Oklahoma Panhandle Research & Extension Center

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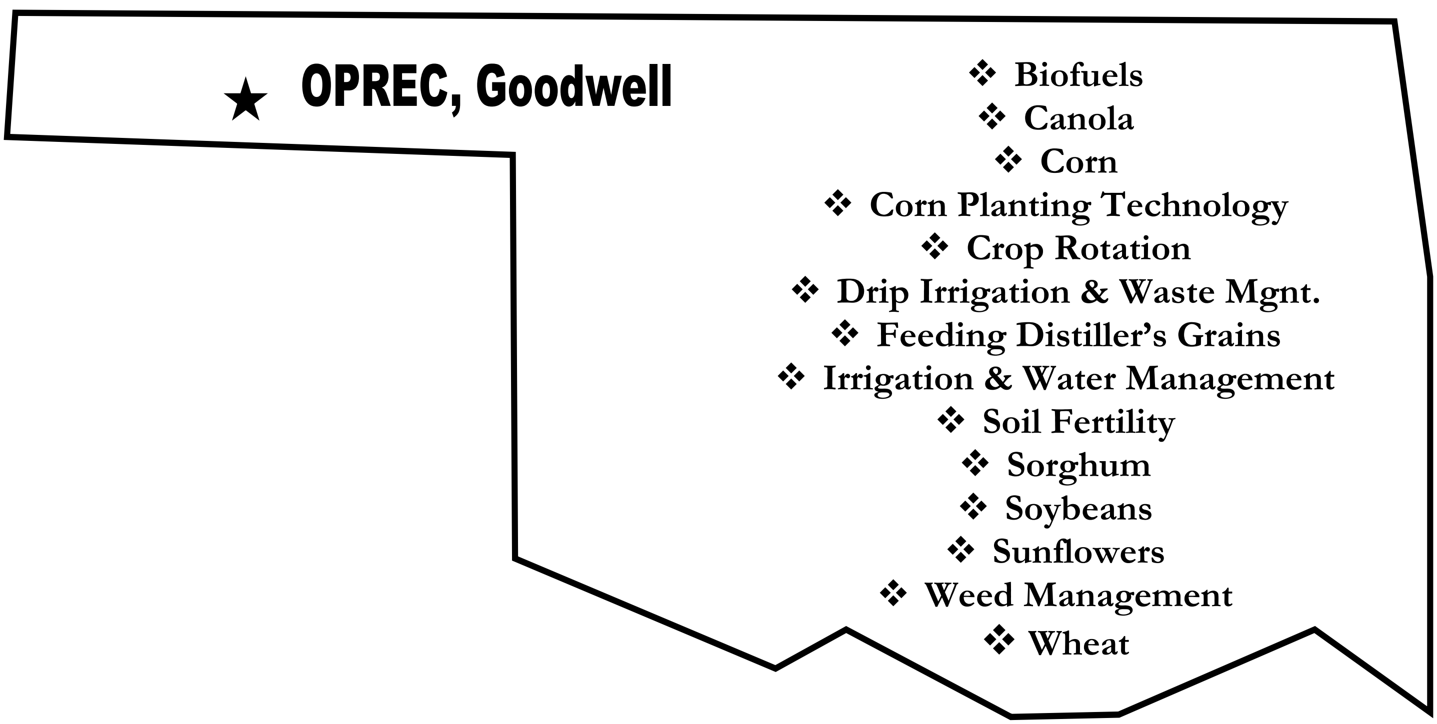
http://oprec.okstate.edu



2012 Research Highlights

Division of Agricultural Sciences and Natural Resources

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

OKLAHOMA PANHANDLE RESEARCH AND EXTENSION CENTER

The Division of Agricultural Sciences and Natural Resources (DASNR) including the Oklahoma Agricultural Experiment Station (OAES) and the Oklahoma Cooperative Extension Service (OCES) at Oklahoma State University (OSU) have a long history of working cooperatively with Oklahoma Panhandle State University (OPSU) to meet the needs of our clientele, the farmers and ranchers of the high plains region. OAES is the research arm of DASNR and continues with the mission to conduct fundamental and applied research for the purpose of developing new knowledge that will lead to technology improvements addressing the needs of the region. The Oklahoma Panhandle Research and Extension Center (OPREC) is operated within OAES by the Field and Research Services Unit (FRSU). Our unit consists of 19 research stations (including the OPREC) with almost 13,500 acres, numerous growth chambers, and greenhouses. We in OAES generate research information which is then disseminated by OCES to the public through field days, workshops, tours, and demonstrations. This has been and will continue to be a major focus of our efforts at the OPREC. Together as a team we have been able to solve many significant problems related to high plains agriculture.

OPREC is committed to serving the people of the Panhandle region. One problem we are facing in this area is a shortage of water, whether it comes from rainfall or from groundwater. Developing best management practices for irrigation systems that provide maximum benefit for the least cost will be one of the critical issues facing us in the future. An investment is being made at the OPREC to install a drip irrigation system that should maximize irrigation efficiency and provide valuable information about production practices for farmers and ranchers in the region. Please watch for results from studies conducted with this new irrigation system at our future events!

Many staff continue to serve our clientele and include; Rick Kochenower - Area Agronomy Research and Extension Specialist, Britt Hicks - Area Livestock Extension Specialist, and Lawrence Bohl - Senior Station Superintendent of OPREC. Other essential OPREC personnel include Donna George-Senior Secretary, Cameron Murley - Equipment Specialist, Camron Nisly - Agriculturalist, and several wage payroll and part-time OPSU student laborers. For the last 19 years we also benefited from the efforts of Craig Chesnut-Field Foreman II, who recently retired in November. Lawrence Bohl has also announced his intention to retire at the end of May after more than 18 years of service. To help fill these tremendous voids, we are currently recruiting an Assistant Superintendent and will soon begin recruiting a Superintendent for OPREC. These new hires should help us to ensure that our research will continue to answer important questions in a timely manner!

We at OSU truly appreciate the support that our clientele, farmers, ranchers, commodity groups, industry, and other agricultural groups have given us over the years. We look forward to your continued support in the future and to meeting the needs of the research, extension, and teaching programs in the high plains region.

Randy L. Raper

Senior Director
Field and Research Service Unit
Oklahoma Agricultural Experiment Station
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

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

Archer Daniels Midland Company
BASF
Bayer Crop Sciences
Dow Agro Sciences (Jodie Stockett)
DuPont (Jack Lyons and Robert Rupp)
Farm Credit of Western Oklahoma
Five Star Equipment
Green Country Equipment
Hitch Enterprises
Liquid Control Systems (Tim Nelson)
Monsanto (Ben Mathews, T. K. Baker, Mike Lenz)
National Sorghum Producers
GM Northwest Cotton Growers Co-op
Oklahoma Genetics, Inc.
Oklahoma Grain Sorghum Commission
Oklahoma Wheat Commission
Oklahoma Wheat Growers
OPSU
Orthman Manufacturing
Pioneer Seed (Ramey Seed)
Sorghum Partners
Hopkins Ag/AIM Agency (J. B. Stewart & Jarrod Stewart)
Syngenta
Texhoma Wheat Growers
Triumph Seed Company
United Sorghum Checkoff Program
Joe Webb

Oklahoma Panhandle Research and Extension Center

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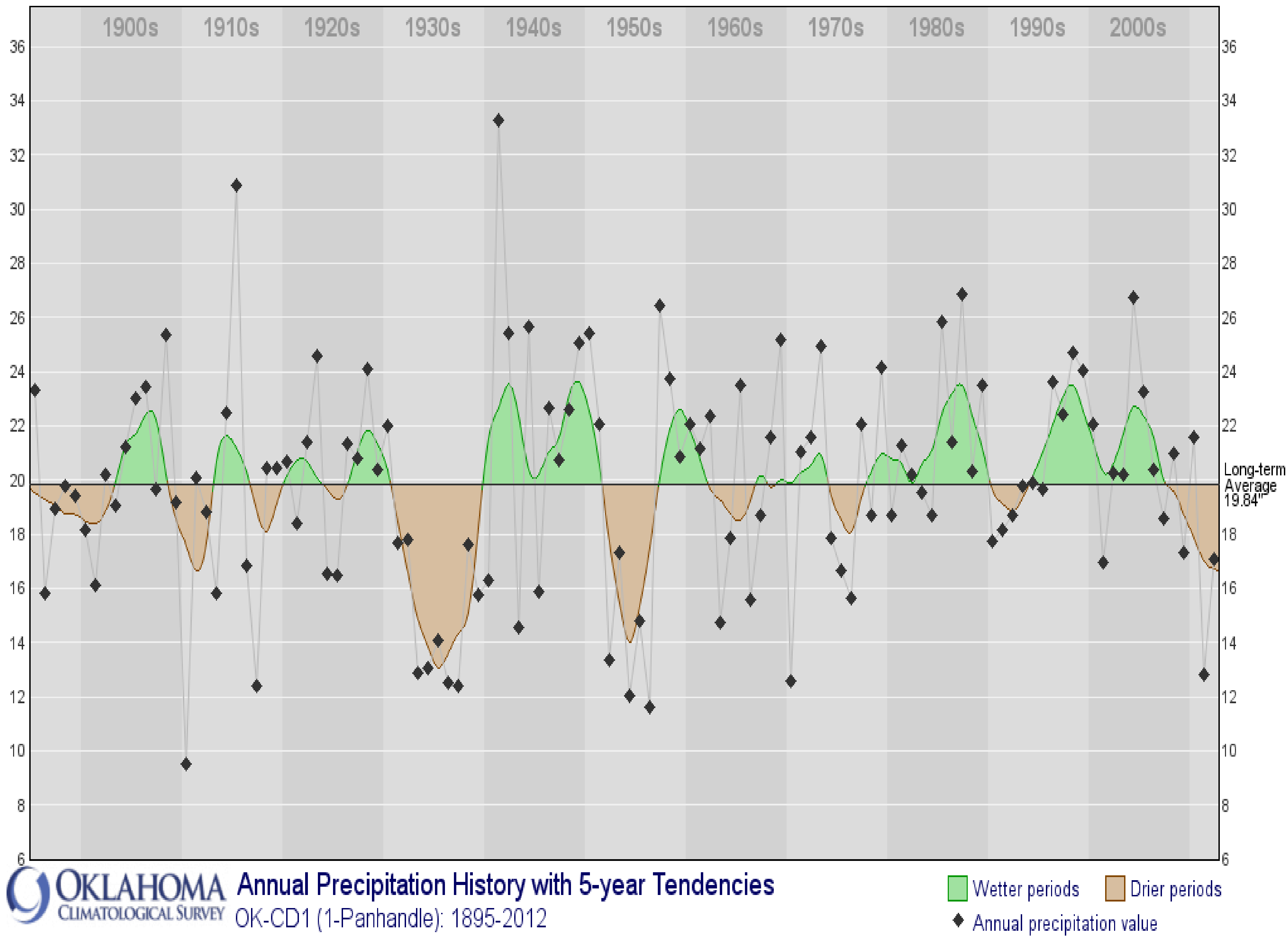
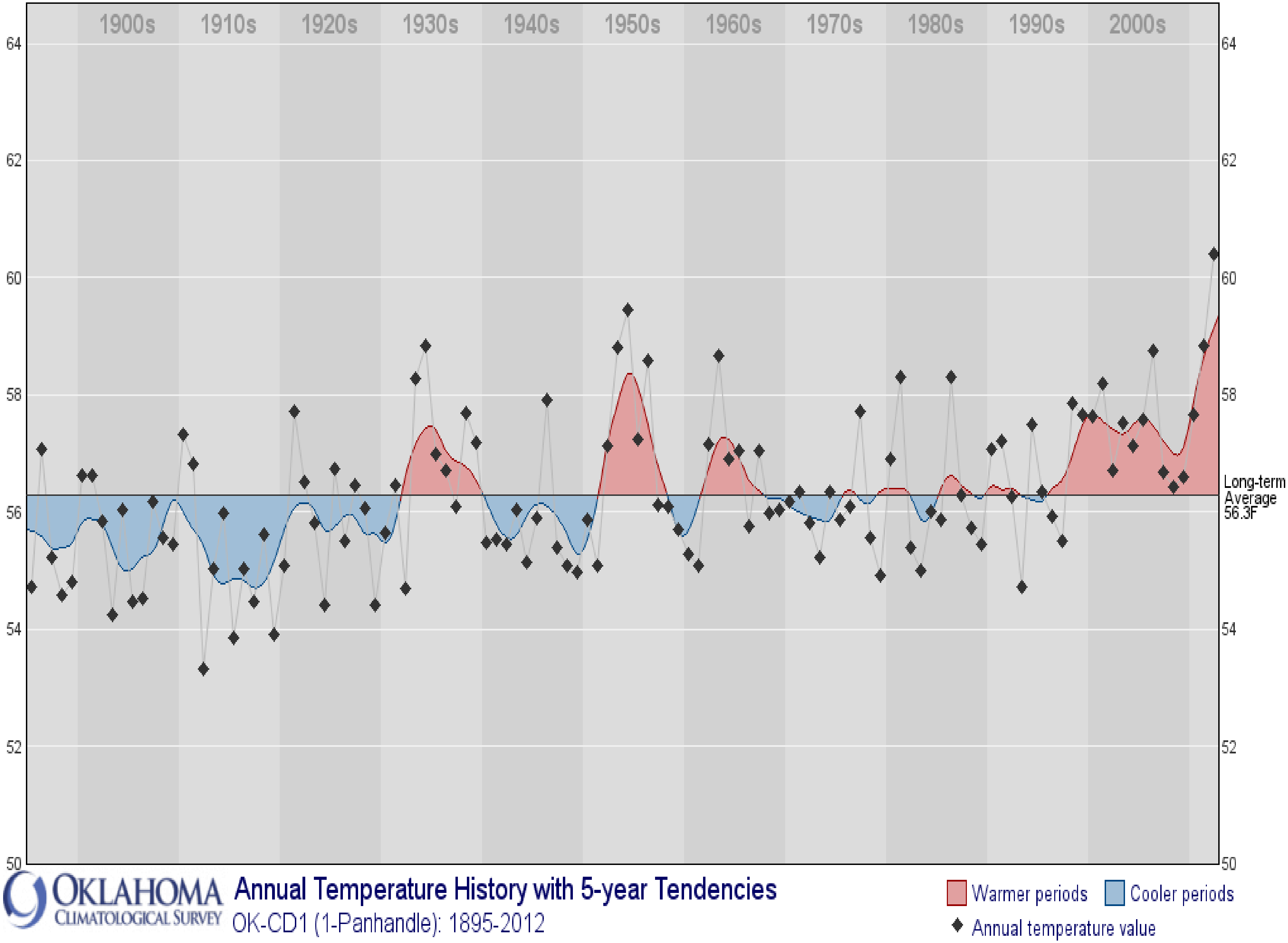


Annual Precipitation History with 5-year Tendencies

OK-CD1 (1-Panhandle): 1895-2012

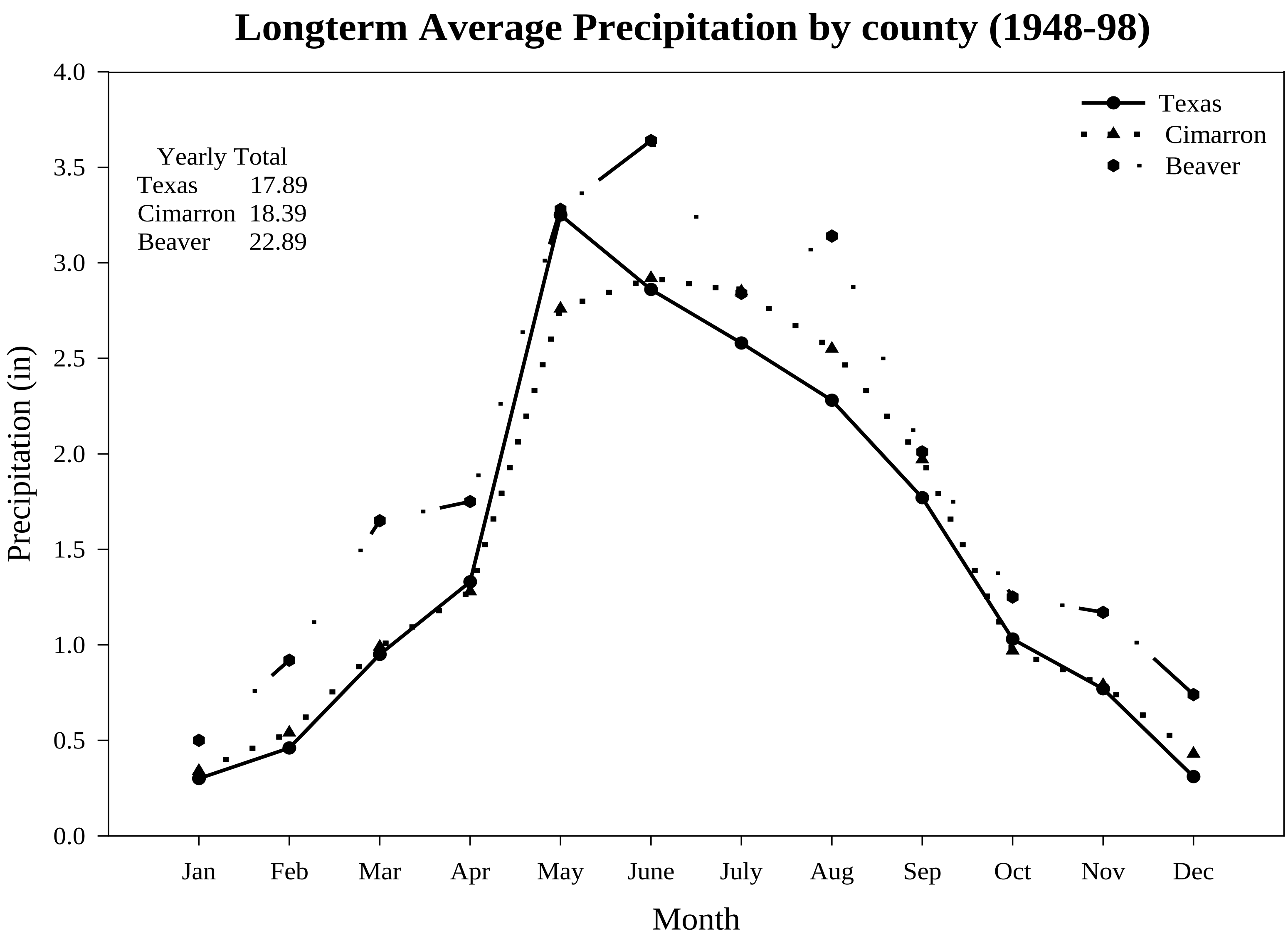


1900s
1910s
1920s
1930s
1940s
1950s
1960s
1970s
1980s
1990s
2000s
64
62
60
58
56
54
52
50
Long-term Average 56.3F
OKLAHOMA CLIMATOLOGICAL SURVEY
Annual Temperature History with 5-year Tendencies
OK-CD1 (1-Panhandle): 1895-2012
Warmer periods
Cooler periods
Annual temperature value

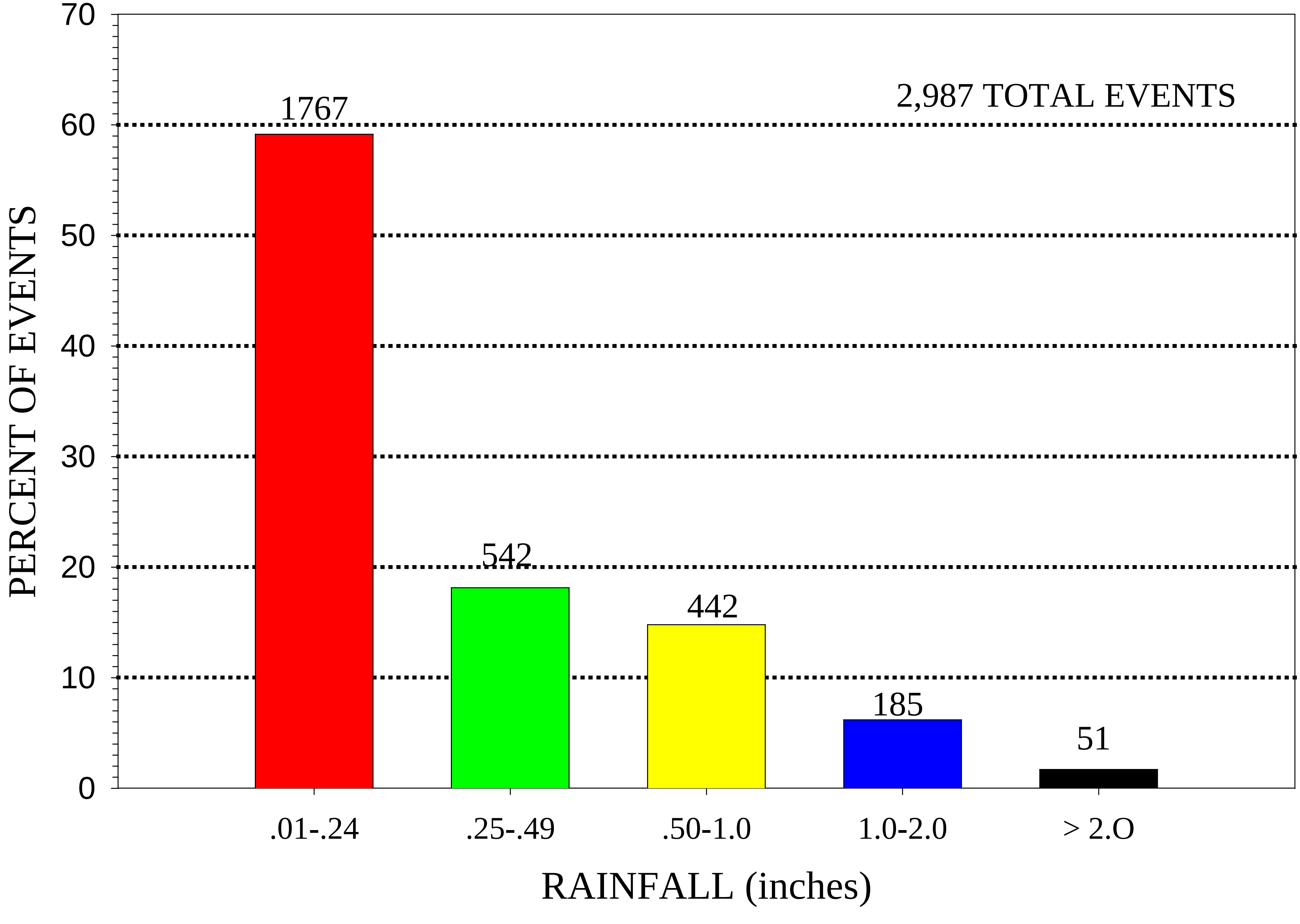
Climatological data for Oklahoma Panhandle Research and Extension Center, 2012.

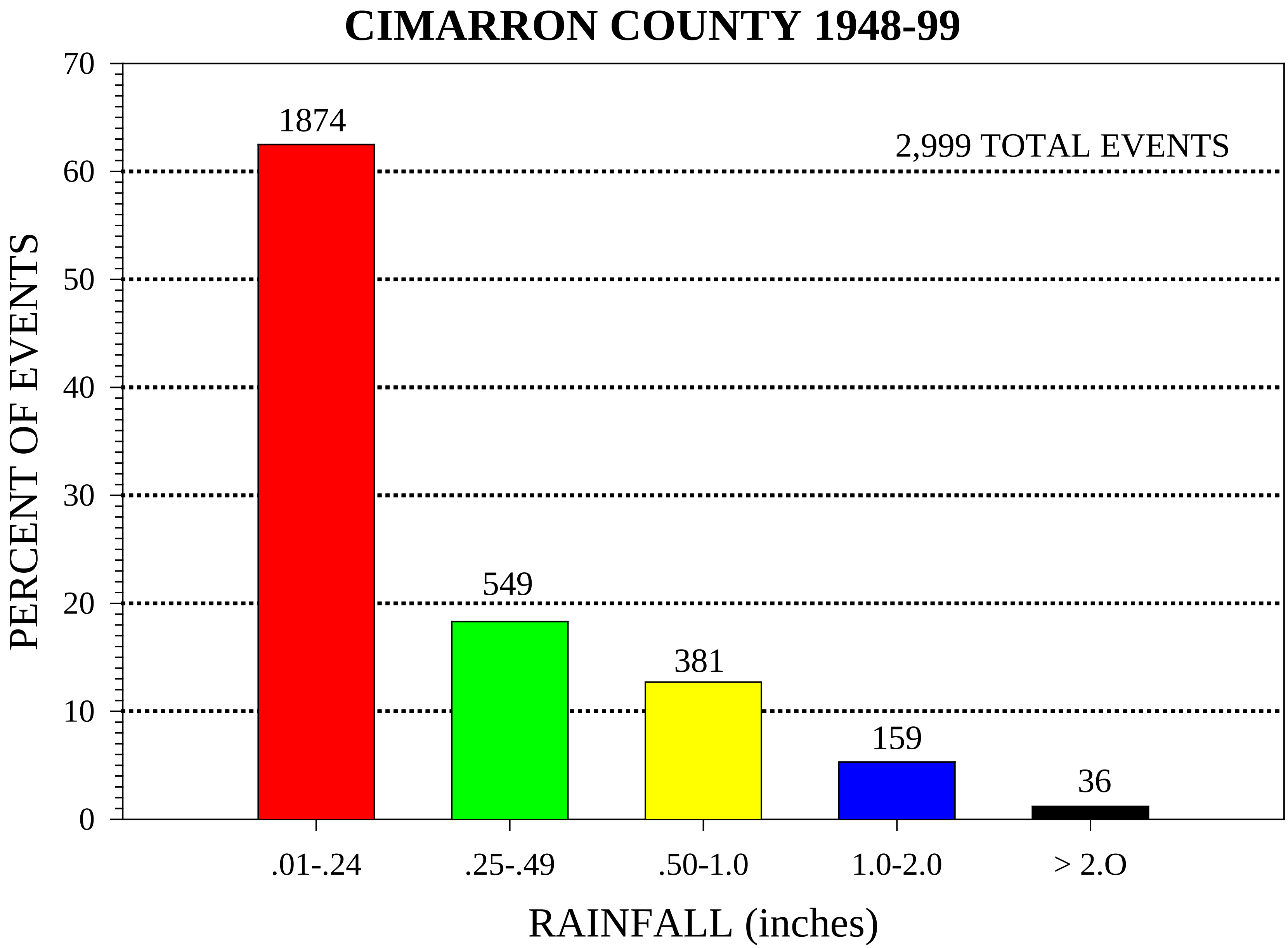
	Temperature								Precipitation				Wind	
Month	Max		Min		Max. mean		Min. mean		Inches		Long term mean	Largest one day total	AVG mph	Max mph
	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011				
Jan	72	73	13	-5	55	49	24	17	0.05	0.12	0.30	0.05	12.0	56.8
Feb	75	81	13	-8	50	52	24	18	0.27	0.12	0.46	0.12	13.9	62.6
March	87	85	19	9	70	63	38	31	1.69	0.06	0.95	1.16	13.8	51.3
April	95	92	34	27	74	74	45	39	2.28	0.94	1.33	0.53	13.7	55.3
May	101	103	43	31	84	81	52	47	0.88	0.51	3.25	0.84	12.6	60.1
June	107	111	51	53	94	97	63	62	2.33	0.53	2.86	1.03	14.7	49.3
July	103	108	67	62	97	101	67	68	1.95	0.17	2.58	1.00	12.0	43.9
Aug	105	105	54	62	93	98	62	68	0.85	2.05	2.28	0.34	10.5	48.0
Sept	102	102	41	41	85	83	53	54	2.66	1.67	1.77	0.59	10.5	52.0
Oct	90	91	22	29	70	76	40	43	0.27	0.61	1.03	0.27	12.0	51.9
Nov	81	76	18	20	66	61	33	31	0.00	0.79	0.77	0.00	13.7	51.0
Dec	72	64	3	2	51	41	22	21	0.39	1.17	0.31	0.30	12.4	62.3
	Annual total				74.1	73	43.5	41.5	13.62	8.74	17.9	NA	NA	NA

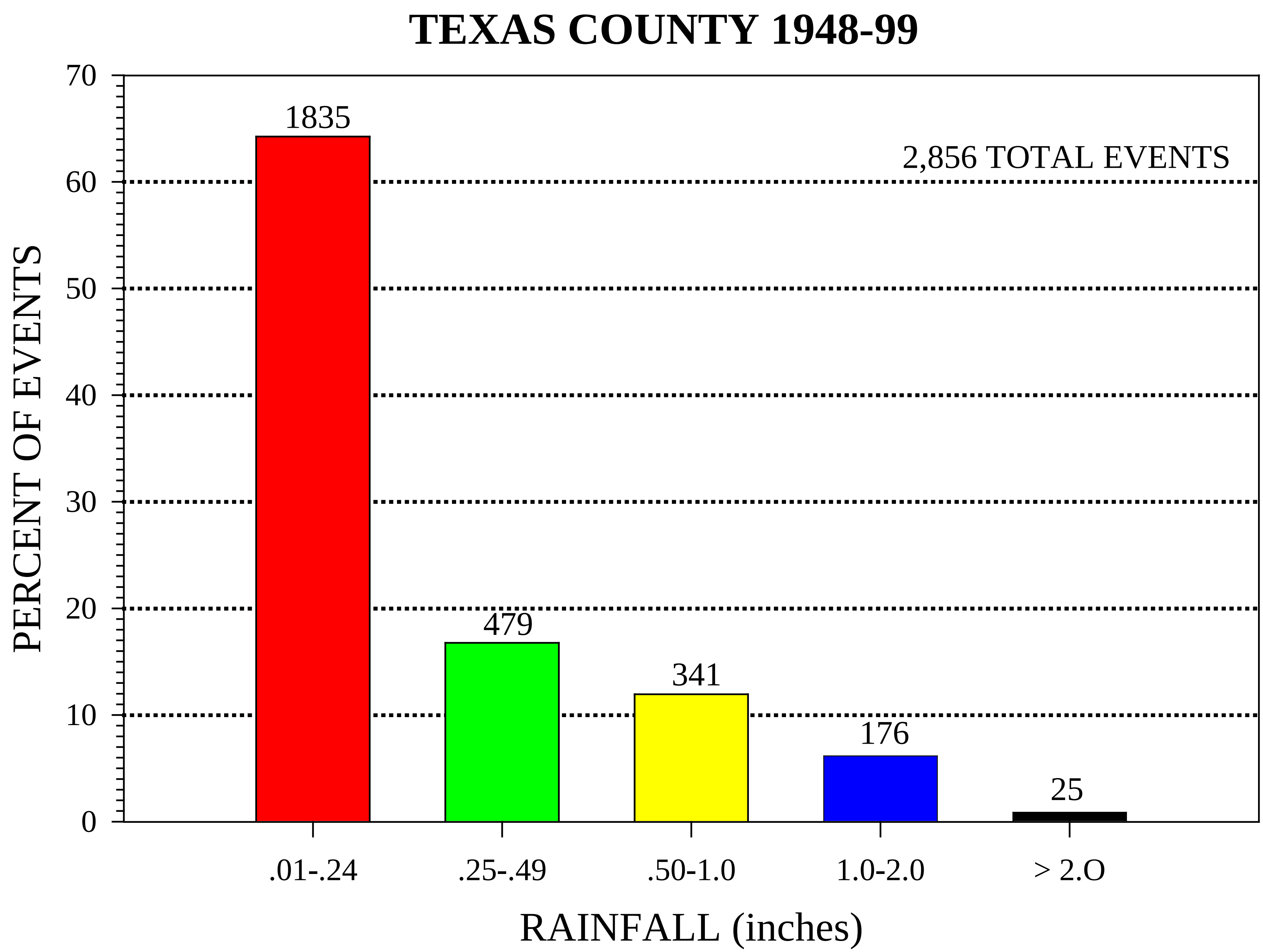
Data from Mesonet Station at OPREC


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

BEAVER COUNTY 1948-99




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



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

Oklahoma Panhandle Research & Extension Center
2012 Research Highlights

Crops

Extension Publications

Oklahoma Panhandle Research and Extension Center
Wheat Improvement Program
Annual Report, 2013

Collaborative Variety Trial – AgriPro, Texas AgriLife, and OSU

Since 2009, Oklahoma State University has cooperated with wheat breeding programs at AgriPro and Texas AgriLife to test advanced experimental lines, contemporary varieties, and a few hallmark varieties in five Oklahoma environments, including trials at the Oklahoma Panhandle Research and Extension Center (OPREC). This effort has been part of a larger testing role the OPREC has played in the final stages of OSU wheat variety development.

