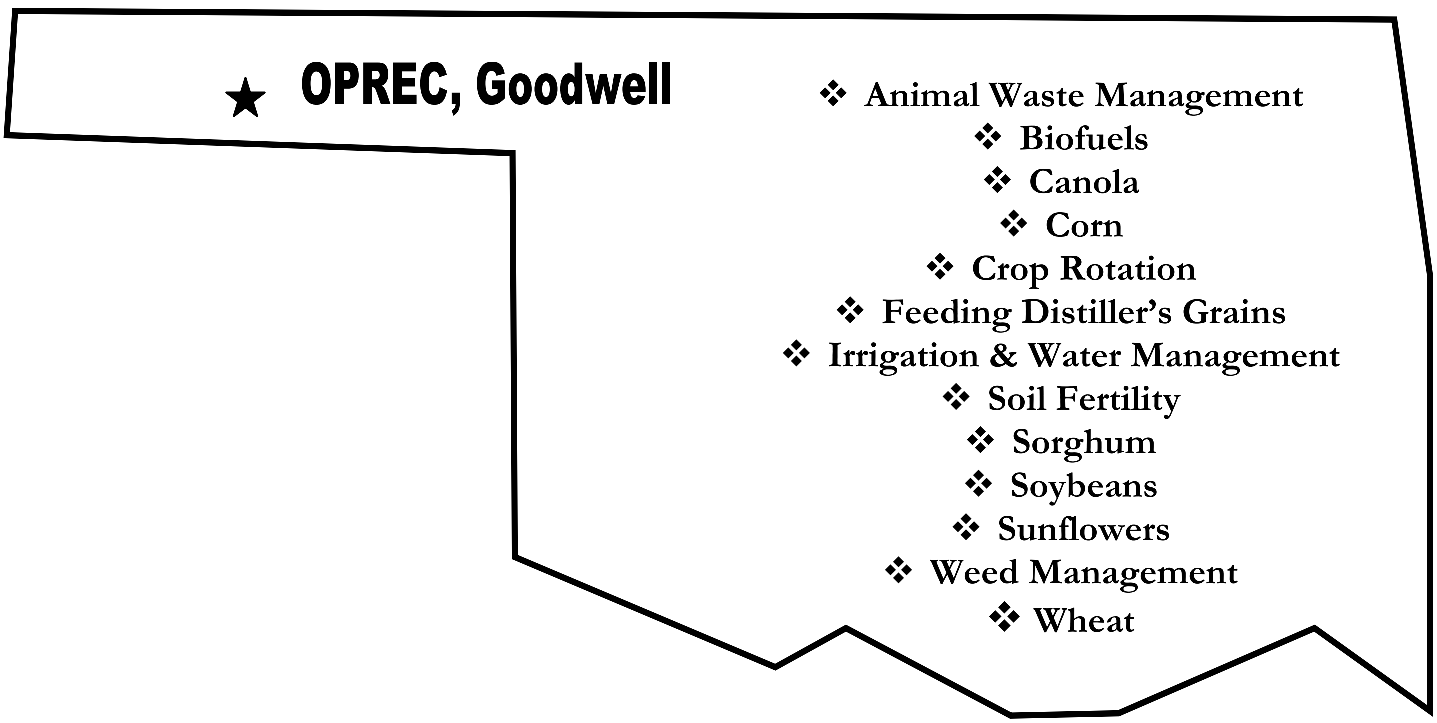
Oklahoma Panhandle Research & Extension Center

Route 1, Box 86M   Goodwell, Oklahoma 73939-9705   (580) 349-5440
http://oaes.pss.okstate.edu/goodwell

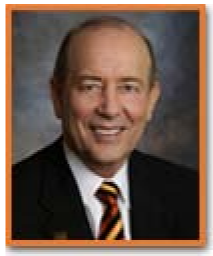


2010 Research Highlights

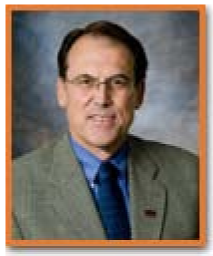
Division of Agricultural Sciences and Natural Resources
Oklahoma Panhandle Research and Extension Center
Oklahoma State University
Field & Research Services Unit
Department of Animal Science
Department of Entomology and Plant Pathology
Department of Plant and Soil Sciences
Department of Biosystems and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

In Sincere Memory of Brent Westerman

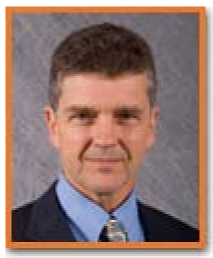
Brent Westerman
Senior Director of Field Research Service Units



Robert E. Whitson
DASNR Vice President, Dean & Director



Clarence Watson
Associate Director of the Oklahoma Agricultural Experiment Station



Jonathan Edelson
Assistant Director of the Oklahoma Agricultural Experiment Station

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 people. The OCES continues to strive to disseminate the research information generated by OAES 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 Oklahoma Panhandle Research and Extension Center. Together as a team we have been able to solve many significant problems related to high plains agriculture.

The OPREC is centrally operated within the Field and Research Services Unit (FRSU) of the OAES. The FRSU serves as the back bone for well over 1,000 statewide field and lab based research trials annually. Our unit consists of 18 outlying research stations including the OPREC, the Controlled Environmental Research Lab, the Ridge Road Greenhouse Phase I and Phase II, the Noble Research Center and the Stored Product Research and Extension Center. The FRSU works to provide a central focus for station operations and management with the goal to improve overall efficiency by providing a systematic means for budget management, facility upgrades, consolidation of labor pools, maintenance and repair of equipment and buildings, and other infrastructure needs.

The Oklahoma Panhandle Research and Extension Center at Goodwell is committed to serving the people of the region. 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, Craig Chesnut Field Foreman II, Jake Baker Agriculturalist, and several wage payroll and part-time OPSU student laborers. OSU faculty members from numerous Departments continue to utilize OPREC to conduct research and extension efforts in the Panhandle area. Additionally, the OPREC continues to serve as a “hub” for our commodity groups and agriculture industries by hosting several informative agriculture related meetings annually.

The DASNR, OAES, and OCES truly appreciate the support that our clientele, farmers, ranchers, commodity groups, industry, and other agricultural groups have given us over the years. Without your support many of our achievements would not have been possible. 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.

Clarence Watson
Associate Director
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
Green Country Equipment
Hitch Enterprises
Liquid Control Systems (Tim Nelson)
Midwest Genetics (Bart Arbuthnot)
Monsanto (Ben Mathews, T. K. Baker, Mike Lenz)
National Sorghum Producers
Rick Nelson
GM Northwest Cotton Growers Co-op
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

~ Advisory Board ~

2010 Oklahoma Panhandle Research and Extension Center
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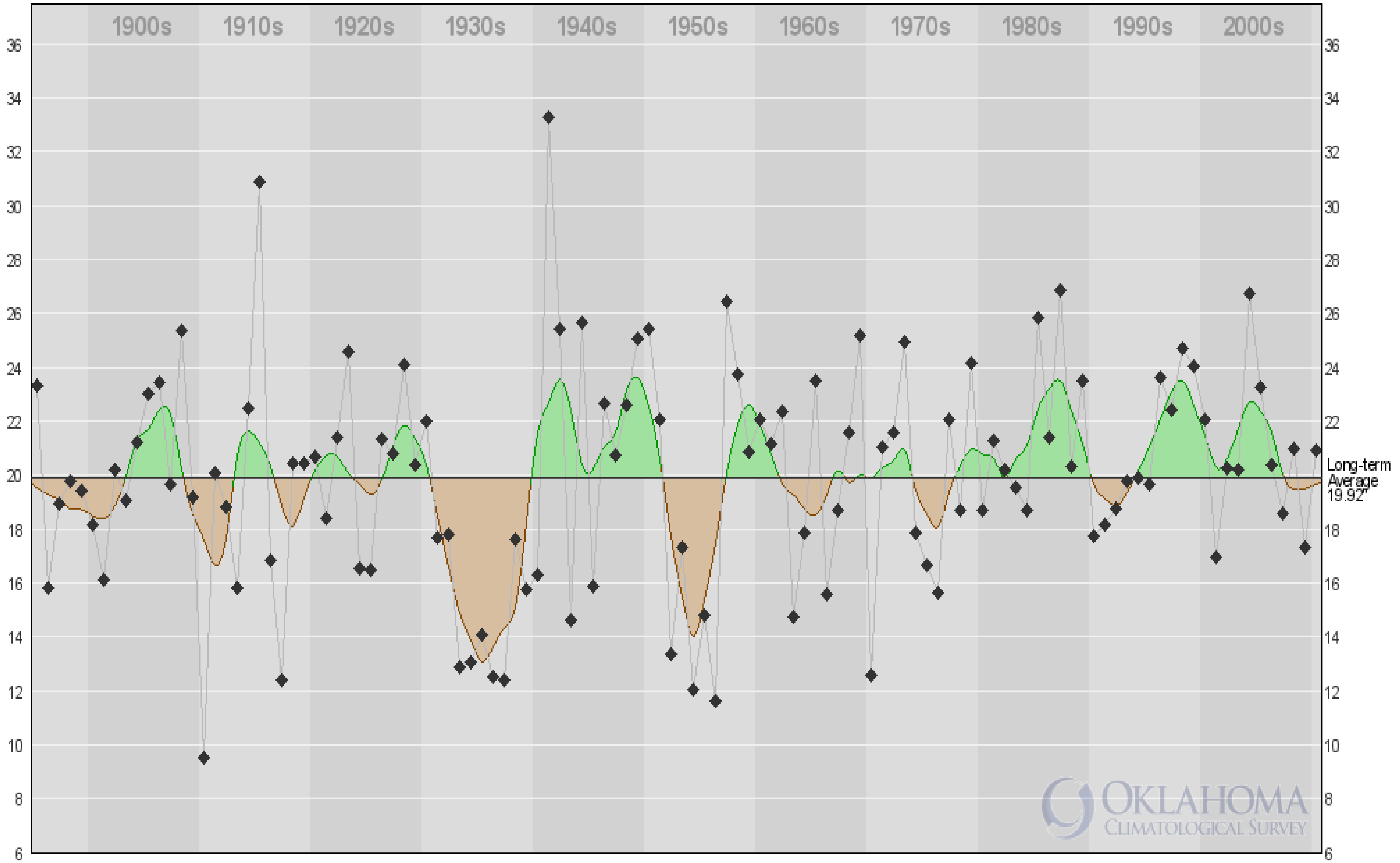
Dr. Jason Warren (405) 744-1721	Assistant Professor, Soil and Water Conservation, Dept. of Plant and Soil Sciences, Oklahoma State University



USDA ars

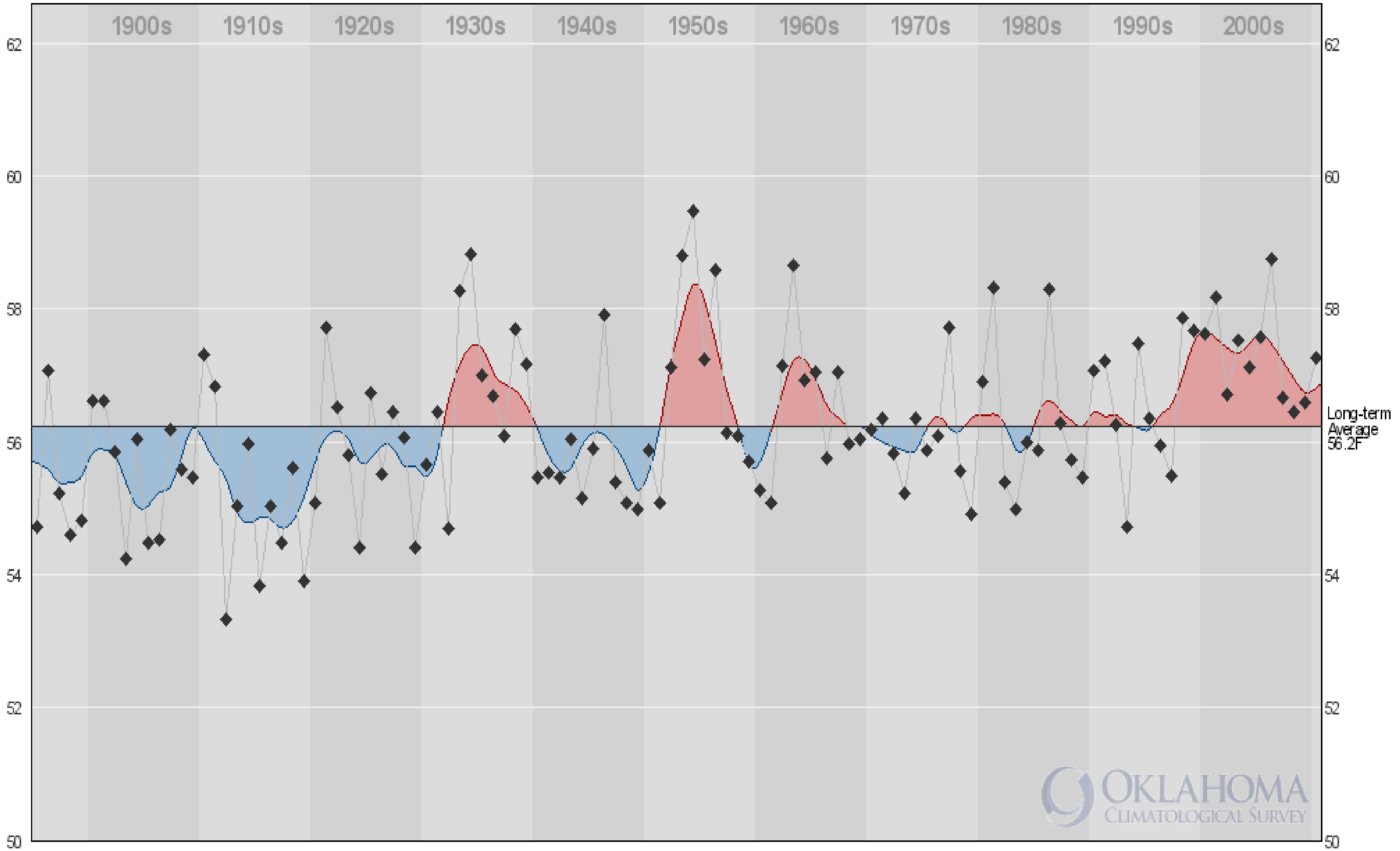
Annual Precipitation History with 5-year Tendencies

