NC+ Hybrids	NC+ Nutri-Cane II	Sorgo	80	Yes	No
Sorghum Partners Inc	Sordan Headless	Sorg X Sud	NA	Photo	No
Sorghum Partners Inc	Trudan Headless BMR	Sud X Sud	NA	Photo	Yes
Sorghum Partners Inc	NK 300	Hybrid Forage	90	No	No
Sorghum Partners Inc	HIKANE II	Hybrid Forage	90	No	No

Table 2. Ensilage Yields and and harvest parameters for OPREC Sorghum Silage Performance Trial, 2006.

Company Brand Name	Entry Designation	Yield lbs/ac DM	Invitro % DM lbs/ac	Yield Tons/ac Ensilage	Plant Population plants/ac	Harvest Moisture	Lodging %
NC+ Hybrids	NC+ Nutri-Choice II	14,450	10,120	20.6	58,000	0.71	2
Sorghum Partners Inc	Trudan Headless BMR	14,250	9,990	24.3	40,400	0.61	1
Walter Moss Seed Co., Ltd.	Mega Green	15,170	9,880	21.7	61,300	0.76	1
Seed Resource	FS 515 HQ	13,540	9,780	22.4	63,400	0.64	1
Sorghum Partners Inc	NK 300	13,110	9,500	18.7	55,200	0.70	1
NC+ Hybrids	NC+ Nutri-Cane II	12,780	9,330	18.3	50,700	0.66	2
Walter Moss Seed Co., Ltd.	SU-2-LM	12,640	8,510	18.1	56,200	0.69	1
Walter Moss Seed Co., Ltd.	Millenium BMR	10,920	8,330	15.6	46,100	0.71	3
Sorghum Partners Inc	Sordan Headless	12,500	8,310	17.9	49,100	0.74	1
Sorghum Partners Inc	HIKANE II	11,180	7,960	16.0	49,500	0.69	2
Seed Resource	SS 204 BMR	9,720	7,080	13.9	50,100	0.63	2
Walter Moss Seed Co., Ltd.	4Ever Green BMR	8,840	6,760	12.6	35,600	0.76	1
Seed Resource	SS 206 BMR	9,060	6,660	15.0	48,800	0.64	1
Walter Moss Seed Co., Ltd.	Mega Green BMR	8,500	6,290	14.1	41,400	0.77	2
Walter Moss Seed Co., Ltd.	38 Special BMR	7,930	5,440	11.3	49,900	0.71	2
Seed Resource	BMR 106	6,770	5,160	9.7	66,700	0.66	2
	Mean	11,340	8,070	16.9	51,400	0.69	2
	C.V.%	19.7	19.7	15.3	11.1	11.6	----
	L.S.D.	3,730	2,660	4.3	9,600	0	----

Table 3. Ensilage Quality OPREC Sorghum Silage Performance Trial, 2006.

Company Brand Name	Entry Designation	Lbs Milk/ ton DM	ADF %	NDF %	Lignin %	TDN %	Energy Values (Mcal/lb)		
							Lact.	Maint.	Gain
Seed Resource	BMR 106	2,360	36.4	54.5	4.5	61.0	0.58	0.57	0.31
Walter Moss Seed Co., Ltd.	Millenium BMR	2,300	41.0	58.9	4.8	61.0	0.56	0.56	0.31
Walter Moss Seed Co., Ltd.	4Ever Green BMR	2,260	43.7	64.2	5.2	60.3	0.51	0.55	0.29
Seed Resource	SS 206 BMR	2,180	40.5	59.8	5.0	59.0	0.54	0.54	0.28
Sorghum Partners Inc	NK 300	2,180	38.5	55.7	5.4	57.7	0.55	0.52	0.27
Walter Moss Seed Co., Ltd.	Mega Green BMR	2,160	42.7	64.6	5.1	59.7	0.51	0.54	0.28
NC+ Hybrids	NC+ Nutri-Cane II	2,100	37.8	53.5	5.5	57.7	0.55	0.52	0.26
Seed Resource	FS 515 HQ	2,090	38.9	57.7	5.7	56.7	0.52	0.50	0.25
Sorghum Partners Inc	Trudan Headless BMR	2,050	43.8	60.2	4.9	57.7	0.52	0.52	0.27
NC+ Hybrids	NC+ Nutri-Choice II	1,990	43.4	62.2	5.7	56.0	0.49	0.49	0.24
Sorghum Partners Inc	HIKANE II	1,970	40.3	56.3	5.7	55.7	0.52	0.49	0.24
Seed Resource	SS 204 BMR	1,930	41.3	60.1	5.3	55.0	0.50	0.48	0.23
Walter Moss Seed Co., Ltd.	38 Special BMR	1,890	44.9	63.6	6.5	53.7	0.47	0.46	0.21
Walter Moss Seed Co., Ltd.	SU-2-LM	1,850	44.9	62.3	6.9	52.7	0.46	0.44	0.49
Sorghum Partners Inc	Sordan Headless	1,820	45.2	63.7	6.2	52.7	0.46	0.44	0.19
Walter Moss Seed Co., Ltd.	Mega Green	1,720	46.0	66.5	6.4	51.3	0.42	0.41	0.17
	Mean	2,050	41.8	60.2	5.6	56.7	0.51	0.50	0.25
	C.V.%	7.6	6.6	5.3	12.1	4.3	6.6	7.6	14.2
	L.S.D.	260	4.6	5.3	1.1	4.1	0.06	0.06	0.06