Shown in Table 1 are grain yield results from the 2012 trials, one of which was placed under irrigation at the OPREC. Gallagher and Iba were entered as experimental lines, although their official release occurred prior to harvest. The other experimental line entry from OSU was a 2-gene Clearfield variety with the experimental designation OK09915C. Its candidacy remains under evaluation, and is currently under review by OSU's Plant Materials and Release Committee.

The 2009 OSU release, Billings, performed well in all trials at the OPREC in 2012, and certainly so in the collaborative trial reported in Table 1. With excellent top-end yield potential, Billings vaulted to the top of the yield standings, aided by moisture availability (provided by irrigation), resistance to prevailing races of stripe rust, and the apparent ability to dodge late winter freeze damage that occurred at the OPREC in 2012. Placing in the same statistical top-yielding group were other varieties with historically good performance throughout the Great Plains, such as TAM 304, Jackpot, and Iba.

If a favorable release decision is handed down by the PMRC and eventually by BASF, OK09915C will be positioned statewide, or where the Clearfield management system is most appropriate. Its primary area of adaptation appears to be northern Oklahoma, but this delineation is under further review via statewide testing in the Oklahoma Small Grains Variety Performance Tests (OSGVPT) coordinated by Dr. Jeff Edwards. OK09915C is a late-maturing line (similar to Endurance) with exceptional milling and baking characteristics. Its agronomic performance in a Clearfield management system surpasses expectations of a two-gene mutant in a hard red winter wheat background. Its increased imazamox tolerance will fill a significant genetic void in areas challenged by weed pressures from Italian ryegrass and feral rye.

Testing of Elite Materials from the OSU Wheat Improvement Program

Since 1998, the OPREC has always served as one of three cornerstone testing sites for replicated yield and quality trials in the OSU wheat improvement program. The other two sites include a farmer-cooperator site near Granite in southwest Oklahoma and the North Central Research Station at Lahoma. Breeding lines in their first year of replicated yield trials, all the way up to those in their fifth year of replicated trials, typically appear at the Center in both dryland and irrigated plots. One such trial, called the Oklahoma Elite Trial (OET), contains the most advanced (i.e., elite) breeding lines each year, along with a panel of several varieties representing the best available commercial genetics for Oklahoma in the HRW market class. This panel changes each year slightly to reflect new improved genetics. Data from paired irrigated and dryland trials at the Center are shown in Table 2 for the top 20 entries in the 35-entry trial.

Consistent with the 2012 UVT trial discussed above, Billings claimed the top spot in the 2012 OET under irrigation. Separation from the remaining set of entries was so distinct that Billings formed its own statistical group for yield. The dryland trial was severely compromised by season-long drought stress but is shown for comparison. The only entries to show any degree of consistency between the irrigated and dryland trials were Billings, Iba, and the experimental, OK09528. In the 2012 OSGVPT, Ruby Lee claimed the top yield rank in nearly 25% of the trials, but none of those occurred in the panhandle region. However, its relatively high placing in the dryland trial shown in Table 2 was not unexpected based on past performance, and as a descendent of Endurance it warrants further review as a dryland-adapted variety for the High Plains. Ironically, Ruby Lee's best fit for downstate Oklahoma will be in intensively managed environments where its top-end yield potential is better capitalized, though Ruby Lee has not historically shown the same potential under irrigation at the OPREC.

The OSU wheat improvement team is now assessing the candidacy of OK09528, OK09125, OK09729, and OK09634. OK09634 is definitely not positioned for the High Plains, but instead for central and north central Oklahoma. Of the remaining three, OK09125 and OK09528 have shown more favorable trends historically for adaptation to dryland or irrigated environments in the panhandle, though as already mentioned, Billings stifled the competition in 2012. We will continue to build a multi-year assessment of these candidates and will likely make a decision to propose a release, if any, at the conclusion of the 2013 harvest.

As reported in previous years, we have expanded our breeding strategy to combine two distinct genes for wheat streak mosaic (WSM) resistance known as *Wsm1* and *Wsm2* with a gene (*Cmc4*) that confers resistance to the vector of *Wheat streak mosaic virus* (curl mite). Once deployed, this three-pronged approach will uniquely provide the best protection to date for this disease. Breeding materials continue to cycle their way through the 10-year variety development cycle. One curl-mite resistant experimental line, OK05312, progressed through the program to qualify for foundation seed increase in 2012, after it went through a "clean-up" phase in a head row purification nursery at Yuma, AZ in 2011. However, we have decided to withdraw this experimental line from commercial release consideration due to continued weaknesses shown in baking quality. Instead, OK05312 will be released as a germplasm stock to cooperating research programs for further use as an agronomically appealing donor of the critical *Cmc4* gene.

The Wheat Improvement Team will continue to address concerns specific to the High Plains and pertinent to research capabilities at the OPREC. We appreciate the research opportunity afforded by the OPREC and the unique position it places OSU's Wheat Improvement Team in addressing concerns of wheat producers in the northwest region.

Contributed by Brett F. Carver, OSU Wheat Breeder, on behalf of the Wheat Improvement Tea

Table 1. The Texas Uniform Variety Trial conducted at four Oklahoma sites in 2011-2012. Entry mean yields (bu/ac) and ranks are shown in each column, with 33 entries sorted by yield at the OPREC, with supplemental irrigation. The first eight entries listed, i.e., the top-yielding group, could not be differentiated statistically based on yield performance at the OPREC. The statewide data included the OPREC, plus Granite, Lahoma, and Enid.

	OPREC		**Statewide**	
Entry	Mean	Rank	Mean	Rank
Billings	78	*1*	59	*4*
TAM 304	72	*2*	60	*3*
TX07A001505	71	*3*	64	*1*
Everest	70	*4*	56	*10*
Fuller	67	*5*	56	*8*
Iba	66	*6*	55	*13*
TX06A001263	66	*7*	58	*5*
Jackpot	65	*8*	58	*6*
Gallagher	63	*9*	60	*2*
TX06V7266	62	*10*	56	*9*
AP08TA6927	62	*11*	54	*16*
OK09915C	62	*12*	57	*7*
TAM 203	60	*13*	51	*19*
Ruby Lee	58	*14*	51	*18*
TAM 113	58	*15*	55	*14*
Doans	57	*16*	56	*11*
Santa Fe	56	*17*	54	*15*
APH09T9614	56	*18*	56	*12*
Duster	56	*19*	49	*20*
Armour	55	*20*	44	*31*
Greer	52	*21*	52	*17*
Pete	52	*22*	44	*30*
Endurance	52	*23*	48	*23*
Garrison	51	*24*	45	*28*
TAM W-101	49	*25*	46	*26*
CJ	48	*26*	47	*25*
TAM 112	47	*27*	48	*24*
TX03A0563-07AZHR247	47	*28*	39	*33*
Fannin	47	*29*	45	*29*
Jagger	46	*30*	48	*22*
APH09T2620	43	*31*	43	*32*
TAM 111	41	*32*	46	*27*
TAM 401	40	*33*	49	*21*
MEAN	**57**		**52**	
LSD	**14**		**6**	

Table 2. Grain yield results from the 2012 Oklahoma Elite Trial (OET) conducted at the OPREC under dryland conditions and with supplemental irrigation. Entry mean yields (bu/ac) and ranks are shown in each column, with 35 entries sorted by yield and truncated for the top 20 entries in the irrigated trial.

Entry	**Pedigree or check name**	**Irrigated**		**Dryland**	
Billings	Billings	*105*	*1*	20	*7*
OK07214	Gallagher	*86*	*2*	18	*13*
OK09528	TX98D1170/Ok102	*79*	*3*	19	*8*
OK07209	Iba	*77*	*4*	21	*4*
OK09621	WH542/2174//OK93P656-3299	*76*	*5*	14	*29*
OK09729	OK98697/CIM//OK00614	*74*	*6*	14	*30*
Everest	Everest	*73*	*7*	16	*22*
OK09125	TX98D1170/Overley	*73*	*8*	18	*15*
OK08328	OK93P656-RMH3299//GK Keve/Ok101	*72*	*9*	20	*5*
Ruby Lee	Ruby Lee	*69*	*11*	24	*2*
OCW02S029T-1	TC-14 SPEAR2/T302//KSUseln 00F5-42-2	*67*	*12*	14	*33*
OK09935C	N91D2308-13/2*OK03928C	*67*	*13*	13	*34*
OK08127	Intrada/Dominator//OK93P656-RMH3299	*67*	*14*	17	*19*
OK09634	OK95616-98-6756/Overley	*67*	*15*	19	*9*
OK098055C	N91D2308-13/OK03935C	*66*	*16*	18	*14*
OK1059014	Billings/Duster	*66*	*17*	18	*12*
OK1059018	OK93P656H3299-99/OK03522	*66*	*18*	24	*3*
Armour	Armour	*66*	*19*	17	*17*
Duster	Duster	*65*	*20*	26	*1*
MEAN		**64**		**17**	
LSD		**10**		**5**	

Starter Fertilizer Effect on Wheat Grain Yields Following Strip-till Corn

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

When producers in the high plains began adapting strip-till for planting corn, and then following with no-till wheat many producers question why they could see the strip till rows in the wheat. Speculation has been seed to soil contact due to heavy residue, some have suspected phosphorous (P) fertilizer may have been the cause. With strip-till, P is applied at a depth of six to eight inches concentrating the P in a narrow band at 30 inch intervals. When wheat is planted following corn, only the wheat directly over the band will benefit. Therefore in the fall of 2011 a study was initiated at the Oklahoma Panhandle Research and Extension Center (OPREC) to determine the benefit of banding P in wheat following strip-till corn. Treatments included no P applied, 5 and 10 gal/ac in the row with seed, 5 and 10 gal/ac applied before planting, and 5 and 10 gal/ac after planting. The before and after were applied with the same drill as in the row, just either before planting or just after planting. Fertilizer used was 10-34-0. Soil pH was 7.3 and Mehlich 3 soil test value for P was 19 ppm for soil collected before previous corn crop.

Results

In the first year of the study, starter fertilizer did affect yield, test weight, and maturity. The highest yield and test weight of 78 bu/ac and 61 lb/bu respectively, was obtained with 10 gal/ac in the row (Table 1). This treatment was also better than the application of 5 gal/ac either before or after planting. The yield difference between all treatments receiving fertilizer can be attributed to difference in maturity, the no P treatment headed out 10 days to two weeks behind all treatments receiving P fertilizer. There was also a visible difference in growth starting in early March when wheat broke dormancy. By spring strip-till rows were visible in the no P plots, but were never visible in the plots receiving P fertilizer. Therefore producers utilizing strip-till in corn and plan on following with wheat should consider a P application by either broadcast or utilize starter fertilizer to increase wheat grain yields and test weights. These results also validate the use of soil test taken for the corn to determine the P need of the following wheat crop.

Table 1. 2012 grain yields and test weight for wheat when starter fertilizer applied following strip-till irrigated corn at the Oklahoma Panhandle Research and Extension Center, Goodwell, OK.

Treatment	Grain Yield (bu/ac)	Test weight (lb/bu)
10 gal/ac in row	78	61
5 gal/ac in row	72	61
10 gal/ac before planting	71	61
10 gal/ac after planting	70	61
5 gal/ac before planting	68	61
5 gal/ac after planting	68	61
Check no P	58	59
L.S.D	7	1

Valent Bio-Sciences Wheat Drought Stress Product Evaluation

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In 2012 with Valent Bio-Sciences two studies were established at OPREC to evaluate a product on winter wheat to reduce drought stress and increase grain yields. Two timings were utilized 7 days pre-anthesis or 7 days post-anthesis with 5 rates of the product. One trial was dry-land and the other with very limited irrigation. Plots were evaluated for lodging prior to harvest, then harvested with a Kincaid 8XP combine to determine grain yield and test weights.

Results

In 2012, neither timing nor amount of product appeared to increase grain yields or test weights (not reported) as can be seen in figures 1 and 2. Although yields were lower for the post-anthesis treatments in both studies they were not statistically different. The difference was approximately1 bu/ac at the rain-fed location and 4 bu/ac at the limited irrigation location. At both locations, the check plots receiving no product were among the highest yielding.

Figure 1. Wheat grain yields for the Valent Bio-Sciences drought stress study for the rain-fed site at OPREC in 2012.

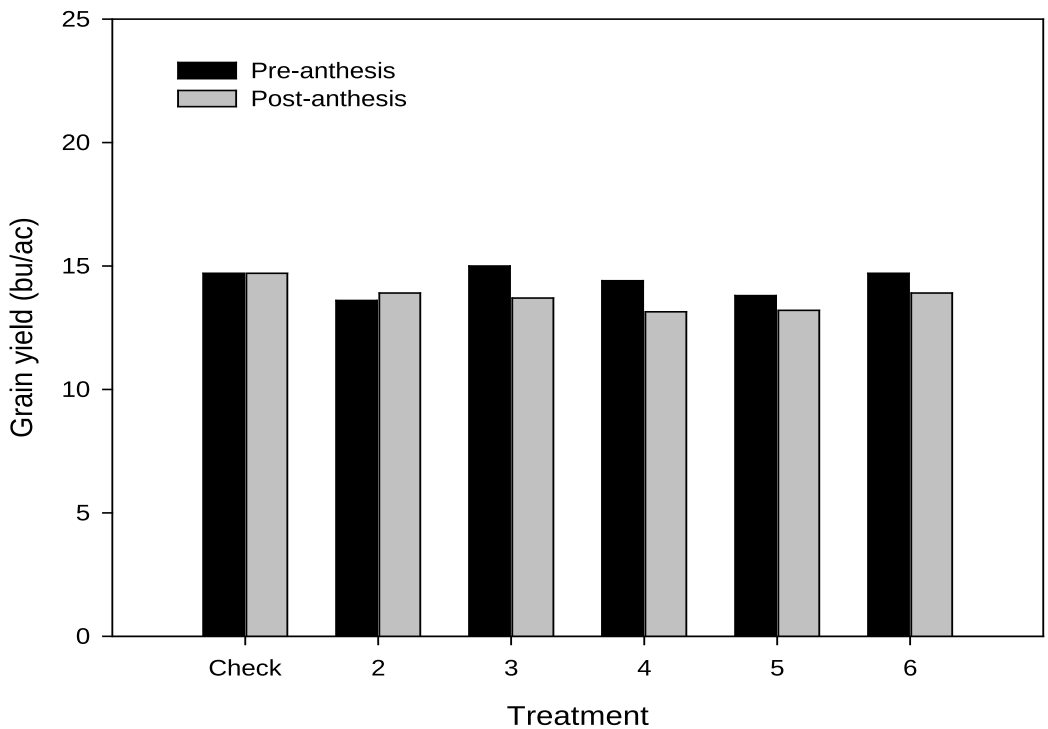
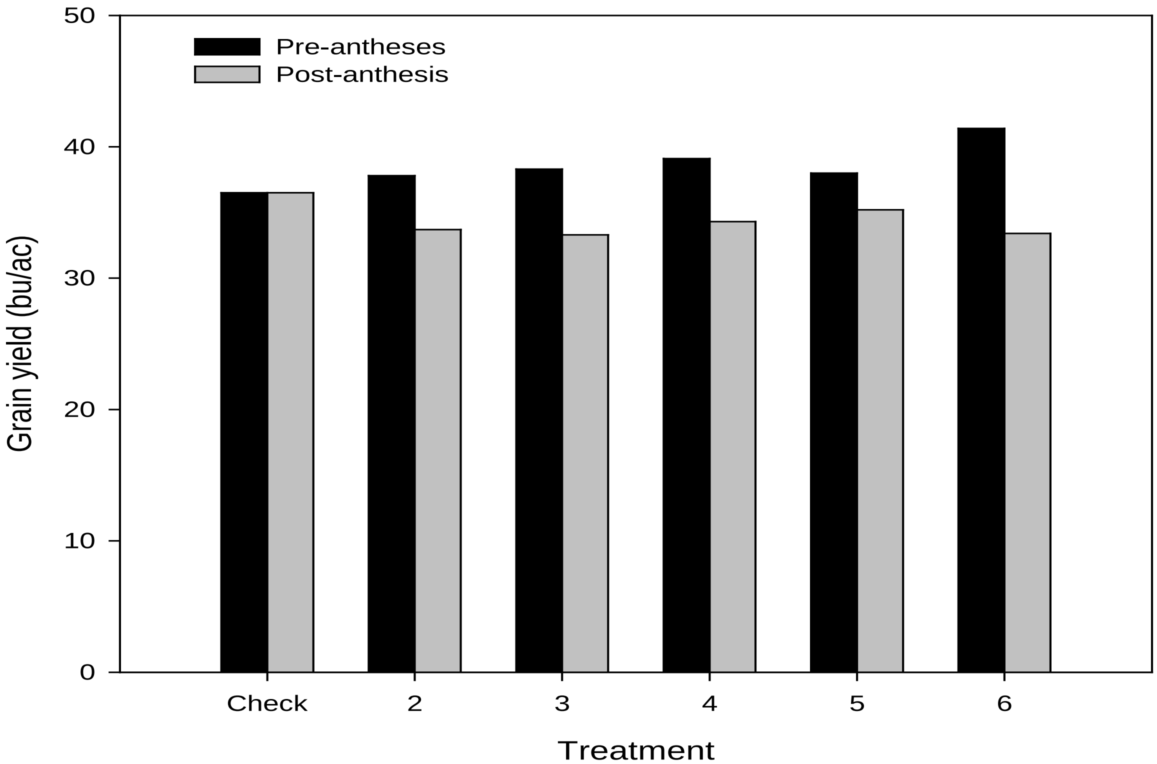


Figure 2. Wheat grain yields for the Valent Bio-Sciences drought stress study for the rain-fed site at OPREC in 2012.


Pre-antheses
Post-anthesis
Grain yield (bu/ac)
0
10
20
30
40
50
Check
2
3
4
5
6
Treatment

BRDi PROJECT - BIOMASS YIELD AND QUALITY OF THREE BIOENERGY FEEDSTOCK PRODUCTION SYSTEMS IN OKLAHOMA

Gopal Kakani, Department of Plant and Soil Sciences, Oklahoma State University

INTRODUCTION

The Oklahoma Panhandle Research and Extension Center (OPREC), Goodwell, OK, will play a pivotal role in disseminating research based information to Bioenergy Feedstock producers in the region. The Abengoa Bioenergy Biomass of Hugoton, Kansas is expected to begin operations by late 2013 or early 2014. The plant has annual installed bioethanol capacity of 25 Mgal and 22 MW of renewable energy from biomass. As the plant grows in capacity there is potential to expand the acres into cellulosic bioenergy feedstocks for enhanced energy efficiency.

The overall objective of this project is to develop the practices and technologies necessary to ensure efficient, sustainable, and profitable production of cellulosic biomass. This project addresses the needs and concerns of diverse stakeholders both within the cellulosic biorefinery industry and the public at large. Using large-scale feedstock production research fields, the economic and environmental sustainability of switchgrass, mixed species perennial grasses, and annual biomass cropping systems will be evaluated. Synergy between bioenergy and livestock production will be explored through dual-use (grazing plus biomass harvest) cropping system experiments. Feedstock quality characteristics, as desired by the biorefinery industry, will be assessed under varied harvest, handling, storage, and preprocessing scenarios. Sophisticated production and logistics economics models will use the data produced from the field-sized experiments to determine if an integrated landscape vision of diversified species can provide a flow of feedstock throughout the year to a cellulosic biorefinery at a cost that will enable cellulosic biofuel to compete with gasoline.

OBJECTIVES

The research project at OPREC is one of the multi-location testing environments for Oklahoma. The main objectives of this study are:

1) Develop best management practices (BMPs) for sustainable large-scale establishment and production of feedstocks.

Switchgrass has been identified as the model second generation feedstock for cellulosic biofuels production because of its high yield potential, broad adaptability, indigenousness to North America, perennial life-form, and low fertilization requirements (McLaughlin and Kszos, 2005; Schmer et al., 2008). As the cellulosic biofuels refining industry matures, evaluation of feedstock BMPs for agronomic, environmental and economic efficiency is needed. Due to the slow establishment of perennial grasses such as switchgrass, high biomass sorghums could play a critical role in cellulosic feedstock production because of their rapid growth rates, ease of establishment and low input requirements. The BMPs for switchgrass, mixed grasses, and high biomass sorghum include definition of potential feedstock yields and quality across a wide geographic region, proper establishment methods, planting times, soil fertility and water requirements, and procedures for harvesting and storing feedstock to meet year-round feedstock supply needs of cellulosic biofuel refineries. The management practices associated with establishment and maintenance of alternative biomass feedstocks has consequences for carbon sequestration, greenhouse gas production, and water use. Nitrogen (N), harvest frequency, harvest timing, cultivar, and rainfall are the major factors determining biomass yields of cellulosic feedstocks. This study will evaluate best planting methods of switchgrass and nitrogen fertility requirements of switchgrass, mixed-grasses, and high biomass sorghum in small-plot studies conducted at OPREC, Goodwell, OK.

2) Enhance diversity, productivity, and resiliency through development of mixed species bioenergy production systems.

Planting diverse, mixed-species systems (switchgrass and other perennial grass species in various ratios) may be advantageous to monoculture systems for cellulosic biomass production. Mixed-species systems in the form of Conservation Reserve Program (CRP) lands and rangelands are already present across marginal lands in the Great Plains region. Biorefineries will require a year-round supply of biomass, pointing to a need for multiple biomass sources. Furthermore, CRP contracts are set to expire and sustainable uses of these lands are needed or they may convert back to annual row crop production. Returning these lands to row crop production is expected to result in diminished environmental benefits associated with growing perennial grasses on marginal lands, including soil conservation, soil carbon sequestration, protection of water quality, and support of wildlife habitat. High-diversity grasslands had greater bioenergy yields and net ecosystem carbon dioxide sequestration than that of low-diversity grasslands, suggesting positive benefits of planting mixed-species systems on marginal lands for cellulosic feedstock production. Whether these results can be replicated at the field-scale in the Great Plains is a question that remains to be answered.

MATERIALS AND METHODS

Objective 1

An experiment consisting of and three bioenergy cropping systems switchgrass “Alamo”, mixed grasses (Switchgrass “Alamo”, Big bluestem “Kaw”, and Indian grass “Cheyenne”), and high biomass sorghum “Blade 5200” as main plots and five nitrogen treatments - winter legume (crimson clover (*Trifolium incarnatum* L.) in 2012), 0, 84, 168 and 252 kg N ha^{-1}) as subplots were planted in April 2012. Plots of 8 m x 8 m dimension were established at the OPREC and replicated four times. The switchgrass, mixed grasses, and energy sorghum were seeded at rates of 5.04, 7 and 9.5 kg ha^{-1} of pure live seeds using a Truax no-till planter. All sorghum plots were fertilized on 3 June 2012, switchgrass was fertilized on 19 April and energy sorghum on 4 May. The five different N treatments were applied to plots arranged in a split plot randomized design with three replications to generate plots with varying yield potential. In the split plot design, species was the main plot and fertilizer treatment was the subplot.

Objective 2

The species diversity, production potential and resiliency is evaluated through varying ratios of switchgrass (SWG), big bluestem (BB) and Indian grass (IG). The three species selected are native to Oklahoma, dominant species of tall grass prairies across USA, and also recommend by NRCS for planting CRP acres. Treatments include control (100% of each species), 50SWG+ 25BB+25IG, 50BB+25SWG+25IG, 50IG+25SWG+25BB. Plot size is 50 m x 20 m and replicated three times. Dry biomass yield was collected after frost kill in November, 2012. Data on stand density, composition, biomass yield and quality were evaluated. Also, data will be analyzed using a split-plot design with the site as the main treatment and species composition as sub-plots.

RESULTS

Weather

Following 2011, year 2012 was another exceptionally dry and hot year at OPREC (Fig. 1). The site received only 12.47 inches during the growing season. As this was the first year of establishment, an additional 13.75 inches of irrigation was provided through lateral sprinkler system.