OK-CD1 (Panhandle): 1895-2010

Wetter historical periods

Drier historical periods

Individual Annual precipitation value



USDA ARS

Annual Temperature History with 5-year Tendencies

OK-CD1 (Panhandle): 1895-2010

Warmer historical periods

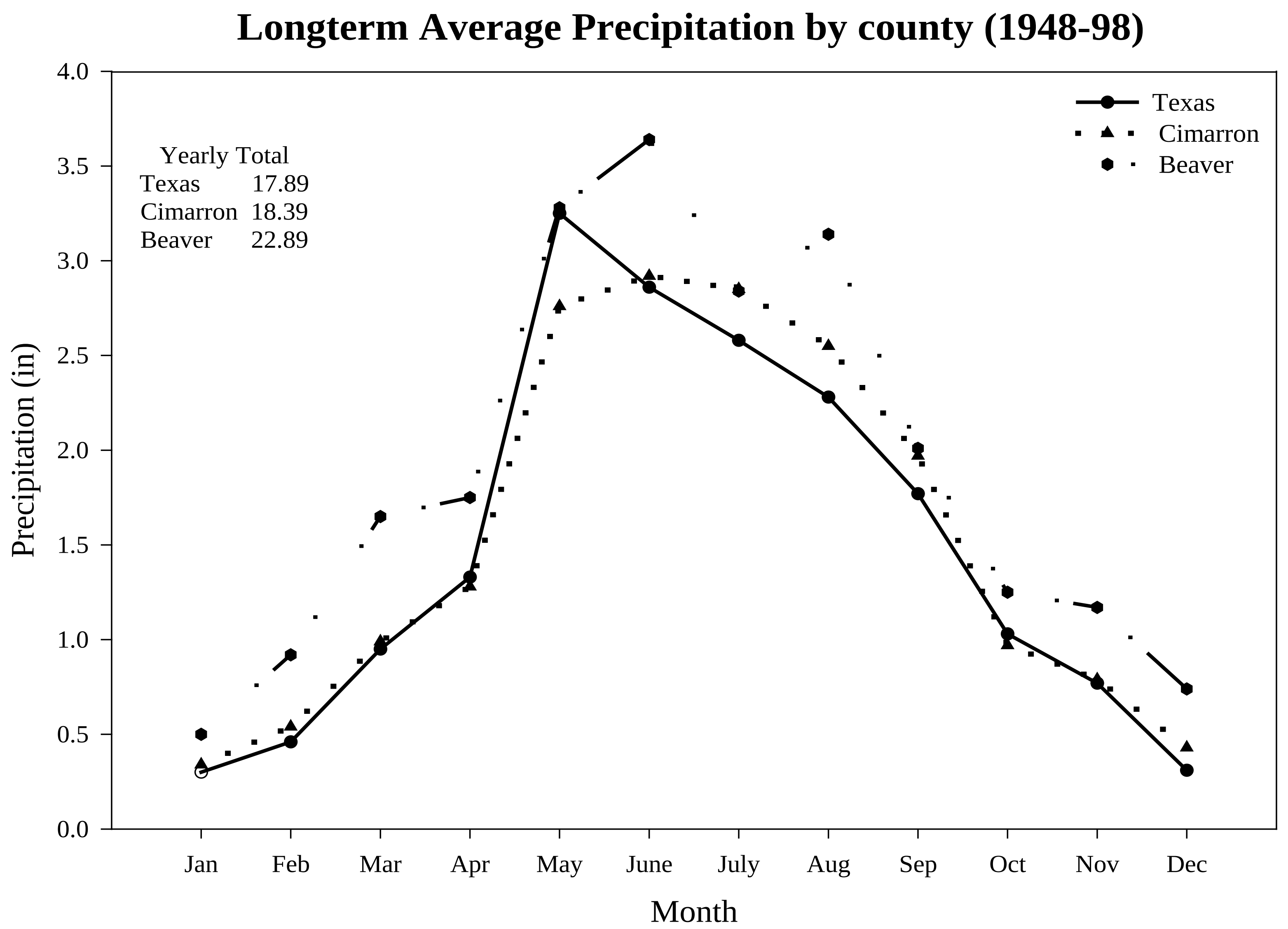
Cooler historical periods

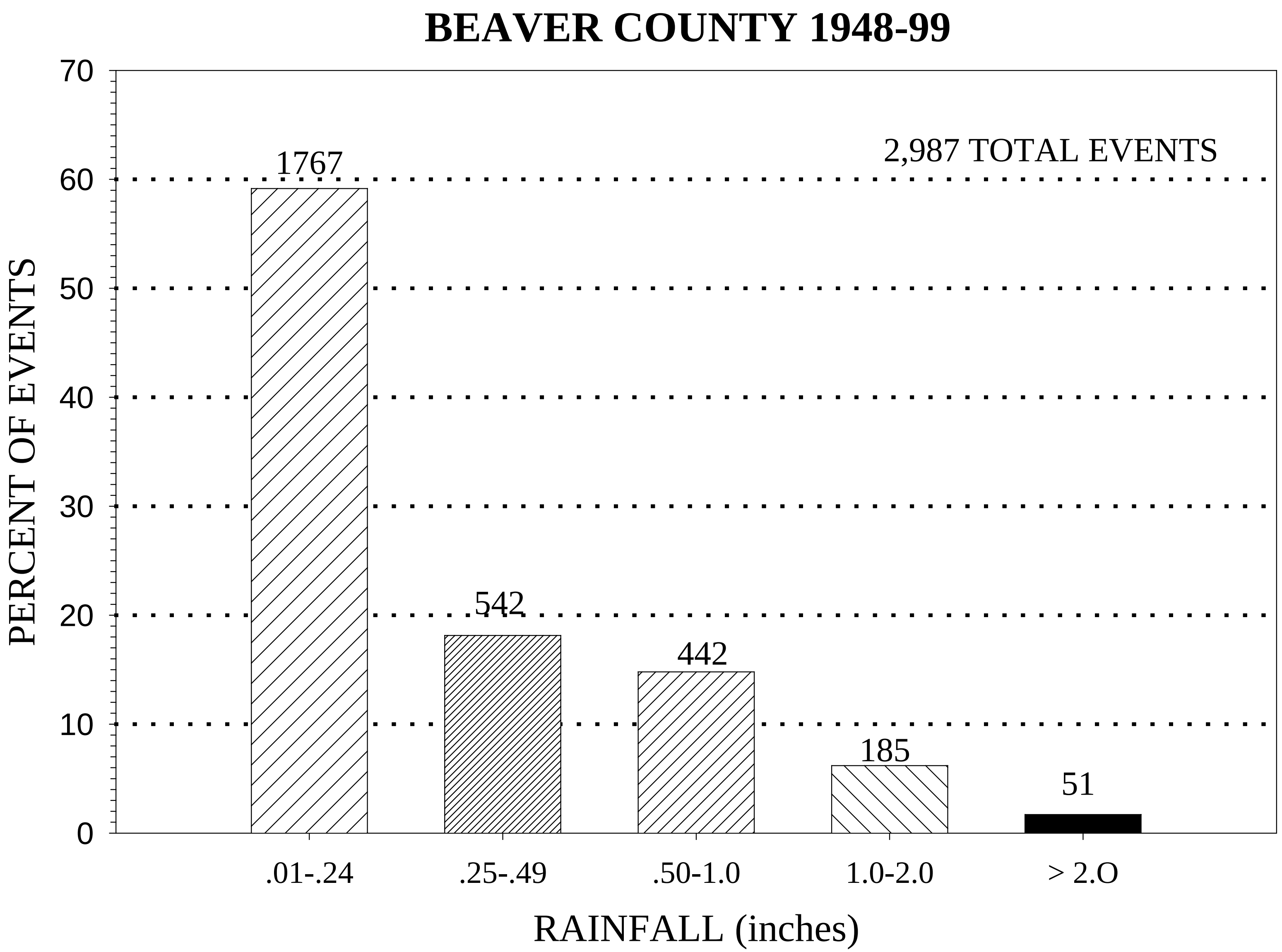
Individual Annual temperature value

Climatological data for Oklahoma Panhandle Research and Extension Center, 2010.

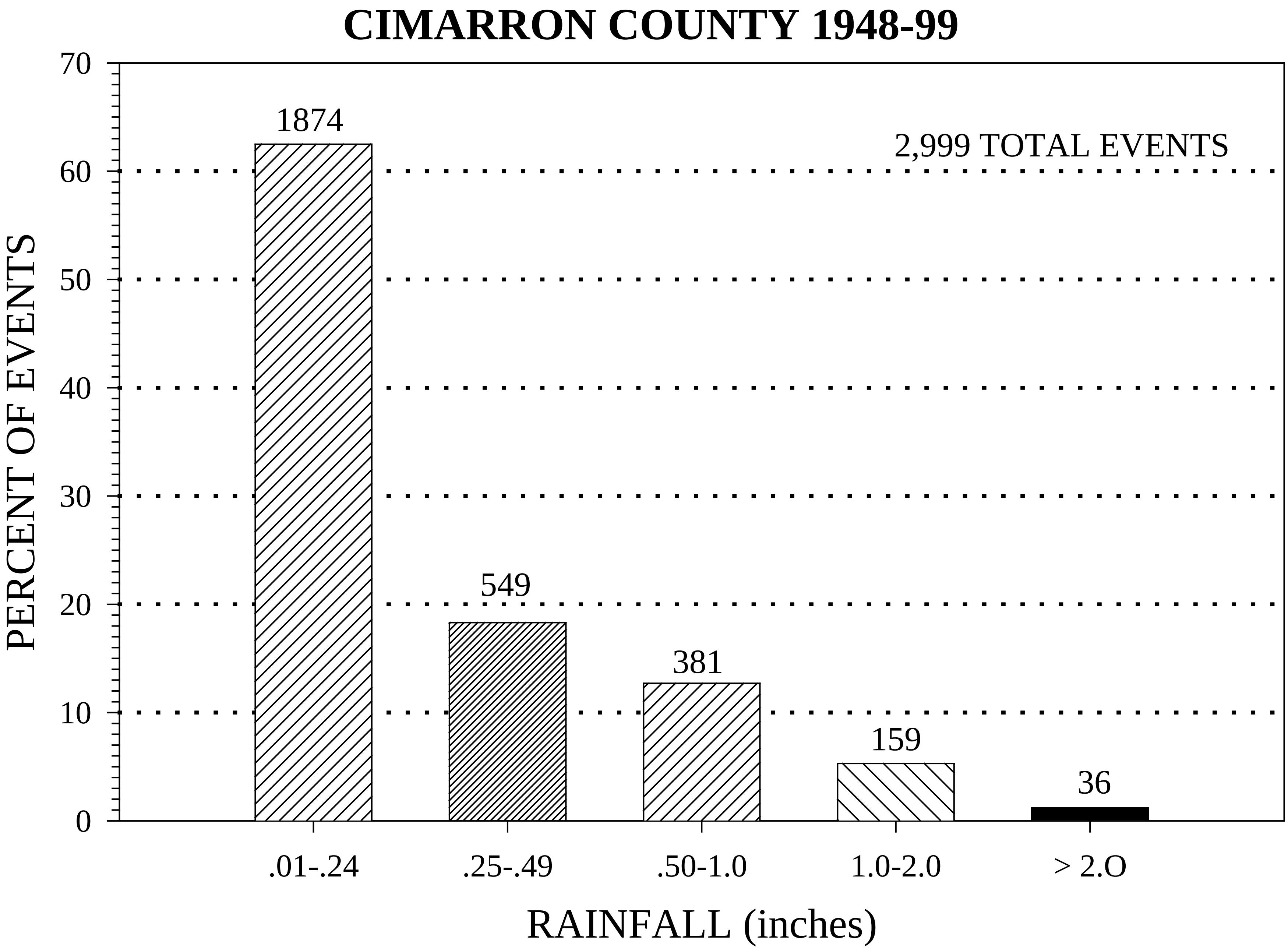
	Temperature				Precipitation			Wind	
Month	Max	Min	Max. mean	Min. mean	Inches	Long term mean	One day total	AVG mph	Max mph
Jan	67	-6	48	17	0.49	0.30	0.29	10.7	52.0
Feb	57	9	39	20	1.51	0.46	0.39	9.9	40.9
March	87	18	60	30	2.51	0.95	0.73	13.4	55.0
April	87	24	69	41	1.76	1.33	0.83	15.3	56.1
May	92	31	77	47	2.64	3.25	0.82	13.8	52.1
June	103	51	91	63	3.16	2.86	1.48	14.3	68.5
July	102	58	93	66	1.22	2.58	0.65	12.6	57.9
Aug	103	49	93	64	5.42	2.28	3.16	11.3	38.9
Sept	99	42	88	56	0.20	1.77	0.11	12.4	51.8
Oct	89	26	76	43	0.81	1.03	0.63	11.5	44.9
Nov	81	8	61	27	0.29	0.77	0.23	13.2	50.9
Dec	71	2	51	22	0.34	0.31	0.23	10.5	52.2
Annual total			70.0	40.5	13.03	17.9	NA	NA	NA