2006 Soybean Variety Performance

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Production Technology Report
PT 2006-16

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CONTENTS

Information on Soybean Variety Trials

Numerous soybean lines and varieties were evaluated in performance tests during 2006. 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 VI. Full-season test were planted during June and included varieties in MG IV, V, and VI. Glyphosate resistant tests were also conducted with one test each in the early-season and full-season plantings.

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.

2006 Soybean Crop Overview

The 2006 soybean production season in Oklahoma was characterized as extremely hot and dry. For many areas in Oklahoma this past soybean growing season will go down among the driest in recorded history. Planted acreage of this year's soybean crop was measured at 310,000 acres and an estimated 260, 000 acres were harvested. Average yield at the time of this report was estimated at 19 bushels per acre. Although poor growing conditions were encountered across much of Oklahoma a few locations received timely rains to save their soybean crop. Even though 2006 was a difficult production year for soybean producers, soybean remains a good cropping choice for most areas of Oklahoma.

Pest problems

For the most part no major widespread pest problems were observed during the 2006 growing season. Threecornered alfalfa hoppers were observed in a few fields during the early part of the growing season. Plant disease was also very low during the 2006 growing season, mainly due to the dry growing conditions. Soybean rust was not detected in any of the Sentinel Plots OSU had throughout the state.

Methods

Test locations were near Chickasha, Haskell, Bixby, Lahoma, and Goodwell. 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.

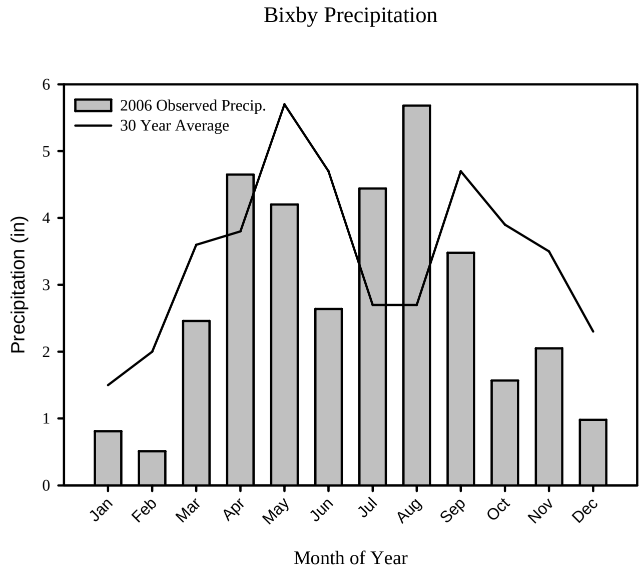
Additional information on the Web

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 2006 Soybean Performance Tests

Dyna-Gro Seeds PO Box 577 Webber Falls, OK 74470	Telephone: 918-464-2012
Hornbeck Seed Co., Inc. PO Box 472 Dewitt, AR 72042	Telephone: 870-946-2087
Delta & Pine Land Company 1301 E. 50th St. Lubbock, TX 79404	Telephone: 806-740-1642
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
Pioneer Hi-Bred Intl., Inc. 1616 S. Kentucky, Suite C-350 Amarillo, TX 79102	Telephone: 806-356-9221
University of Arkansas	
University of Missouri	



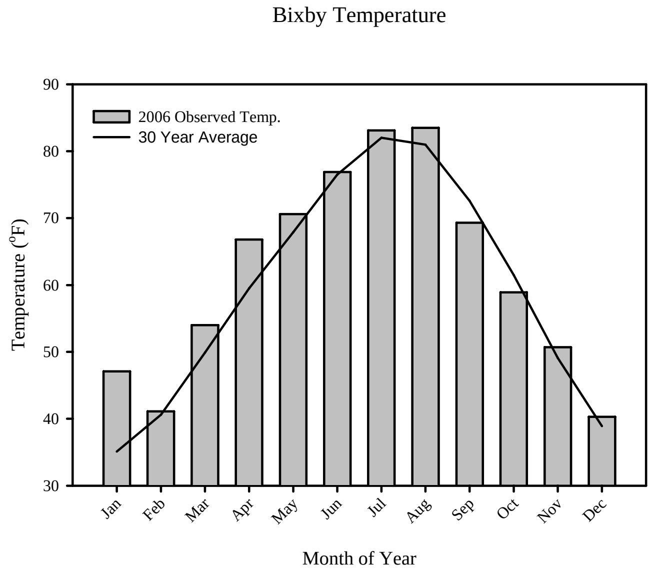


Table 1. Information on soil chemical properties and management practices for the Soybean Production Test at Bixby, OK in 2006.