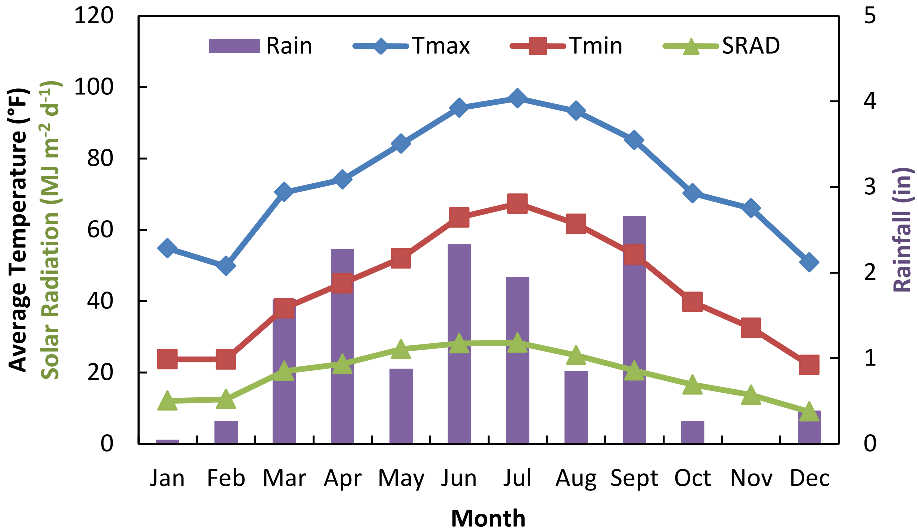


Fig. 1. Monthly average maximum and minimum temperature (Tmax and Tmin), solar radiation (SRAD) and total rainfall (RAIN) during 2012 at Goodwell, OK.

Objective 1

Figure 2 shows yields of different cropping systems under different nitrogen treatments. In the establishment year, sorghum yielded almost twice as that of switchgrass or mixed grass plots. High biomass sorghum produced a maximum dry biomass of 16.5 Mg ha^{-1} at 75 kg ha^{-1}. No significant yield difference was recorded between 75, 150 and 225 kg ha^{-1} treatments. No fertilizer treatments were imposed on grass plots. However, the mixed grass stands appear to produce higher biomass that monoculture of switchgrass. The yield difference in mixed grass plots could be due to differences in stand density in establishment year. The observed yield differences could even out in subsequent years as grasses achieve maximum biomass in third year and beyond. The causes for yield difference in grass plots will be examined in detail in 2013 and beyond.

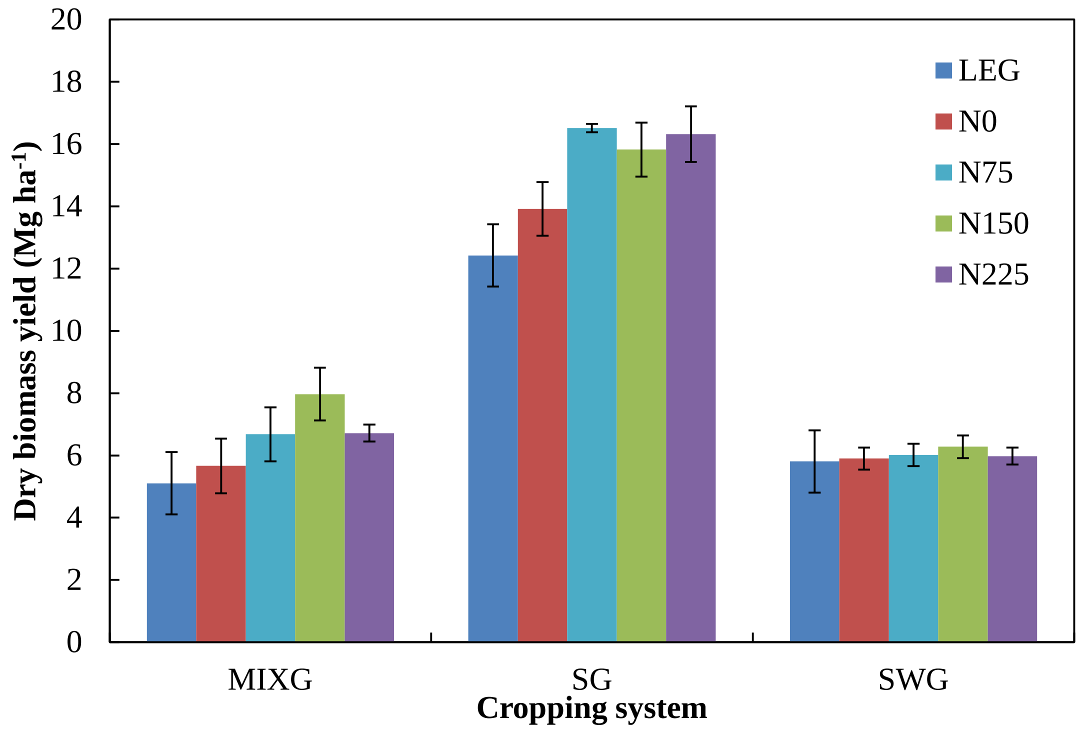


Fig. 2. Dry biomass yield under different nitrogen treatments of different bioenergy feedstock cropping systems at OPRS, Goodwell, OK. The species were established in April 2012 and harvested in November 2012. Only sorghum was fertilized in 2012. Grasses were not fertilized as this was the establishment year to avoid weed growth.

Objective 2

In Figure 3, biomass yields of different grass mixtures are presented. Both switchgrass monoculture (8.7 Mg ha^{-1}) and switchgrass dominated mixture treatment (8.9 Mg ha^{-1}) resulted in the highest biomass yield. The monocultures of big bluestem and Indian grass had relatively lower yields. However their mixture with switchgrass and the other remaining species increased the biomass yields compared to monocultures. Mixture of BB with IG and SWG increased yield by 96%, while the yield increase was 50% for IG with BB and SWG, over their respective monocultures. Further evaluation of the mixtures beyond the establishment year, under rainfed conditions, is essential for establishing the potential of the feedstocks in this region.

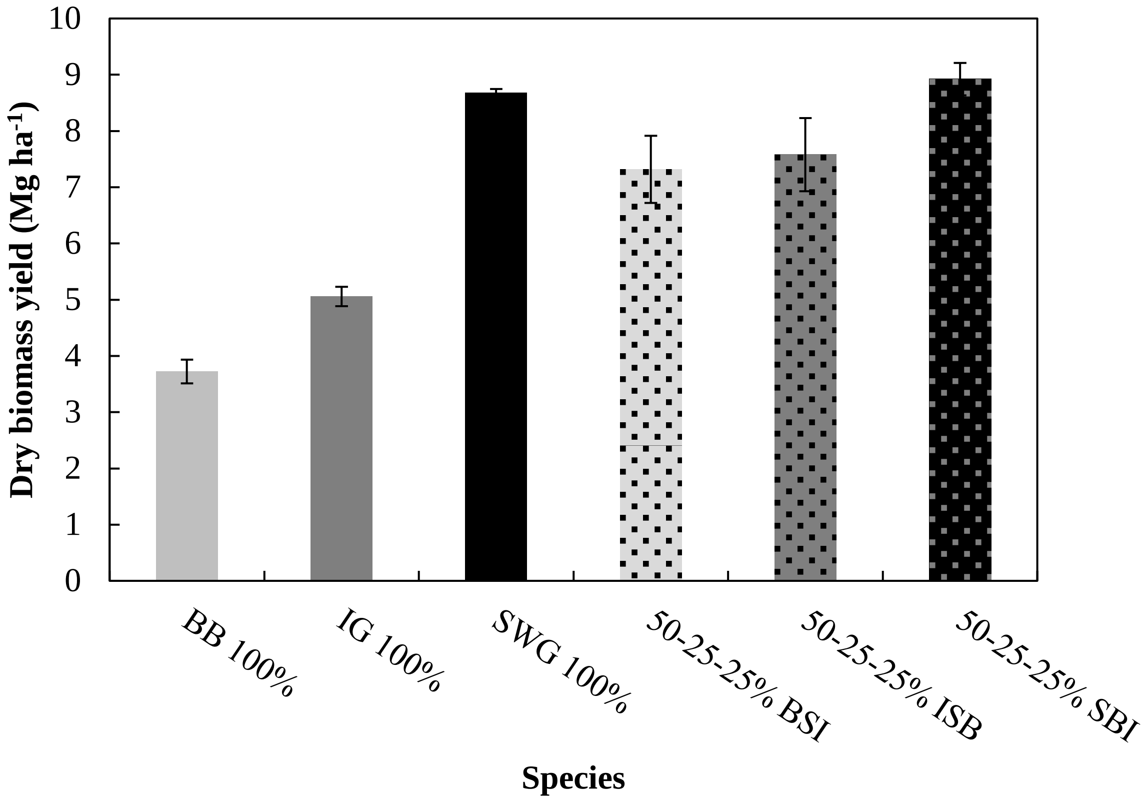


Fig. 3. Dry biomass yield of monoculture of different species (control) and their mixtures. The species include BB/B – Big bluestem, IG/I – Indian grass and SWG/S – Switchgrass. The percentages represent the composition of each species at planting. Planting was in April 2012 and harvesting was done in Nov 2012.

CONCLUSIONS

The yields of 2012 were obtained with an additional 13.75 inches of supplemental irrigation. However, as native grasses are drought and heat tolerant and can be grown under marginal conditions, the true biomass potential of these various treatments will be revealed in 2013 and beyond. The plots will be rainfed during 2013 and beyond, and nitrogen treatments will be imposed on the grass plots.

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

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

A study was initiated in 1999 to evaluate four different dry-land cropping rotations and two tillage systems for their long-term productivity in the panhandle region. Rotations evaluated include Wheat-Sorghum-Fallow (WSF), Wheat-Corn-Fallow (WCF), Wheat-Soybean-Fallow (WBF), and Continuous Sorghum (CS). Soybean and corn were not successful in the first five years of the study; therefore in 2004 cotton replaced soybean and sunflower replaced corn in the rotation, also continuous sorghum was replaced with a grain sorghum-sunflower (SF) rotation. Starting in 2010, the study was changed again and only sorghum was grown. Tillage systems include no-till and minimum tillage. Two maturity classifications were used with all summer crops in the rotations until 2001, at which time all summer crops were planted with single maturity hybrids or varieties. Most dry-land producers in the panhandle region utilize the WSF rotation. Other rotations would allow producers flexibility in planting, weed management, insect management, and marketing.

Results

Climate

The latest drought started at OPREC in September of 2010. In August of 2010 the station received 5.42 inches of rainfall. In the period from September 1, 2010 through August 31, 2011 the station received only 6.11 inches of precipitation with 2.05 inches of that coming in August of 2011 which was too late for any summer crop production. From September 1, 2011 to August 31, 2012 the station received 14.54 inches of precipitation which is also below the average of 17.89 inches. This two year drought has reduced grain yields on both summer and winter crops below what has been raised in the past at OPREC. This is shown in results for both wheat and grain sorghum (Figures 1 and 2)

Eight of the last thirteen summers have been below average rainfall for the months of June – August (Table 1). The two driest periods were 2001 and 2011 with 16.5% and 35.6% of normal. The two years with the highest grain sorghum yields were 2009 and 2010 which is surprising since 2009 was below average rainfall and 2010 was above average.

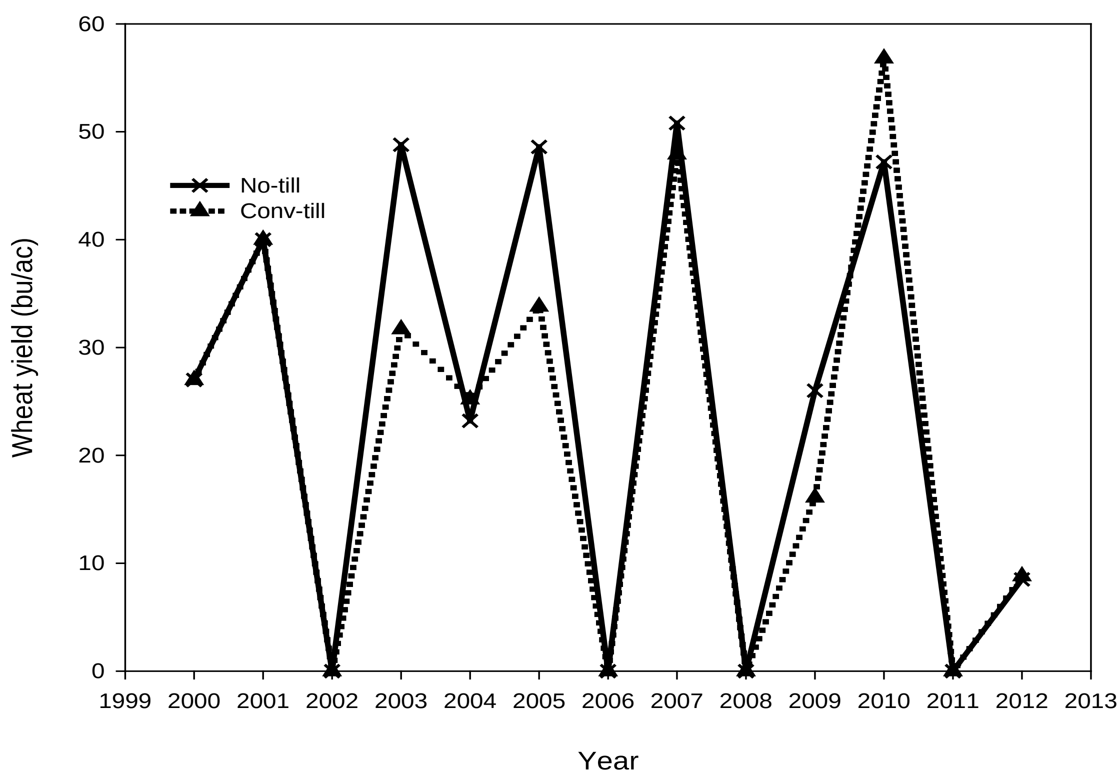
Table 1. Summer growing season precipitation at OPREC

Month	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Long-term mean
June	2.29	0.61	1.32	5.26	3.82	2.01	2.34	1.62	1.51	1.74	3.16	0.53	2.33	2.86
July	0.76	0.00	2.52	1.87	2.43	1.40	2.05	2.00	3.77	2.58	1.22	0.17	1.95	2.58
Aug	1.09	0.66	0.27	1.19	2.87	3.21	4.06	0.26	5.64	1.36	5.42	2.05	0.85	2.28
Total	4.14	1.27	4.11	8.32	9.12	6.62	8.45	3.88	10.7	5.68	9.80	2.75	5.13	7.72

Wheat

No wheat was harvested in 2002, 2008, and 2011 due to drought, and 2006 due to a hail storm. This report will focus on wheat yields following grain sorghum, because in some years other crops never emerged or were lost to other factors.

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

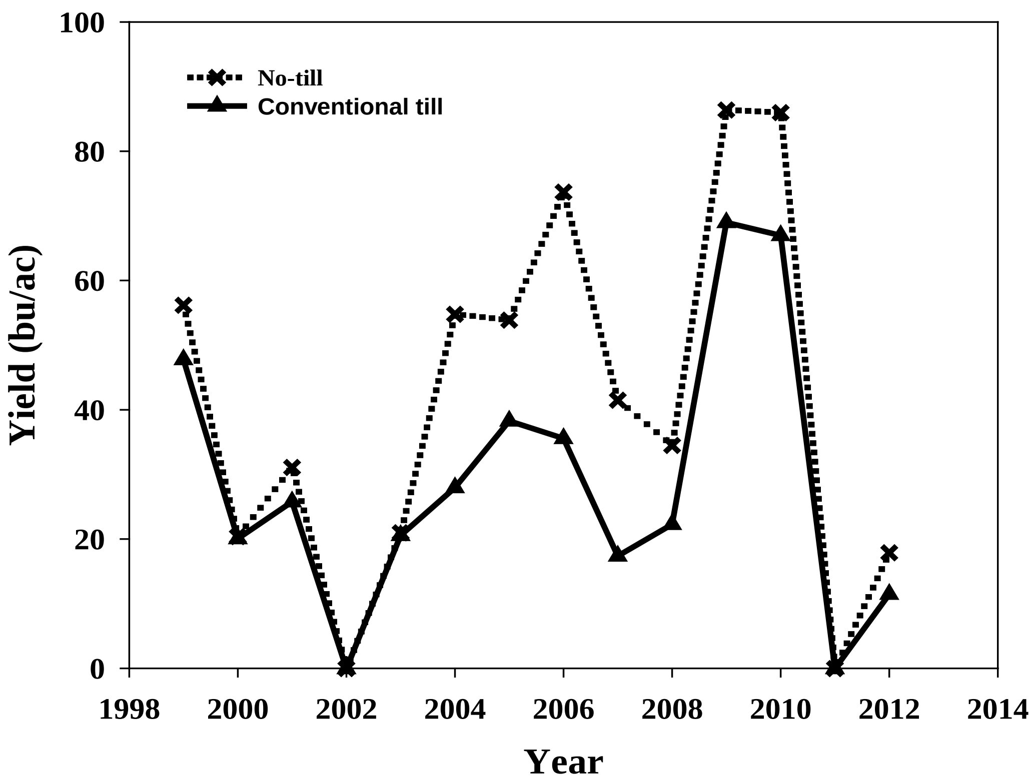


Neither tillage system produced, or will produce grain when drought occurs and no crops are harvested as in 2002, 2008, and 2011 (Figure 1). In three of the seven years that wheat was harvested, grain yields were significantly higher for no-till (Fig. 1) with an average increase of 14 bu/ac. In 2010, yields for conventional tillage were significantly higher than for no-till. Research conducted by Kansas State University at Tribune, they have shown a consistent increase in grain yield for no-till that hasn't yet been observed in this study.

Grain Sorghum

As with wheat, when no precipitation is received the tillage system makes no difference since no sorghum was harvested (see 2002 and 2001 fig. 2).

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



Since 2004, grain sorghum yields have been significantly higher for no-till than conventional tillage. This increase in sorghum grain yields was in year 6 or the third time through the rotation. This yield difference was also observed and reported by researchers at Kansas State University at the Tribune location. In 2004, 2006, and 2007 no-till grain yields were double those for minimum tillage.

NO-TILL CROPPING INTENSITY STUDY

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In the fall of 2010, a study was initiated to determine if increasing cropping intensity for rainfed no-till rotations is possible. Previous work at OPREC has shown significantly higher yields for no-till grain sorghum in the wheat-sorghum-fallow rotation (WSF) when compared to minimum tillage. Grain yields for wheat have been inconsistent with no-till and minimum tillage each having significantly higher yields in some years. With no-till generally showing an increase in yields, it was determined to see if cropping intensity would affect the yield of grain sorghum and wheat. The intensity and timing of selected crops will alter fallow periods from short fallow periods during the winter (when evaporation is least) to the long term standard of approximately 14 months. Shifting the fallow period may allow more intense rotations without affecting yields of grain sorghum. The rotations are wheat-fallow-wheat (WFW) long term standard, wheat-grain sorghum-fallow (WSF) present standard, wheat-double crop sesame-grain sorghum-safflower-wheat (WMSSa) most intense rotation, wheat-cover crop-sorghum-wheat (WMSW), wheat-sorghum-safflower-wheat (WSSaW), and continuous wheat (CW). Plots are 30 ft X 30 ft and will be planted with appropriate equipment and harvested with Kincaid 8XP plot combine.

Crops were selected to increase intensity based on when they could be planted and harvested. Sesame was selected because it would work as a double crop following wheat, and is a crop that is drought tolerant and flowers best when temperatures are warm. Safflower was selected because it could be planted in late March and harvested in early August, therefore wheat could be planted following harvest. Also Safflower is a broadleaf crop which may help with weed control. One cover crop treatment was selected to determine the value of cover crops in rotation.

Results

In 2010 no crops were harvested due to the drought. In 2012 wheat, grain sorghum and safflower were harvested. Due to the drought and plots just being established, little information is available. For example: in 2012 continuous wheat and wheat-fallow-wheat yields were the same (3 bu/ac difference). This is attributed to the fact that no crops were established in 2011, therefore, continuous wheat and wheat fallow wheat were planted into identical soil profile moisture conditions. The precipitation during winter did allow for safflower to be planted and yields were respectable with the top yielding plot being over 800 lbs/ac with all plots averaging 576 lbs/ac. Safflower may have potential for this region due to the timing of the growing season; it was planted in March and harvested in July. Wheat was planted back in the fall and wheat harvest of this year will give an indication if planting wheat following a spring safflower crop will cause significant yield losses. Grain sorghum was planted and harvested, but part of the plots were sprayed and killed with roundup. The other plots averaged 24 bu/ac. As more information become available it will be published in the research highlights.

Evaluating Nitrogen Use Efficiency in Grain Sorghum

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Brain Arnall, Department of Plant and Soil Sciences, Oklahoma State University

In 2011 a multi-university project to evaluate nitrogen use efficiency in grain sorghum was initiated, the universities involved were Kansas State, Texas A&M, Arkansas, New Mexico State and Oklahoma State. Multiple locations in each state were planted, but due to drought condition in the southern plains only a few were harvested. There were to be two trials at OPREC, a limited irrigation and dry-land. In 2011 only the limited irrigated trial was planted, due to the lack of precipitation and soil moisture necessary for emergence. In 2012, both dry-land and the limited irrigated trial was planted and emerged. There were 14 core treatments at each location (Table 1). The limited irrigated trial at OPREC also included a 200 lb N/ac applied with coulter treatment and no additives.

Table 1. Nitrogen rates, source, additives, and application method on grain sorghum at ORPEC in 2011.

Trt	Application	Source	Additive	N Rate
1	Control			0
2	Coulter Band	UAN	None	30
3	Coulter Band	UAN	None	60
4	Coulter Band	UAN	None	90
5	Coulter Band	UAN	None	120
6	Coulter Band	UAN	None	150
7	Broadcast	UAN	None	60
8	Surface Band	UAN	None	60
9	Broadcast	Urea	None	60
10	Broadcast	Urea	Agrotain	60
11	Broadcast	Urea	Super U	60
12	Broadcast	ESN-urea	None	60
13	Coulter Band	UAN	Nutrisphere	60
14	Coulter Band	UAN	Agrotain Plus	60

Two other locations were also planted in north central Oklahoma, in 2011 neither was harvested, but in 2012 both were harvested and with lower than normal yields, no difference was found between treatments. The grain sorghum hybrid planted was DK 37-07, the plots were harvested with a Kincaid XP 8 combine with harvest master classic grain gauge instrumentation for plot weight, test weight, and grain moisture.

Results

Grain yields have been affected more by stand loss than N rate in the first two years of this study. This illustrates the importance of obtaining a soil sample that determines how much N is actually present in the soil. From the results of this study it is apparent more N was available than soil sample indicated. This can be explained by soil test results from another study at OPREC where nitrogen levels of 45 to 60 lbs/ac at a depth of 4 foot. No difference in yield was observed between application methods of surface band, broadcast, and coulter at rate of 60 lb N/ac. A difference was observed between the Nutrisphere additive when compared to surface band and broadcast application at the same N rate, this difference is explained by the stand loss. The loss of stand from Nutrisphere is difficult to explain. The stand loss for the 200 lb/ac rate can be explained by too high of a N rate, being too close to the seed.

Table 2. Harvest characteristics for limited irrigated grain sorghum NUE study at OPREC in 2011 and 2012.

N Rate	Two-year		2012	
	Yield bu/ac	Plants/ac	Yield bu/ac	Plants/ac
60 lbs UAN surface band	162	48,400	165	59,000
150 lbs UAN coulter	161	47,600	168	62,800
60 lbs UAN broadcast	160	50,800	162	65,500
60 lbs Super U broadcast	158	51,500	164	67,400
60 lbs Urea broadcast	157	46,600	164	59,000
30 lbs coulter	156	46,600	158	56,400
60 lbs ESN broadcast	156	45,900	161	56,500
0 check	155	49,000	159	61,600
60 lbs Urea Agrotain	154	45,800	157	53,900
90 lbs UAN coulter	150	44,800	164	60,300
120 lbs UAN coulter	150	40,900	145	44,600
60 lbs UAN Agrotain Plus coulter	149	47,100	149	54,700
60 lbs UAN coulter	148	42,100	146	47,400
60 lbs UAN Nutrisphere coulter	137	35,700	136	38,800
200 lbs UAN coulter	132	36,600	127	40,700
Mean	152	42,300	155	55,200
CV %	10	21	12	19
L.S.D.	15	9,400	NS	15,400

Post Emergent Grass Control in Grain Sorghum

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In 2012 in conjunction with DuPont chemical company, for the first time a grain sorghum hybrid was planted that was tolerant to post emergent grass control herbicides. The hybrid was tolerant to ALS inhibitor herbicides and will have the trade name Inzen Z™. This resistance trait was bred into sorghum from wild relatives by Kansas State University, making it non-genetically modified organisms (non-GMO). Since the resistance came from wild relatives and could potentially move from the grain sorghum back to johnsongrass and shattercane, best management practices will be **CRITICAL** for the long-term viability of the technology. The present timetable for release for Inzen AII is a limited supply of seed in 2014 with adequate seed supplies in 2015. A release date for Inzen AII is not known.

Results

In 2012 the hybrid was planted to evaluate and demonstrate tolerance to the herbicides. The Inzen Z™ herbicide formulation has not been determined as of yet, but we can report that the resistance was passed into the hybrid and is tolerant to the grass control herbicide from the ALS inhibitor mode of action. Also, the hybrid used in 2012 did not exhibit the yellowing during the early growth stages observed in 2010. Johnsongrass was the most common grass weed at the OPREC trial location and infestation was heavy as seen in pictures below, control has been excellent all years the grain sorghum has been evaluated.

Overview of ALS tolerant grain sorghum one week after application

Check plot of ALS grain sorghum one week after application

Header Efficacy in Grain Sorghum Harvest

Andrew Slavens, Wesley Porter, Randy Taylor and Rick Kochenower

Grain sorghum is a popular crop throughout Oklahoma. One advantage of grain sorghum is that it can be grown as a row crop or solid seeded. However, grain sorghum can present challenges during harvest when compared to other crops. The primary harvesting challenge for grain sorghum is cutting/gathering at the header. Another challenge is cleaning. This field survey was directed at quantifying header loss during grain sorghum harvest. Kernel loss is common in all crops but losing grain heads during harvest can become a significant and devastating loss with grain sorghum because individual heads contain many kernels. Specific headers perform better than others at preventing both grain and head losses. Special attachments are also available for certain headers that aid in the retention of grain and heads.

The main objective of this survey was to measure and quantify header loss during grain sorghum harvest with different combine headers and attachments.

Methods

Sorghum harvest field surveys were performed from August 9-25, 2012. Six different combine headers were used during this survey. The locations and headers selected for this survey were based on the producers' willingness for cooperation and headers available. The headers included were two - 30' flex headers (one with milo finger attachments one without), two- 20' row crop headers, one- 35' draper header (with milo finger attachments), and one- 25' flex header (without milo finger attachments). Header losses were measured by collecting full grain heads, threshing and weighing the seeds from the heads, and counting the number of seeds left behind from selected areas in the field. This data was combined and quantified into a loss of yield (pounds and bushels/acre).Header loss collections were performed at four to six different locations within the field during the harvest process with each header. The header loss locations were covered using a method shown in Figure 1. This method ensures total combine loss was not a factor in the collections. Header loss was calculated for each of the headers based on the individual seed weight from the collected heads and seed count per unit area collected from. The seeds collected from the heads were weighed and loss was calculated for the 40 ft^2 area and the individual seed counts converted to weights had the loss calculated for a four $foot^2$ area from each collection site. These calculated loss numbers were then converted to pound per acre yield loss.

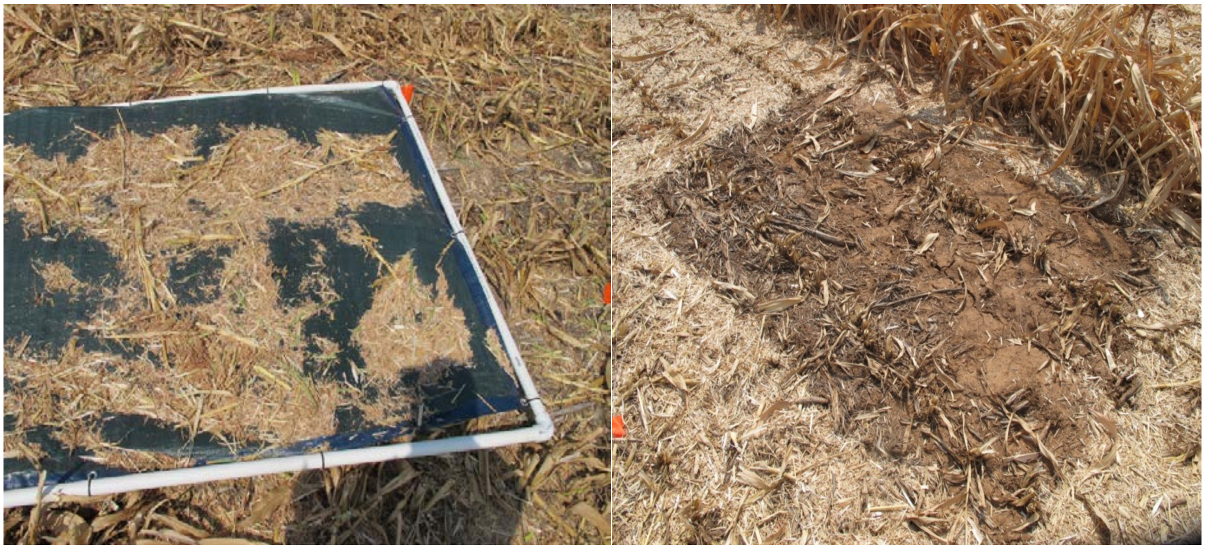


Figure 1: 5’x8’ area covered (left) and the 5’x8’ area uncovered (right).