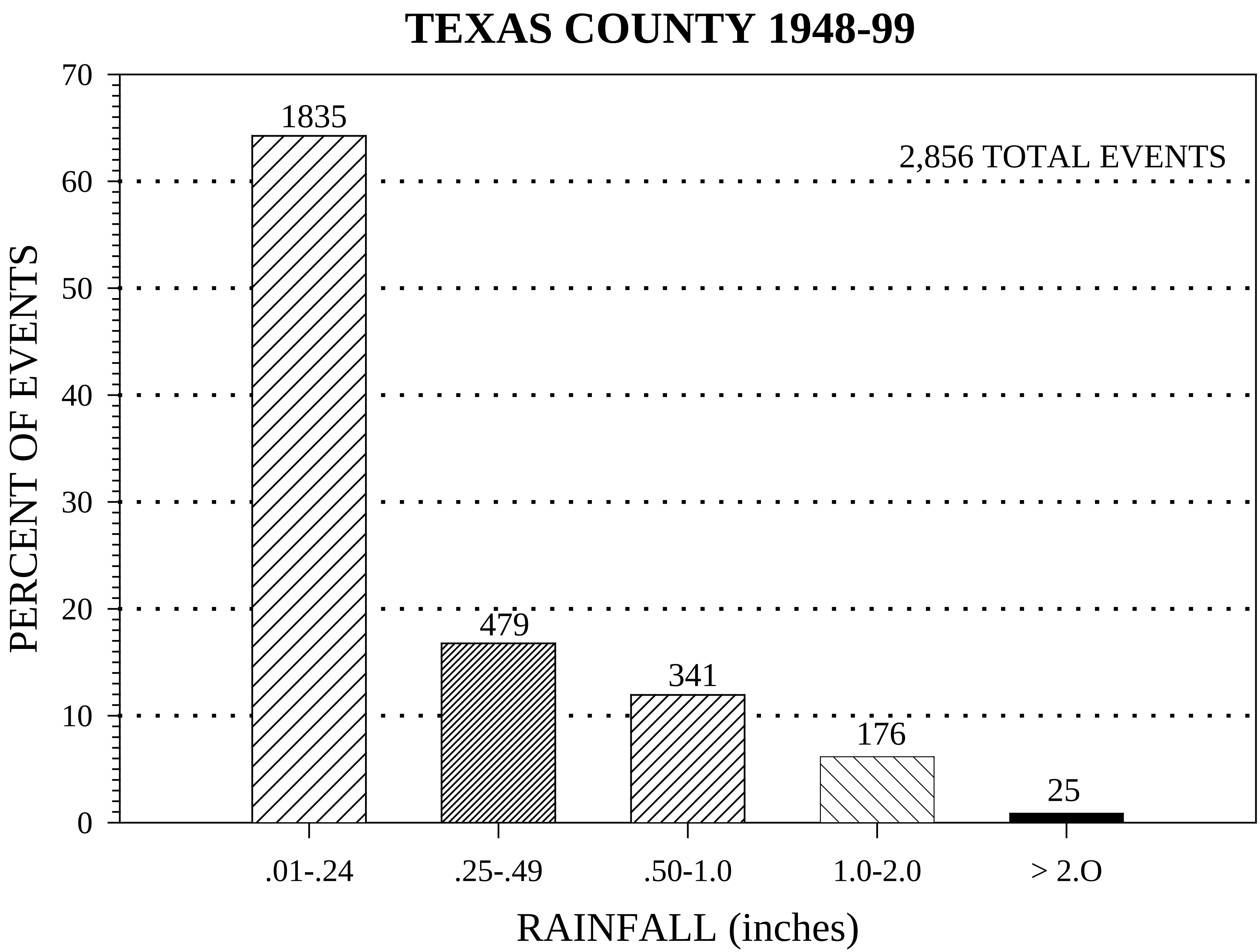
Data from Mesonet Station at OPREC


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



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


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



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

Oklahoma Panhandle Research & Extension Center
2010 Research Highlights

Crops

Extension Publications

Sunflower and Grain Sorghum Combine Header Loss Evaluation

Wesley M. Porter[1], Rick Kochenower[2], Elizabeth Miller[1], Randy Taylor[1]
1: Dept. of Biosystems and Ag Engineering, Oklahoma State University, Stillwater, OK
2: Oklahoma Panhandle Research and Extension Center, Goodwell, OK

More producers are growing row crops such as grain sorghum (milo) and sunflowers in Northwest Oklahoma. Most of the growers already own a combine that they either use for cutting wheat, beans, or corn. These row crops can be a little more difficult to harvest when compared to the other crops that are normally harvested with the combine and its specific headers. A major difference with these crops is that seeds and in extreme cases full heads can be lost. The loss of seeds is common in all crops but losing heads during harvest can be a significant harvest loss. Specific combine headers perform better than others at preventing both types of losses. There are also special attachments for certain headers that aid in retaining the grain seeds and grain heads.

Our objective was to measure header loss during sunflower and grain sorghum harvest with different combine headers and/or attachments. Header losses were measured by collecting full grain heads and counting the number of seeds left behind from selected areas in the field and quantified to a loss in yield (in lbs/ac).

Methods

A John Deere 6620 combine was used to harvest both crops. Sorghum harvest was performed on November 4, 2010. Four different combine headers were used during this harvest and included a row crop header, a bean header, a conventional wheat header, and the conventional header with milo finger attachments. Sunflowers were harvested on November 17, 2010. Five different headers were used with during the sunflower harvest and included a row crop header, a conventional wheat header, a corn header with sunflower plates, a bean header, and the conventional header with the milo fingers (Figure 1). Header loss collections were performed at six different locations within the field during the harvest performed with each header. The header loss locations were collected using a method shown in Figure 2 to ensure total combine loss was not a factor in the collections.

Figure 1. From top left, clockwise: Row crop head, flex bean header, conventional wheat head with Downer Milo Guards, SunStar sunflower plates for a corn header, corn header with sunflower plates and conventional wheat head (without attachments).

Figure 2. The red area represents the areas where header loss was collected.

The headers used were four rows wide (30 inch rows), thus the actual designated collection area was ten foot in width by six foot in length for a total of sixty feet squared within the collection area for each collection (Figure 3). This sample area was collected six times per header. Within this collection area the number of heads were counted and collected to be threshed and weighed later. From within the 60 ft^2 area four one foot square areas were randomly selected to count seeds. Three other 60 ft^2 areas from each header were selected and collected after harvest to get to get a total combine loss weight.

Figure 3: The 6'x10' collection area with the four 1ft^2 sample aids inside.

Heads from both the sunflower and milo harvests were collected from within the 60 ft^2 area. These heads were threshed and the seeds weighed. The seed weights collected from the heads helped to give a pound per acre loss for heads that did not make it into the combine. The header loss was compared to the total loss.

Results

Header loss was calculated for each of the headers based on the individual seed weight and count per the unit area they were collected from. The seeds collected from the heads were counted for a 60 ft^2 area and the individual seed counts were accounted for the four 1 ft^2 areas from each collection site. These numbers were then converted to pound per acre yield loss. The results for the sunflowers (Table1) and the grain sorghum (Table 2) can be viewed below.

Table 1. Header loss from heads and seeds during sunflower harvest.

Header	# of Heads	lbs/ac hd loss	# of Seeds	lbs/ac sd loss	Total Header Loss
Row Crop	2.4	90.7	15.8	72.8	163.4
Wheat	10.8	433.8	9.8	45.3	479.1
Sunflower	4.2	108.4	23.8	109.6	218.1
Bean	4.5	148.5	8.3	38.4	186.8
Milo	6.6	265.4	9.1	42.0	307.5

As shown in Table 1, the row crop header had the lowest header loss followed by the bean header, the sunflower attachments were not very far behind these two. There was a statistical difference in yield loss from each of the headers used. For yield loss from head loss the row crop, sunflower plates and bean header statistically performed the same, while the wheat header and milo fingers were statistically the same. The row crop and sunflower headers performed well below the other three headers when it came to seed loss. More seeds were retained using the grain headers (wheat, bean, and milo fingers). The grain platforms on these headers aided in retaining the higher number of seeds. Total loss followed the same trend as head loss in the performance levels of the headers. A corn header can perform very well with the sunflower plates. However a regular flex header for beans also seemed to work very well for sunflowers during this study. The longer grain platform of the bean header helped to retain a higher number of seeds and heads above the conventional wheat header. Based on this data it is not recommended to use a conventional wheat header or the milo finger attachments for harvesting sunflowers.

Table 2. Header loss from heads and seeds during Milo harvest.

Header	# of Heads	lbs/ac hd loss	# of Seeds	lbs/ac sd loss	Total Header Loss
Row Crop	0.0	0.0	16.1	54.8	54.8
Bean	2.2	72.6	9.7	33.1	105.7
Wheat	0.5	30.9	9.1	31.0	61.9
Milo	0.3	5.1	11.2	38.2	43.3

The milo was harvested at about 13% moisture content. It was a very uniform stand and fed into the headers very well. The average total yield was about 130 bushels per acre. As seen in Table 2 the Milo finger attachments for the conventional wheat header performed the best, with the row crop and wheat headers falling right behind. The row crop header had a higher number of seed losses than any of the other heads because of the smaller seeds and header design. However statistically the number of seeds lost between each header was not different. The yield loss due to head losses was statistically the same for the row crop header and the milo attachments. This means that these two headers perform at the same level for retaining heads. As in the sunflower harvest the grain platforms on the bean and wheat headers helped in the reduced seed loss numbers. Even though the total losses of each header was not significantly different the row crop header and the milo finger attachments improved losses. It should be noted that the very uniform high yielding stand of milo helped to keep all headers at a high harvest level.

Conclusions

The data from both studies support very good performance from the row crop head, and if available this header would be a good choice to be used for harvesting these row crops. However depending on what combine headers you have available specialty attachments can make a significant difference in the amount of head and seed loss occurring during harvest. It would be worth the investment to buy the sunflower plates or the milo fingers for their designed crop. In both cases the grain headers performed better on seed loss due to the design of the header grain platform. Even though fewer seeds were lost with the grain headers it must be remembered the significant losses that occur from the loss of complete or partial grain heads. In both studies the row crop header retained the highest number of grain heads. Milo fingers and sunflower plates both have reduced head loss numbers compared to the wheat and bean headers without attachments. Based on the data collected from this study it is shown that the header attachments tested in these trials helped in retaining full heads. It is very important to retain as many heads as possible to prevent large losses thus the attachments are worth using.

Oklahoma Panhandle Research and Extension Center
Wheat Improvement Program
Annual Report, 2011

Brett Carver, Dept. of Plant and Soil Sciences, Oklahoma State University

OSU joins Texas A&M University/AgriPro in Uniform Testing

The Oklahoma Panhandle Research and Extension Center (OPREC) plays a pivotal role in the final stages of OSU wheat variety development. The 2009-2010 crop season represented our second year of collaborative uniform testing of contemporary varieties and candidate varieties with two other breeding programs in the southern Plains, namely Texas AgriLife and AgriPro. This uniform trial contained the same entries tested across Texas and Oklahoma, including a dryland trial at the OPREC. Along with the usual varieties that would appear in a variety trial such as TAM 111, Jackpot, and Duster, experimental lines under release consideration were evaluated head-to-head. Two such experimental lines from OSU were included in 2010 (Table 1) and have now been officially released by the Oklahoma Agricultural Experiment Station (OAES) as Ruby Lee and Garrison.