Soil Properties	Result	Cultural Practice	Information
pH	6.1	Planting Date	4/20 and 6/8[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
		Soil Moisture at Planting	Good

[1]First planting date is for early season tests and second date is the date that the full season tests were planted.

Table 2. Early Season Roundup Ready Soybean Production Bixby, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering Score	Lodging Score	Seed/Lb	Yield
				- in -				- bu/acre -
HBK R3824	Hornbeck Seed Co. Inc.	3.9						
HBK R4623	Hornbeck Seed Co. Inc.	4.5						
HBK R4724	Hornbeck Seed Co. Inc.	4.7						
HBK R4924	Hornbeck Seed Co. Inc.	4.9						
HBK R5123	Hornbeck Seed Co. Inc.	5.1						
HBK R5226	Hornbeck Seed Co. Inc.	5.2						
HBK R5425	Hornbeck Seed Co. Inc.	5.4						
HBK R5525	Hornbeck Seed Co. Inc.	5.5						
93M92	Pioneer Hi-Bred Intl.Inc.	3						
93M95	Pioneer Hi-Bred Intl.Inc.	3						
SXO6438	Dynagro Seed UAP	3.8	Test was not harvested due to drought conditions.					
SXO6842	Dynagro Seed UAP	4.2						
37A44	Dynagro Seed UAP	4.5						
DG3463NRR	Dynagro Seed UAP	4.6						
SXO6646	Dynagro Seed UAP	4.6						
31A48	Dynagro Seed UAP	4.8						
36Y48	Dynagro Seed UAP	4.8						
35Z49	Dynagro Seed UAP	4.9						
DKB40-51	Monsanto	4						
AG4103	Monsanto	4						
AG4403	Monsanto	4						
AG4404	Monsanto	4						

Table 3. Full Season Group IV Soybean Production Bixby, OK 2006.

Variety	Company	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
UA 4805	University of Arkansas	30-Oct	14	0	0	3050	24.1
S49-Q9	NK Brand Seeds	30-Oct	20	1	0	2850	22.4
S43-B1	NK Brand Seeds	30-Oct	18	0	0	2750	20.3
S41-M5	NK Brand Seeds	30-Oct	15	0	0	2800	14.9

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

[2]Mean yield =21.8 Bu/acre. LSD @ .05 =2.3 Bu/acre. C.V. =5.9 %.

Table 4. Full Season Group V Soybean Production Bixby, OK 2006.

Variety	Company	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
Ozark	University of Arkansas	9-Nov	23	0	0	2600	30.7
S53-A1	NK Brand Seeds	9-Nov	26	0	0	2450	26.2
S57-P1	NK Brand Seeds	9-Nov	24	0	0	2550	26.2
Stoddard	University of Missouri	9-Nov	18	0	0	2500	19.3
Jake	University of Missouri	9-Nov	18	0	0	2400	18.4

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

[2]Mean yield =23.2 Bu/acre. LSD @ .05 =3.4 Bu/acre. C.V. =8.5 %.

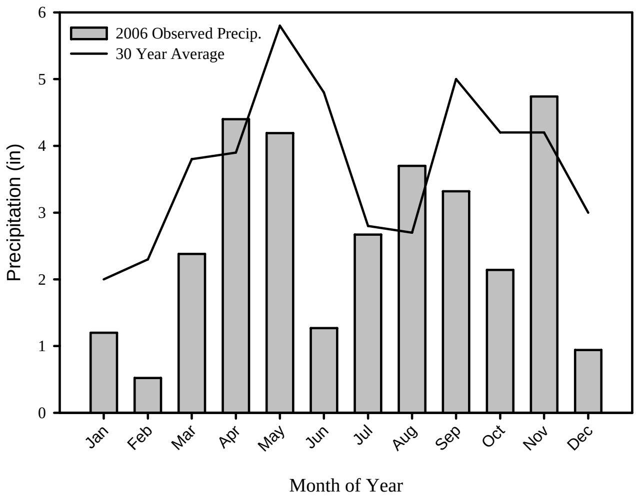
Table 5. Full Season Roundup Ready Soybean Production Bixby, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
				- in -				- bu/acre -
DG3583RR	Dynagro Seed UAP	5.8	9-Nov	24	0	0	2500	37.0
DG3535NRR	Dynagro Seed UAP	5.3	9-Nov	28	0	0	2800	34.0
DP5915	Delta&Pine Land Co.	5.9	9-Nov	25	0	0	2750	32.4
36N57	Dynagro Seed UAP	5.7	9-Nov	25	0	0	2550	31.3
38K57	Dynagro Seed UAP	5.7	9-Nov	25	0	0	2650	31.1
33B52	Dynagro Seed UAP	5.2	9-Nov	24	0	0	2550	29.6
AG5605	Monsanto	5	9-Nov	19	0	0	3050	29.3
AG4903	Monsanto	4	9-Nov	25	0	0	2250	29.1
37C62	Dynagro Seed UAP	6.1	9-Nov	22	0	0	2800	28.4
33X55	Dynagro Seed UAP	5.5	9-Nov	27	0	0	2650	28.0
DP5808RR	Delta&Pine Land Co.	5.8	9-Nov	24	0	0	3100	27.1
AG5301	Monsanto	5	9-Nov	23	0	0	2250	27.0
95M80	Pioneer Hi-Bred Intl. Inc	5	9-Nov	27	0	0	2400	25.5
DG3600NRR	Dynagro Seed UAP	6	9-Nov	24	0	0	2500	23.6
DP5634RR	Delta&Pine Land Co.	5.6	9-Nov	26	0	0	2700	23.2
DKB46-51	Monsanto	4	9-Nov	23	0	0	2100	22.6
AG4703	Monsanto	4	9-Nov	16	0	0	2600	22.6
95M82	Pioneer Hi-Bred Intl. Inc	5	9-Nov	27	0	0	2600	22.4
AG5501	Monsanto	5	9-Nov	22	0	0	2600	20.0
SXO5352	Dynagro Seed UAP	5.2	9-Nov	23	0	0	2350	18.3