As the combine header passed, the harvest loss aids were placed directly behind the header as the machine continued to move forward. The chaff was allowed to fall on the survey area (Figure 2). After the harvester passed, the harvest loss aids were removed for proper collection and analysis of the harvest loss survey area. Harvest loss was calculated by counting the number of seeds within four one foot square frames thrown at random within the five foot by eight foot survey areas (Figure 3). The use of a protective covering frame is important to prevent any machine loss from being counted as header loss. This method also allowed the survey to occur without the combine operator having to stop during their harvest process.

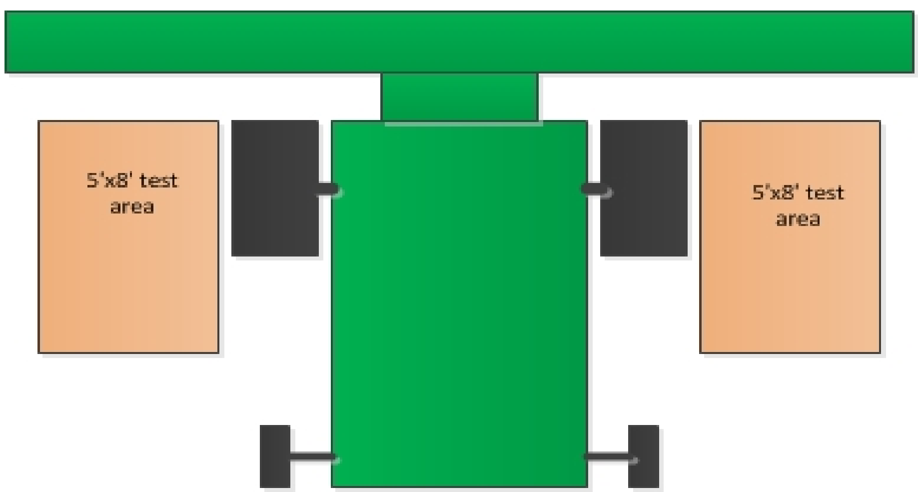


Figure 2: Representation of the two 5’x8’ collection areas directly behind the combine header.

Figure 3: 5’x8’ area with 4-12”x12” boxes thrown at random.

Milo heads from the header loss during harvest were collected from within the 40 ft^2 area. The heads were threshed and the seeds weighed. The seed weights collected from the heads were converted to a pound per acre loss for each head that did not make it into the combine. Figures 4 and 5 represent common header platforms and milo accessories used throughout the state.

Figure 4: Plastic and Metal Milo Finger Attachments.

The milo finger attachments in Figure 4 are used to aid in guiding stalks into the cutter bar on the combine header. These attachments are very useful in lower yielding environments where plant stalks may have broken over. The attachments will aid in lifting the heads on the broken stalks back into the machine and keep cut heads from falling to the ground before they can be gathered in the header.

Figure 5: Row Crop header harvesting low yielding grain sorghum.

Results

Significant yield losses were found in fields one and five. These losses are attributed to running the header too high leaving shorter and lodged heads. Fields three and six gave direct comparisons between two headers in the same field. In field three the draper header (DH) with metal fingers performed slightly better than the flex head (FH) in the same field conditions. On an interesting note, the draper header lost more heads than the flex header even though it had metal finger attachments (Figure 4). The only potential explanation for this is that field three was harvested with headers operating very close to the ground. Though this will greatly increase the material other than grain entering the combine, it will help minimize head loss. In field six the row crop (RC) head performed very well losing only 1% while the grain platform lost 4.9% in the same field. Ignoring fields 1 and 5, the row crop headers averaged 2.7% header loss and the flex headers averaged at 11% header loss. The grain platforms averaged 4.5% header loss. Since only on header did not have attachments, it is not possible to assess their benefits from this study.

Table 1: Header loss data 2012 Milo Harvest

Header	Attachments	Field	Head loss (lb/ac)	Seed loss (lb/ac)	Total Loss (bu/ac)	Estimated Yield	% Yield loss
FH	yes	1*	1648.9	32.5	28.7	80	35.9
FH	yes	2	75.0	99.8	2.9	24	12.2
FH	no	3	31.1	173.4	3.4	35	9.8
DH	yes	3	136.8	29.4	2.5	35	8.1
RC	N/A	4	120.9	7.1	2.2	50	4.3
RC	N/A	5*	774.3	86.6	14.7	37	39.6
RC	N/A	6	6.6	14.1	0.4	42	1.0
GP	yes	6	102.0	22.8	2.1	42	4.9
GP	yes	7	57.2	9.4	1.1	25	4.4

*Fields were harvested high leaving lodged and shorter heads.

Conclusions

Minimizing crop loss during harvest should always be a priority, but it becomes even more important in poor production years similar to 2011 and 2012 when crop harvest conditions are less that optimal. Factors such as plant height and quality play important roles in correct platform selection. Overall farmers should consider their options for best platform selection. Row crop headers in this survey performed the best as far as percent loss from the header, but may require more maintenance and added cost when compared to other headers. Rigid platforms performed well in low yielding and thin stands of milo with 4.5% average header loss when used with heavy plastic milo finger attachments. Flex platforms performed the poorest in this survey with 11% average header losses. The single Draper platform tested had a header loss of 8.1%. In conclusion selection of the proper platform header depends on specific field conditions and is best left up to the discretion of the producer.

EFFECTS OF CORN STOVER HARVEST ON SOIL QUALITY INDICATORS AND IRRIGATED CORN YIELD IN THE SOUTHERN GREAT PLAINS

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Corn fields in Southwest Kansas and the Oklahoma Panhandle have been identified as potential sources of crop residue to serve as cellulosic feedstock for a new cellulosic ethanol plant. Research in other locations has shown that crop residue harvest can have negative impacts on soil quality such as increased erosion, reduced soil nutrient content, and a loss of soil organic carbon. These changes in soil quality can reduce crop productivity and reduce the potential for soil carbon sequestration under no-till management in the region. These detrimental effects of stover harvest might be reduced by partial residue removal and the utilization of cover crops. However, no data are available for the high-yielding, irrigated conditions on the Southern High Plains. Additionally, the impacts of strip-tillage on these soil quality characteristics have not been studied in this region. The impacts of residue removal, strip-tillage, and cover crop utilization may differ from those found in the Midwestern US because the soils, climate, and cropping systems are different. Therefore, the objectives of this study are to evaluate the effects of full and partial corn stover removal and the use of winter cover crops on soil carbon storage in no-till and strip-till management systems.

Materials and Methods

A field experiment was initiated in October 2009 at the Oklahoma Panhandle Research and Extension Center at Goodwell, OK. The treatment structure includes three strip-till treatments that differ only by the amount of residue removed. One has no residue removed and represents the standard irrigated corn production system. All residue is removed from a second strip-till treatment, and 50% of the corn residue is removed from the other treatment. A fourth strip-till treatment has all residue removed and a cover crop of winter wheat planted after corn harvest. The final treatment is no-till with all residue removed. The experiment is a randomized complete block design with four replications. The plots are 6 corn rows wide and 30 feet long. Ground cover was measured three times in 2010, twice in 2011, and three times in 2012 using downward facing digital photographs taken at a height of 1.2 m and analyzed using SamplePoint software. Saturated hydraulic conductivity and bulk density of the 0-5 cm (0-2 inch) soil layer were measured using intact 5.0 cm diameter samples collected on 30 October 2010, 01 March 2012, and 11 October 2012. Yield data were subjected to two-factor ANOVA with treatment and block as the factors.

Results and Discussion

A primary concern related to corn residue harvest is the increased potential for wind erosion due to inadequate ground cover. Conservation tillage systems may be rendered ineffective for wind erosion prevention by the practice of residue harvest. Typically, a tillage system must maintain <70% bare soil (or >30% residue cover) after planting to qualify as conservation tillage. The strip-till treatment with 100% residue removal exceeded this threshold in May 2010, and March and May 2011 (Fig. 1). Likewise, the no-till treatment with 100% removal had >70% bare soil in March and

May 2011. Therefore, these management practices leave the soil vulnerable to wind erosion. Removing just 50% of the corn residue offered a marginal level of protection against erosion with maximum bare soil exposure reaching 60% in May 2011. The control (strip-till with no residue removal) and the strip-till plus cover crop treatment with 100% residue removal offered more protection against erosion as indicated by bare soil exposure consistently below 50%.

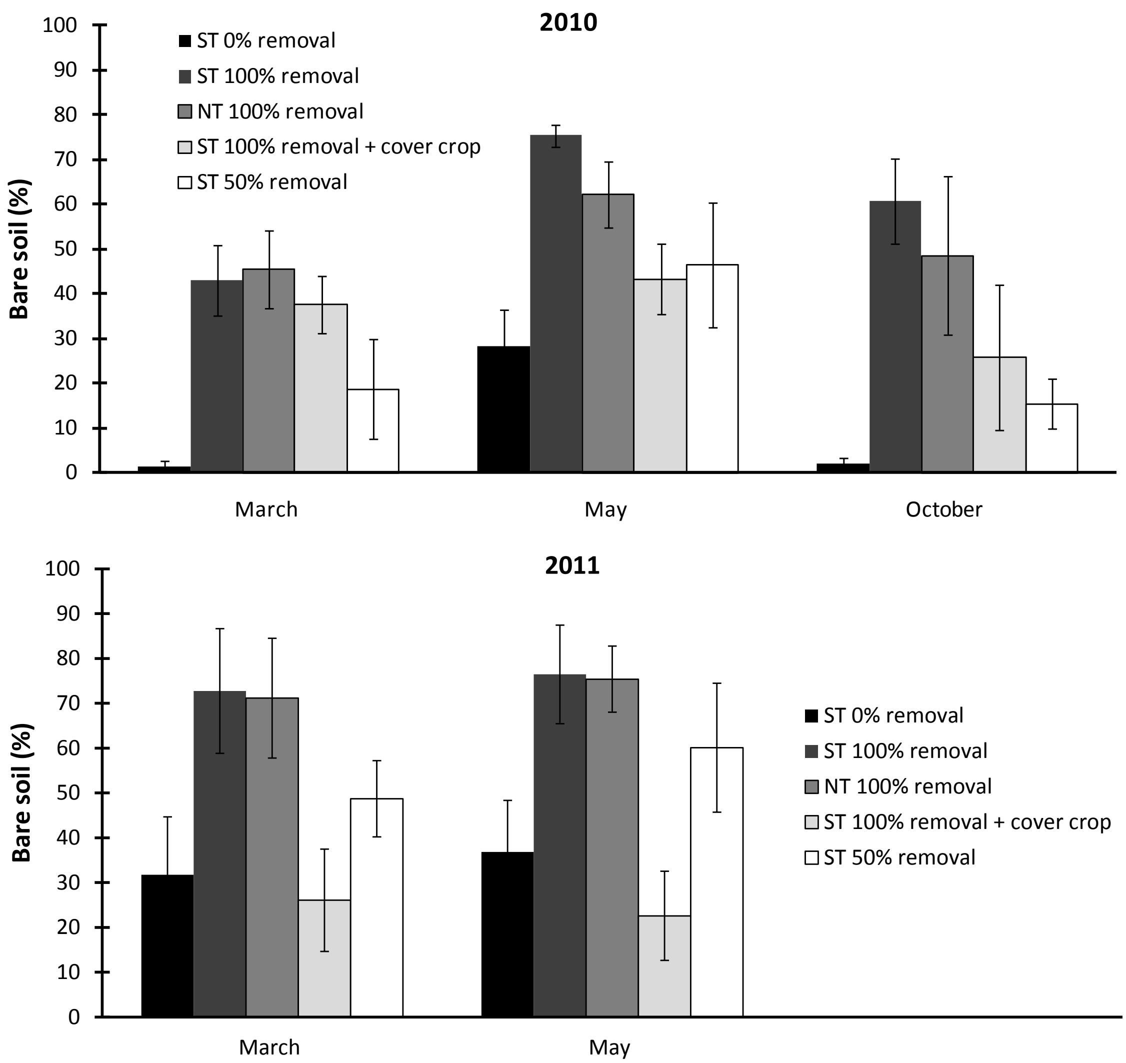

Fig. 1. Percent bare soil during March, May, and October 2010 and March and May 2011 for strip-till (ST) with 0%, 50%, and 100% residue removal, for no-till (NT) with 100% residue removal, and for strip-till with 100% residue removal and a winter wheat cover crop. Corn was planted in all treatments in April and harvested in September. Vertical bars represent ± one standard deviation from the mean.

Soil samples collected on 30 October 2010 show highest saturated hydraulic conductivity and lowest bulk density under the strip-till plus cover crop treatment (Fig. 2 a). Figure 2 b and c, show the saturated hydraulic conductivity and bulk density of soil sample collected on 01 March 2012 and 11 October 2012, respectively. On these two dates the highest hydraulic conductivity and lowest bulk density was observed from strip-till with 100% residue removal.

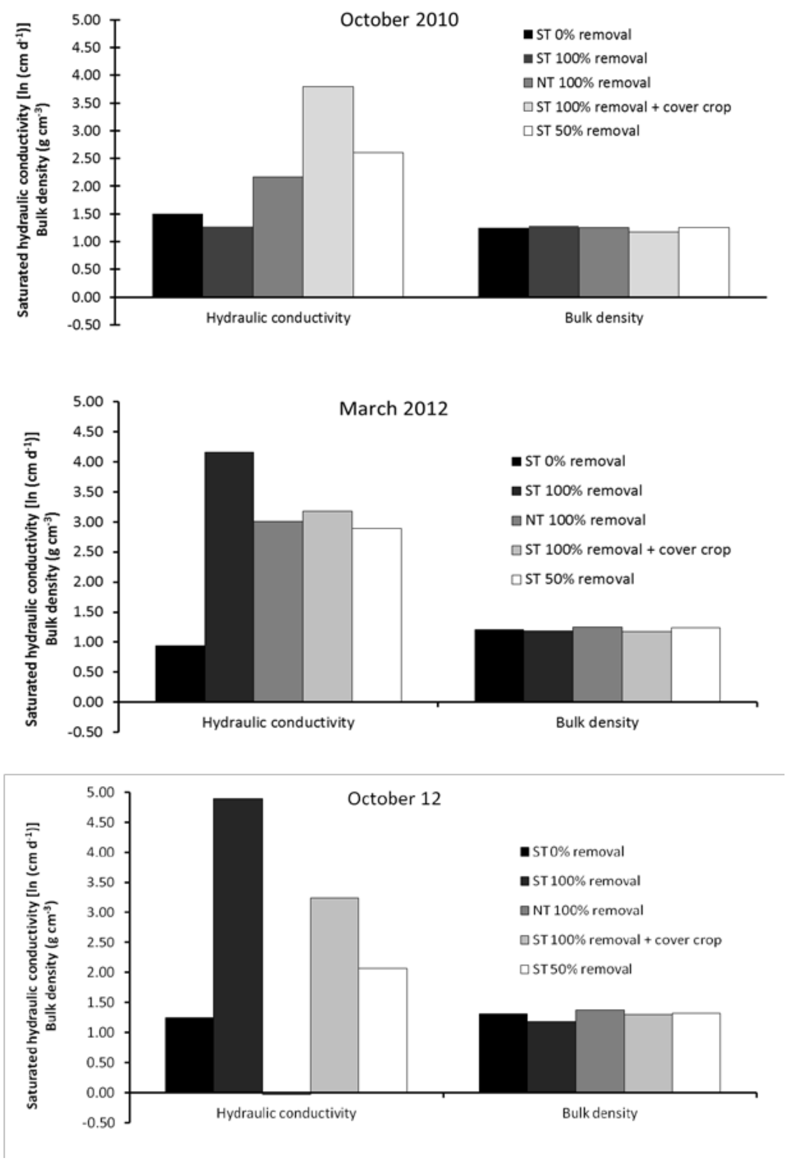

Fig. 2. Saturated hydraulic conductivity and bulk density for the 0-5 cm soil depth under strip-till (ST) with 0%, 50%, and 100% residue removal, for no-till (NT) with 100% residue removal, and for strip-till with 100% residue removal and a winter wheat cover crop. Corn was planted in all treatments in April and harvested in September. Soil samples collected in 30 October 2010, March 01, 2012, and October 11, 2012.

Table 1. Effects of tillage (ST = strip till, NT = no till), residue removal, and cover crop treatments on saturated hydraulic conductivity (K_{sat}) and bulk density (BD) for the 0-5 cm layer on three sampling dates.

	K_{sat}	BD
	ln(cm d^{-1})	g cm^{-3}
	October 2010	
ST 0% removal	1.50 a	1.22 cd
ST 100% removal	1.28 a	1.29 a
NT 100% removal	2.17 a	1.29 ab
ST 100% removal + cover crop	3.79 a	1.18 d
ST 50% removal	2.61 a	1.24 bc
	March 2012	
ST 0% removal	0.945 b	1.20 ab
ST 100% removal	4.16 a	1.18 b
NT 100% removal	3.00 ab	1.26 a
ST 100% removal + cover crop	3.18 ab	1.18 b
ST 50% removal	2.90 ab	1.23 ab
	October 2012	
ST 0% removal	1.25 bc	1.32 ab
ST 100% removal	4.90 a	1.18 c
NT 100% removal	-0.024 c	1.38 a
ST 100% removal + cover crop	3.24 ab	1.31 b
ST 50% removal	2.06 bc	1.32 ab

Corn yields average from 84 to 104 bu ac^{-1} in 2010, 61 to 72 bu ac^{-1} in 2011, and 69 to 114 bu ac^{-1} in 2012 (Table 2). In 2010 and 2011 there was no statistically significant (p<0.05) differences between treatments. Numerically, for these two growing seasons, the lowest average yields occurred in the no-till and strip-till plus cover crop treatments with 100% residue removal. In 2012 there was a significant difference in treatment on the yield among treatments. A significantly higher yield was observed from strip-till plus cover crop; while the lowest yield was observed from strip-till with 100% residue removal.

Table 2. Average corn yields (1 standard deviation) for residue removal treatments in 2010, 2011, and 2012

Treatment	**2010**	**2011**	**2012**
		bu ac^{-1}	
ST 0% removal	104 (55)	72 (13)	97 (31) ab
ST 100% removal	100 (37)	73 (8)	69 (17) b
NT 100% removal	87 (32)	62 (9)	85 (50) ab
ST 100% removal + cover crop	84 (36)	61 (19)	114 (28) a
ST 50% removal	92 (42)	64 (26)	81 (54) ab

Corn Planting Date

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

Previous research at OPREC indicated that the optimal planting date for a 114 day maturity corn is near or on April 10th for the central Oklahoma panhandle (Table 1). Data for a 107 day maturity corn was the same (data not shown). Recent research from Texas has suggested that a June planting date may produce higher yields due to lower temperatures during pollination. Therefore in 2012, a planting date study was again established at OPREC with selected planting dates of April 10, May 10, and June 10. The maturity was a 113 day corn. Corn was planted following wheat and double crop sunflowers in 2011. Plots were planted in four 30-inch rows by 30 feet long with a target plant population of 32,000 plants per acre. The two center rows were harvested for grain yield with a Kincaid 8XP plot combine.

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

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

†Yields with same letter not significantly different
Data was not collected in 2002 or 2005 due to irrigation well problems.

Results

As with previous research, April 10th appears to be the optimum date for corn planting with the highest grain yield and test weight observed on the April 10th planting date (Table 2). Although the May 10 planting date was 87.5% of the April 10 planting date, no statistical difference was observed. Both the April 10 and May 10 dates were significantly higher than the June 10 date, which was 69.8% and 79.7% of the grain yield for April 10 and May 10, respectively. Part of the yield difference can be attributed to the difference in test weights with the April 10 having a 2.5 and 5 lb/bu higher test weight than May 10 and June 10, respectively. Different results may be obtained when planting corn following corn. Thus in 2013 planting date studies will be established following both corn and sunflowers.

Table 2. Mean grain yields and test weights for corn planting dates at OPREC in 2012.

Planting date	Grain yield (bu/ac)	Test weight (lb/bu)
April 10	225	58.9
May 10	197	56.4
June 10	157	53.9
CV %	8.1	1.0
L.S.D.	32	0.9

Valent Bio-Sciences Corn Drought Stress Product Evaluation

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In 2012 with Valent Bio-Sciences two studies were established at OPREC to evaluate a product on corn to reduce drought stress and increase grain yields. The study had 4 treatments: a check and three rates of a product sprayed when the second visible leaf collar was observed. Corn was planted on June 28th with a 105 day maturity corn. The product was sprayed on July 11th. Irrigation was removed on July 23rd and resumed on August 13th. A five foot moisture profile was present at planting. Starting on July 28th, for the next 10 days at 9 am and 3 pm temperature was recorded and plots were evaluated for leaf rolling using a scale of 1-9, with 9 completely rolled. Plant heights were determined at 50% silk and recorded. Plots were harvested with a Kincaid 8XP combine and grain yield, test weight, and moisture was determined.

Results

As would be expected leaf rolling was always worse at 3 pm than at 9 am and rolling was worse on day 10 than it was on day 1 of the evaluation. But, surprisingly the 9 am treatments didn't change as much as did the 3 pm treatments. The morning treatments generally were in the 2-3 range for all 10 days, which was an indication that the plants possibly recovered overnight. The afternoon ratings started at 6-7 and by day 7 were at 9, but cooler weather on days 8 and 9 82 and 80°F, respectively, reduced curling. The other seven days, temperature ranged from 96 to 103°F at the afternoon rating. No difference was observed among treatments for any observations. Grain yield, test weight, and moisture can be found in (Table 1).

Table 1. Grain characteristics for Valent Bio-Science corn drought product study at OPREC in 2012.

Treatment	Grain yield (bu/ac)	Test weight (lb/bu)	Moisture %
Check	93	49.0	17.0
2	87	48.7	16.9
3	91	48.9	16.8
4	91	48.8	17.1

Comparison of Grain Sorghum and Corn Productivity under Limited Irrigation with Subsurface Drip

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Introduction:

In 2012 an effort was initiated to simultaneously evaluate the production potential of corn and sorghum under limited irrigation using the subsurface drip irrigation systems at the Oklahoma Panhandle Research and Extension Center. The drought conditions of the past 2 years combined with declining pumping capacities have spurred this effort to determine at what irrigation capacity if any sorghum will become a more profitable crop. This effort will be continued and intensified through funding from the Oklahoma Water Resources Research Institute in 2013.

Materials and Methods:

This research utilized the subsurface drip irrigation system located at the Oklahoma Panhandle Research and Extension center. This system provides individually plumbed experimental units that can be irrigated independently. These plots are 50 ft. long and 15 ft. wide. The drip tape is placed at 14 inches below the soil surface at 60 inch spacing such that one tape irrigates 2 rows which are space 30 inches apart. The emitters on the tape are placed 12 inches apart and will emit a maximum of 0.63 inches/hour. This system allowed us to include 12 treatments, each replicated 4 times.

The experiment was initiated with the planting of 3 corn treatments April 15 which were irrigated with pumping capacities of 0.19, 0.25, and 0.34 inches/day. Three additional corn treatments and 6 sorghum treatments were planted on June 6th. The corn treatments were irrigated with 0.19, 0.25, and 0.34 inch/day irrigation capacities. The sorghum treatments included a dryland treatment receiving no irrigation and treatments receiving 0.06, 0.13, .019, 0.25, and 0.34 inches/day. Although, the drip system does allow us to apply these rates daily, we did not because we wanted to make an effort to simulate the irrigation frequency required when using a center pivot system. Therefore, an application rate of 1.5 inches was used for each treatment, making irrigation intervals for the above mentioned treatments 28.0, 14.0, 9.5, 7.0, 5.7 days, respectively. Irrigation events were scheduled using the Aquaplanner software available at www.aquaplanner.com. This tool identified early season irrigation requirements meant to maintain soil moisture and late season requirements as the crop water use declined. Mid-season irrigation frequency was dictated by the maximum pumping capacities mentioned above.

Corn was planted at a population of 34,000 seeds/acre and the sorghum was planted at a population of 60,000 seeds/ac for higher well volumes and 28,000 seeds/ac for the rain-fed and lowest well volume. Five gallons of 10-34-0 was applied in the row at planting. Prior to planting corn plots received 250 lbs N $acre^{-1}$ as liquid UAN (28-0-0) and sorghum plots received 180 lbs N $acre^{-1}$ as Liquid UAN (28-0-0) with a strip-till applicator.

Results:

The April planted corn became heavily infested with spider mites, which combined with drought conditions resulted in an average yield of 65 bushels/acre for these three treatments and no significant differences. The June planted corn was slightly more successful as shown in figure 1 along with the sorghum yields.

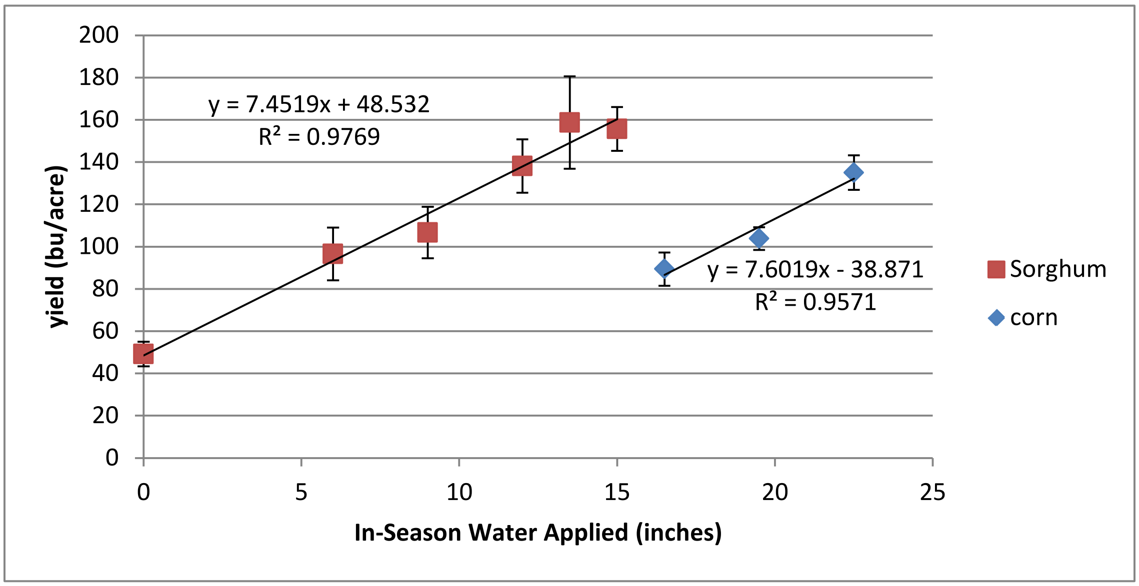

Figure 1: Corn and sorghum yields as a function of water applied after planting of each crop on June 8, 2012.

Yield response to each inch of water applied was similar for the two crops as indicated by the similar slopes of 7.5 and 7.6 bushels/inch for sorghum and corn respectively. As expected the yield potential of the corn crop was greatly reduced by the late planting date which prevented full development of the crop.

Continued Effort:

This study will be continued in 2013 with funding from the Oklahoma Water Resources Research Institute. An altered treatment structure will be imposed. Specifically, all corn treatments will be planted in mid-April and sorghum treatments will be planted in early June.

The experimental design will consist of 6 sorghum treatments and 6 corn treatments. Four of the sorghum treatments and 4 of the corn treatments will simulate application rates achievable with well pumping capacities shown in table 1 when applied to 125 acre center pivot. The sorghum treatments will include all pumping capacities included in the table except for the 800 gallon/minute. The corn treatments will include all pumping capacities listed except for the 100 gal/min rate because this is well below the require water for irrigated corn. One of the remaining treatments for each crop will serve to optimize water use efficiency by applying daily applications of water at a rate sufficient to replace water losses due to evapotranspiration as estimated by the Aquaplanner software. The final treatment will receive irrigation based on recommendations provided by the Aquaspy soil moisture probe. The Aquaspy treatments will maintain soil moisture above 50% of measured field capacity in one of treatment replicates. This will be sufficient for its demonstration as an irrigation scheduling tool. When used in field scale applications a single probe is used for a whole field (often 125 acres). The experimental area used for this study will be approximately 1.5 acres therefore spatial variability will be negligible compared to that found in a producer's field. The Aquaspy and Aquaplanner treatments will be applied without restrictions that could result from limited water availability. These treatments will serve to demonstrate the maximum production achievable when using subsurface drip irrigation in combination with these scheduling technologies.