Topping the list for statewide performance in Oklahoma were Armour (WestBred), Duster, and the new OAES release, Garrison (Table 1). The statewide yield means included trials at Granite, Enid, Lahoma, and Goodwell dryland. To identify best-variety performance at Goodwell, one must focus strictly on the Goodwell performance data in Table 1. That is because variety means at Lahoma or at Granite were not significantly correlated with variety means at Goodwell (r = 0.2 for both pairs of correlations). Hence, a different set of varieties excelled at Goodwell than elsewhere in the state, including TAM 203, the OSU new beardless variety Pete, Jagger, and SY Gold (AgriPro). This lack of yield consistency between downstate locations and the OPREC is not unusual, and we must account for this inconsistency in the OSU wheat improvement program by using the OPREC as a core testing site for line evaluation and selection. The Uniform Variety Trial summarized in Table 1 will be repeated in 2011 with a different lineup of experimental lines.

Testing of Elite Materials from the OSU Wheat Improvement Program

As alluded above, the OPREC is used as one of the three cornerstone testing sites for replicated yield and quality trials in the OSU wheat improvement program. The other two sites include Granite in southwest Oklahoma and Lahoma in north central Oklahoma. 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 contains the most advanced (i.e., elite) breeding lines each year, called the Oklahoma Elite Trial (OET).

Nine of the 30 slots in the 2010 OET were occupied by contemporary check varieties, plus the long-term check variety Chisholm (Table 2). We include varieties which represent the best available commercial genetics for Oklahoma in the HRW market class. Thus each year the panel of checks changes slightly to reflect new improved genetics. This year you will find test results for these outstanding check varieties: Billings, Duster, Endurance, OK Bullet, Centerfield, Fuller, TAM 203, Pete, and Jackpot. The 2010 trial also featured four candidate varieties that were under the careful watch of the OSU Wheat Improvement Team. Two of those candidates were released by the OAES in February 2011 and are currently being considered for licensing.

OK05212 was released as Garrison, and OK05526 was released as Ruby Lee. More information on each of those varieties may be found at the end of this report.

Under further release consideration are the experimental lines OK07209, OK07214, and OK07231, all of which have Duster as one of their parents, with the other parent being different. Of primary interest are the two highest yielding lines in the 2010 OET, OK07209 and OK07214. These lines also performed very well at the OPREC, either irrigated or dryland. Differences between OK07209 and OK07214 have relevance to downstate Oklahoma, such as Hessian fly resistance or tolerance to acidic soils. OK07209 is currently under large-scale foundation seed increase, whereas OK07214 was placed under a limited foundation seed increase, with the intent to undergo a second year of seed multiplication in 2011-2012.

Unlike previous years, the yield results obtained under irrigation were not highly influenced by viruses, the most notable of which in the past have been *Barley yellow dwarf virus* (BYDV), *Wheat streak mosaic virus* (WSMV), and *Triticum mosaic virus*. However, the correlation between yields in the irrigated trial versus the dryland trial was no better than in previous years where differential disease presence biased the comparison (r=0.62 in 2010).

Duster, Billings, TAM 203, and Jackpot consistently had higher yields among the checks in both trials. In addition to the two experimental lines already discussed, we have our sights set on a couple other experimentals that have performed well over several years of OPREC testing, including OK05511 and OK05312. OK05511 provides much needed insect resistance currently not offered in OSU releases--specifically to greenbug and Hessian fly—and we are evaluating in 2011 a reselection of the original line to purify the insect resistance. OK05312 holds our interest strictly as a High Plains variety, because its yield potential is best expressed in the Oklahoma panhandle, and it confers a high degree of resistance to curl mite, the WSMV vector.

What is our plan for breeding resistance to WSMV?

The OSU Wheat Improvement Team has been able to transfer breeding success to OSU stakeholders through the release of varieties with resistance to multiple viruses. Those traits are often stacked in a single variety, with Duster being one example of conferring resistance to *Wheat soilborne mosaic virus* (WSBMV), *Wheat spindle streak mosaic virus* (WSSMV), BYDV, and *High Plains Virus*. However, WSMV has presented a greater challenge to the team, and we do realize the severity of the disease and the yield-limitations it causes in the Oklahoma panhandle. Dr. Hunger, the team's wheat pathologist, reported in 2004 an average yield loss of 62% when infection occurred in the fall and an average yield loss of 15% when infection occurred in the spring relative to non-infected wheat. Our awareness of WSMV susceptibility was reflected in the priority we placed on this trait when participating in the USDA-CAP grant from 2005 to 2010, where molecular markers were employed across several generations to select directly for WSMV resistance using germplasm developed at the University of Nebraska-Lincoln in partnership with USDA-ARS and at Kansas State University.

The resulting breeding populations are making their way through the breeding program at Oklahoma State University, and purelines are now being developed for statewide testing. Furthermore, we have since expanded our breeding strategy to combine two distinct gene forms of WSMV resistance known as *Wsm1* and *Wsm2* (indeed, they are selected by different molecular markers) with a gene (probably *Cmc4*) that confers resistance to the disease vector (curl mite). This three-pronged approach should uniquely provide the best protection to date for this disease.

One curl-mite resistant experimental has progressed through the program to become a candidate variety, already mentioned as OK05312. We continue to evaluate this line for agronomic and quality traits, and particularly the value of the insect resistance trait to protection from WSMV (in cooperation with Rich Kochenower). Its yielding ability in the High Plains is well established, though performance in the Oklahoma Small Grains Variety Performance Tests in 2010 and in the 2010 OET (Table 2) was compromised by shattering losses.

At Yuma, AZ, 500 head-rows of OK05312 were planted in Fall 2009 to eliminate red-chaff variants and to improve uniformity within the variety. This nursery will provide breeder seed for producing foundation seed in 2011-2012, pending confirmation of reduced yield losses in the presence of WSMV. Scientists at Kansas State University have already confirmed curl mite resistance of OK05312, such that leaf rolling is significantly reduced and fecundity of the curl mite is greatly decreased when plants of OK05312 versus Jagger were infested in a controlled environment (Table 3).

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 solving concerns of wheat producers in the panhandle region.

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

Table 1. Texas-Oklahoma-AgriPro Uniform Wheat Variety Trial, 2009-2010, conducted at four Oklahoma locations.

Entry	Statewide mean	OPREC dryland mean & rank	
Armour	54	67	*20*
Duster	52	72	*6*
Garrison	52	63	*24*
TX06A001263	51	71	*9*
Billings	51	69	*17*
Jackpot	50	66	*21*
TAM 304	49	70	*13*
Greer	49	70	*12*
TAM 401	48	73	*5*
TAM 111	48	71	*8*
Ruby Lee	48	70	*14*
Santa Fe	47	68	*18*
TAM 113	47	71	*10*
CJ	47	59	*30*
OK05511	46	70	*11*
Fannin	46	61	*28*
TAM 112	46	71	*7*
Jagger	45	75	*2*
SY Gold	45	74	*4*
Pete	45	75	*3*
TAM 203	45	77	*1*
Endurance	44	62	*27*
Shocker	44	62	*25*
TX05A001822	44	66	*22*
Fuller	44	68	*19*
Doans	44	56	*31*
AP503CL	42	70	*15*
Art	40	65	*23*
TAM W-101	39	55	*32*
Jagalene	39	69	*16*
OK Bullet	38	60	*29*
AP06T3621	36	62	*26*
Mean		68	
C.V.		8	
LSD		9	

Table 2. Oklahoma Elite Trial 3 (OET3) conducted at 10 locations in 2009-2010. Entry mean yields and ranks are shown in each column.

Entry	Pedigree of experimental line	Statewide		OPREC Irrigated		OPREC Dryland	
OK07214	OK93P656-(RMH 3299)/OK99711	54	1	88	1	60	13
OK07209	OK93P656-(RMH 3299)/OK99621	53	2	81	5	70	1
Duster	Check	52	3	82	4	60	12
Billings	Check	49	4	80	6	62	5
Garrison	OK95616-1/Hickok//Betty	49	5	70	16	61	9
Ruby Lee	KS94U275/OK94P549	49	6	72	15	61	7
Jackpot	Check	49	7	77	8	66	2
OK05204	SWM866442/OK95548	48	8	77	9	64	3
OK06332	SWM866442/OK95548//2174	47	9	66	20	60	11
OK06029C	TXGH12588-120*4/FS4//2*2174	47	10	83	3	61	6
TAM 203	TAM 203	47	11	87	2	63	4
OK06336	Magvars/2174//Enhancer	47	12	61	27	59	15
OK05511	TAM 110/2174	46	13	77	7	56	20
OK07231	OK92P577-(RMH 3099)/OK93P656-(RMH 3299)	46	14	73	14	49	26
OK05312	TX93V5919/WGRC40//OK94P549/WGRC34	46	15	66	19	61	10
OK06609	SWM866442-7H/2174//OK95548-26C	46	16	60	28	54	23
OK06822W	OK97G611/Trego	45	17	64	24	57	18
Endurance	Check	45	18	66	21	58	16
OK06617	FAWWON 06/2137//OK95G703-98-61421	45	19	65	22	47	28
OK06127	KS91W049-1-5-1/CMBW90M294//X920618-C-4-1/3/.	43	20	65	23	54	22
Centerfield	Check	43	21	75	12	58	17
Pete	Check	43	22	77	10	59	14
Fuller	Check	43	23	76	11	56	19
OK03825-5403-6	Custer*3/94M81	43	24	75	13	53	24
OK07919C	OK98G508W/(IMITX105/2174 F3 seln)	42	25	68	18	55	21
OK05711W	G1878/OK98G508W	42	26	64	25	46	29
OK Bullet	OK00514-05806	41	27	69	17	61	8
OK06618	SWM866442/OK94P549//2174	41	28	57	30	43	30
Chisholm	Check	41	29	59	29	50	25
OK06528	Vilma/Hickok//Heyne	36	30	62	26	49	27
Mean		**46**		**71**		**57**	
C.V.		**10**		**10**		**9**	
LSD		**4**		**12**		**8**	

Table 3. Mean number of wheat curl mites produced and two indicators of feeding damage occurring on OK05312 and Jagger wheat plants infested with a group of curl mites. Data collected 14 days post-infestation, courtesy Kansas State University (M. Marimuthu, P.A. Sotelo, D. Ponnusamy, and C.M. Smith).

Entry	No. of wheat curl mites produced	Leaf folding score	Leaf rolling score
OK05312	79 ± 15 b	1.0 ± 0 b	1.9 ± 0.3 b
Jagger	1573 ± 390a	2.0 ± 0.3a	7.7 ± 0.6 a

Means in a column followed by the same letter not significantly different (α = 0.05)

RELEASE ANNOUNCEMENT

'Garrison' Hard Red Winter Wheat

Experimental Designation OK05212
Pedigree OK95616-1/Hickok//Betty
Yield Performance

Ranks (highest yielding = '1')

OSU Breeding Nurseries (statewide)	2010 *n*=30	2009 *n*=30	2008 *n*=15	2007 *n*=30
Garrison	**4**	**1**	**4**	**4**
Duster	3	3	1	28
Endurance	18	6	8	1

SRPN History (18-20 sites per year)
2010: 10th out of 48 entries; 1st at Lahoma and Wichita; 3rd at Winfield
2009: 7th out of 46 entries; 3rd at Colby, 4th at Lahoma, 5th at Amarillo (irrig.)