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

[2]Mean yield =27.1 Bu/acre. LSD @ .05 =4.7 Bu/acre. C.V. =10.4 %.

Haskell Precipitation



Haskell Temperature

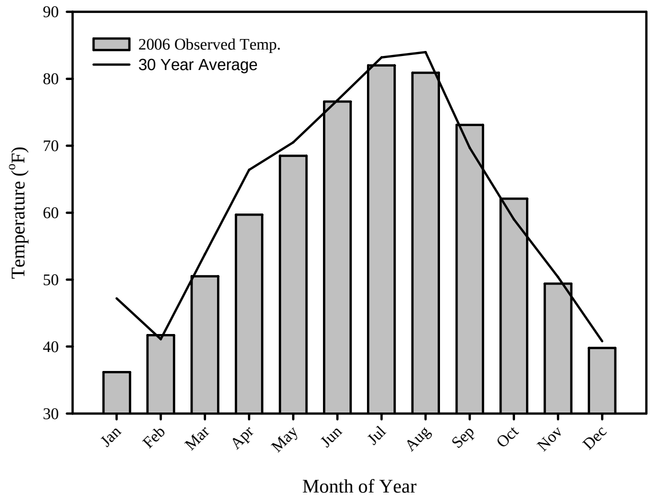


Table 6. Information on soil chemical properties and management practices for the Soybean Production Test at Haskell, OK in 2006.

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
		Soil Moisture at Planting	Good

[1]First planting date is for early season tests and second date is the date that the full season tests were planted.

Table 7. Early Season Roundup Ready Soybean Production Haskell, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
				- in -				- bu/acre -
HBK R5123	Hornbeck Seed Co. Inc.	5.1	20-Oct	27	0	0	2900	26.2
HBK R5226	Hornbeck Seed Co. Inc.	5.2	20-Oct	17	1	0	2800	22.5
HBK R5525	Hornbeck Seed Co. Inc.	5.5	20-Oct	14	1	0	2750	21.8
35Z49	Dynagro Seed UAP	4.9	20-Oct	28	0	0	2750	20.4
HBK R4924	Hornbeck Seed Co. Inc.	4.9	20-Oct	27	0	0	2850	17.5
HBK R5425	Hornbeck Seed Co. Inc.	5.4	20-Oct	21	0	0	2650	17.5
SXO6842	Dynagro Seed UAP	4.2	20-Oct	13	1	0	2950	17.5
31A48	Dynagro Seed UAP	4.8	15-Sep	20	0	0	2950	15.1
SXO6438	Dynagro Seed UAP	3.8	20-Oct	16	2	0	2900	14
36Y48	Dynagro Seed UAP	4.8	15-Sep	25	0	0	3200	12.8
HBK R4623	Hornbeck Seed Co. Inc.	4.5	15-Sep	22	1	0	3100	12.4
HBK R4724	Hornbeck Seed Co. Inc.	4.7	20-Oct	26	2	0	2950	11.5
HBK R3824	Hornbeck Seed Co. Inc.	3.9	20-Oct	25	2	0	3250	10.2
DG3463NRR	Dynagro Seed UAP	4.6	15-Sep	23	1	0	3700	9.2
93M92	Pioneer Hi-Bred	3	15-Sep	18	2	0	3050	8.9
AG4103	Monsanto	4	15-Sep	19	2	0	3500	8.3
93M95	Pioneer Hi-Bred	3	15-Sep	17	2	0	3600	7.7
37A44	Dynagro Seed UAP	4.5	15-Sep	21	1	0	3400	7.7
DKB40-51	Monsanto	4	15-Sep	21	1	0	3500	7.7
AG4404	Monsanto	4	15-Sep	23	2	0	3600	7.6
AG4403	Monsanto	4	15-Sep	19	1	0	3450	7.1
SXO6646	Dynagro Seed UAP	4.6	15-Sep	18	0	0	2850	6.3

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

[2]**Mean yield =13.2 Bu/acre. LSD @ .05 =2.2 Bu/acre. C.V. =10.0 %.**

Table 8. Full Season Group IV Soybean Production Haskell, OK 2006.