Table 1: Pumping capacities, application intervals, and resulting application rates for basic irrigation treatments.

Well Capacity	Applicatio n/Interval	Minimum Irrigation Interval	Application Rate	
Gallons/min.	Inches	Days	GPM/acre	inches/day
800	1.5	5.3	6.4	0.28
600	1.5	7.1	4.8	0.21
400	1.5	10.6	3.2	0.14
200	1.5	21.2	1.6	0.07
100	1.5	42.4	0.8	0.04
Treatments are meant to simulate a center pivot system irrigating a 125 acre circle with specific well pumping capacities. GPM, Gallons/minute.				

Aquaspy probes will also be installed in the 600 gal/min treatment for corn and the 400 gal/min treatments for the sorghum. Monitoring these treatments will provide demonstration of soil moisture response to an irrigation schedule, required by limited irrigation water availability, using intervals suitable for a center pivot system.

GreenSeeker™ Sensor in Irrigated corn production

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The Green Seeker™ sensor plots were established to demonstrate the use of the sensor and N-Rich strip in the high yield production system of the Oklahoma Panhandle. The trials consisted of five nitrogen (N) rates replicated four times. The N treatments were 0, 50, 100, 150 and 200 lbs. N ac^{-1} applied at planting. No side-dress fertilizer was applied because the plots needed to go to final grain yield without additional N to evaluate the ability of the sensor to predict yield. Green Seeker™ Sensor normalized difference vegetative index (NDVI) readings were collected from the plots at the eight leaf stage. The purpose of using the sensor is to collect the data needed for the Sensor Based Nitrogen Rate Calculator (SBNRC) that is located on the www.NUE.okstate.edu website.

Final grain yield ranged from 130 to 156 bu ac^{-1}, Table 1 show the treatment averages. In 2012 the environment likely impacted final yield and nitrogen demand. Table 1 shows that the check (zero N) treatment actually yielded better than all fertilized treatments. This also indicates that there was likely a high amount of residual nitrate in the sub-soil or a great deal of N was released though breakdown of organic matter. In the statistical analysis replication of a significant variable but there was no significant treatment differences for grain yield, grain moisture, or test weight.

Over time NDVI readings and yield data collected from this trial will be combined to refine the Corn Yield Prediction model to be regionally specific to irrigated corn grown in the Oklahoma Panhandle.

Table 1. Treatment averages for grain yield, grain moisture, and test weight across the six nitrogen (N) rates.

N Rate lb/ac	Yield Bu/ac	% Grain Moisture	Test Weight lb/bu
0	156	13.0	56.7
200	151	13.7	57.1
50	150	12.4	57.2
150	140	13.4	57.9
250	134	13.3	56.8
100	130	12.3	57.1

Corn Seed Spacing Uniformity as Affected by Metering System

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W.R. Raun, and R. Kochenower Department of Plant and Soil Sciences, Oklahoma State University

Abstract. *Vacuum seed metering systems are one of the most common methods for singulating corn seed. Much of the attention related to improving down-the-row seed spacing has been directed at improving metering systems. A 4-row John Deere 7300 row crop planter was used to test three planter metering systems (standard corn, ProMAX 40, and Precision Planting's eSet). Tests were conducted at three locations in Oklahoma representing three different growing environments and thus seeding rates in 2011 and one location with two environments in 2012. Four travel speeds (3, 5, 7, and 9 mph) were randomized with each seed meter plot. After emergence, plant spacing was measured in 10 feet within the center two rows of each plot. There was no distinct advantage for planting below 5 mph for any meter. For planting at the two highest travel speeds, meter selection will have an impact on overall plant spacing, as indicated in the mean and standard deviation of plant spacing.*

Objective

The objective of this study was to determine the effect of corn metering devices and ground speed on uniformity of corn plant spacing in the row.

Methods

A John Deere MaxEmerge II (Model 7300) planter was used in this study. The tests were conducted in a split-plot design with seed meter replicated three times as the primary factor. The meters tested were a John Deere standard corn disk and housing (STD), a John Deere ProMAX 40 seed disk and standard housing (Pro40), and Precision Planting's eSet disk and housing (eSet).

Four travel speeds were randomized within each seed meter plot. The travel speed was regulated via a throttle, gear selections, and monitored on the dashboard indicator. Target travel speeds were the same for all locations (3, 5, 7, and 9 mph). The vacuum level was set in the alleys prior to the advancement through the plots at the throttle level the tractor would be traveling to maintain proper level. There were two tillage treatments used in the study, strip till (ST) and no-till (NT). Each row unit was equipped with a Keaton seed firmer and row cleaners were used in the no-till plots, to clear the furrow area. The vacuum levels used for the vacuum system was the typical level indicated by the seed size and plate type in the planter user manual and meter user guide. The target seeding rate was about 32000 seeds per acre. The seeding rate for the ProMAX 40 was inadvertently set too high in 2011 due the fact that sprockets were not changed and the disk has 40 cells as opposed to 30 on the other two disks.

In 2011 the plots were 50 feet long. In 2012 plot length was increased to 60 feet long. The increase in plot length was to provide longer distance for the higher travel speeds. Plots were 10 feet wide in both years.

Within the center two rows of each plot, 20 feet was staked to measure plant spacing after emergence. A length was recorded at each plant to the nearest 0.5 inch. The measurements indicated a spacing value between plants were compared to the desired plant spacing, based on planting density and found in the planter charts. The data was used to calculate mean plant spacing, standard deviation in plant spacing, misses, multiples and precision of each metering system as defined by ISO Standard 7256/1-1984. An analysis of variance test with statistically significance level of 0.1 was used to determine statistically similar groups in the resulting data according to the Duncan method. SPSS (2010) was used as the statistical package in the analysis. Each location, meter and travel speed was considered as a treatment.

Analysis and Results

There was no statistical difference in mean plant spacing between 3 and 5 mph for individual metering disks (data not shown). This indicates that planting below 5 mph did not influence final stand. The STD metering disk had significantly different mean plant spacing at both 7 and 9 mph for the Goodwell Strip Till site/years. The STD metering disk Goodwell no-till plot had no significant differences in mean plant spacing, which was an unexpected result, due to the differences in the smoothness of the planting bed when compared to the strip till plots as well as the speed of the metering disk being the highest at the Goodwell sites. Comparing STD and eSet meter systems, the results show that the meters did produce different mean spacing at 3 site/years at the highest travel rate, indicating that although the disk was spinning at the same rate, some other factor was influencing the spacing measured in the field.

As in mean spacing, the STD meter system has some significant differences in standard deviation (table 1) at the two higher travel speeds and the influence of planting density amplify these trends. ProMAX standard deviation is not influenced by travel speed, having only one instance that is contrary to this result (Goodwell/2011) which may have been due to the extremely high planting density caused by a mistake in setting the planter as previously noted.

Table 1. Standard deviation of spacing for each site/year in inches

Treatment		Site/year		
Meter	**Speed, mph**	**Goodwell 2011 ST**	**Goodwell 2012 ST**	**Goodwell 2012 NT**

STD	3	2.4^{b,c}	2.4^{a,b}	2.6^{a}
	5	3.1^{c}	3.0^{a,b}	3.7^{a,b,c}
	7	4.0^{d}	7.1^{c}	5.6^{b,c}
	9	5.9^{e}	6.1^{c}	5.1^{a,b,c}
ProMAX	3	1.6^{a}	2.0^{a}	5.7^{b,c}
	5	2.2^{a,b}	2.4^{a,b}	3.0^{a,b}
	7	3.0^{c}	2.8^{a,b}	6.3^{c}
	9	4.3^{d}	3.7^{a,b}	4.1^{a,b,c}
eSet	3	2.1^{a,b}	2.4^{a,b}	2.4^{a}
	5	2.2^{a,b}	2.2^{a,b}	3.1^{a,b}
	7	2.7^{b,c}	3.3^{a,b}	3.2^{a,b}
	9	2.8^{b,c}	4.0^{b}	4.5^{a,b,c}

Letters appearing on chart indicate the statistical similar groups within each column (site).

The percent of skips are shown in table 2. The Goodwell /2011plot had results indicating that skips by the eSet was not influenced by travel speed. However, for the 2012 results, the eSet did have some variance with travel speed. The ProMAX meter system was influenced at the higher travel rates with the higher planting rates at the Goodwell location having the highest percent skips in this test. At Goodwell, 7 and 9 mph have significantly greater skips than 3 mph in all three site/years for standard and ProMax and two of three site/years for eSet systems.

Table 2. Percent skips for each meter and speed by location.

Treatment		**Site/year**		
Meter	**Speed, mph**	**Goodwell 2011 ST**	**Goodwell 2012 ST**	**Goodwell 2012 NT**
STD	3	11.2^{a,b}	10.4^{a,b,c}	12.1^{a,b}
	5	14.7^{b}	15.3^{b,c,d}	14.2^{a,b,c}
	7	22.8^{c}	34.6^{e,f}	27.9^{d,e}
	9	28.7^{d}	34.3^{e,f}	24.0^{c,d,e}
ProMAX	3	7.2^{a}	17.5^{c,d}	20.5^{b,c,d}
	5	8.5^{a,b}	29.6^{e}	30.3^{d,e,f}
	7	21.8^{c}	32.7^{e,f}	40.6^{f}
	9	30.2^{d}	39.5^{f}	34.7^{e,f}
eSet	3	7.6^{a}	9.0^{a,b}	7.8^{a}
	5	7.7^{a}	7.3^{a}	12.6^{a,b,c}
	7	9.1^{a,b}	17.7^{c,d}	21.2^{b,c,d}
	9	12.1^{a,b}	20.6^{d}	24.2^{c,d,e}

Letters appearing on chart indicate the statistical similar groups within each column (site).

The percent of doubles in relation to speed were less than the percent of skips (table 3). The Pro40 meter system has higher percentage of doubles at the two higher speeds at Goodwell. The larger amount of multiples for the ProMAX meter system at Goodwell/2011 may have been due to the incorrect and higher planting rate that was noted earlier. The standard meter system generally produced the most doubles at the two highest travel rates and planting density (Goodwell site/years). For the standard meter, 9 mph produced significantly greater doubles than 3 and 5 mph.

Table 3. Percent doubles for each meter and speed by location.

Treatment		Site/year		
Meter	**Speed, mph**	**Goodwell 2011 ST**	**Goodwell 2012 ST**	**Goodwell 2012 NT**
STD	3	3.9[a]	1.0[a]	3.2[a,b]
	5	3.6[a]	8.2[b,c,d]	9.9[c]
	7	10.4[d]	8.7[c,d]	8.7[b,c]
	9	16.2[e]	8.9[c,d]	15.9[d]
ProMAX	3	7.2[b,c]	2.8[a]	4.9[a,b,c]
	5	11.8[d]	2.9[a]	3.9[a,b,c]
	7	18.5[e]	4.0[a,b]	4.0[a,b,c]
	9	19.2[e]	9.7[d]	8.0[b,c]
eSet	3	3.8[a]	2.5[a]	1.0[a]
	5	5.2[a,b]	1.9[a]	6.4[a,b,c]
	7	9.9[c,d]	8.1[b,c,d]	6.4[a,b,c]
	9	10.0[c,d]	4.7[a,b,c]	7.4[a,b,c]

Letters appearing on chart indicate the statistical similar groups within each column (site).

Conclusion

The performance of the meter systems are influenced by travel speed and seeding rate. The higher seeding rates (Goodwell locations), had the higher amounts of misses. Multiples had no clear relation with seeding rates or travel speed. Precision did not differ with seeding rate, but varied with travel speed. Tillage practices did not have a significant impact on performance of any meter at any speed. There was no distinct advantage for planting below 5 mph for any meter. For planting at the two highest travel speeds, meter selection will have an impact on overall plant spacing, as indicated in the mean and standard deviation of plant spacing.

Other Project with no Reports

1. Two herbicide trials with Syngenta
    a. Kochia burn down in Corn
    b. New formulation of Lumax on sorghum
        i. Birds damage didn't allow for correct harvest

2. Herbicide study with BASF on grain sorghum

3. Two corn herbicide trials with DuPont

4. Soybean herbicide trial with DuPont

5. Corn strip trials with Monsanto and Pioneer

6. Soybean strip trial with Pioneer

7. Sunflower strip trial with Pioneer and Triumph

Extension Reports

OKLAHOMA CORN PERFORMANCE TRIALS, 2012

PRODUCTION TECHNOLOGY CROPS

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

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TRIAL OBJECTIVES AND PROCEDURES

Each year the Oklahoma Cooperative Extension Service conducts corn performance trials in Oklahoma. 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, maturity information, and trial locations were provided by the companies and were not validated by OSU; therefore, we strongly recommend consulting company representatives for more detailed information regarding these traits and disease resistance ratings (Table 1).

Irrigated test plots were established at the Oklahoma Panhandle Research and Extension Center (OPREC) near Goodwell and the Joe Webb farm near Guymon. Three rainfed trials were planted in north central Oklahoma near Burlington, Enid, and Ponca City. Fertility levels, herbicide use, and soil series (when available) are listed with data. Individual plots were two 25-foot rows seeded at a target population also listed with the data. Plots were trimmed to 20 feet prior to being harvested to determine grain yield. A separate ensilage trial was planted with 10 feet of one row harvested to determine yield. Experimental design for all locations was a randomized complete block with four replications. Grain yield is reported consistent with U.S. No. 1 grade corn (56 lbs/bu and adjusted to moisture content of 15.5%). Corn ensilage was harvested at later than optimum in 2012 with an average moisture content of 45.6% and production is reported as tons/ac adjusted to 65% moisture.

GROWING CONDITIONS

Drought affected corn state-wide. Adequate soil moisture was available at planting for all locations (Fig. 1). Planting started in early March in the body of the state with short delays due to precipitation. In the panhandle planting started early April and continued with short interruptions due to precipitation until completed. Minimal pre-irrigation was required for irrigated corn in the panhandle for emergence due to rainfall from September 2011 until planting. Temperatures during the growing season were at or above long-term means, but were not as hot as in 2011. In the panhandle no day was like June 26, 2011, when for most of the high plains temperatures were above 110 degree F° with wind speeds above 30 mph. In 2011 most of the damage and reduced yields to irrigated corn happened on this day. Irrigation well volume again was a critical factor for the yields in the region. Higher volume wells again had the highest yields, although unlike 2011 there were no complete failures in 2012. For the rainfed trials in north central Oklahoma, lack of precipitation limited yields at all locations, but the Ponca City location was the most severely affected. The trial at Ponca City was harvested but is not reported here. The trial received no precipitation during the months of May and June. Yields for the Trial at Burlington were affected by two hail-storms one in May and another

Highlights

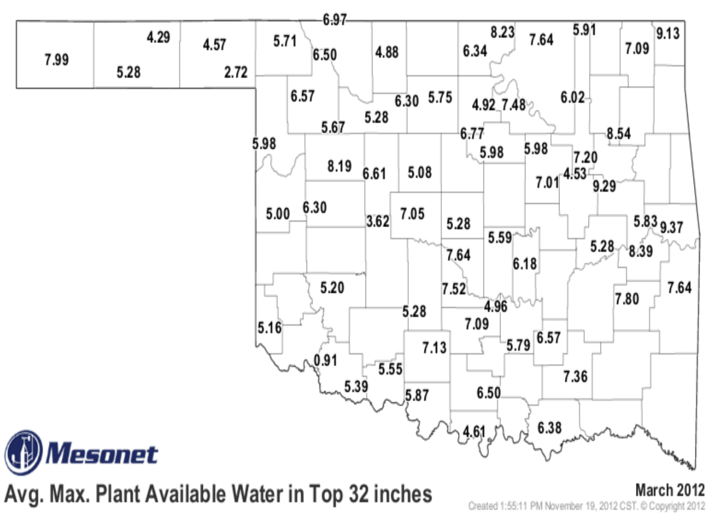
Drought affected corn yield in all of the state. Test weights were light for rainfed sites in north central Oklahoma. Irrigated corn yield with lower well volumes was also reduced. The Ponca City location was harvested but yields were from 12 to 33 bu/ac and not reported here. Yields for the Enid and Joe Webb location were exceptional for the climate conditions of 2012 in June. Due to lack of precipitation in late June and July, test weights were severely affected at all north central locations as seen in result tables. With the lower test weights, some producers were not able to market their grain. Limited water and irrigation well problems reduced the yields of the trials at OPREC in 2012. Due to greater well volume, higher yields were obtained at the Joe Webb location (circle with approximately 5.75 gal/min/ac) compared to OPREC (approximately 4.5 gal/min/ac).

RESULTS

Grain yield, test weight, harvest moisture, and plant populations for are presented in tables 2 - 6. Least Significant Differences (L.S.D.) are shown at the bottom of each table. Unless two entries differ by at least the L.S.D. shown, little confidence can be placed in one being superior to another. The coefficient of variation (C.V.) is provided as an estimate of the precision of the data with respect to the mean. To provide some indication of yield stability, 2-year means are also provided in tables. Producers interested in comparing hybrids for consistency of yield should consult these.

The following people have contributed to this report by assisting in crop production, data collection, and publication; Roger Gribble, Jeff Bedwell, Tommy Puffinbarger, Donna George, Lawrence Bohl, Jake Baker, Cori Woelk, Cameron Murley, and Craig Chesnut. Their efforts are greatly appreciated.

Figure 1. Average inches of plant available water in Oklahoma for March and April 2012.



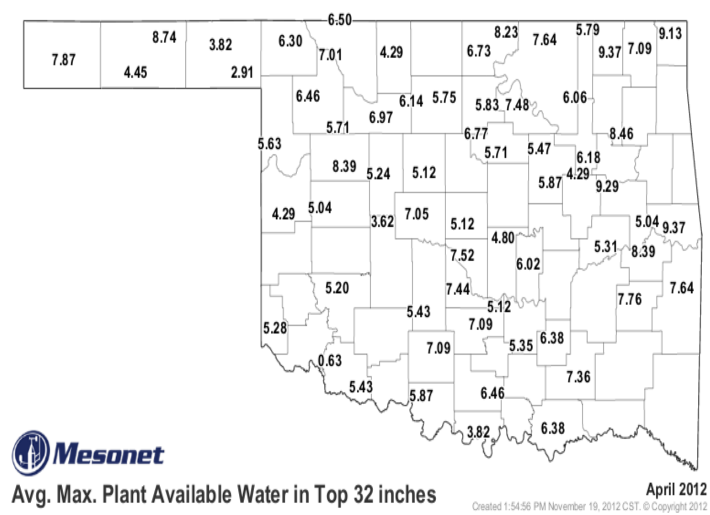


Table 1. Characteristics of Corn Hybrids in Oklahoma Corn Performance Trials, 2012.

Company Brand Name	Hybrid	Plant Characteristics SV	SS	SG	EP	Maturity Days	Trial Locations
Terral Seed, Inc	Rev™ 21HR33™	NA	NA	NA	NA	115	All
Terral Seed, Inc	Rev™ 22BHR43™	NA	NA	NA	NA	115	All
Terral Seed, Inc	Rev™ 28HR20™	7	7	7	MH	118	All
Terral Seed, Inc	Rev™ 23RE73™	NA	NA	NA	NA	116	All
Terral Seed, Inc	Rev® 28R10™	7	7	7	MH	118	All
Terral Seed, Inc	Rev® 25BHR63™	NA	NA	NA	NA	116	All
Terral Seed, Inc	Rev® 26HR50™	3	3	3	MH	116	All
Terral Seed, Inc	Rev® 27HR52™	NA	NA	NA	NA	117	All
Terral Seed, Inc	Rev® 26HR23™	NA	NA	NA	NA	116	All
Terral Seed, Inc	Rev® 27HR83™	NA	NA	NA	NA	117	All
Terral Seed, Inc	Rev® 29HR13™	NA	NA	NA	NA	119	All
Terral Seed, Inc	Rev® 24BHR93™	NA	NA	NA	NA	114	All
Terral Seed, Inc	Rev® 26R60™	7	6	7	M	116	All
Triumph Seed Co. Inc.	1217S	2	3	3	M	112	All
Triumph Seed Co. Inc.	1157X	2	4	3	M	111	All
Triumph Seed Co. Inc.	1725H	3	2	2	MH	117	Pan. Only
Triumph Seed Co. Inc.	7514S	3	3	3	M	114	Pan. Only
Triumph Seed Co. Inc.	1801H	2	2	2	H	118	Pan. Only
Triumph Seed Co. Inc.	TRX21366H	3	3	3	M	113	Pan. Only
Triumph Seed Co. Inc.	1358H	2	3	2	H	113	Pan. Only
Triumph Seed Co. Inc.	1329H	3	3	3	M	113	Pan. Only
Triumph Seed Co. Inc.	2288H	3	2	1	H	122	Pan. Only
CPS Dyna-Gro	D43QV30	1	2	2	M	103	NC only
CPS Dyna-Gro	D48VP93	3	3	4	M	108	NC only
CPS Dyna-Gro	D49VC59	2	2	4	M	109	NC only
CPS Dyna-Gro	D54VP81	3	3	2	M	114	NC only
Hoegemeyer	7644 Hx/LL/RR	5	5	4	M	106	All
Hoegemeyer	7876 Hx/LL/RR/CB	5	4	5	M	108	All
Hoegemeyer	7422 Rw/LL/GT/CB	3	4	3	M	104	All
Hoegemeyer	8389 HXT/LL/RR	5	4	3	H	113	All
Hoegemeyer	8122 HX/LL/RR	5	4	3	M	110	All

* 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

Trial locations: All; all trial locations, Pan.only; Panhandle trials only; NC only; North Central locations only

Table 3. Grain Yield and Harvest Parameters for the Alfalfa county location (Burlington), Oklahoma Corn Performance Trials, 2012.

Company Brand Name	Hybrid	Maturity	Grain Yield bu/ac	Test Weight lb/bu	Harvest Moisture	Plant Population plants/ac
Hoegemeyer	7644 Hx/LL/RR	106	55	47.2	10.6	26,100
CPS Dyna-Gro	D48VP93	108	52	47.0	6.5	27,700
CPS Dyna-Gro	D49VC59	109	48	47.8	6.7	22,700
CPS Dyna-Gro	D54VP81	114	48	48.8	10.2	26,200
Hoegemeyer	7876 Hx/LL/RR/CB	108	48	48.7	8.9	24,800
Triumph Seed Co. Inc.	1157X	111	45	47.2	6.9	25,400
CPS Dyna-Gro	D43QV30	103	45	46.7	8.7	23,600
Terral Seed, Inc	Rev™ 22BHR43™	115	44	51.2	11.5	25,200
Hoegemeyer	7422 Rw/LL/GT/CB	104	39	47.4	8.3	19,900
Terral Seed, Inc	Rev™ 21HR33™	115	34	48.0	8.7	24,900
Terral Seed, Inc	Rev® 25BHR63™	116	31	48.7	10.9	25,200
Triumph Seed Co. Inc.	1217S	112	31	45.6	9.4	24,200
Hoegemeyer	8389 HXT/LL/RR	113	31	50.9	18.1	25,800
Terral Seed, Inc	Rev® 26R60™	116	30	46.9	13.4	26,100
Terral Seed, Inc	Rev® 24BHR93™	114	29	48.9	21.8	23,300
Hoegemeyer	8122 HX/LL/RR	110	29	48.7	14.4	26,100
Terral Seed, Inc	Rev® 27HR52™	117	27	47.5	16.4	25,300
Terral Seed, Inc	Rev® 26HR50™	116	24	45.1	17.4	24,700
Terral Seed, Inc	Rev® 27HR83™	117	24	50.3	15.0	23,000
Terral Seed, Inc	Rev® 26HR23™	116	21	46.9	19.6	28,300
Terral Seed, Inc	Rev™ 28HR20™	118	20	49.0	19.7	27,400
Terral Seed, Inc	Rev® 28R10™	118	20	47.9	22.3	30,700
Terral Seed, Inc	Rev® 29HR13™	119	18	46.4	7.3	25,200
		Mean	34.4	48.0	12.7	25,300
		CV %	24.9	2.2	20.6	9.1
		L.S.D.	12	1.5	3.7	3,200

Cooperator: Schupbach Farms
No-till: Following soybean in 2011
Fertilizer: N: 44 lbs/ac, P: 0, K: 0, 5 gal 10-34-0 in row with planter
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)
Target population: 25,000 plants/ac
Planting Date: March 30, 2012
Harvest Date: July 31, 2012

Soil Series: Pond Creek Silt Loam
Soil Test: N: 91 P: 139 K: 831 pH: 6.0

Monthly Rainfall (in.)	Apr.	May	June	July	**Total**
2012:	2.88	0.96	2.18	0.65	**6.67**
Long term mean:	2.99	4.79	3.83	2.23	**13.81**

Table 3. Grain Yield and Harvest Parameters for the Grant/Garfield county location (Enid), Oklahoma Corn Performance Trials, 2012.