Disease Protection

WSBMV, WSSMV	Highly resistant
BYDV	Moderately resistant
High Plains Virus	Moderately resistant
WSMV	Not known
Stripe rust	Resistant (to races present in OK in 2005, 2008, & 2010)
Leaf rust	Intermediate to moderately resistant (late symptoms)
Powdery mildew	Intermediate to moderately resistant (field tolerance)
Tan spot	Resistant
Septoria leaf blotch	Intermediate
Fusarium head blight	Moderately resistant

Agronomic and Quality Traits:

Exceptional acid-soil tolerance
Exceptional spring freeze avoidance or tolerance
Late FHS arrival, good grazing recovery; Endurance-type maturity
Moderately good emergence and early vigor
2010 test weight: 1-2 lb > Endurance
2010 WVT Protein: 13.3% vs. 11.7% (Endurance)
vs. 12.8% (Duster)

Weaknesses

Kernel size (similar to Duster)
Hessian fly
Late-season leaf rust

RELEASE ANNOUNCEMENT

'Ruby Lee' Hard Red Winter Wheat

Experimental Designation OK05526, OK05526-RHf

Pedigree KS94U275/OK94P549

Yield Performance

Ranks (highest yielding = '1')

OSU Breeding Nurseries (statewide)	2010 *n*=30	2009 *n*=30	2008 *n*=15	2007 *n*=30
Ruby Lee	**4 T**	**16**	**1 T**	**3**
Duster	3	3	1	28
Endurance	18	6	8	1

SRPN History

2010: 5th out of 48 entries
1st at Amarillo (irrig.), Chillicothe, Winfield
4th at Wichita

Disease and Insect Protection

WSBMV, WSSMV	Resistant
BYDV	Moderately resistant
High Plains Virus	Moderately resistant
WSMV	Intermediate
Stripe rust	Intermediate (to races present in OK in 2005, 2008, & 2010)
Leaf rust	Moderately resistant (↓)
Powdery mildew	Intermediate
Tan spot	Resistant
Septoria leaf blotch	Susceptible
Hessian fly	Resistant

Agronomic and Quality Traits:

Exceptional top-end yield
Early maturity
Above-average test weight with kernel size
Very good baking quality
Excellent grazeability (vegetative regeneration, grazing recovery)
2010 test weight: 0.5 lb > Garrison
2010 WVT Protein: 13.3% vs. 12.4% (Endurance)
vs. 12.7% (Duster)

Weaknesses

Acid soils (similar to Fuller)
Spring freeze events

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

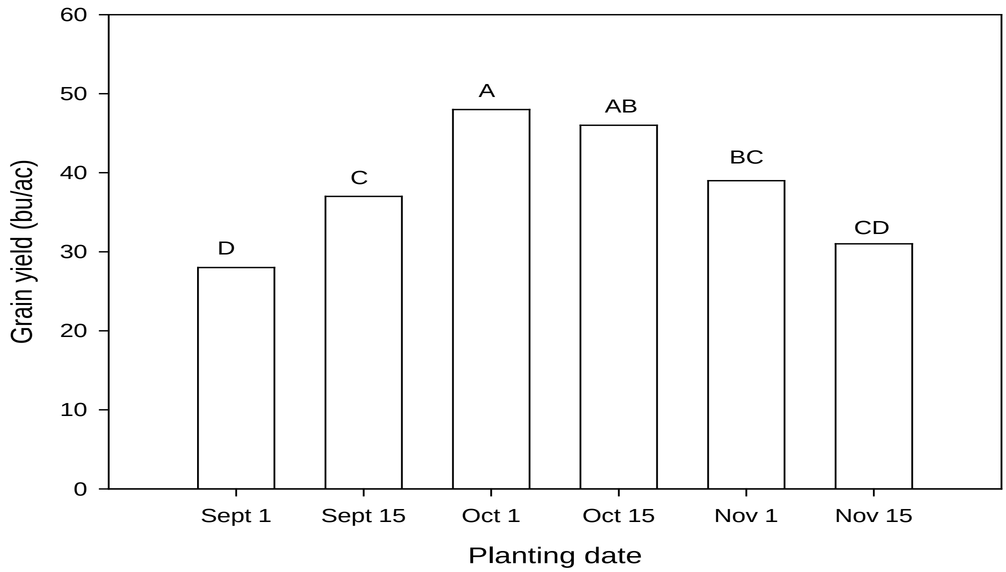
Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Jeff Edwards, Dept. of Plant and Soil Sciences, Oklahoma State University, Stillwater

Dryland wheat producers in the panhandle region often plant wheat when soil moisture is adequate regardless of calendar date. In the fall of 2004 a study was initiated at OPREC to determine the effect of planting date and variety on dryland wheat grain yield and test weight. Results from these studies can be found in previous highlights books. In the fall of 2009, Duster a variety this known for producing a high number of tillers, was selected for the seeding rate by planting date study. By producing a high number of tillers grain yield maybe increased for planting dates after the optimum period. Planting dates selected were September 1 and 15, October 1 and 15, and November 1 and 15. The selected seeding rates were 45 lb/ac and 90 lb/ac for all dates. Plot size was 5 feet wide by 35 feet long and all plots were planted with a Great Plains no-till plot drill.

Results

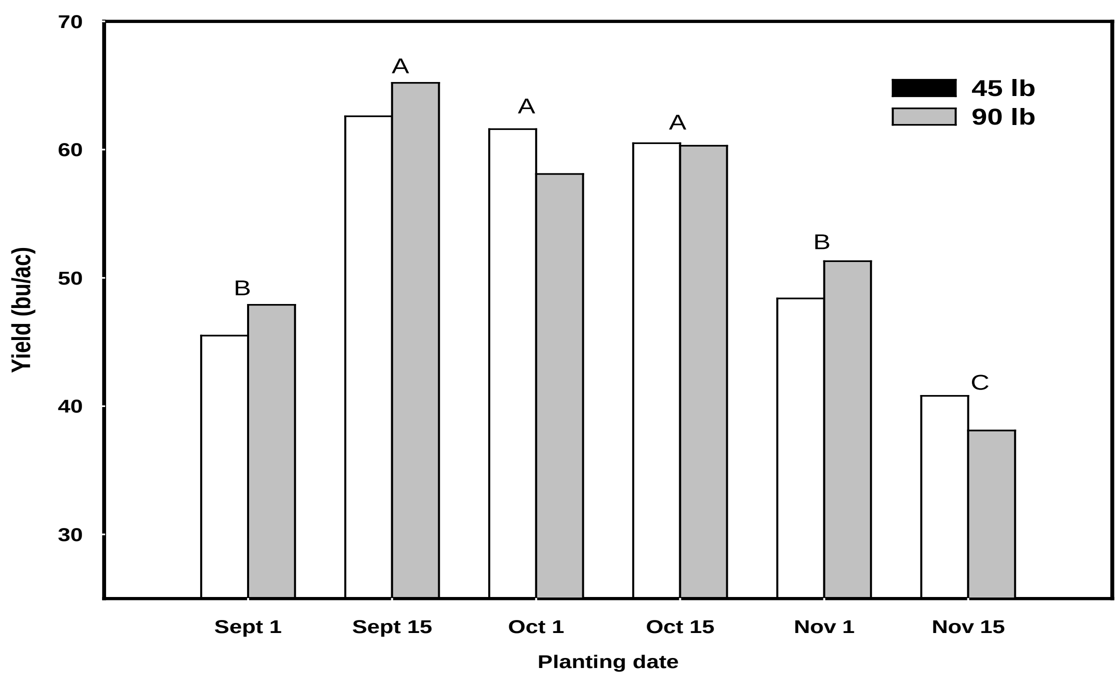
Previous research at OPREC has shown the first two weeks of October to be the optimal planting time with the highest yields obtained when planted October 1 (Fig. 1). Recommendations for planting after the optimum date have been to increase seeding rate to potentially increase yield. These recommendations were based on with more seeds planted more tillers and heads would be produced, thus increasing grain yield. Utilizing Duster a variety that will produce a high number of tillers may increase the chance to make up yield with later planting. The results in 2010 were similar to what has been observed in the past, except no difference was observed for the September 15th date when compared to the October dates (Fig. 2). The grain yield was 60 bu/ac or higher for the September 15th to October 15th planting dates. The yields for the September and November 1st planting dates were reduced by 10 bu/ac or more when compared to the optimum period. The November 15th date had the lowest yield at 39 bu/ac. Seeding rate had no effect at any of the selected dates which is most likely due to the high number of tillers produced by Duster.

Figure 1. Grain yields for dry-land wheat on selected planting dates at ORPEC in 2005, 2007, and 2009.



Yields with same letter are not significantly different

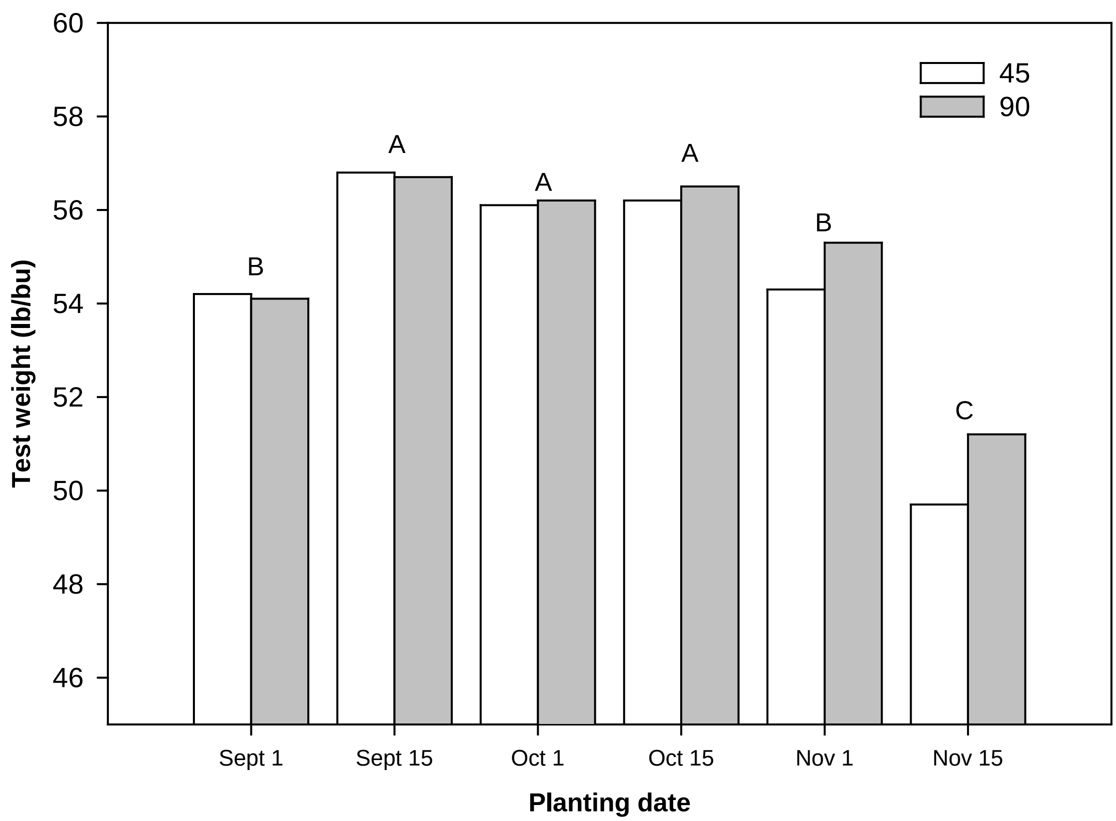
Figure 2. Grain yields for Duster planted dry-land at selected dates and seeding rates at OPREC in 2009.



Yields with same later are not significantly different and are for date only

Planting date had a greater effect on test weights than grain yield in 2010, although the November 15th planting date was also affected by seeding rate. As with the yield the optimum planting period was from September 15th to October 15th. Test weights were negatively affected by earlier or later planting compared to the optimum period (Fig 3.). The trend was for higher test weights with higher seeding rates for the last two planting dates. And there was a difference observed for the last planting date with a 1.5 lb/bu higher test weight for the 90 lb/ac seeding rate. This trend has also been observed in earlier seeding rate work and is hard to explain. For 2011 a trial was planted November 15th to compare Duster to another variety at 4 selected seeding rates to determine if it will require a lower seeding rate when planted late.

Figure 3. Test weights for Duster planted dry-land at selected seeding rates and planting dates at OPREC in 2010.



Yields with same letter are not significantly different and are for date only

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

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Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Jason Warren, Plant and Soil Sciences, Oklahoma State University

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 the 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 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 soil layer were measured using intact 5.0 cm diameter samples collected on 30 October 2010.

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. In 2010, the strip-till treatment with 100% residue removal had 76% bare soil exposed at the surface in May after corn planting (Fig. 1). That level of bare soil exposure would increase the vulnerability to wind erosion. The no-till treatment with 100% removal had 62% bare soil in May and would have offered a marginal level of protection against erosion. Both the strip-till plus cover crop treatment with 100% residue removal and the strip-till treatment with 50% residue removal offered better protection against erosion as indicated by bare soil exposure at the surface remaining below 50% throughout the year.

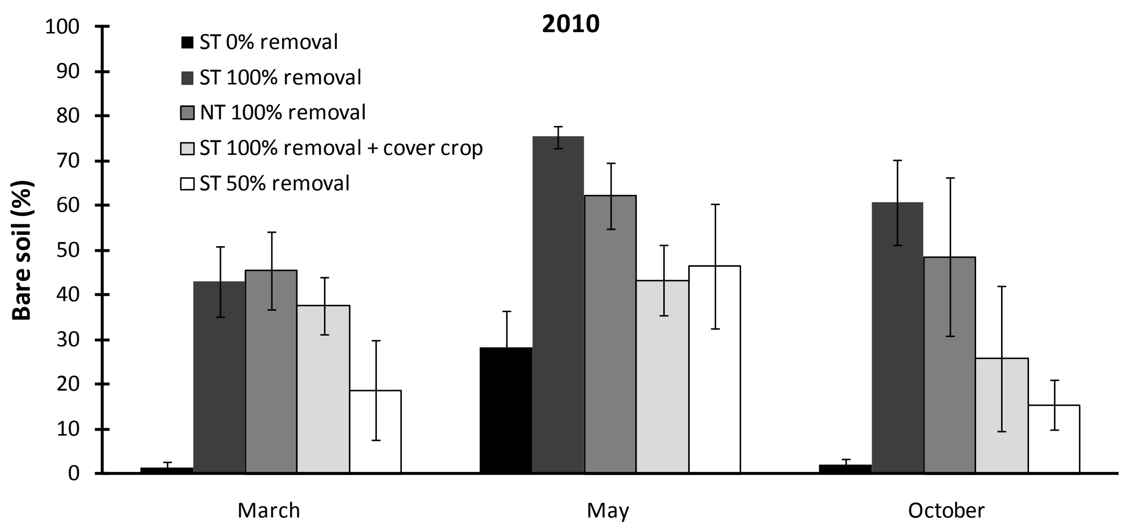

Fig. 1. Percent bare soil during March, May, and October 2010 for strip-till (ST) with 0%, 50%, and 100% residue removal, for no-till (NT) with 100% residue removal, and for strip-till with 100% residue removal and a winter wheat cover crop. Corn was planted in all treatments in April and harvested in 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). These data suggest that the wheat cover crop helped to alleviate short-term degradation of soil physical properties under 100% residue removal. More data will be needed to determine if the treatment effects are statistically significant and if they persistent from year to year.