Variety	Company	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
UA 4805	University of Arkansas	20-Oct	17	0	0	2950	20.8
S49-Q9	NK Brand Seeds	20-Oct	25	0	0	3200	19.7
S41-M5	NK Brand Seeds	20-Oct	16	0	0	3600	16.7
S43-B1	NK Brand Seeds	20-Oct	19	0	0	3150	13.8

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

[2]Mean yield =19.4 Bu/acre. LSD @ .05 =3.3 Bu/acre. C.V. =9.6 %.

Table 9. Full Season Group V Soybean Production Haskell, OK 2006.

Variety	Company	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
Ozark	University of Arkansas	14-Nov	22	1	0	2600	23.6
S53-A1	NK Brand Seeds	14-Nov	24	1	0	2250	20.7
Jake	University of Missouri	14-Nov	21	1	0	2600	18.3
Stoddard	University of Missouri	14-Nov	20	1	0	2500	18.2
S57-P1	NK Brand Seeds	14-Nov	22	0	0	2400	14.4

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

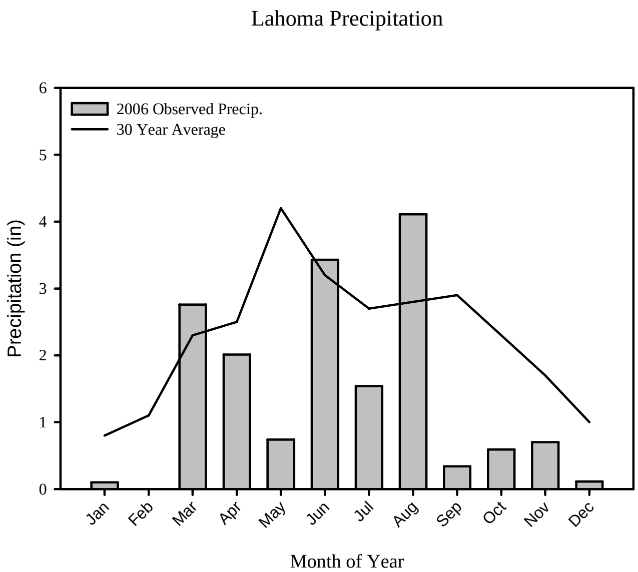
[2]Mean yield =19.6 Bu/acre. LSD @ .05 =3.1 Bu/acre. C.V. =9.2 %.

Table 10. Full Season Roundup Ready Soybean Production Haskell, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
				- in -				- bu/acre -
AG5605	Monsanto	5	14-Nov	23	1	0	2900	26.4
36N57	Dynagro Seed UAP	5.7	14-Nov	27	0	0	2350	22.9
DG3583RR	Dynagro Seed UAP	5.8	14-Nov	28	0	0	2650	22.8
DP5808RR	Delta&Pine Land Co.	5.8	14-Nov	30	0	0	2950	22.7
DP5915	Delta&Pine Land Co.	5.9	14-Nov	26	0	0	2800	22.2
95M82	Pioneer Hi-Bred Intl.	5	14-Nov	28	1	0	2700	22
AG5301	Monsanto	5	14-Nov	26	0	0	2650	21.9
AG4903	Monsanto	4	14-Nov	23	0	0	2650	21.7
AG4703	Monsanto	4	14-Nov	20	0	0	3050	21.6
DKB46-51	Monsanto	4	14-Nov	26	0	0	2600	21.5
33B52	Dynagro Seed UAP	5.2	14-Nov	25	0	0	2450	19.9
38K57	Dynagro Seed UAP	5.7	14-Nov	29	0	0	2750	19.3
95M80	Pioneer Hi-Bred Intl.	5	14-Nov	25	0	0	2650	17.8
AG5501	Monsanto	5	14-Nov	26	1	0	2600	17.4
SXO5352	Dynagro Seed UAP	5.2	14-Nov	24	0	0	2350	16.7
DG3535NRR	Dynagro Seed UAP	5.3	14-Nov	28	0	0	2600	16.4
33X55	Dynagro Seed UAP	5.5	14-Nov	27	0	0	2500	16.3
37C62	Dynagro Seed UAP	6.1	14-Nov	25	0	0	2700	16.1
DP5634RR	Delta&Pine Land Co.	5.6	14-Nov	26	0	0	2550	15.2
DG3600NRR	Dynagro Seed UAP	6	14-Nov	29	0	0	2650	10.9

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

[2] Mean yield =19.6 Bu/acre. LSD @ .05 =3.7 Bu/acre. C.V. =11.5 %.