Company Brand Name	Hybrid	Maturity	Grain Yield bu/ac	Test Weight lb/bu	Harvest Moisture	Plant Population plants/ac
CPS Dyna-Gro	D54VP81	114	103	51.6	7.3	26,500
Triumph Seed Co. Inc.	1217S	112	101	48.8	6.1	27,600
CPS Dyna-Gro	D43QV30	103	100	48.8	6.3	28,200
Hoegemeyer	7422 Rw/LL/GT/CB	104	100	49.5	6.5	24,300
Terral Seed, Inc	Rev™ 22BHR43™	115	98	53.6	8.3	25,400
Triumph Seed Co. Inc.	1157X	111	98	48.5	6.3	27,300
CPS Dyna-Gro	D49VC59	109	98	50.4	7.2	28,900
Terral Seed, Inc	Rev™ 21HR33™	115	95	49.6	6.1	26,400
Hoegemeyer	7876 Hx/LL/RR/CB	108	94	51.5	7.0	24,300
CPS Dyna-Gro	D48VP93	108	93	50.2	6.7	28,400
Hoegemeyer	7644 Hx/LL/RR	106	92	49.7	6.6	27,100
Terral Seed, Inc	Rev® 26R60™	116	91	49.9	12.3	26,700
Hoegemeyer	8389 HXT/LL/RR	113	89	52.8	12.0	24,700
Terral Seed, Inc	Rev® 25BHR63™	116	82	51.1	7.9	24,600
Terral Seed, Inc	Rev® 26HR23™	116	82	53.1	13.3	28,500
Terral Seed, Inc	Rev® 27HR83™	117	82	51.0	8.6	26,200
Terral Seed, Inc	Rev® 24BHR93™	114	81	50.9	10.2	26,900
Terral Seed, Inc	Rev® 26HR50™	116	80	51.2	12.1	26,100
Hoegemeyer	8122 HX/LL/RR	110	80	51.3	8.3	24,900
Terral Seed, Inc	Rev® 28R10™	118	78	52.0	11.2	30,300
Terral Seed, Inc	Rev® 29HR13™	119	78	49.8	9.3	25,800
Terral Seed, Inc	Rev™ 28HR20™	118	74	51.7	11.9	28,100
Terral Seed, Inc	Rev® 27HR52™	117	73	47.6	8.8	25,900
		Mean	89	50.6	8.7	26,700
		CV %	13.5	2.2	26.3	8.7
		L.S.D.	17	1.6	3.2	3,300

Cooperator: Ed Regier
Strip-Till: Following soybean in 2011
Soil Series: Dale Silt Loam
Soil Test: N: 13 P: 58 K: 492 pH: 7.5
Fertilizer: N: 130 lbs/ac, P: 50 lbs P_2O_5/ac, K: 0, 5 gal 10-34-0 in row with planter
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence) +
Target population: 25,000 plants/ac
Planting Date: March 30, 2012
Harvest Date: July 31, 2012

Monthly Rainfall (in.)	Apr.	May	June	July	**Total**
2012:	7.06	0.36	3.40	0.13	**6.67**
Long term mean:	2.99	4.86	4.26	2.89	**15.00**

Table 4. Grain Yield and Harvest Parameters for the Joe Webb location, Oklahoma Corn Performance Trials, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test Weight lb/bu	Harvest Moisture	Plant Population plants/ac
Triumph Seed Co. Inc.	1358H	288	51.5	17.3	35,000
Terral Seed, Inc	Rev® 26HR23™	270	60.1	15.5	35,300
Triumph Seed Co. Inc.	1801H	264	53.5	18.8	32,900
Triumph Seed Co. Inc.	1725H	263	54.1	18.2	33,700
Terral Seed, Inc	Rev® 27HR83™	262	59.5	16.2	32,900
Terral Seed, Inc	Rev™ 28HR20™	260	59.0	17.1	34,500
Hoegemeyer	8389 HXT/LL/RR	259	59.7	16.9	36,400
Hoegemeyer	8122 HX/LL/RR	259	59.3	16.5	33,000
Terral Seed, Inc	Rev™ 23RE73™	256	60.4	16.0	34,400
Terral Seed, Inc	Rev® 24BHR93™	253	58.9	15.3	35,400
Terral Seed, Inc	Rev® 25BHR63™	250	59.8	16.7	32,900
Terral Seed, Inc	Rev® 29HR13™	248	58.5	16.3	34,300
Triumph Seed Co. Inc.	1329H	246	54.7	16.4	32,000
Terral Seed, Inc	Rev™ 22BHR43™	243	61.1	15.2	32,300
Terral Seed, Inc	Rev™ 21HR33™	240	58.8	15.1	32,700
Triumph Seed Co. Inc.	7514S	240	56.6	17.3	34,500
Terral Seed, Inc	Rev® 26R60™	240	59.1	15.8	33,000
Triumph Seed Co. Inc.	2288H	239	56.0	21.5	32,800
Terral Seed, Inc	Rev® 27HR52™	233	57.0	17.1	33,800
Triumph Seed Co. Inc.	1217S	233	57.8	15.2	32,100
Triumph Seed Co. Inc.	TRX21366H	229	57.1	16.2	31,100
Terral Seed, Inc	Rev® 26HR50™	220	59.3	17.4	31,800
Hoegemeyer	7644 Hx/LL/RR	212	59.3	13.2	34,700
Triumph Seed Co. Inc.	1157X	209	56.5	14.9	27,400
Hoegemeyer	7876 Hx/LL/RR/CB	207	60.1	13.8	31,300
Terral Seed, Inc	Rev® 28R10™	204	59.5	16.1	29,800
Hoegemeyer	7422 Rw/LL/GT/CB	163	57.8	12.3	28,400
	Mean	240	58.0	16.2	32,900
	CV %	9.9	0.9	4.2	8.2
	L.S.D.	34	0.8	1.0	3,800

Cooperator: Joe Webb

Soil Series: Pullman Clay Loam

Strip-Till: Following corn in 2011

Soil Test: N: NA P: NA K: NA pH: NA

Fertilizer: N: 225 lbs/ac, P: 40 lbs P2O5/ac, K: 0, 5 gal 10-34-0 in row with planter

Herbicide: 5 oz/ac Balance Flex + 24 oz Traxion + 1 oz Distinct (Preemergence) and 28 oz RT3 + 2 oz Distinct POST

Target population: 28,000 plants/ac for grain and 32,000 plants/ac for ensilage

Planting Date: April 23, 2012

Harvest Date: September 19, 2012

Monthly Rainfall (in.)	Apr.	May	June	July	Aug	**Total**
2012:	2.28	0.88	2.33	1.95	0.85	**8.29**
Long term mean:	1.33	3.25	2.86	2.58	2.28	**12.30**
Irrigation:	1.50	3.00	9.00	9.00	3.00	

Table 5. Grain Yield and Harvest Parameters for the OPREC location, Oklahoma Corn Performance Trials, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test Weight lb/bu	Harvest Moisture	Plant Population plants/ac
Triumph Seed Co. Inc.	1217S	145	56.9	11.1	24,600
Terral Seed, Inc	Rev® 24BHR93™	142	57.9	12.0	26,700
Terral Seed, Inc	Rev® 27HR83™	141	59.5	14.4	27,900
Hoegemeyer	7644 Hx/LL/RR	138	57.3	11.4	28,300
Terral Seed, Inc	Rev™ 22BHR43™	137	60.4	14.0	27,000
Terral Seed, Inc	Rev® 26HR50™	137	58.0	16.0	25,400
Terral Seed, Inc	Rev® 27HR52™	126	55.9	11.9	29,400
Triumph Seed Co. Inc.	1157X	126	54.6	11.8	24,900
Hoegemeyer	7876 Hx/LL/RR/CB	125	57.1	10.8	28,900
Triumph Seed Co. Inc.	TRX21366H	121	54.6	11.6	24,400
Triumph Seed Co. Inc.	1358H	121	53.2	13.6	27,400
Terral Seed, Inc	Rev® 25BHR63™	118	59.2	12.6	30,700
Terral Seed, Inc	Rev™ 23RE73™	111	58.6	14.0	26,800
Hoegemeyer	8122 HX/LL/RR	111	58.7	13.5	27,900
Terral Seed, Inc	Rev® 28R10™	110	57.5	13.4	27,000
Terral Seed, Inc	Rev™ 21HR33™	109	57.3	11.1	28,600
Hoegemeyer	8389 HXT/LL/RR	109	59.9	12.7	26,100
Triumph Seed Co. Inc.	1725H	108	55.7	14.6	29,200
Terral Seed, Inc	Rev® 29HR13™	103	56.9	15.9	28,900
Terral Seed, Inc	Rev® 26R60™	101	56.1	10.8	27,400
Terral Seed, Inc	Rev® 26HR23™	99	59.2	14.2	28,400
Triumph Seed Co. Inc.	7514S	99	55.7	13.5	28,400
Triumph Seed Co. Inc.	2288H	99	56.5	19.6	25,200
Terral Seed, Inc	Rev™ 28HR20™	96	56.8	12.8	29,100
Hoegemeyer	7422 Rw/LL/GT/CB	96	55.3	10.6	26,400
Triumph Seed Co. Inc.	1329H	94	55.1	12.3	29,500
Triumph Seed Co. Inc.	1801H	88	54.7	15.2	27,900
	Mean	115	57.0	13.2	27,500
	CV %	16.6	1.7	10.3	9
	L.S.D.	27	1.4	1.9	NS

Cooperator: OPREC
Strip-Till: Following wheat double crop sunflower in 2011
Soil Series: Gruver Clay Loam (formally Richfield)
Soil Test: N: NA P: NA K: NA pH: NA
Fertilizer: N: 200 lbs/ac, P: 40 lbs P2O5/ac, K: 0, 5 gal 10-34-0 in row with planter
Herbicide: 2.0qt/ac Cinch ATZ Lite (Preemergence) + 1 oz/ac Balance pro
Target population: 28,000 plants/ac for grain and 32,000 plants/ac for ensilage
Planting Date: April 18, 2012
Harvest Date: Grain September 10, 2012,

Monthly Rainfall (in.)	Apr.	May	June	July	Aug	**Total**
2012:	2.28	0.88	2.33	1.95	0.85	**8.29**
Long term mean:	1.33	3.25	2.86	2.58	2.28	**12.30**
Irrigation:	1.25	1.25	5.00	6.25	1.25	

Table 6. OPREC Ensilage Yields for Panhandle Corn Performance Trial, 2011.

Company Brand Name	Hybrid	YIELD Tons/ac 2012	YIELD Tons/ac two-year	Plant Population plants/ac	Harvest Moisture %
Triumph Seed Co. Inc.	1157X	23.8	22.2	24,800	48.1
Triumph Seed Co. Inc.	2288H	23.5	20.9	28,300	60.1
Terral Seed, Inc	Rev™ 28HR20™	19.7	19.9	32,100	36.9
Triumph Seed Co. Inc.	1217S	19.1	19.3	27,200	48.9
Triumph Seed Co. Inc.	1725H	20.1	18.4	28,900	52.9
Triumph Seed Co. Inc.	7514S	19.7	18.3	30,200	47.4
Terral Seed, Inc	Rev® 28R10™	19.3	18.0	29,800	42.8
Terral Seed, Inc	Rev® 27HR52™	19.6	18.0	31,800	44.5
Terral Seed, Inc	Rev® 26R60™	19.3	18.0	30,600	41.3
Terral Seed, Inc	Rev® 26HR50™	18.0	17.0	29,800	48.1
Hoegemeyer	7876 Hx/LL/RR/CB	25.4	----	31,800	42.3
Hoegemeyer	7644 Hx/LL/RR	21.6	----	29,600	36.4
Terral Seed, Inc	Rev™ 22BHR43™	21.2	----	33,000	49.9
Triumph Seed Co. Inc.	TRX21366H	21.0	----	31,100	46.5
Terral Seed, Inc	Rev® 24BHR93™	20.4	----	27,400	46.1
Hoegemeyer	8389 HXT/LL/RR	20.0	----	31,100	49.0
Triumph Seed Co. Inc.	1329H	19.9	----	31,400	45.8
Hoegemeyer	8122 HX/LL/RR	19.7	----	31,700	54.6
Terral Seed, Inc	Rev™ 23RE73™	19.6	----	30,600	47.1
Triumph Seed Co. Inc.	1358H	19.6	----	29,600	47.9
Terral Seed, Inc	Rev® 26HR23™	19.5	----	31,800	46.3
Triumph Seed Co. Inc.	1801H	19.5	----	28,900	43.6
Terral Seed, Inc	Rev® 25BHR63™	19.2	----	27,900	40.0
Terral Seed, Inc	Rev® 29HR13™	19.0	----	33,300	47.7
Hoegemeyer	7422 Rw/LL/GT/CB	17.9	----	29,200	42.7
Terral Seed, Inc	Rev® 27HR83™	17.6	----	33,800	45.6
Terral Seed, Inc	Rev™ 21HR33™	16.0	----	27,700	28.0
	Mean	20.0	19.0	30,100	45.6
	CV %	14.3	11.8	13	12.9
	L.S.D.	4.7	2.6	NS	0.1

Cooperator: OPREC
Soil Series: Gruver Clay Loam (formally Richfield)
Strip-Till: Following wheat double crop sunflower in 2011
Soil Test: N: NA P: NA K: NA pH: NA
Fertilizer: N: 200 lbs/ac, P: 40 lbs P2O5/ac, K: 0, 5 gal 10-34-0 in row with planter
Herbicide: 2.0qt/ac Cinch ATZ Lite (Preemergence) + 1 oz/ac Balance pro
Target population: 28,000 plants/ac for grain and 32,000 plants/ac for ensilage
Planting Date: April 18, 2012
Harvest Date: August 23, 2012

Monthly Rainfall (in.)	Apr.	May	June	July	Aug	**Total**
2012:	2.28	0.88	2.33	1.95	0.85	**8.29**
Long term mean:	1.33	3.25	2.86	2.58	2.28	**12.30**
Irrigation:	1.25	1.25	5.00	6.25	1.25	

GRAIN SORGHUM PERFORMANCE TRIALS IN OKLAHOMA, 2012

PRODUCTION TECHNOLOGY CROPS

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

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TRIAL OBJECTIVES AND PROCEDURES

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

Performance trials are conducted at eleven locations in Oklahoma: Apache, Alva, Blackwell, Cherokee, Enid, Goodwell, Homestead, Keyes, Gate, Seiling, and Tipton. All sites are dry-land with the exception of Goodwell, which received limited irrigation. The Cherokee, Homestead, and Gate locations are uniquely designed to evaluate certain hybrids (generally early and medium maturity) for planting in late April. In 2012 trials were to be continued at Alva, Enid and Seiling to evaluate hybrids for use as a double crop, however only Enid was planted. The Enid trial was not harvested due to drought.

Highlights

The highlight in 2012 or lowlight depending on how you look at it was drought which affected yields and test weights for most locations. In spite of the drought the Apache and Keyes locations had higher than expected yields. Neither the Gate location nor any of the double crop trials were harvested. The OPREC dry-land location was harvested but data was too variable to report. The full season results from Keyes and Tipton are also not reported.

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, Enid, Alva, and Gate 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, and 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 for the body of the state and the limited irrigated trials. Plots were trimmed to 20 feet prior to harvest. Dry-land trials in the panhandle were 35 feet and trimmed to 30 feet for harvest. Tractor powered cone planters were used to plant all trials with seeding rates adjusted for trial location. Trials were harvested with a Kincaid model, 8XP 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.

GROWING CONDITIONS

Due to excellent soil moisture for planting, stand establishment was excellent at all locations. The double crop trial at Enid was planted into adequate moisture, but never received rainfall after emergence. The Alva and Seiling locations were never planted. For sorghum planted in April, plant available moisture was adequate with most locations having more than 5 inches of available water (Fig. 1). For grain sorghum planted in late May or early June, again there was 5 inches of plant available or water to begin the growing season (Fig. 2). For locations planted in April rainfall for the critical growing months of May and June was below the long-term mean (data with results). Blackwell for example received only 22% of normal while Apache received 78% of normal. The yield difference between Apache and Blackwell locations was dramatically affected by the rainfall received in May and June. The highest dry-land yield in 2012 was at Apache with 135 bu/ac. July rainfall was also below the long-term mean and was expressed by the low test weight observed at most locations. Grain marketing was a challenge for some producers due to lighter than normal test weights. Dry-land sorghum in the panhandle had low yields except in isolated locations. The Keyes trial was an area that received more rainfall than other areas of the panhandle.

RESULTS

Grain yields are reported in bushel per acre of threshed grain, adjusted to a moisture content of 14.0% (Table 2-8). Test weight, plant population, and the number of heads per acre at harvest are reported.

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

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

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

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

The following people have contributed to this report by assisting in crop production, data collection, and publication: Donna George, Lawrence Bohl, Rocky Thacker, Jake Baker, Jeff Bedwell, Jimmy Rhodes, Tommy Puffinbarger, Cori Woelk, Cameron Murley, Jacob Anderson, and Logan Bechtel. Their efforts are greatly appreciated. Also would like to thank the ***Oklahoma Grain Sorghum Commission and The United Sorghum Checkoff Program*** *for their financial support.*

Figure 1. Average inches of plant available water in soil at 32 inches of depth for Oklahoma in the month of April.

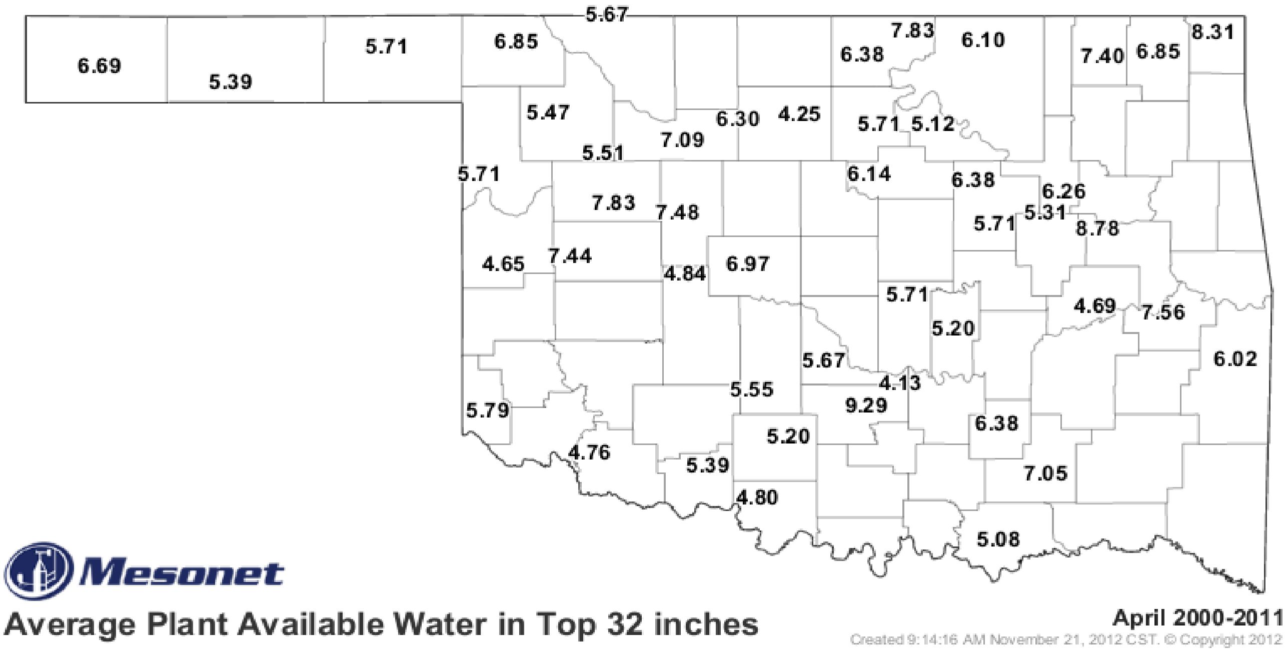

Figure 2. Average inches of plant available water in soil at 32 inches of depth for Oklahoma in the month of June.

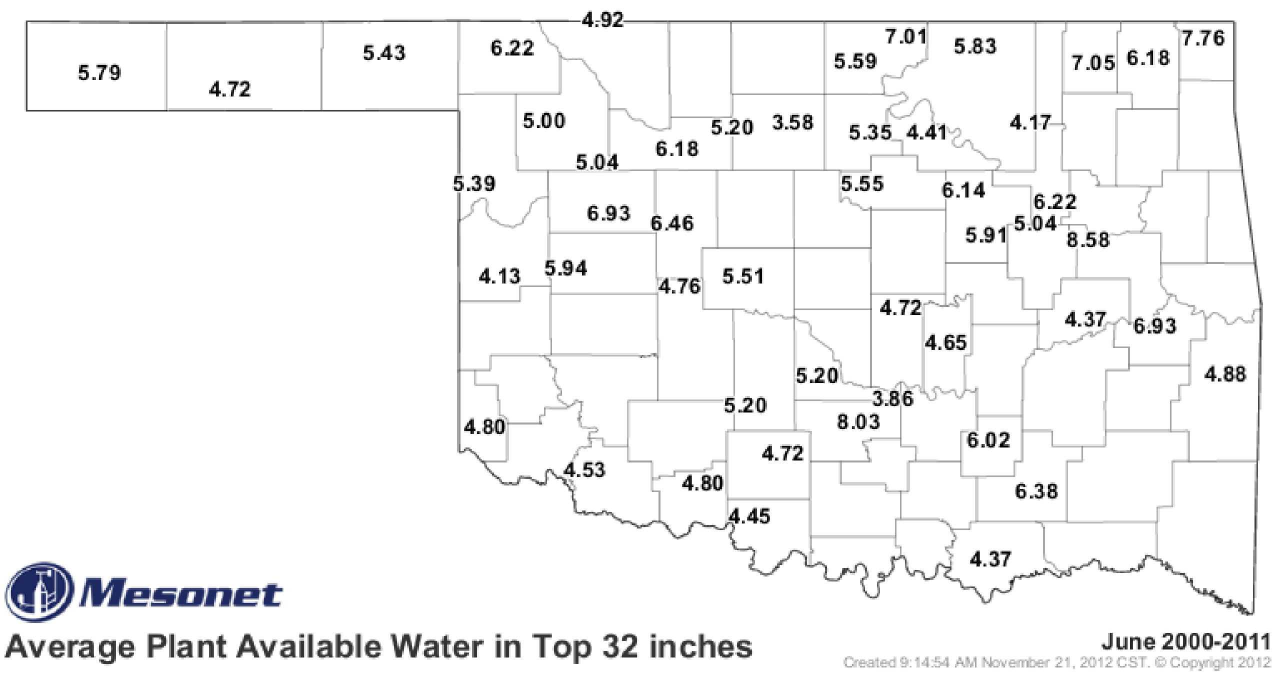

Table 1. Seed source and hybrid characteristics of grain sorghums in the Oklahoma Grain Sorghum Performance Trials, 2012. All hybrids are susceptible to birds and are single cross.

Company Brand Name	Hybrid	Seed Color	Endo-sperm	Days to Mid-bloom	Greenbug Resistance	Trial Location
less than 60 days to mid-bloom **(early)**/61 to 69 days to mid-bloom **(medium)**						
DeKalb	DKS 28-05	Bz	HY	58	-----	1
DeKalb	DKS 37-07	Bz	HY	60	C,E,I	1
DeKalb	DKS 44-20	BZ	HY	67	NA	1
Sorghum Partners LLC	KS 585	Bz	HY	67	C, E	1
Sorghum Partners LLC	NK5418	Bz	HY	67	C,E	1
Pioneer Hi-Bred Int.	85G01	R	W	69	-----	1
Pioneer Hi-Bred Int.	85G03	R	W	69	-----	1
Pioneer Hi-Bred Int.	86G32	R	W	65	-----	1
Johnston Seed Co.	JS 222	Bz	Hy	68	C, E	1
Johnston Seed Co.	JS 219	R	W	69	-----	1
Johnston Seed Co.	JS - 056	R	N	65	C	1
Pioneer Hi-Bred Int.	87P06	R	W	63	-----	1
Hoegemeyer	6056	R		66	C	1
Hoegemeyer	6037	R		62		1
Hoegemeyer	EXP 6128					1
Hoegemeyer	671	Cr				1
Fontanelle Hybrids	G 6192	Bz		69	-----	4
Fontanelle Hybrids	GE 5901	Bz		66	-----	4
Full days or greater to mid-bloom						
Pioneer Hi-Bred Int.	84P80	R	W	70	-----	4
DeKalb	DKS 49-45	Bz	Hy	70	E,I	1
DEKALB	DKS 53-67	Bz	HY	71	C,E,I	4
Sorghum Partners LLC	K73-J6	Bz	Hy	73	C,E	1
Pioneer Hi-Bred Int.	84G62	Bz	Y	72	-----	4
Pioneer Hi-Bred Int.	85Y40	W	Y	70	-----	1
Triumph Seed	TRX85131	R	Hy	72	E	1
Triumph Seed	4941	Bz		72		1
Triumph Seed	4951	Bz		74		1
Gayland Ward Seed Co.	GW 9417	R	Hy	75	C,E	1
Gayland Ward Seed Co.	GW 9320	R	Hy	79	C,E	4

Trial locations: 1 – all; 2 – panhandle only; 3 – (Altus, Tipton, Blackwell); 4 – irrigated only (OPREC)
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
Greenbug Resistance: Biotype hybrid is resistance too

Table 2. Results from Apache grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
			Early and medium			
Pioneer Hi-Bred Int.	86G32	135	54.9	9.9	41,500	1.68
Pioneer Hi-Bred Int.	85G03	127	55.9	11.6	43,200	1.59
DeKalb	DKS 44-20	126	56.9	10.6	42,900	1.41
Pioneer Hi-Bred Int.	85G01	126	57.1	11.7	39,500	1.33
DeKalb	DKS 28-05	124	55.8	9.6	42,300	1.77
Sorghum Partners LLC	KS 585	122	59.7	10.8	40,800	1.60
Pioneer Hi-Bred Int.	87P06	121	56.2	9.7	43,200	1.66
Hoegemeyer	EXP 6128	121	56.4	10.3	36,600	1.76
DeKalb	DKS 37-07	118	58.2	11.0	37,800	1.53
Johnston Seed Co.	JS 219	118	57.0	13.6	44,000	1.24
Hoegemeyer	6056	116	55.7	11.4	43,200	1.36
Sorghum Partners LLC	NK5418	116	56.1	10.1	43,500	1.67
Johnston Seed Co.	JS - 056	110	54.2	10.4	40,800	1.49
Hoegemeyer	6037	110	56.5	10.4	39,400	1.53
Johnston Seed Co.	JS 222	108	55.5	12.0	38,900	1.23
Hoegemeyer	671	103	56.3	10.3	41,800	1.43
	Mean	119	56.4	10.8	41,200	1.52
	CV %	7.9	2.2	7.2	9.2	12.8
	L.S.D.	13	1.7	1.1	NS	0.27

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
			Full			
Pioneer Hi-Bred Int.	85Y40	119	56.0	10.1	37,100	1.7
Gayland Ward Seed Co.	GW 9417	115	55.8	11.1	35,000	1.5
DeKalb	DKS 49-45	109	55.8	9.9	35,000	1.5
Sorghum Partners LLC	K73-J6	107	55.0	11.8	35,500	1.6
Triumph Seed	TRX85131	105	54.5	12.0	39,900	1.3
Triumph Seed	4941	104	54.0	10.8	36,600	1.4
Triumph Seed	4951	95	52.0	9.8	39,200	1.2
	Mean	108	54.7	10.8	36,900	1.5
	CV %	7.9	1.0	11.8	13.9	14.4
	L.S.D.	13	0.8	NS	NS	NS

Cooperator: Alan Mindemann
No-till following wheat in 2011
Fertilizer: N: 110 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 56,000 seeds/ac
Planting Date: April 24, 2012

Soil Series: Hollister Silt Loam
Soil Test: N: 10 P: 38 K: 188 pH: 5.2
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Target Population: 45,000 plants/ac
Harvest Date: August 14, 2012

Monthly Rainfall (in.)	April	May	June	July	**Total**
2012:	3.15	2.17	4.57	0.15	**10.04**
Long-term mean:	2.99	4.79	3.83	2.23	**13.84**

Table 3. Results from Blackwell grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Lodging
			Early and medium				
DeKalb	DKS 28-05	46	51.0	9.6	39,900	1.27	0
DeKalb	DKS 44-20	46	52.8	11.3	40,400	1.14	0
Pioneer Hi-Bred Int.	87P06	43	54.2	10.8	39,100	1.17	10
Sorghum Partners LLC	KS 585	42	57.1	11.1	38,200	1.07	0
Pioneer Hi-Bred Int.	86G32	41	52.8	10.9	39,700	1.10	10
Hoegemeyer	6037	40	54.3	11.2	38,800	1.09	0
Sorghum Partners LLC	NK5418	39	53.4	11.1	37,200	1.20	0
DeKalb	DKS 37-07	38	53.5	10.6	42,100	1.03	0
Pioneer Hi-Bred Int.	85G01	33	54.7	12.0	38,100	0.88	0
Hoegemeyer	6056	33	53.1	10.9	41,400	0.97	0
Hoegemeyer	EXP 6128	33	54.4	17.1	39,500	0.90	12
Pioneer Hi-Bred Int.	85G03	29	50.8	17.1	38,000	1.03	0
Johnston Seed Co.	JS - 056	29	52.8	14.2	37,800	0.83	0
Johnston Seed Co.	JS 222	27	53.0	12.1	38,000	0.83	0
Hoegemeyer	671	24	52.2	11.3	40,700	0.76	0
Johnston Seed Co.	JS 219	17	52.5	13.7	43,500	0.55	0
	Mean	35	53.3	12.2	39,500	0.99	-----
	CV %	13.4	2.3	11.0	12.3	12.20	-----
	L.S.D.	7	1.8	1.9	NS	0.17	-----

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
			Full			
Pioneer Hi-Bred Int.	85Y40	42	52.7	13.2	43,300	0.92
DeKalb	DKS 49-45	41	51.0	13.6	35,600	1.04
Triumph Seed	4941	22	50.2	15.1	21,900	1.09
Sorghum Partners LLC	K73-J6	22	59.6	20.6	27,900	0.92
Gayland Ward Seed Co.	GW 9417	17	54.2	15.0	30,400	0.65
Triumph Seed	4951	16	49.8	14.4	30,300	0.59
Triumph Seed	TRX85131	11	51.4	13.5	38,100	0.42
	Mean	24.4	51.3	15.1	32,500	0.8
	CV %	22.4	3.0	15.6	15	18.9
	L.S.D.	8	2.3	3.5	7,200	0.23

Cooperator: Bill and Louise Rigdon
No-till following soybean in 2011
Fertilizer: N: 110 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 56,000 seeds/ac
Planting Date: April 19, 2012

Soil Series: Bethany Silt Loam
Soil Test: N: 13 P: 25 K: 428 pH: 6.0
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Target Population: 45,000 plants/ac
Harvest Date: August 16, 2012

Monthly Rainfall (in.)	April	May	June	July	**Total**
2012:	12.61	0.64	1.38	0.25	**14.88**
Long-term mean:	3.28	5.23	4.05	2.68	**15.24**

Table 4. Results from Cherokee grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Lodging
Hoegemeyer	6037	39	51.8	11.6	40,600	1.29	10
DeKalb	DKS 28-05	38	47.2	9.8	49,100	1.28	15
Pioneer Hi-Bred Int.	85Y40	38	50.5	12.0	46,600	1.19	10
Pioneer Hi-Bred Int.	86G32	36	50.3	11.8	45,200	1.27	10
DeKalb	DKS 37-07	34	50.8	11.3	47,900	1.20	5
Hoegemeyer	6056	34	50.5	13.9	46,100	1.16	0
Sorghum Partners LLC	NK5418	34	51.2	11.1	43,000	1.31	15
Johnston Seed Co.	JS - 056	33	50.5	13.3	41,800	1.20	0
Pioneer Hi-Bred Int.	85G03	32	49.7	13.7	45,700	1.24	15
Sorghum Partners LLC	KS 585	32	54.5	10.6	37,600	1.44	5
DeKalb	DKS 44-20	31	50.3	10.9	50,700	1.15	0
Gayland Ward Seed Co.	GW 9417	30	18.8	15.0	40,900	1.11	0
Johnston Seed Co.	JS 222	29	48.7	12.9	40,900	1.18	0
Triumph Seed	4941	25	47.5	12.9	32,500	1.44	5
	Mean	33	50.1	12.2	43,500	1.25	-----
	CV %	16.2	2.8	14.1	9.1	12.0	-----
	L.S.D.	8	2	2.5	5,700	NS	-----