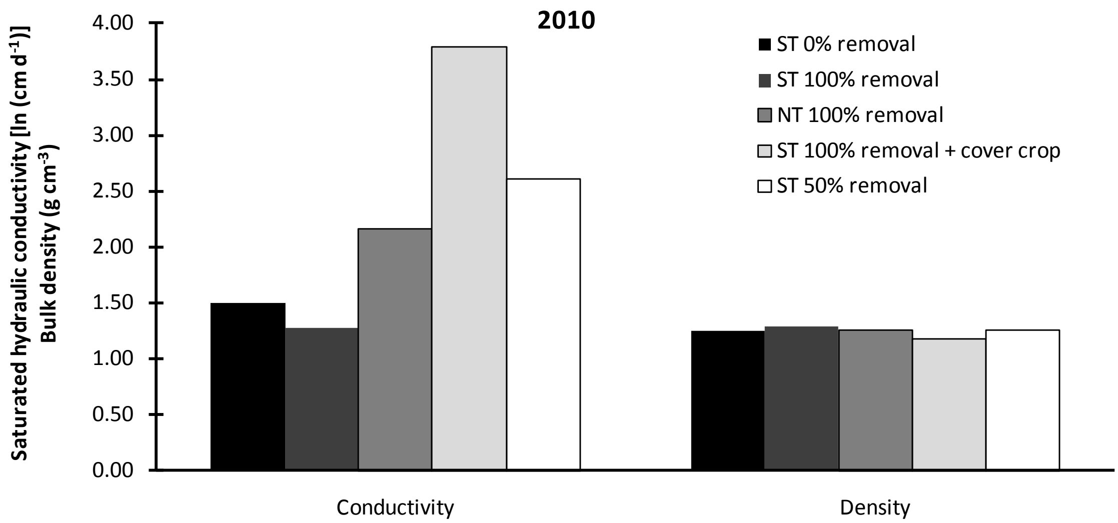

Fig. 2. Saturated hydraulic conductivity and bulk density for the 0-5 cm soil depth under strip-till (ST) with 0%, 50%, and 100% residue removal, for no-till (NT) with 100% residue removal, and for strip-till with 100% residue removal and a winter wheat cover crop. Corn was planted in all treatments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

Corn yields were low and variable across all treatments in 2010 (Table 1). Lowest average yields occurred in the no-till and strip-till plus cover crop treatments with 100% residue removal. More data are needed to determine how these treatments will affect the yield of the subsequent corn crop.

Table 1. Corn yields in 2010 after one year of residue removal treatments

Treatment	Average	Std. Dev.
	bu ac^{-1}	
ST 0% removal	104	55
ST 100% removal	100	37
NT 100% removal	87	32
ST 100% removal + cover crop	84	36
ST 50% removal	92	42

GreenSeeker™ Sensor in Irrigated corn production

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Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

The GreenSeeker™ 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 three nitrogen (N) rates replicated four times. The N treatments were 0, 100 and 200 lbs N ac^{-1} applied at planting. On June 14th the plots were sensed with the GreenSeeker™ handheld sensor and Normalized Difference Vegetative Index (NDVI) reading recorded. Those readings were used to predict final grain yield and side-dress N rates. 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. Final grain yield ranged from 107 to 195 bu ac^{-1}, Table 1 show the treatment averages. You can see in Figure 1, that yield was likely maximized with just a little more than 100 lbs of N. The optical sensor did predict higher yields than what was recorded however this is expected as Predicted Yield (YP0) should be considered as a maximum yield potential and as often the case something will occur between sensing and harvest that will reduce yield potential. Figure2 illustrates the relationship between NDVI and final yield, in which there is a strong correlation. The purpose of using the sensor is to collect the data needed for the Sensor Based Nitrogen Rate Calculator (SBNRC) that is looked on the www.NUE.okstate.edu website. Table 1 has the SBNRC side-dress N rate recommendation (N-Rec) and the theoretical N need (N-Need) of each treatment. The theoretical N-Need is calculated as total Grain N of the plot subtracted from total Grain N of highest yielding plot divided by an expected N fertilizer use efficiency of 50%. On the treatment average the SBNRC underestimated N at the 0 and 100 lbs rate and over estimated at the 200 lbs rate. However if we average every plot the SBNRC underestimated the N need by 9 lbs N ac^{-1}. This is actually a very impressive value as we often expect soil test N recommendations to be off by 20 to 30 lbs. This trial demonstrated the potential of the technology and an expanded trial is planned for the 2011 crop year.

Table 1. Treatment averages across the three nitrogen (N) rates. Yield, predicted yield (YP0), NDVI, SBNRC N rate recommendation (N-Rec), and theoretical N needs based on a grain N concentration of 0.75 and fertilizer use efficiency of 50% (N-Need).

N rate lbs ac^{-1}	Yld bu ac^{-1}	YP0 bu ac^{-1}	NDVI	N-Rec lbs ac^{-1}	N-Need* lbs ac^{-1}
0	129	175	0.70	71	98
100	177	210	0.76	19	27
200	185	208	0.76	23	15

*N-Need calculated as total Grain N of the plot subtracted from total Grain N of highest yielding plot divided by an expected N fertilizer use efficiency of 50%.

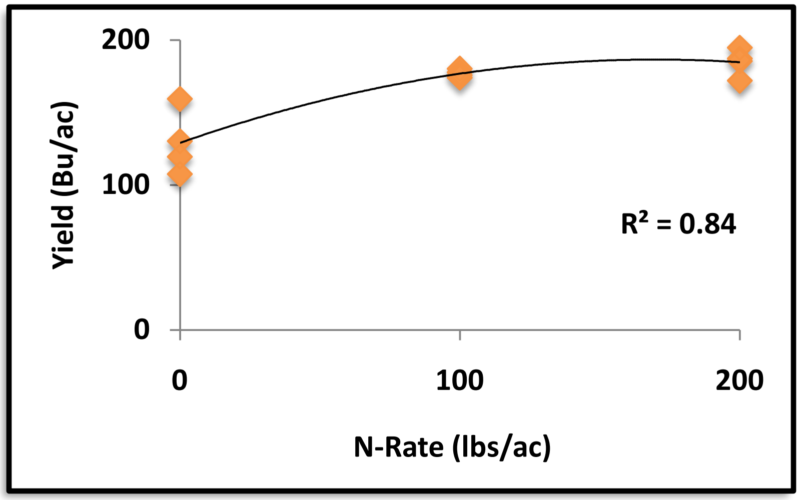


Figure 1. Nitrogen rate and final yield from the GreenSeeker™ corn trial. Grain yield was maximized between 100 and 200 lbs N ac^{-1}.

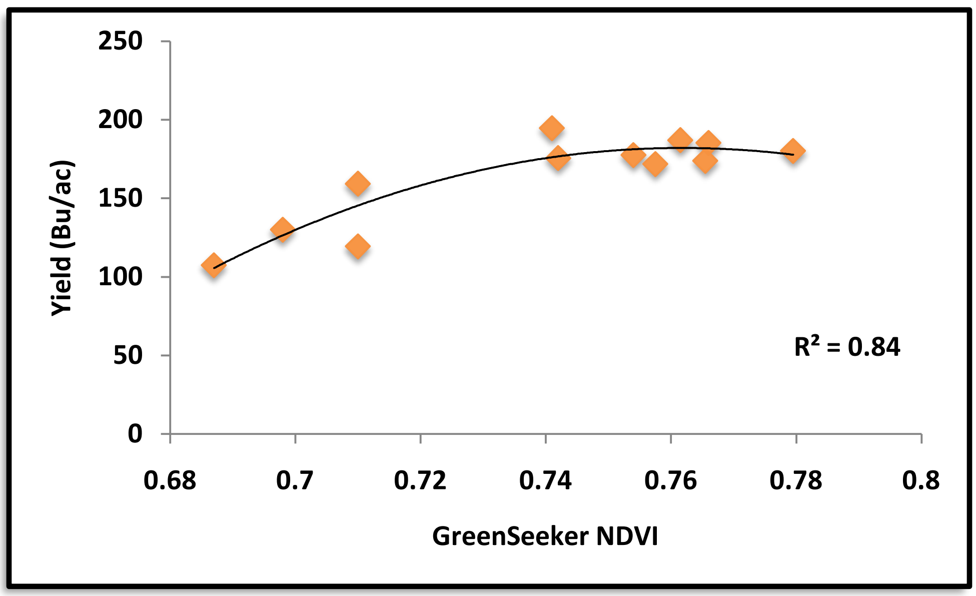


Figure 2. Normalized Difference Vegetative Index (NDVI) recorded from the plots on June 18th 2010 and final grain yield (bu ac^{-1}).

Nitrogen Fertilizer Management using Subsurface Drip Application of Swine Effluent

Jason Warren, Dept. of Plant and Soil Sciences, Oklahoma State University
Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Jeff Hattey, Dept. of Plant and Soil Sciences, Oklahoma State University

In traditional center pivot applications as much as 50% of the total N applied in swine effluent can easily be lost to volatilization. In addition, diurnal variations in the amount of N lost to volatilization after application causes variation in the availability of N across the irrigated corn field. This variability is generally overcome using supplemental application of commercial fertilizer at rates sufficient to ensure optimum yields in the most N limited areas of the field. This results in very inefficient utilization of swine effluent N.

Swine effluent application through subsurface drip irrigation eliminates ammonia volatilization, thereby optimizing the potential use efficiency of swine effluent N. The cost savings resulting from reduced supplemental commercial N requirements can offset some of the cost of implementing subsurface irrigation. Elimination of ammonia volatilization after swine effluent application also provides environmental benefit. The N is no longer transported off the intended cropland and therefore cannot be deposited in sensitive ecosystems.

Despite these obvious benefits of subsurface swine effluent applications, research is needed to optimize its use in the context of current corn management practices. Specifically, there is currently no research data available to evaluate subsurface irrigation in combination with strip-tillage pre-plant N applications.

Therefore a study was initiated in 2010 in which the treatments in Table 1 were imposed in a corn/soybean rotation. This study will allow us to determine if supplementation with 40 lbs of commercial fertilizer applied pre-plant with a strip-till unit will influence nitrogen use efficiency when N is applied as commercial fertilizer or swine effluent periodically throughout the growing season.

Table 1: N source, tillage and N rate treatments imposed on subsurface drip irrigated (SDI) corn within a corn/soybean rotation located at the OPREC, Goodwell, OK

TRT#	N application strategy*	Tillage	N rate	First N application	Fertigation schedule
1	No Nitrogen Control	no-till	0	--	
2	No Nitrogen Control	strip-till	0	--	
3	Effluent only through SDI	no-till	180	initiate at 4 leaf	40lbs at V4 and 35lbs at V8, V12, V15, VT
4	Effluent only through SDI	strip-till	180	40 lbs in Strip	35lbs at V8, V12, V15, VT
5	UAN through SDI	no-till	180	initiate at 4 leaf	40lbs at V4 and 35lbs at V8, V12, V15, VT
6	UAN through SDI	strip-till	180	40 lbs in Strip	35lbs at V8, V12, V15, VT

*all treatments will recieve 5 gals of 10-34-0 at corn planting and all treatments except the No-N control will receive a additional target application of 180 lbs of total N. Corn and Soybeans will be rotated on plots with 4 replicates for three years at which time the treatment structure and objectives will be assessed..

Expected Results:

We expect that strip-tillage application of commercial fertilizer may increase NUE because the N is placed above the irrigation drip line. This will allow early season water applications to carry this supplemental fertilizer to the root zone with the wetting front. In contrast, early season fertigation can result in portion of the fertilizer N be leached to below the drip line thereby moving it farther from the root zone. This research will help to make informed decision about the N management strategies when utilizing strip-till and subsurface drip irrigation.