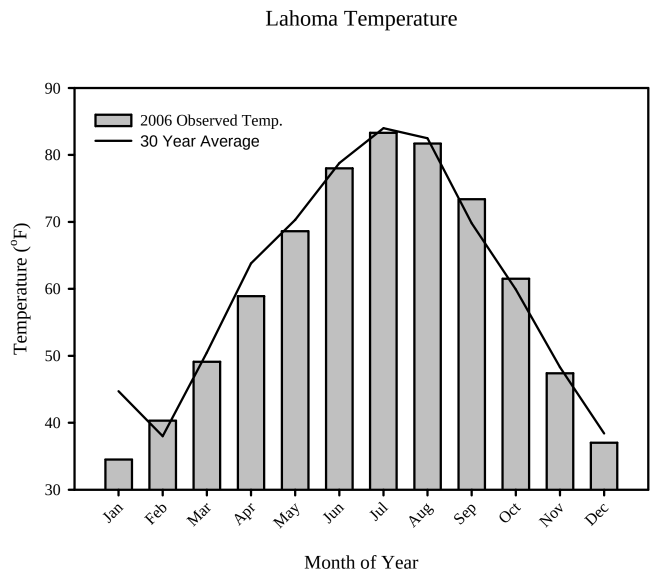


Table 11. Information on soil chemical properties and management practices for the Soybean Production Test at Lahoma, OK in 2006.

Soil Properties	Result	Cultural Practice	Information
pH	na[1]	Planting Date	4/21 and 6/5[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
		Soil Moisture at Planting	Very Dry

[1]Not available.

[2]First planting date is for early season tests and second date is the date that the full season tests were planted.

Table 12. Early Season Roundup Ready Soybean Production Lahoma, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
				- in -				- bu/acre -
DKB40-51	Monsanto	4	2-Oct	23	0	0	2750	16.6
SXO6842	Dynagro Seed UAP	4.2	2-Oct	28	0	0	2950	14.8
HBK R5525	Hornbeck Seed Co. Inc.	5.5	2-Oct	22	0	0	2850	14.4
AG4403	Monsanto	4	2-Oct	24	0	0	3150	13.5
37A44	Dynagro Seed UAP	4.5	2-Oct	23	0	0	3100	13
AG4103	Monsanto	4	2-Oct	22	0	0	2750	12.6
HBK R4924	Hornbeck Seed Co. Inc.	4.9	2-Oct	26	1	0	2700	12.4
HBK R5123	Hornbeck Seed Co. Inc.	5.1	2-Oct	29	0	0	3050	12.2
HBK R5226	Hornbeck Seed Co. Inc.	5.2	2-Oct	21	0	0	2900	12.2
HBK R5425	Hornbeck Seed Co. Inc.	5.4	2-Oct	29	0	0	2750	11.8
31A48	Dynagro Seed UAP	4.8	2-Oct	21	0	0	2800	11.7
HBK R3824	Hornbeck Seed Co. Inc.	3.9	2-Oct	21	0	0	2550	11.5
DG3463NRR	Dynagro Seed UAP	4.6	2-Oct	28	0	0	3150	11.2
36Y48	Dynagro Seed UAP	4.8	2-Oct	23	0	0	3200	10.9
SXO6438	Dynagro Seed UAP	3.8	2-Oct	23	0	0	2700	10.4
35Z49	Dynagro Seed UAP	4.9	2-Oct	29	0	0	2600	10.1
SXO6646	Dynagro Seed UAP	4.6	2-Oct	21	0	0	3150	10
HBK R4623	Hornbeck Seed Co. Inc.	4.5	2-Oct	21	0	0	2900	9.9
93M92	Pioneer Hi-Bred Intl.Inc	3	2-Oct	18	0	0	2700	8.3
AG4404	Monsanto	4	2-Oct	24	0	0	2550	8
93M95	Pioneer Hi-Bred Intl.Inc	3	2-Oct	23	2	0	3250	6.7
HBK R4724	Hornbeck Seed Co. Inc.	4.7	24-Oct	24	0	0	2650	6.5

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

[2]**Mean yield =11.3 Bu/acre. LSD @ .05 =2.7 Bu/acre. C.V. =14.4 %.**

Table 13. Full Season Group IV Soybean Production Lahoma, OK 2006.

Variety	Company	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
UA 4805	University of Arkansas	27-Oct	17	1	0	4150	24.8
S43-B1	NK Brand Seeds	27-Oct	18	2	0	3700	18.9
S41-M5	NK Brand Seeds	27-Oct	12	2	0	3600	16.1
S49-Q9	NK Brand Seeds	27-Oct	22	0	0	4150	13.5

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

[2]Mean yield =21.2 Bu/acre. LSD @ .05 =4.6 Bu/acre. C.V. =12.4 %.

Table 14. Full Season Group V Soybean Production Lahoma, OK 2006.

Variety	Company	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
			- in -				- bu/acre -
S57-P1	NK Brand Seeds	27-Oct	20	0	0	3300	18.2
S53-A1	NK Brand Seeds	27-Oct	16	1	0	3250	17.4
Jake	University of Missouri	27-Oct	14	0	0	3150	15.7
Ozark	University of Arkansas	27-Oct	15	1	0	3150	14.9
Stoddard	University of Missouri	27-Oct	16	1	0	3400	14.5

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

[2]Mean yield =15.5 Bu/acre. LSD @ .05 =3.5 Bu/acre. C.V. =13.3 %.