Cooperator: Doug McMurtrey
No-till following wheat double crop soybean in 2011
Fertilizer: N: 110 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 56,000 seeds/ac
Planting Date: April 19, 2012

Soil Series: Pond Creek Silt Loam
Soil Test: N: 22 P: 153 K: 630 pH: 5.8
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Target Population: 45,000 plants/ac
Harvest Date: August 16, 2012

Monthly Rainfall (in.)	April	May	June	July	**Total**
2012:	2.88	0.96	2.18	0.65	**6.67**
Long-term mean:	2.80	4.50	3.90	3.10	**14.30**

Table 5. Results from Homestead grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Lodging
Pioneer Hi-Bred Int.	86G32	71	49.2	9.5	45,200	1.59	0
Sorghum Partners LLC	KS 585	67	55.1	10.2	45,300	1.50	0
DeKalb	DKS 37-07	65	51.8	10.1	49,400	1.32	0
DeKalb	DKS 28-05	64	51.8	8.8	46,600	1.54	0
Pioneer Hi-Bred Int.	85G03	59	50.2	11.6	44,900	1.57	5
Johnston Seed Co.	JS - 056	58	50.9	12.2	44,600	1.46	0
Hoegemeyer	6056	58	50.7	10.7	46,400	1.22	5
DeKalb	DKS 44-20	57	51.4	9.6	47,200	1.25	8
Triumph Seed	4941	56	50.4	10.4	33,100	1.59	8
Hoegemeyer	6037	56	50.2	10.8	45,400	1.54	0
Pioneer Hi-Bred Int.	85Y40	53	46.6	10.9	44,500	1.45	5
Johnston Seed Co.	JS 222	53	49.1	10.2	42,600	1.44	0
Gayland Ward Seed Co.	GW 9417	50	52.6	11.5	43,000	1.36	10
Sorghum Partners LLC	NK5418	46	46.6	9.1	44,500	1.55	0
	Mean	58	50.5	10.4	44,500	1.45	-----
	CV %	15.4	4.1	12.9	8.5	13.9	-----
	L.S.D.	13	3	1.9	5,400	NS	-----

Cooperator: Brook Strader
Conventional tillage following grain sorghum in 2011
Fertilizer: N: 130 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 56,000 seeds/ac
Planting Date: April 20, 2012

Soil Series: Canadian Fine Sandy Loam
Soil Test: N: 7 P: 40 K: 331 pH: 6.6
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Target Population: 45,000 plants/ac
Harvest Date: August 17, 2012

Monthly Rainfall (in.)	April	May	June	July	**Total**
2012:	3.20	1.33	4.00	0.62	**9.15**
Long-term mean:	2.50	4.20	3.20	2.70	**12.60**

Table 6. Results from Keyes grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
			Early and medium			
DeKalb	DKS 28-05	68	53.6	9.0	30,100	1.19
Sorghum Partners LLC	NK5418	63	54.9	9.8	20,500	1.39
Pioneer Hi-Bred Int.	87P06	60	54.2	9.3	23,400	1.39
Pioneer Hi-Bred Int.	86G32	58	53.1	9.6	20,700	1.15
DeKalb	DKS 44-20	53	55.0	9.7	29,900	0.88
Hoegemeyer	6037	52	55.2	9.4	21,800	1.12
Hoegemeyer	EXP 6128	52	55.3	9.7	20,800	1.05
Hoegemeyer	6056	48	54.3	9.7	22,600	0.99
DeKalb	DKS 37-07	47	53.7	9.3	24,100	0.94
Sorghum Partners LLC	KS 585	44	54.9	9.5	22,700	1.1
Johnston Seed Co.	JS - 056	42	53.4	9.1	21,800	0.99
Pioneer Hi-Bred Int.	85G03	41	50.2	9.6	23,700	1.06
Johnston Seed Co.	JS 222	40	54.7	10.4	23,100	0.91
Johnston Seed Co.	JS 219	40	53.9	9.5	22,800	0.73
Pioneer Hi-Bred Int.	85G01	33	53.6	9.4	21,900	0.75
Hoegemeyer	671	24	53.3	9.4	21,900	0.69
	Mean	48	54.0	9.5	23,200	1.02
	CV %	20.2	4.9	6.1	7.4	14.8
	L.S.D.	13.8	NS	NS	2,400	0.22

Cooperator: Ken Rose
No-till following wheat in 2011
Fertilizer: N: 130 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 31,000 seeds/ac
Planting Date: May 31, 2012

Soil Series: Richfield Loam
Soil Test: N: NA P: NA K: NA pH: NA
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Target Population: 25,000 plants/ac
Harvest Date: November 7, 2012

Monthly Rainfall (in.)	May	June	July	Aug	Sept	**Total**
2012:	1.66	2.33	0.94	0.57	1.79	**7.29**
Long-term mean:	2.76	2.92	2.85	2.55	1.97	**13.05**

Table 7. Results from OPREC limited irrigation grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac			Test weight lb/bu			Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		2012	2-year	3-year	2012	2-year	3-year			
early/medium										
DeKalb	DKS 44-20	159	167	164	57.8	58.6	59.3	14.0	53,500	1.43
DeKalb	DKS 37-07	161	165	163	55.7	57.4	58.2	12.5	51,500	1.72
Pioneer Hi-Bred Int.	85G01	167	173	162	56.3	57.2	58.0	15.1	47,500	1.47
Sorghum Partners LLC	KS 585	161	168	160	59.3	58.5	59.1	13.6	47,300	1.59
Johnston Seed Co.	JS 222	156	159	158	55.9	57.0	57.9	15.9	48,100	1.35
DeKalb	DKS 28-05	164	159	155	57.0	56.2	56.4	14.1	41,500	1.71
Johnston Seed Co.	JS - 056	165	163	155	57.7	57.7	58.1	14.4	48,700	1.43
Sorghum Partners LLC	NK5418	140	161	155	55.5	56.5	57.1	12.8	47,900	1.60
Pioneer Hi-Bred Int.	86G32	171	156	150	56.1	56.1	56.8	12.9	53,700	1.52
Pioneer Hi-Bred Int.	87P06	140	134	130	56.7	56.8	57.1	12.8	46,600	1.75
Johnston Seed Co.	JS 219	170	161	----	56.3	56.7	----	20.4	46,900	1.43
Pioneer Hi-Bred Int.	85G03	175	----	----	57.4	----	----	16.6	51,300	1.61
Fontanelle Hybrids	G 6192	175	----	----	57.3	----	----	16.3	52,800	1.47
Fontanelle Hybrids	GE 5901	170	----	----	56.6	----	----	14.4	52,700	1.50
Hoegemeyer	6056	160	----	----	56.8	----	----	14.3	52,300	1.40
Hoegemeyer	671	158	----	----	56.7	----	----	14.3	47,300	1.55
Hoegemeyer	EXP 6128	153	----	----	57.3	----	----	14.8	50,500	1.46
Hoegemeyer	6037	150	----	----	57.0	----	----	12.9	48,700	1.52
	Mean	161	161	155	56.9	57.2	57.8	14.6	49,380	1.53
	CV %	6.6	8.7	8.0	1.9	1.8	1.8	5.7	10.5	13.40
	L.S.D.	15	14	10	1.6	1.1	0.8	1.2	NS	NS

Table 7. Continued

Company Brand Name	Hybrid	Grain Yield bu/ac			Test weight lb/bu			Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		2012	2-year	3-year	2012	2-year	3-year			
					Full					
Pioneer Hi-Bred Int.	84G62	161	165	163	55.6	55.9	56.8	15.7	54,600	1.20
DeKalb	DKS 49-45	160	165	160	53.5	53.9	55.2	14.7	50,700	1.24
DEKALB	DKS 53-67	161	164	158	56.6	56.4	57.1	17.2	49,700	1.24
Pioneer Hi-Bred Int.	85Y40	157	162	157	57.4	57.9	58.3	15.5	49,300	1.25
Pioneer Hi-Bred Int.	84P80	174	177	----	56.2	56.4	----	16.6	49,500	1.33
Triumph Seed	TRX85131	158	159	----	54.6	55.5	----	18.0	52,200	1.26
Triumph Seed	4951	152	----	----	53.2	----	----	16.0	42,900	1.26
Triumph Seed	4941	151	----	----	55.7	----	----	14.7	46,000	1.31
Sorghum Partners LLC	K73-J6	142	----	----	55.1	----	----	15.8	40,700	1.51
Gayland Ward Seed Co.	GW 9320	139	----	----	54.6	----	----	19.3	41,100	1.31
Gayland Ward Seed Co.	GW 9417	123	----	----	54.9	----	----	16.9	43,200	1.05
	Mean	152	165	159	55.2	56.0	56.8	16.5	47,300	1.27
	CV %	8.4	6.4	6.8	1.4	1.2	1.6	7.1	8.0	15.50
	L.S.D.	18	11		1.1	0.7		1.7	5,500	NS

Cooperator: OPREC
Strip-till following wheat in 2011
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Seeding rate 64,500 seeds/ac
Planting Date: June 13, 2012

Soil Series: Gruver Clay Loam (formally Richfield)
Soil Test: N: 36 P: 7 K: 1,082 pH: 7.9
Fertilizer: N: 150 lbs N and 50 lbs P2O5 with strip-till + 5 gal/ac 10-34-0 with planter
Target Population: 50,000 plants/ac
Harvest Date: October 18, 2012

Monthly Rainfall (in.)	May	June	July	Aug	Sept	**Total**
Long-term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**
2012:	0.88	2.33	1.95	0.85	2.66	**8.67**
Irrigation	1.25	2.50	3.75	2.50	1.25	**11.25**

`

Table 8. Results from Tipton grain sorghum performance trial, 2012.

Company Brand Name	Hybrid	Grain Yield bu/ac	Test weight lb/bu	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		Early and medium				
Pioneer Hi-Bred Int.	85G01	87	49.2	6.4	42,800	1.68
Hoegemeyer	6037	85	50.4	6.5	45,000	1.56
Pioneer Hi-Bred Int.	86G32	79	47.4	6.0	44,000	1.76
Pioneer Hi-Bred Int.	85G03	77	39.7	5.6	47,400	1.71
Hoegemeyer	EXP 6128	73	47.1	6.3	47,800	1.42
Sorghum Partners LLC	NK5418	71	43.7	5.0	42,300	1.83
Johnston Seed Co.	JS - 056	68	45.5	5.5	46,500	1.27
DeKalb	DKS 28-05	67	42.3	4.9	41,600	1.81
Pioneer Hi-Bred Int.	87P06	67	49.3	6.2	47,400	1.56
Johnston Seed Co.	JS 219	61	46.1	5.9	46,300	1.31
Hoegemeyer	6056	60	42.4	5.2	46,100	1.35
DeKalb	DKS 44-20	59	43.4	5.6	44,000	1.36
DeKalb	DKS 37-07	57	43.6	5.4	42,900	1.44
Johnston Seed Co.	JS 222	55	42.9	5.2	40,400	1.43
Sorghum Partners LLC	KS 585	53	46.0	5.3	41,400	1.56
Hoegemeyer	671	42	38.8	5.0	47,000	1.24
	Mean	66	44.9	5.6	44,500	1.52
	CV %	24.3	12.2	16.3	13.2	18.1
	L.S.D.	23	7.4	NS	NS	0.39

Cooperator: Southwest Research and Extension Center
Conventional Tillage Practices: Sorghum-fallow-sorghum rotation
Fertilizer: N: 92 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 56,000 seeds/ac
Planting Date: April 13, 2012

Soil Series: Tipton Silt Loam
Soil Test: N: 37 P: 104 K: 708 pH: 6.8
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Target Population: 45,000 plants/ac
Harvest Date: July 30, 2012

Monthly Rainfall (in.)	April	May	June	July	**Total**
2012:	1.60	1.55	2.63	1.11	**6.89**
Long-term mean:	2.30	4.30	3.45	2.08	**12.13**

Oklahoma Small Grains Variety Performance Tests 2011 - 2012

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Kansas Wheat Alliance, Manhattan, KS
Kelly Green Seeds, Farwell TX
Limagrain Cereal Seeds, Ft. Collins, CO
Oklahoma Genetics Inc, Stillwater, OK
Watley Seed Company, Spearman, TX
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CONTENTS

Protein data will be reported in a separate publication in September 2012 and posted at

www.wheat.okstate.edu

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2012 WHEAT CROP OVERVIEW

The extreme drought and widespread crop failure of 2011 was followed by a bumper wheat crop in 2011-2012 for most Oklahoma farmers. At the time of writing this report, 2012 Oklahoma wheat production is estimated to be approximately 159.1 million bushels, which is roughly double the 2010-2011 production (Table 1). The production increase came as a result of an approximate 1.1 million acre increase in harvested acres and a 68% increase in average yield.

Table 1. Oklahoma wheat production for 2011 and 2012 as estimated by OK NASS, June 2012

	2011	2012
Harvested Acres	3.2 million	4.3 million
Yield (bu/ac)	22	37
Total bushels	70.4 million	159.1 million

The 2011-2012 wheat production season started slowly. The extreme drought of 2011 completely depleted soil moisture reserves in most of Oklahoma. Oklahoma farmers and ranchers entered the month of September 2011 with almost no soil moisture and extreme heat that quickly dissipated the little rainfall that occurred. Hay supplies were gone along with any remaining pastures, so the desperate need for forage of any kind pushed most producers to roll the dice and dust in wheat for pasture. A break from the extreme heat and a few timely rains in late September allowed wheat to establish itself but did not provide much opportunity for growth. The pattern of just enough moisture to survive persisted throughout the winter in western Oklahoma and the Panhandle.

Central and west-central Oklahoma was a different story. What began as a slow wheat forage year turned into one of the best wheat pasture years in recent memory for farmers and ranchers in this region. Timely rainfall throughout October, November, and December, combined with one of the warmest winters on record, resulted in rapid forage production and outstanding average daily gains. Residual soil nitrogen left by failed crops in 2011 sometimes exceeded 150 lb/ac and spurred wheat forage production onward. In fact, many producers were unable to secure sufficient stocker cattle to keep up with wheat forage.

Temperatures during the 2011-2012 season were never cold enough to hold wheat back more than a day or two. Wheat came out of winter dormancy earlier than normal with an abundance of tillers. Tiller counts of 700 – 1,000 tillers/yd^2 were not uncommon versus the Oklahoma norm of 400 to 600 tillers/yd^2. The abnormally early crop and lush growth in March had everyone concerned about the possibility of a late spring freeze. Outside of the Panhandle, the freeze bullet was dodged with only light injury occurring in a few isolated areas. Temperatures reached 21F the morning of March 20, 2012 causing some damage to wheat heads and injury to wheat stems (see Goodwell Irrigated data). This injury contributed to, but was not the only cause, of lodging at this site.

Weed problems such as feral rye, Italian ryegrass, and rescuegrass were certainly present in 2011-2012 but weed problems were not as severe as previous years. Oklahoma still has a long way to go, however, before we can say our weed control and the associated yield losses are at acceptable levels.

As mentioned previously, the failed crops of 2011 left a great deal of residual nitrogen in the soil profile. The absence of rainfall meant that this nitrogen was easily accessible to the wheat crop. In addition, the favorable outlook in terms of yield and price resulted in many farmers deciding to make an investment in topdress nitrogen. In many cases a heavy nitrogen investment was well justified. In some instances, though, the topdress nitrogen, combined with high levels of residual soil nitrogen and excessive tillering, resulted in a lodged crop.

Other than winter grain mite activity in some of the drier areas of the state, the fall of 2011 was relatively insect free. A flush of bird cherry oat aphids seemed to appear overnight in mid-to-late March, and many producers chose to spray. This aphid flush resulted in widespread barley yellow dwarf virus (BYDV) symptoms at heading. Symptoms were mostly restricted to yellowing/purpling of flag leaves with no stunting or reduction in plant height. A legion of armyworms invaded just prior to harvest and some producers were compelled to spray an insecticide, but in many cases the rapid ripening of the wheat crop negated the need for pesticide application.

A significant shift in the predominant stripe rust race made it a game-changing foliar disease in 2011-2012. While stripe rust was present statewide, the epicenter for stripe rust was in central Oklahoma. Among our locations, Marshall Grain Only had the highest stripe rust incidence and severity. As evidenced by the results and confirmed by visual observation, the resistance genes in Armour, Everest, and Pete offered little protection against the stripe rust onslaught. Even some of varieties fresh off the assembly line, such as Garrison, succumbed to stripe rust, although to a lesser degree. Fortunately, varieties such as Gallagher, Billings, Iba, WB-Cedar and CJ seemed to weather the stripe rust storm fairly well. Foliar diseases such as tan spot, septoria, powdery mildew, and leaf rust were also present in 2012 but never reached the severity of stripe rust. The combination of all of these foliar diseases led to a 10 bu/ac average yield advantage for fungicide-treated wheat at Lahoma and an 8 bu/ac advantage at Apache.

A wave of heat hit Oklahoma in mid April and soil moisture reserves were quickly depleted. This was especially true in areas south of Hwy 51 and west of Hwy 81 where fields quickly took on a blue cast. Temperatures moderated and moisture returned by early May, but the damage had already been done. White heads and aborted tillers quickly began to appear. In a few instances these were due to dryland root rot and/or take-all, but by and large the white heads were due to drought and heat stress combined.

Harvest was in full swing by mid May, approximately 65% complete by June 1, and essentially finished by the second week of June. Yields were better than expected in most locations and reports of field averages in the 60 – 80 bu/ac range in central Oklahoma were not uncommon. Lodging combined with delayed harvest resulted in low test weights in a few locations and some isolated pre-harvest sprouting. Low test weights were also common in many areas of western Oklahoma due to shrived grain caused by excessive heat and drought stress during grainfill.

Methods

Cultural Practices. Conventional plots were eight rows wide with six-inch row spacing. No-till plots were seven rows wide with 7.5-inch row spacing. Plots were 20 feet long and wheel tracks were included in the plot area for yield calculation. Conventional till plots received 50 lb/ac of 18-46-0 in-furrow at planting. No-till plots received 5 gal/ac of 10-34-0 at planting. The El Reno and Marshall dual-purpose (DP) trials were sown at 120 lb/ac. All other locations were sown at 60 lb/ac. Grazing pressure, nitrogen fertilization, and insect and weed control decisions were made on a location-by-location basis and reflect standard management practices for the area.

Additional information on the Web

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

www.wheat.okstate.edu

Marketing rights

Breeding programs responsible for varietal release are indicated as the "source" in results tables. In many cases, however, a separate entity has the marketing rights for these varieties. For this reason, a list of wheat seed companies and the varieties they market is provided below.

AgriPro
AP503CL2
CJ
Doans
Greer
Fannin
Jackpot
TAM 111
TAM 203
TAM 401

AGSECO
TAM 113

CO Wheat Res. Found.
Bill Brown
Hatcher

Husker Genetics
Mace

Kansas Wheat Alliance
Everest
Fuller
Jagger

Limagrain Cereal Seeds
T153
T158

OK Foundation Seed
2174
Deliver
Endurance

Oklahoma Genetics
Billings
Centerfield
Duster
Gallagher
Garrison
Iba
OK Bullet
Pete
Ruby Lee

WestBred
Armour
Santa Fe
WB-Cedar
Winterhawk

Watley Seed
TAM 112

More information available on the web:

www.wheat.okstate.edu

Twitter:
@OSU_small grains

Facebook:
facebook.com/OSUsmallgrains

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2012 Oklahoma Wheat Variety Trial Yield Summary

Variety	Afton	Alva	Apache	Apache Fungicide	Balko	Buffalo	Chattanooga	Cherokee	El Reno	Gage	Goodwell Irrigated	Goodwell Nonirrigated
	grain yield (bu/ac)											
2174	-	-	-	-	-	-	-	-	-	-	-	-
AP503CL2	-	48	-	-	-	19	-	-	-	23	-	-
Armour	44	48	50	60	24	25	38	45	40	16	40	14
Bill Brown	-	-	-	-	27	-	-	-	-	-	32	15
Billings	42	51	60	68	26	30	40	48	44	40	65	16
Centerfield	-	46	-	-	-	31	-	46	-	32	-	-
CJ	39	45	-	-	27	33	-	43	45	29	39	16
Deliver	-	-	48	53	-	-	38	47	37	-	-	-
Doans	43	46	47	51	28	31	34	41	50	31	41	16
Duster	27	51	36	51	28	29	40	52	34	28	48	15
Endurance	24	48	39	50	28	28	34	46	38	33	41	15
Everest	58	52	59	66	-	32	39	49	49	27	-	-
Fannin	-	-	36	41	-	-	37	-	30	-	-	-
Fuller	46	46	60	62	-	25	38	48	52	24	-	-
Gallagher	53	56	57	64	29	30	41	56	45	-	64	18
Garrison	43	49	44	57	23	24	37	47	35	14	41	12
Greer	24	41	46	54	25	24	38	50	36	26	42	13
Hatcher	-	-	-	-	29	-	-	-	-	-	43	13
Iba	32	51	42	50	30	32	39	55	35	-	56	15
Jackpot	25	46	51	60	26	27	42	45	46	29	48	14
Jagger	28	44	51	62	24	24	39	47	35	20	41	15
Mace	-	-	-	-	19	-	-	-	-	-	23	7
OK Bullet	30	44	48	55	-	25	33	48	35	29	-	-
Pete	-	-	47	68	-	-	37	47	38	-	-	-
Ruby Lee	39	57	57	64	31	36	49	48	54	27	54	16
Santa Fe	20	-	-	-	-	-	-	49	39	-	-	-
T153	-	-	-	-	30	-	-	-	-	-	61	16
T158	-	-	-	-	27	-	-	-	-	-	62	16
TAM 111	-	49	-	-	26	25	-	-	-	20	40	9
TAM 112	-	48	-	-	27	22	-	-	-	18	35	16
TAM 113	-	49	-	-	26	20	-	-	-	26	38	13
TAM 203	-	-	51	59	-	-	45	-	-	-	-	-
TAM 401	-	-	53	60	-	-	44	43	45	-	-	-
WB-Cedar	46	-	-	-	-	-	-	-	59	-	74	-
Winterhawk	-	53	-	-	28	31	-	57	-	26	58	16
OCW00S063S-1B	-	-	-	-	-	-	-	-	-	-	-	16
OK05312	-	-	-	-	27	-	-	-	-	-	32	11
OK08229	-	-	-	-	27	-	-	-	-	24	31	12
OK08328	-	53	48	52	26	23	31	-	43	22	46	14
OK08413	27	-	-	-	-	-	-	-	-	-	-	-
OK08707W	-	-	-	-	28	-	-	-	-	-	36	13
OK09125	-	-	-	-	-	-	-	-	-	-	-	11
OK09634	-	51	60	63	-	-	-	-	36	-	-	-
OK0986146W	-	-	-	-	-	-	-	-	-	-	27	-
OK09915C	-	50	-	-	-	22	-	-	44	30	-	-
Mean	37	49	49	58	27	27	39	48	42	26	47	14
LSD (0.05)	14	5	8	10	3	3	8	7	6	5	8	3

Partial financial support provided by the Oklahoma Wheat Commission and the Oklahoma Wheat Research Foundation

2012 Oklahoma Wheat Variety Trial Yield Summary

Variety	Homestead	Hooker	Keyes	Kildare	Kingfisher	Lahoma	Lahoma Fungicide	Lamont	Marshall DP	Marshall GO	McLoud	Olustee	Thomas
	----------------------------------- grain yield (bu/ac)---------------------------------												
2174	-	-	-	-	-	-	-	-	-	-	57	-	-
AP503CL2	-	-	-	-	-	-	-	-	-	-	-	-	-
Armour	50	28	26	43	53	30	53	36	22	14	72	29	18
Bill Brown	-	33	24	-	-	-	-	-	-	-	-	-	-
Billings	59	33	19	54	64	52	63	36	37	53	72	26	37
Centerfield	-	-	-	-	52	-	-	-	-	-	-	-	-
CJ	43	36	20	42	63	50	55	29	46	51	64	-	-
Deliver	48	-	-	43	51	49	50	33	38	42	-	29	28
Doans	47	36	21	41	56	46	48	37	47	45	56	26	36
Duster	44	35	21	46	58	46	59	28	49	46	55	27	26
Endurance	47	37	21	46	55	51	56	31	44	47	62	29	16
Everest	58	-	-	62	55	47	58	35	39	40	73	29	30
Fannin	-	-	-	-	-	-	-	-	-	-	-	25	25
Fuller	59	-	-	48	62	51	55	34	41	44	62	30	21
Gallagher	60	35	20	53	66	57	63	33	37	56	75	29	23
Garrison	44	32	18	59	49	33	65	31	20	22	73	24	20
Greer	54	26	20	55	60	52	61	30	31	42	71	27	21
Hatcher	-	32	21	-	-	-	-	-	-	-	-	-	-
Iba	57	38	24	62	58	54	63	31	48	51	67	25	45
Jackpot	57	37	26	52	62	54	64	36	38	42	69	31	27
Jagger	50	35	23	41	61	50	58	33	28	39	66	33	13
Mace	-	31	15	-	-	-	-	-	-	-	-	-	-
OK Bullet	49	-	-	45	54	46	52	35	31	37	63	23	21
Pete	43	-	-	49	43	35	58	27	18	14	-	31	20
Ruby Lee	57	37	24	63	64	43	65	44	38	39	77	31	29
Santa Fe	54	-	-	50	55	49	55	40	39	41	52	-	-
T153	-	37	23	-	-	-	-	-	-	-	-	-	-
T158	-	29	24	-	-	-	-	-	-	-	-	-	-
TAM 111	-	33	17	-	-	-	-	-	-	-	-	-	-
TAM 112	-	33	29	-	-	-	-	-	-	-	-	-	-
TAM 113	-	30	24	-	-	-	-	-	-	-	-	-	-
TAM 203	-	-	-	-	-	-	-	-	-	-	-	31	26
TAM 401	45	-	-	43	59	49	51	29	37	47	-	26	34
WB-Cedar	60	-	-	57	63	60	71	47	45	65	71	-	-
Winterhawk	-	34	26	-	-	-	-	-	-	-	-	30	34
OCW00S063S-1B	-	-	22	-	-	-	-	-	-	-	-	-	-
OK05312	-	34	22	-	-	-	-	-	-	-	-	-	-
OK08229	-	34	23	-	-	-	-	-	-	-	-	-	-
OK08328	61	34	20	-	59	48	59	-	43	-	62	29	34
OK08413	-	-	27	57	-	-	-	-	-	-	60	-	-
OK08707W	-	-	-	-	-	-	-	-	-	-	-	-	-
OK09125	-	-	-	-	-	-	-	-	-	-	-	-	-
OK09634	-	-	-	-	72	52	60	-	-	47	-	-	-
OK0986146W	-	32	15	-	-	-	-	-	-	-	-	-	-
OK09915C	-	-	-	-	56	53	62	-	-	46	-	-	-
Mean	52	34	22	50	57	48	58	34	37	42	66	28	26
LSD $_{(0.05)}$	5	5	7	6	6	5	5	10	7	7	13	5	18

Balko Wheat Variety Trial

Cooperator: Craig Frantz | **Tillage: No-till**
Soil type: Ulysses-Richfield complex | **Management: Grain only**
Planting date: 10-05-11 | **Previous crop: Sorghum/Fallow**
Harvest date: 06-11-12 | **Soil test: pH = 6.7, P = 41, K = 1080**

		Grain Yield			Test Weight
Source	Variety	2011-12	2-Year	3-Year	2011-12
		---------------bu/ac-------------			-----lb/bu-----
OSU	Ruby Lee	31	-	-	57.1
OSU	Iba	30	-	-	56.3
LCS	T153	30	-	-	56.2
OSU	Gallagher	29	-	-	54.3
CSU	Hatcher	29	36	-	56.6
AgriPro	Doans	28	33	45	57.2
OSU	Duster	28	37	51	56.1
WestBred	Winterhawk	28	37	51	58.1
OSU	Endurance	28	36	46	55.4
LCS	T158	27	34	-	55.0
TAMU	TAM 112	27	35	48	56.2
CSU	Bill Brown	27	34	-	55.5
AgriPro	CJ	27	-	-	56.9
OSU	Billings	26	32	46	53.9
AgriPro	Jackpot	26	34	47	55.7
TAMU	TAM 113	26	-	-	56.2
TAMU	TAM 111	26	34	51	56.6
AgriPro	Greer	25	34	-	54.2
WestBred	Armour	24	35	-	54.0
KSU	Jagger	24	31	43	55.9
OSU	Garrison	23	31	45	56.1
UNL	Mace	19	28	40	55.0
Experimentals					
	OK08707W	28	-	-	55.0
	OK08229	27	-	-	54.5
	OK05312	27	36	51	56.5
	OK08328	26	-	-	52.2
	Mean	27	34	47	55.6
	LSD $_{(0.05)}$	3	3	2	1.8