Impact and Sustainability of a Subsurface Drip Irrigation System Used for the Application of Swine Effluent as a Nutrient Resource in Semi-Arid Environments

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

INTRODUCTION

It is estimated that rough 2.4 M pigs are located in the Oklahoma panhandle and surrounding counties. In the geographic region of the Ogallala Aquifer which is the prime non-renewable water resource. The Ogallala Aquifer supplies the water used to irrigate approximately one fifth of U.S. cropland. Looking for sustainability, farmers and producers search for alternatives to current water sources. With the influx of animal waste increments from swine production facilities, numerous farmers and producers apply effluent to adjoining property as a liquid fertilizer for irrigation. Nevertheless, continuous applications have lead to the buildup of macro and micro-nutrients in the soil which makes them more vulnerable to leaching. For water or soil issues, subsurface drip irrigation (SDI) provides several advantages including water use efficiency by reducing soil evaporation, surface runoff, or deep percolation while improving infiltration and water storage. The purpose of this study is to evaluate the nutrient distributions that occur after various seasonal applications of swine effluent through a subsurface drip irrigations system. Swine effluent was placed through two subsurface drip irrigation systems, one with an emitter rate of 2.38 L hr^{-1} and the other with a slower emitter rate of 0.72 L hr^{-1}. After 10 years of application, an extensive soil sampling regime was implemented and the samples were taken to the lab for analysis. Nutrient distribution maps were determined for the following: NO_3, NH_4, P, Ortho-P, K, Mg, SO_4, Ca, Zn, Cu, Mn, Fe, and B. The data indicates that concentrations between the lower and the higher emitter rate were significantly different at all depths and distances. However, the lower emitter rate on the SDI system can help use swine manure as sustainable water and nutrient rich resource for agricultural purposes. The lower emitter rate allows for the nutrients to be distributed more evenly throughout the profile. This project will play a significant role in the future of agriculture, water efficiency, and animal waste management as water resources become a more prevalent issue.

PROCEDURE

Research plots were established in 2001at the Oklahoma Panhandle Research and Extension Center (OPREC) in Goodwell, OK and fitted with the SDI system. The 18.29 m X 182.88 m (60 by 600 ft.) plots were put on a corn-soybean rotation with two flow rates range from the highest flow rate for plots 49-50 to be 2.38 L h^{-1} (0.63 gal h^{-1}) and the lowest flow rate of 0.72 L h^{-1} (0.19 gal h^{-1}) for the field designated 53. Swine effluent was applied in 2010: May 21st, June 5th, July 2nd, and July 23rd. Approximately 18,927.06 L (5000 gallons) were applied to each plot during each application. Plots are also irrigated with groundwater on a revolving schedule. In the fall of 2010, an extensive soil sampling regime was put into place. Sampling layout had small difference between plots because, irrigation tape lines with an emitter rate of 2.38 L h^{-1} emitters were placed 60 cm apart and irrigation tape lines with an emitter rate of 0.72 L h^{-1} emitters were spaced 46 cm apart (Figure 1). As a control plot, soil samples were taken in surround soil to examine original nutrient distributions prior to swine effluent amendments.

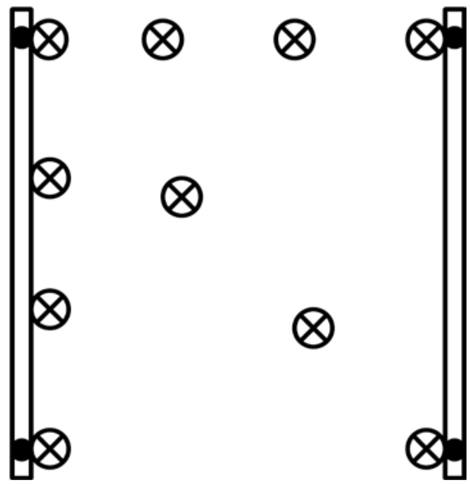


Figure 1. Soil Sampling Schematic. Each circle with an "X" indicates a soil core with a depth from 0-90 centimeters (cm) which were not randomly assigned for each rep. Black dots represent emitters along drip tape line. Top right emitter exemplifies emitter in question.

RESULTS

ANOVA was used to determine if there was significance in the nutrient distributions between the high and low flow emitter rates. Table 1 shows below that for all mobile nutrients, there was only a significant difference at the 15-30, 30-45, and 45-60 cm depths.

Difference Between Nutrient Distribution of High vs. Low Emitter										
Depth (cm)	**Mobile Nutrients**			**Immobile Nutrients**						
	NO3	**B**	**SO4**	**P**	**K**	**Mg**	**Ca**	**Zn**	**Cu**	**Fe**
0-15	**NS**	**NS**	**NS**	*	*	*	*	**NS**	**NS**	**NS**
15-30	*	*	*	*	*	*	*	**NS**	**NS**	**NS**
30-45	*	*	*	*	*	*	*	**NS**	**NS**	**NS**
45-60	*	*	*	*	*	*	**NS**	**NS**	**NS**	**NS**
60-75	**NS**	**NS**	**NS**	*	*	*	**NS**	**NS**	**NS**	**NS**
75-90	**NS**	**NS**	**NS**	*	*	*	**NS**	**NS**	**NS**	**NS**

Table 1. NS, * Not significant or significantly different at 0.05 respectively

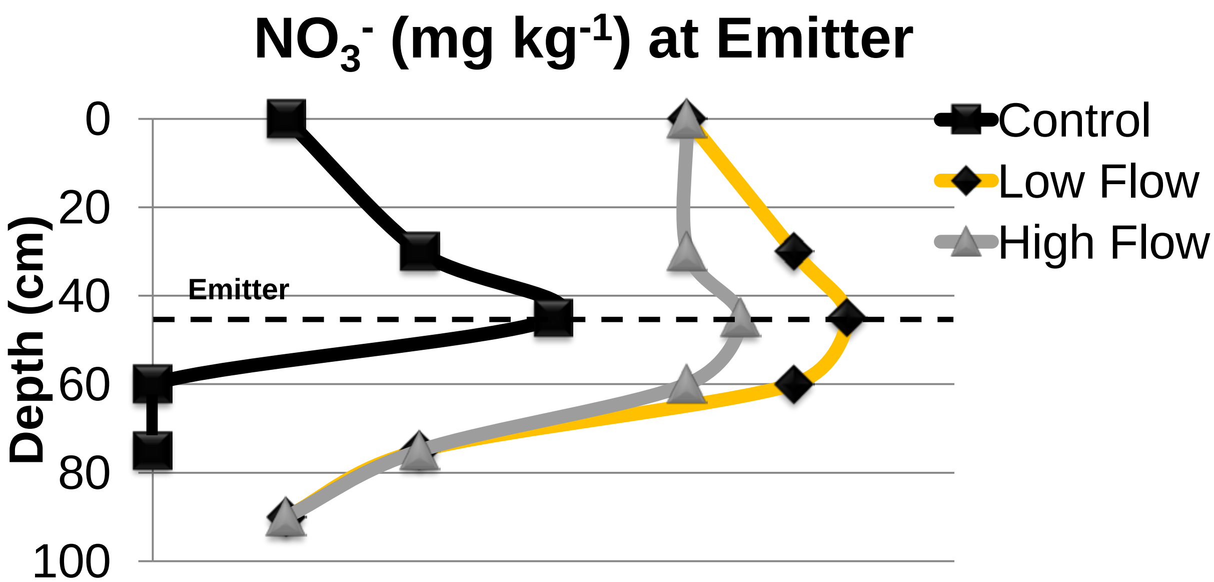


Figure 2. Data shows that NO_3^- concentrations directly at emitter are higher for the Low Flow. This build up of nutrients in the low flow emitter is due to the low amount of pressure used to exert the nutrients away from the emitter and into the surrounding soil. Boron and SO_4^- distributions were similar to the nitrate distributions as stated in Table 1.

NO_3^- (mg kg^{-1})

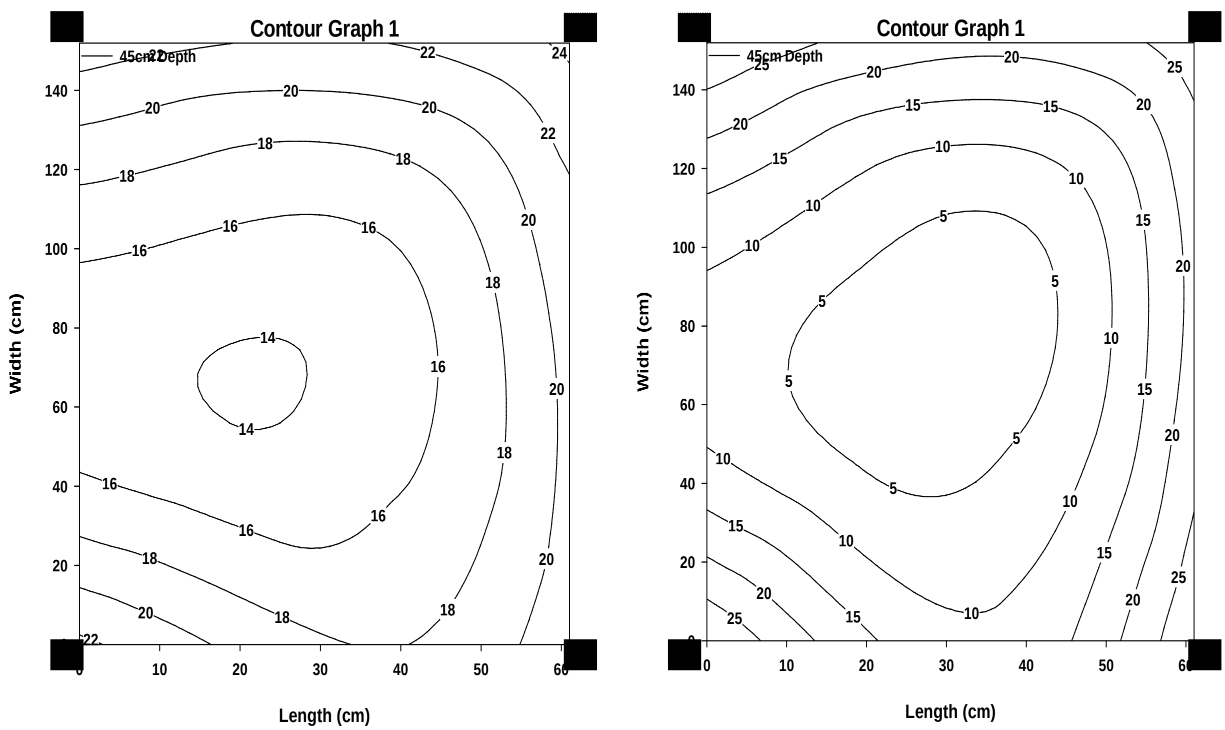


Figure 3. High flow (left) vs. Low right (right) NO_3^- concentrations between emitters at the 45 cm depth. Emitters are represented by black square boxes. The data suggest that there is a “starving” effect occurring between emitters in the low flow while the contours within the high flow are not at steep and there is an overall evening of nutrients throughout the profile.

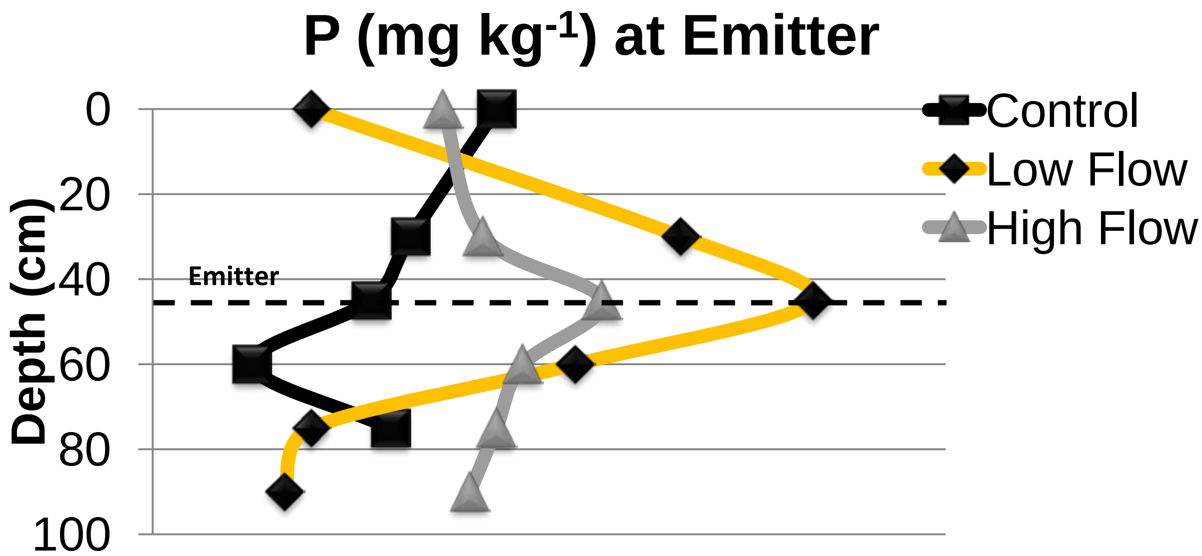


Figure 4. Data shows that Phosphorus concentrations directly at emitter are higher for the Low Flow. This is due to the low amount of pressure used to exert the nutrients away from the emitter and into the surrounding soil. Potassium, Magnesium and Calcium distributions were similar.