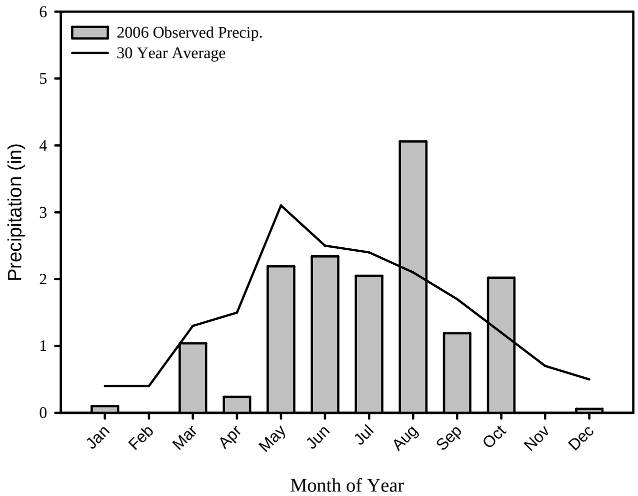
Table 15. Full Season Roundup Ready Soybean Production Lahoma, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
				- in -				- bu/acre -
AG5605	Monsanto	5	27-Oct	27	0	0	4100	34.2
36N57	Dynagro Seed UAP	5.7	27-Oct	22	0	0	3500	29.8
95M80	Pioneer Hi-Bred Intl. In	5	27-Oct	25	0	0	3600	29.3
AG4903	Monsanto	4	27-Oct	18	0	0	3050	29.1
DP5808RR	Delta&Pine Land Co.	5.8	27-Oct	29	0	0	4000	29
DG3583RR	Dynagro Seed UAP	5.8	27-Oct	28	0	0	3700	28.6
AG5501	Monsanto	5	27-Oct	26	0	0	3800	27.8
AG4703	Monsanto	4	27-Oct	24	1	0	3200	26.9
DG3600NRR	Dynagro Seed UAP	6	27-Oct	26	0	0	3650	26.4
DP5915	Delta&Pine Land Co.	5.9	27-Oct	29	0	0	3800	26.4
33B52	Dynagro Seed UAP	5.2	27-Oct	17	0	0	3200	25.3
DKB46-51	Monsanto	4	27-Oct	28	0	0	2850	24.8
95M82	Pioneer Hi-Bred Intl. In	5	27-Oct	20	0	0	3400	24.4
SXO5352	Dynagro Seed UAP	5.2	27-Oct	21	0	0	2900	23.8
37C62	Dynagro Seed UAP	6.1	27-Oct	26	0	0	3600	22.7
DP5634RR	Delta&Pine Land Co.	5.6	27-Oct	25	0	0	3200	21.8
33X55	Dynagro Seed UAP	5.5	27-Oct	18	0	0	3100	20.6
DG3535NRR	Dynagro Seed UAP	5.3	27-Oct	20	0	0	3600	20.4
AG5301	Monsanto	5	27-Oct	27	0	0	3700	19.7
38K57	Dynagro Seed UAP	5.7	27-Oct	29	0	0	3600	18.2

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

[2]Mean yield =25.5 Bu/acre. LSD @ .05 =4.7 Bu/acre. C.V. =11.2 %.

Goodwell Precipitation



Goodwell Temperature

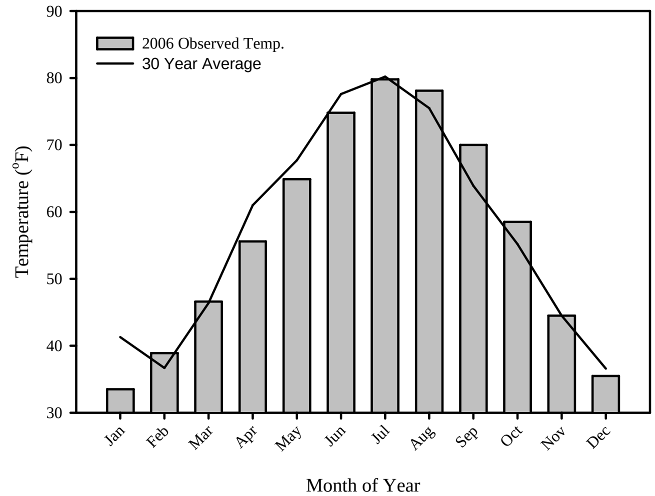


Table 16. Information on soil chemical properties and management practices for the Soybean Production Test at Goodwell, OK in 2006.

Soil Properties	Result	Cultural Practice	Information
pH	na[1]	Planting Date	June 7, 2006
Soil Test P Index	na	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	na	Seeding Depth (in)	1.5
		Irrigation	As needed

[1]Not available.