Goodwell Irrigated Wheat Variety Trial

Cooperator: OK Panhandle Research & Extension Center **Tillage: Conventional till**
Soil type: Richfield clay loam **Management: Grain only**
Planting date: 10-03-11 **Total irrigation: 14.5 in** **Previous crop: Wheat/Fallow**
Harvest date: 06-15-12 **Total rainfall: 9.1 in** **Soil test: pH = 7.6, P = 49, K = 1200**

		Grain Yield					Test Weight
Source	Variety	2011-12	Freeze Inj.*	Lodging**	2-Year	3-Year	2011-12
		---bu/ac---			----------bu/ac----------		-----lb/bu-----
WestBred	WB-Cedar	74	L	0	-	-	57.8
OSU	Billings	65	H	7	50	56	55.7
OSU	Gallagher	64	L	2	51	-	54.1
LCS	T158	62	L	2	51	-	53.5
LCS	T153	61	L	0	-	-	55.4
WestBred	Winterhawk	58	H	2	48	54	51.2
OSU	Iba	56	L	3	-	-	53.0
OSU	Ruby Lee	54	L	7	-	-	53.7
OSU	Duster	48	L	6	44	52	51.4
AgriPro	Jackpot	48	L	4	38	46	53.2
CSU	Hatcher	43	H	3	42	-	52.3
AgriPro	Greer	42	L	3	36	46	49.6
OSU	Endurance	41	M	3	39	45	47.5
KSU	Jagger	41	L	7	37	43	49.4
OSU	Garrison	41	L	2	-	-	48.1
AgriPro	Doans	41	L	5	36	43	54.2
WestBred	Armour	40	L	3	41	-	51.0
TAMU	TAM 111	40	M	3	40	51	50.2
AgriPro	CJ	39	L	1	-	-	53.3
TAMU	TAM 113	38	H	9	-	-	49.5
TAMU	TAM 112	35	H	8	39	48	52.1
CSU	Bill Brown	32	M	1	32	-	46.8
UNL	Mace	23	L	1	29	40	43.3
Experimentals							
	OK08328	46	M	4	-	-	45.5
	OK08707W	36	M	5	-	-	46.8
	OK05312	32	H	6	-	-	43.2
	OK08229	31	L	3	-	-	41.2
	OK0986146W	27	L	0	-	-	43.0
	Mean	45			41	48	50.2
	LSD (0.05)	8			6	5	1.8

* Temperatures reached 21F on March 20, 2012. Freeze injury ratings of low (L), medium (M), or high (H) were recorded March 31, 2012. Injury symptoms were mostly restricted to node damage and lodging

**Lodging notes taken at time of harvest using a 0 - 10 scale with 0 representing no lodging and 10 representing complete lodging

Goodwell Nonirrigated Wheat Variety Trial

Cooperator: OK Panhandle Research & Extension Center **Tillage: No-till**
Soil type: Richfield clay loam **Management: Grain only**
Planting date: 09-23-11 **Previous crop: Wheat/Fallow**
Harvest date: 06-01-12 **Soil test: pH = 7.9, P = 44, K = 936**

Source	Variety	Grain Yield 2011-12	Test Weight 2011-12
		---bu/ac---	-----lb/bu-----
OSU	Gallagher	18	58.7
OSU	Ruby Lee	16	57.8
TAMU	TAM 112	16	57.9
LCS	T153	16	57.4
WestBred	Winterhawk	16	59.1
AgriPro	Doans	16	58.4
OSU	Billings	16	57.0
LCS	T158	16	56.4
AgriPro	CJ	16	57.1
CSU	Bill Brown	15	59.0
OSU	Iba	15	58.0
KSU	Jagger	15	56.0
OSU	Endurance	15	58.1
OSU	Duster	15	59.0
AgriPro	Jackpot	14	56.5
WestBred	Armour	14	56.5
CSU	Hatcher	13	58.9
AgriPro	Greer	13	55.3
TAMU	TAM 113	13	57.9
OSU	Garrison	12	55.8
TAMU	TAM 111	9	56.3
UNL	Mace	7	55.9
Experimentals			
	OCW00S063S-1B	16	58.1
	OK08328	14	58.0
	OK08707W	13	57.8
	OK08229	12	57.4
	OK09125	11	58.8
	OK05312	11	56.1
	Mean	14	57.5
	LSD $_{(0.05)}$	3	NS

Notes: Grain yield affected by season-long drought.

Partial financial support provided by the Oklahoma Wheat Commission and the Oklahoma Wheat Research Foundation

Hooker Wheat Variety Trial

Cooperator: Dan and Earnest Herald
Soil type: Dalhart fine sandy loam
Planting date: 09-30-11
Harvest date: 06-05-12
Tillage: No-till
Management: Grain only
Previous crop: Failed sorghum

Source	Variety	Grain Yield 2011-12	Grain Yield 2-Year	Grain Yield 3-Year	Test Weight 2011-12
		---------------bu/ac-------------			--lb/bu--
OSU	Iba	38	-	-	52.3
AgriPro	Jackpot	37	29	49	52.3
OSU	Ruby Lee	37	-	-	51.7
OSU	Endurance	37	29	42	52.3
LCS	T153	37	-	-	54.6
AgriPro	Doans	36	29	43	54.9
AgriPro	CJ	36	-	-	53.4
KSU	Jagger	35	27	45	52.7
OSU	Gallagher	35	-	-	51.8
OSU	Duster	35	28	43	50.4
WestBred	Winterhawk	34	-	-	55.6
TAMU	TAM 112	33	29	46	53.1
CSU	Bill Brown	33	29	-	48.4
TAMU	TAM 111	33	27	44	50.5
OSU	Billings	33	26	46	47.3
OSU	Garrison	32	-	-	53.6
CSU	Hatcher	32	28	-	50.2
UNL	Mace	31	27	41	51.1
TAMU	TAM 113	30	-	-	50.3
LCS	T158	29	26	-	48.2
AgriPro	Armour	28	25	-	51.1
AgriPro	Greer	26	-	-	48.3
Experimentals					
	OK05312	34	30	39	53.8
	OK08328	34	-	-	47.2
	OK08229	34	-	-	48.7
	OK0986146W	32	-	-	50.0
	Mean	34	28	44	51.3
	LSD $_{(0.05)}$	5	3	2	2.5

Notes: Grain yield affected by season-long drought. Low test weights are the result of extreme late-season drought and heat.

Keyes Wheat Variety Trial

Cooperator: J. B. Stewart
Soil type: Richfield clay loam
Planting date: 09-30-11
Harvest date: 06-12-12

Tillage: No-till
Management: Grain only
Previous crop: Wheat/Fallow
Soil test: pH = 7.7, P = 14, K = 918

		Grain Yield			Test Weight
Source	Variety	2011-12	2-Year	3-Year	2011-12
		---------------bu/ac-------------			-----lb/bu-----
TAMU	TAM 112	29	31	34	58.7
AgriPro	Jackpot	26	24	31	58.1
WestBred	Winterhawk	26	-	-	61.5
WestBred	Armour	26	23	-	58.0
OSU	Ruby Lee	24	-	-	58.5
LCS	T158	24	24	-	56.8
TAMU	TAM 113	24	-	-	58.7
OSU	Iba	24	-	-	58.5
CSU	Bill Brown	24	22	-	59.5
LCS	T153	23	-	-	57.1
KSU	Jagger	23	22	29	57.5
CSU	Hatcher	21	20	-	58.6
OSU	Endurance	21	20	26	59.3
AgriPro	Doans	21	24	29	57.4
OSU	Duster	21	22	28	58.6
AgriPro	Greer	20	-	-	57.1
AgriPro	CJ	20	-	-	58.2
OSU	Gallagher	20	-	-	58.4
OSU	Billings	19	19	25	54.0
OSU	Garrison	18	-	-	57.5
TAMU	TAM 111	17	20	26	56.1
UNL	Mace	15	16	23	57.2
Experimentals					
	OK09125	27	-	-	57.6
	OK08229	23	-	-	55.4
	OK05312	22	23	30	59.4
	OCW00S063S-1B	22	-	-	59.9
	OK08328	20	-	-	58.5
	OK0986146W	15	-	-	55.6
	Mean	22	22	28	57.9
	LSD $_{(0.05)}$	7	4	3	2.3

Notes: Grain yields were reduced approximately 10% by spring freeze injury just prior to flowering.

Partial financial support provided by the Oklahoma Wheat Commission and the Oklahoma Wheat Research Foundation

Plant height at harvest for selected 2012 Oklahoma wheat variety trials

Variety	Alva	Apache	Balko	Buffalo	Chattanooga	Gage	Homestead	Hooker	Keyes	Kildare	Kingfisher	Lahoma	Marshall DP	Marshall GO	Olustee	Thomas
	plant height (inches)															
AP503 CL2	31	-	-	26	-	23	-	-	-	-	-	-	-	-	-	-
Armour	31	29	18	27	29	23	35	28	20	31	33	28	27	30	22	34
Bill Brown	-	-	20	-	-	-	-	28	17	-	-	-	-	-	-	-
Billings	31	32	22	27	28	29	36	30	16	31	33	29	26	33	23	40
Centerfield	32	-	-	28	-	26	-	-	-	-	35	-	-	-	-	-
CJ	34	-	26	28	-	26	39	30	19	35	38	30	33	36	-	-
Deliver	-	32	-	-	26	-	37	-	-	33	35	33	31	31	24	34
Doans	33	32	23	28	25	28	37	30	21	35	35	34	33	34	21	37
Duster	31	28	19	30	30	26	35	31	18	31	34	31	28	31	22	33
Endurance	32	31	21	29	26	27	37	30	20	33	37	34	29	33	23	34
Everest	28	31	-	27	23	24	36	-	-	30	30	33	28	33	21	36
Fannin	-	28	-	-	27	-	-	-	-	-	-	-	-	-	23	28
Fuller	32	31	-	27	28	26	39	-	-	34	34	30	31	35	23	34
Gallagher	31	33	22	29	24	-	35	29	19	33	34	31	32	33	22	35
Garrison	32	33	18	27	26	23	37	29	20	32	35	35	27	32	22	36
Greer	29	33	23	28	26	28	35	26	19	35	35	32	28	33	24	32
Hatcher	-	-	19	-	-	-	-	26	18	-	-	-	-	-	-	-
Iba	30	32	22	29	26	-	34	28	19	32	34	33	31	33	23	33
Jackpot	30	32	25	28	25	26	38	29	20	35	36	36	30	34	24	37
Jagger	32	31	24	30	27	25	37	29	20	33	31	34	28	34	24	34
Mace	-	-	23	-	-	-	-	29	17	-	-	-	-	-	-	-
OK Bullet	33	35	-	30	26	28	40	-	-	36	36	36	32	37	23	37
Pete	-	30	-	-	24	-	37	-	-	30	29	31	28	32	22	36
Ruby Lee	36	31	24	30	35	28	40	33	21	34	36	35	30	36	25	38
Santa Fe	-	-	-	-	-	-	37	-	-	31	35	37	30	33	-	-
T153	-	-	21	-	-	-	-	29	16	-	-	-	-	-	-	-
T158	-	-	21	-	-	-	-	27	18	-	-	-	-	-	-	-
TAM 111	32	-	23	29	-	26	-	28	18	-	-	-	-	-	-	-
TAM 112	32	-	20	29	-	26	-	30	22	-	-	-	-	-	-	-
TAM 113	32	-	18	28	-	26	-	29	20	-	-	-	-	-	-	-
TAM 203	-	31	-	-	27	-	-	-	-	-	-	-	-	-	24	34
TAM 401	-	30	-	-	25	-	38	-	-	33	33	34	29	34	24	33
WB-Cedar	-	-	-	-	-	-	35	-	-	28	34	28	25	32	-	-
Winterhawk	31	-	23	28	-	27	-	27	20	-	-	-	-	-	24	32
OCW00S063S-1B	-	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-
OK05312	-	-	19	-	-	-	-	26	17	-	-	-	-	-	-	-
OK08229	-	-	20	-	-	25	-	28	17	-	-	-	-	-	-	-
OK08328	30	28	24	28	24	24	37	26	16	-	34	28	26	-	24	34
OK08413	-	-	-	-	-	-	-	-	-	34	-	-	-	-	-	-
OK08707W	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-
OK09125	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-
OK09634	32	32	-	-	-	-	-	-	-	-	36	32	-	37	-	-
OK0986146W	-	-	-	-	-	-	-	25	18	-	-	-	-	-	-	-
OK09915C	31	-	-	29	-	29	-	-	-	-	37	34	-	34	-	-

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Fall forage production and date of first hollow stem in winter wheat varieties during the 2011-2012 crop year

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Introduction

Fall forage production potential is just one consideration in deciding which wheat variety to plant. Dual-purpose wheat producers, for example, may find varietal characteristics such as grain yield after grazing and disease resistance to be more important selection criteria than slight advantages in forage production potential. Forage-only producers might place more importance on planting an awnless wheat variety or one that germinates readily in hot soil conditions. Ultimately, fall forage production is generally not the most important selection criteria used by Oklahoma wheat growers, but it is one that should be considered.

Fall forage production by winter wheat is determined by genetic potential, management, and environmental factors. The purpose of this publication is to quantify some of the genetic differences in forage production potential and grazing duration among the most popular wheat varieties grown in Oklahoma. Management factors such as planting date, seeding rate, and soil fertility are very influential and are frequently more important than variety in determining forage production. Environmental factors such as rainfall and temperature also play a heavy role in dictating how much fall forage is produced. All of these factors along with yield potential after grazing and the individual producer's preferences will determine which wheat variety is best suited for a particular field.

Site descriptions and methods

The objective of the fall forage variety trials is to give producers an indication of the fall forage production ability of wheat varieties commonly grown throughout the state of Oklahoma. The forage trials are conducted under the umbrella of the Oklahoma State University Small Grains Variety Performance Tests at our El Reno and Stillwater, OK test sites. Weather data for these two sites are provided in Figures 1 and 2. Please note the difference in scale on the rainfall data.

A randomized complete block design with four replications was used at each site. Forage was measured by hand clipping two 1-m by 1-row samples at random sites within each plot. Samples were then placed in a forced-air dryer for approximately 7 days and weighed. All plots were sown at 120 lb/A in a conventionally-tilled seedbed and received 50 lb/ac of 18-46-0 in furrow at planting. Fertility, planting date, and harvest date information are provided in Table 1.

Results

Extremely hot and extremely dry. There is no other way to describe the summer of 2011. Oklahoma farmers and ranchers entered the month of September 2011 with almost no soil moisture and extreme heat that quickly dissipated the little rainfall that occurred. Hay supplies were gone along with any remaining pastures, so the desperate need for forage of any kind pushed most producers to roll the dice and dust in wheat for pasture. A break from the extreme heat and a few timely rains in late September allowed wheat to establish itself but did not provide much opportunity for growth. The pattern of just enough moisture to survive persisted throughout the winter in western Oklahoma and the Panhandle.

Central and west-central Oklahoma was a different story. What began as a slow wheat forage year turned into one of the best wheat pasture years in recent memory for farmers and ranchers in this region. Timely rainfall throughout October, November, and December combined with one of the warmest winters on record resulted in rapid forage production and outstanding average daily gains. High levels of residual soil nitrogen (Table 1) left by failed crops in 2011 also spurred wheat forage production onward. In fact, many producers were unable to secure sufficient stocker cattle to keep up with wheat forage.

Fall forage production at Stillwater ranged from 2,980 lbs/ac (TAM 203) to 4,020 lbs/ac (Gallagher) with average

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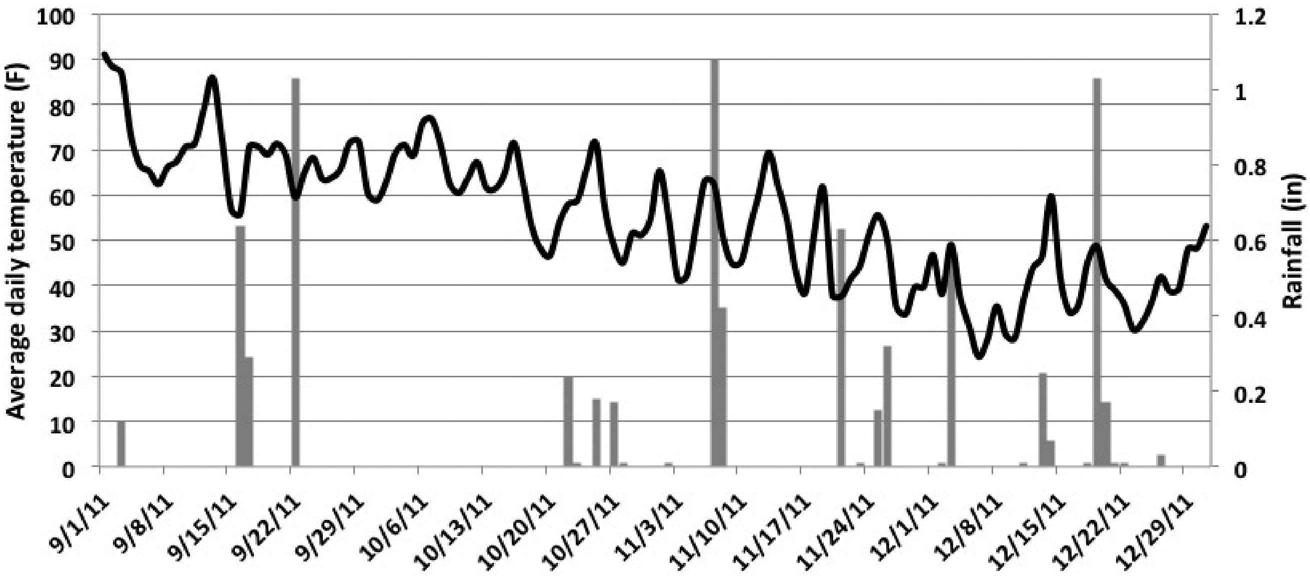

Figure 1. Average daily temperature (line graph) and rainfall (bar chart) from September 1 to December 31, 2011 at Stillwater, OK. Weather data courtesy Oklahoma Mesonet.

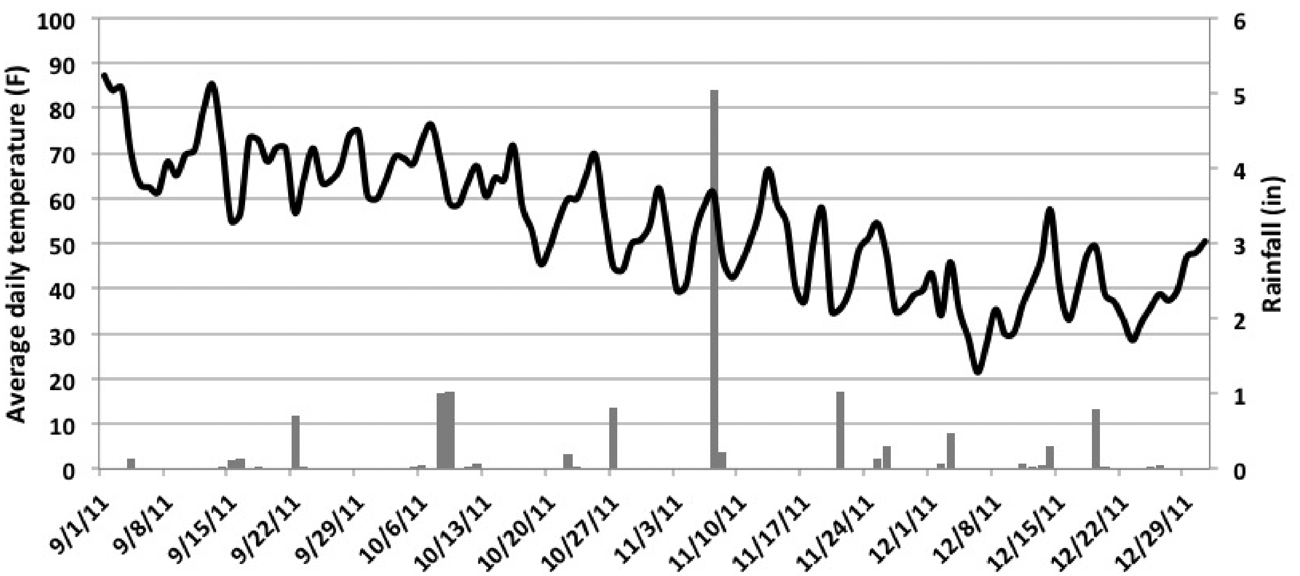

Figure 2. Average daily temperature (line graph) and rainfall (bar chart) from September 1 to December 31, 2011 at El Reno, OK. Weather data courtesy Oklahoma Mesonet.

Table 1. Location information for 2010-2011 OSU wheat forage trials.

	Planting date	*Sampling date*	*pH*	*N*	*P*	*K*
El Reno	09/27/11	01/06/12	6.8	119	71	337
Stillwater	09/20/11	12/12/11	5.7	286	157	373

Table 2. Fall forage production by winter wheat varieties at Stillwater, OK in 2011.

Source	*Variety*	*2011*	*2-Year*	*3-Year*	*4-Year*
		---------------------------------------lbs dry forage/acre---------------------------------------			
OSU	Gallagher	4,020†	-	-	-
UNL	Mace	3,870	3,230	-	-
CSU	Hatcher	3,830	3,380	-	-
OSU	Endurance	3,770	3,300	3,020	3,000
AgriPro	Fannin	3,760	3,320	3,130	3,240
OSU	Centerfield	3,730	3,260	2,930	3,030
KSU	Jagger	3,680	3,040	2,800	2,910
AgriPro	Doans	3,640	3,240	2,980	3,040
TAMU	TAM 111	3,640	3,170	2,870	2,990
LCS	T153	3,580	-	-	-
OSU	Duster	3,560	3,190	3,060	3,200
OSU	Iba	3,550	3,340	-	-
TAMU	TAM 401	3,520	3,090	2,920	-
OSU	Deliver	3,510	3,090	2,840	2,890
LCS	T-158	3,490	3,150	-	-
OSU	Ruby Lee	3,480	3,210	2,980	-
WestBred	Winterhawk	3,480	3,180	2,830	2,860
OSU	Pete	3,440	3,150	2,880	-
OSU	Garrison	3,430	3,070	2,660	-
KSU	Everest	3,400	2,910	2,600	-
OSU	Billings	3,360	3,160	2,930	-
TAMU	TAM 113	3,340	-	-	-
CSU	Bill Brown	3,330	3,250	-	-
AgriPro	CJ	3,330	-	-	-
AgriPro	Jackpot	3,330	3,040	2,860	2,990
WestBred	Armour	3,310	3,170	2,930	3,050
WestBred	Santa Fe	3,310	3,010	2,870	2,950
WestBred	WB-Cedar	3,280	2,990	-	-
TAMU	TAM 112	3,220	3,070	2,830	2,940
AgriPro	Greer	3,210	3,050	2,750	-
OSU	OK Bullet	3,190	2,950	2,870	2,990
KSU	Fuller	3,120	2,910	2,750	2,880
TAMU	TAM 203	2,980	2,800	2,810	2,850
	Average	**3,480**	**3,130**	**2,870**	**2,990**
	LSD	580	420	290	260

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

Table 3. Fall forage production by winter wheat varieties at El Reno, OK in 2011.

Source	*Variety*	*2011*	*2-Year*†	*3-Year*
		--------------lbs. dry forage/acre------------		
OSU	Ruby Lee	2,840‡	-	-
KSU	Jagger	2,770	2,760	2,310
AgriPro	Fannin	2,750	3,300	2,680
WestBred	Armour	2,700	3,190	2,680
OSU	Iba	2,670	-	-
AgriPro	Greer	2,660	3,100	-
KSU	Fuller	2,660	2,820	2,480
OSU	Deliver	2,600	2,880	2,440
WestBred	Santa Fe	2,580	2,850	2,370
OSU	OK Bullet	2,550	3,170	2,680
TAMU	TAM 401	2,540	2,960	-
OSU	Gallagher	2,520	2,670	-
OSU	Pete	2,480	2,720	-
OSU	Billings	2,400	3,060	-
OSU	Duster	2,380	2,940	2,530
OSU	Garrison	2,350	-	-
WestBred	WB-Cedar	2,350	2,730	-
AgriPro	CJ	2,270	-	-
KSU	Everest	2,270	2,800	-
OSU	Endurance	2,240	2,560	2,210
AgriPro	Jackpot	2,160	2,710	2,310
AgriPro	Doans	2,110	2,570	2,330
	Average	**2,490**	**2,880**	**2,460**
	LSD	550	460	370

† Data were not reported in 2009. 2-year averages include 2010 and 2011 data. 3-year averages include 2008, 2010, and 2011 data.
‡ Shaded cells within a column are not statistically different from the greatest value within that column

production of 3,480 lbs/ac (Table 2). Fall forage production at El Reno was slightly less, but still impressive, and ranged from 2,110 lbs/ac (Doans) to 2,840 lbs/ac (Ruby Lee) with average production of 2,490 lbs/ac (Table 3). As with previous years, there was a large grouping of high-yielding varieties with statistically equal forage production at both sites. This was true for both the single year results and the multi-year averages. Given the wide selection of varieties with suitable fall forage production, dual-purpose producers should also place heavy emphasis on the dual-purpose grain yield potential of these varieties and use grain yield after grazing as a selection tool for choosing among top forage producers.

First hollow stem data are reported in 'day of year' (day) format (Table 4). To provide reference, keep in mind that March 1 is day 61 (2012 is a leap year). Average occurrence of first hollow stem at Stillwater and El Reno in 2012 was day 52 and 55, respectively. This was eleven and nine days earlier than in 2011 and was the result of the warm winter, adequate rainfall, and high levels of residual nitrogen (Table 1, Figures 1 and 2). There was a 39-day range in occurrence of first hollow stem at Stillwater and a 17-day range at El Reno. The wider range of dates of first hollow stem at Stillwater was the result of a broader selection of varieties and more frequent early-season sampling. Even with this variation in date of first hollow stem between locations, the relative rankings of varieties (i.e. early, medium, or late) were fairly consistent.

Table 4. Occurrence of first hollow stem (day of year) for winter wheat varieties sown in 2011 and measured in 2012 at Stillwater and El Reno, OK.

Source	*Variety*	*Stillwater*	*El Reno*
		-----day of year-----	
AgriPro	Fannin	28	49
KSU	Jagger	33	50
AgriPro	Greer	40	55
TAMU	TAM 112	40	-
CSU	Hatcher	40	-
OSU	Gallagher	40	52
OSU	Billings	46	49
TAMU	TAM 401	46	47
KSU	Fuller	49	45
WestBred	Armour	49	55
OSU	Garrison	49	55
AgriPro	Jackpot	49	55
AgriPro	TAM 203	49	-
CSU	Bill Brown	49	-
WestBred	Santa Fe	51	55
KSU	Everest	51	50
TAMU	TAM 113	51	-
LCS	T153	51	-
OSU	Ruby Lee	52	58
WestBred	Winterhawk	53	-
AgriPro	CJ	53	55
OSU	OK Bullet	55	55
WestBred	WB-Cedar	55	55
AgriPro	Doans	55	69
OSU	Pete	55	58
OSU	Deliver	56	61
OSU	Duster	58	58
OSU	Iba	58	58
TAMU	TAM 111	60	-
AgriPro	AP503 CL2	60	-
OSU	Endurance	62	66
LCS	T158	62	-
OSU	Centerfield	64	-
OSU	2174	64	-
UNL	Mace	67	-
Experimentals			
	OCW00S063S-1B	28	-
	OK09634	33	-
	OK0986146W	51	-
	OK09125	55	-
	OK08229	56	-
	OK08707W	58	-
	OK08413	60	-
	OK05312	60	-
	OK08328	62	-
	OK09915C	62	-
	Average	**52**	**55**

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Seed donated by:

AgriPro Wheat, Vernon, TX
Colorado Wheat Breeding Program, Ft. Collins, CO
Husker Genetics, Lincoln, NE
Kansas Wheat Alliance, Manhattan, KS
Limagrain Cereal Seeds, Ft. Collins, CO
Oklahoma Genetics Inc, Stillwater, OK
Watley Seed Company, Spearman, TX
WestBred LLC, Haven, KS

Seed Source Abbreviations

CSU = Colorado State University
KSU = Kansas State University
LCS = Limagrain Cereal Seeds
OSU = Oklahoma State University
UNL = University of Nebraska-Lincoln
TAMU = Texas AgriLife Research