Notes:

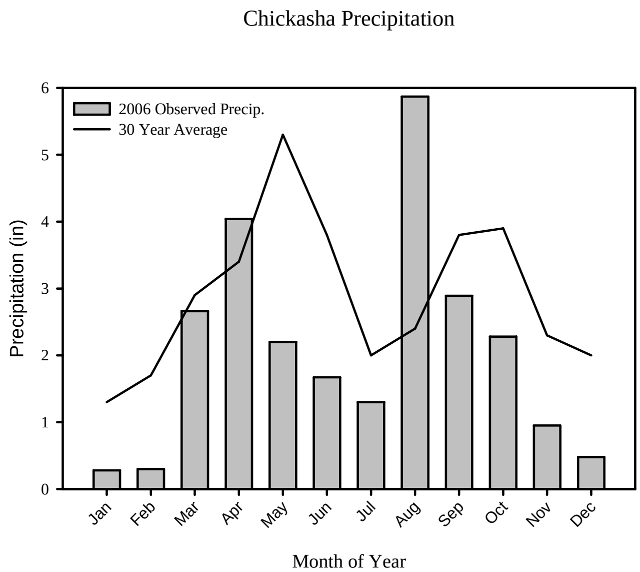
- Early season roundup ready test was not harvested due to hail storm received in early June.

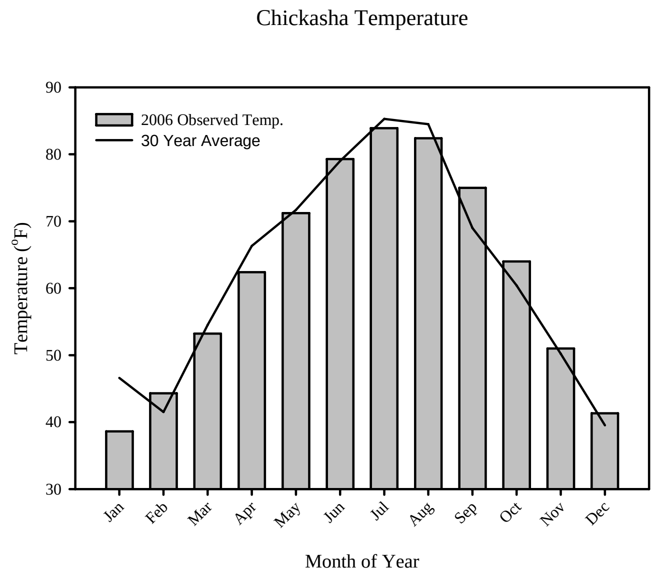
Table 17. Full Season Roundup Ready Soybean Production Goodwell, OK 2006.

Variety	Company	Maturity Group	Harvest Date	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield[2]
				- in -				- bu/acre -
AG4703	Monsanto	4	6-Oct	31	0	0	3100	51.7
AG4903	Monsanto	4	6-Oct	27	0	0	2950	48.5
DKB46-51	Monsanto	4	6-Oct	36	0	0	2950	45.9
33B52	Dynagro Seed UAP	5.2	6-Oct	36	0	0	3650	42.6
AG5301	Monsanto	5	6-Oct	31	0	0	3900	42.6
AG5605	Monsanto	5	6-Oct	37	0	1	3750	41.1
DP5808RR	Delta&Pine Land Co.	5.8	6-Oct	44	0	3	4050	40.8
DG3583RR	Dynagro Seed UAP	5.8	6-Oct	34	0	0	3850	39.4
DG3535NRR	Dynagro Seed UAP	5.3	6-Oct	35	0	1	3950	39.3
95M80	Pioneer Hi-Bred Intl.	5	6-Oct	35	0	0	3450	38.4
AG5501	Monsanto	5	6-Oct	36	0	0	3700	38
95M82	Pioneer Hi-Bred Intl.	5	6-Oct	35	0	0	4050	36.6
38K57	Dynagro Seed UAP	5.7	6-Oct	35	0	2	4100	35.8
DP5634RR	Delta&Pine Land Co.	5.6	6-Oct	33	0	0	3500	35
DP5915	Delta&Pine Land Co.	5.9	6-Oct	37	0	1	3700	32.6
37C62	Dynagro Seed UAP	6.1	6-Oct	39	0	0	4250	30.9
36N57	Dynagro Seed UAP	5.7	6-Oct	33	0	0	4150	29.5
33X55	Dynagro Seed UAP	5.5	6-Oct	38	0	0	3600	28.7
SXO5352	Dynagro Seed UAP	5.2	6-Oct	43	0	1	3350	28.3
DG3600NRR	Dynagro Seed UAP	6	6-Oct	39	0	1	3550	27

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

[2]Mean yield =37.6 Bu/acre. LSD @ .05 =5.7 Bu/acre. C.V. =9.2 %.





Notes:

- Soybean tests were not harvest at Chickasha in 2006 due to drought conditions and very dry soil moisture conditions at planting time for the full season tests. Early season test germinated and a good stand was obtained but below normal precipitation in May, June, and July put plants under severe moisture stress. For full season tests lack of soil moisture at seeding in the seeding zone prevented germination.