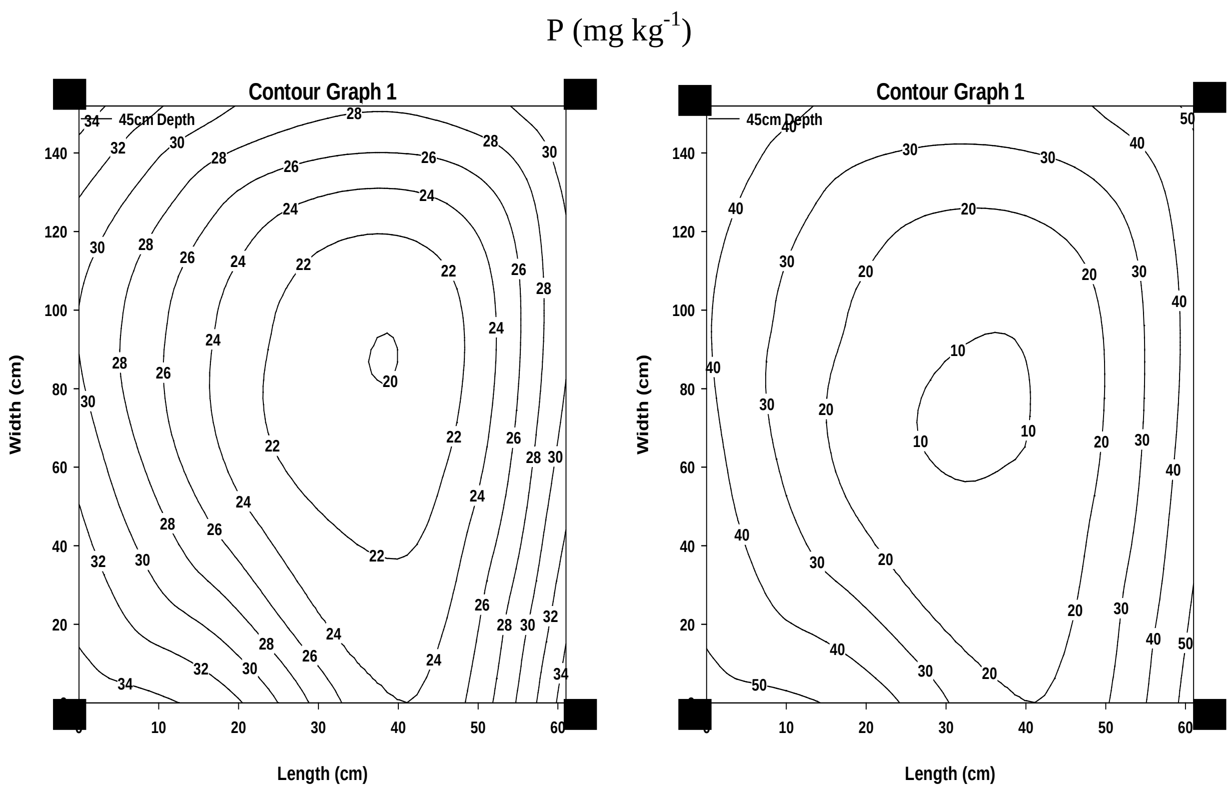


Figure 5. High flow (left) vs. Low right (right) Phosphorus concentrations between emitters at the 45 cm depth. Emitters are represented by black square boxes. Nutrient distributions for Phosphorus show that the high flow has a more even distribution while the low flow has steeper contour changes.

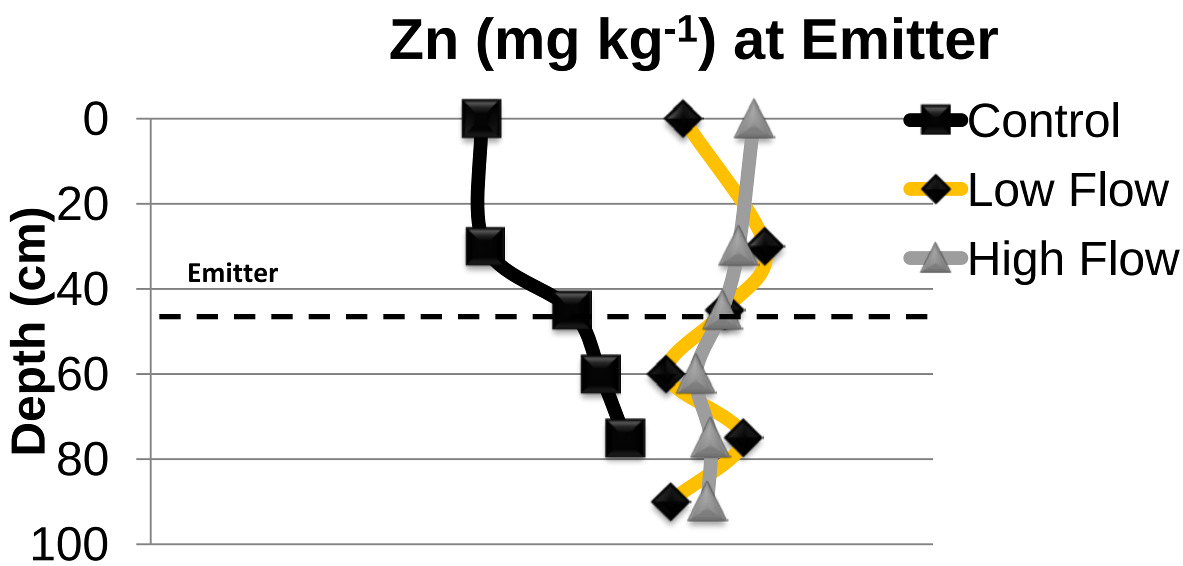


Figure 6. Data shows that Zinc concentrations directly at emitter are higher for the Low Flow. This is due to the low amount of pressure used to exert the nutrients away from the emitter and into the surrounding soil. Copper and Iron distributions were similar.

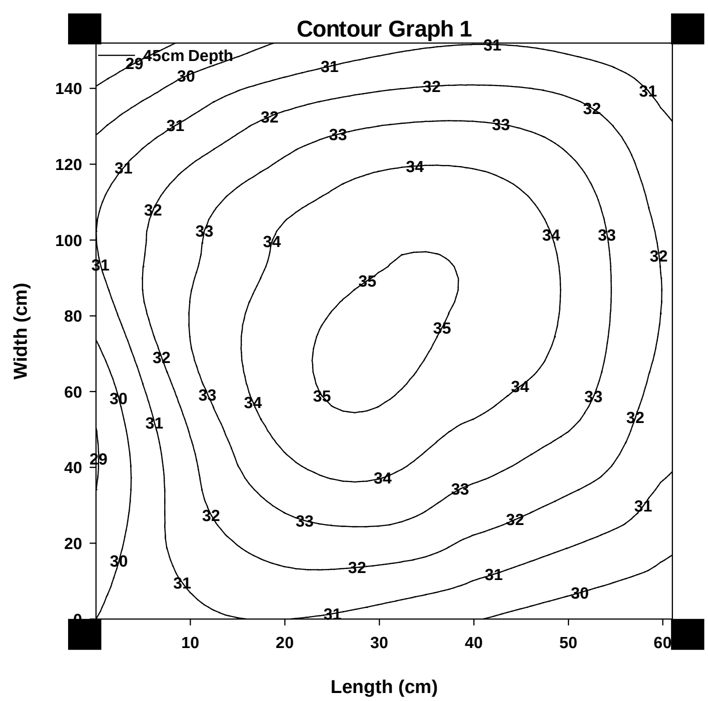


Figure 7. High flow clay % between emitters at the 45 cm depth. Emitters are represented by black square boxes. Clay percentages can be seen to being exerted by emitters and moved towards the center of the profile. This would also cause a sand percentage increase right at the emitters.

CONCLUSIONS

Nitrate-N concentrations are significantly correlated with depth and distance at the 30, 45, and 60 cm depths. Zinc, Copper, and Iron were not significantly correlated with depth or distance, and Phosphorus and Potassium were significantly correlated at all depths and distances.

The data indicates that concentrations between the lower and the higher emitter rate were significantly different at all depths and distances only for the nutrients of Phosphorus, Potassium, and Magnesium. However, the lower emitter rate on the SDI system can help use swine manure as sustainable water and nutrient rich resource for agricultural purposes. The lower emitter rate allows for the nutrients to be distributed more evenly throughout the profile. This project will play a significant role in the future of agriculture, water efficiency, and animal waste management as water resources become a more prevalent issue.

Comparison of bleacher herbicides for use in corn

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Joe Armstrong, Dept. of Plant and Soil Sciences, Oklahoma State University

Introduction

In 2010, a study was conducted at the OSU Panhandle Research Station to compare various "bleacher" herbicides for weed control and yield in corn. The bleacher herbicides, also known as HPPD inhibitors, have been shown to provide excellent control of many difficult-to-control weeds, including broadleaf weeds that have developed resistance to other herbicides. Many of the bleacher herbicides can be used as either preemergence or postemergence treatments and are usually tank-mixed with atrazine to further improve weed control. Additionally, the herbicide Integrity® was also evaluated. Integrity is a pre-mix of Sharpen® and Outlook® and is used as a preemergence treatment for grass and broadleaf weed control. Sharpen is typically used with glyphosate to improve control of weeds in burndown applications prior to planting in no-till situations, but can also be used a preemergence treatment ahead of corn to provide soil residual weed control.

Results

All of the treatments evaluated provided good to excellent control of pigweed and sunflower at 21 days after application. The preemergence only treatments, Trt 1 Corvus and Trt 2 Balance Flexx, were effective at controlling pigweed and sunflower during the evaluation period, but would likely not provide season-long weed control. Capreno, Trts 5 and 6, provided 100% control when applied as a "delayed preemergence" treatment at V2-V4 corn. When combined with Roundup or Ignite, Capreno can control any weeds that are present and provide soil activity into the growing season, often requiring only a single application. Integrity also provided excellent control of pigweed and sunflower at 21 days after application. No crop injury was observed with any of the treatments that were evaluated.

To effectively prevent or delay the development of herbicide-resistant weeds, it is necessary to use multiple herbicides and modes of action. Over-reliance on a single herbicide is the quickest way to select for herbicide-resistant weeds. The bleacher herbicides provide excellent weed control and allow use of a new herbicide mode of action. Bleacher herbicides are also available for use in other crops, such as Huskie® in grain sorghum and wheat, and Callisto® and Callisto-containing products in grain sorghum. As always, read the product labels to determine appropriate application timings and use rates.

Table 1. Weed control and grain yields for various bleacher herbicides used in corn.

Trt	Herbicides	Rate/acre	Application timing	% Weed control 21 d after treatment		Grain yield bu/acre
				Pigweed	Sunflower	
1	Corvus + Aatrex	5 fl oz + 2 pt	PRE	98	100	156
2	Balance Flexx + Aatrex	5 fl oz + 2 pt	PRE	95	88	144
3	Corvus + Aatrex Laudis + Aatrex	3 fl oz + 2 pt 3 fl oz + 1 pt	PRE V5-V6	100	100	107
4	Balance Flexx + Aatrex Laudis + Aatrex	3 fl oz + 2 pt 3 fl oz + 1 pt	PRE V5-V6	100	99	141
5	Capreno + Ignite + Aatrex	3 fl oz + 22 fl oz + 2 pt	V2-V4	100	100	129
6	Capreno + Roundup + Aatrex	3 fl oz + 22 fl oz + 2 pt	V2-V4	100	100	156
7	Lumax Roundup	2.5 qt 22 fl oz	PRE V5-V6	98	95	137
8	Bicep II Magnum Callisto + Aatrex	1.6 qt 3 fl oz + 1 pt	PRE V5-V6	100	100	141
9	Prequel Roundup	1.66 oz 22 fl oz	PRE V5-V6	99	95	129
10	Integrity Roundup	10 fl oz 22 fl oz	PRE V5-V6	100	100	144
11	Integrity Roundup	16 fl oz 22 fl oz	PRE V5-V6	100	100	126
12	Untreated			0	0	135
Mean						137
CV %						11.4
LSD						26

Post Emergent Broadleaf Control in Grain Sorghum

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In 2010 in a study was initiated to evaluate Huskie, a broadleaf herbicide currently labeled for use in wheat, for its effectiveness in controlling pigweed and velvetleaf in grain sorghum (it is expected to get registration for use in grain sorghum in September of 2011). Huskie is a pre-mix combination of Buctril and pyrasulfotole, a bleacher herbicide. Applications were mad at the V-5 growth stage, or 15 inch tall grain sorghum, with 6 treatments at each stage, a sequential treatment, and one preemergent treatment (Table 1.)

Table 1. List of treatment for post emergent broadleaf control in grain sorghum at OPREC, in 2010

Treatment Number	Herbicide	Rate	Timing
1	Control	NA	NA
2	Sharpen	2 oz/ac	Preemergent
3 and 10	Huskie Atrazine Ammonium Sulfate	13 oz/ac Pt/ac Lb/ac	V-5 and 15 inch sorghum
4 and 11	Huskie Atrazine Ammonium Sulfate	16 oz/ac Pt/ac Lb/ac	V-5 and 15 inch sorghum
5 and 12	Huskie Atrazine 2,4-D Ester Ammonium Sulfate	16 oz/ac Pt/ac 4 oz/ac Lb/ac	V-5 and 15 inch sorghum
6 and 13	Huskie Atrazine Banvel Ammonium Sulfate	16 oz/ac Pt/ac 4 oz/ac Lb/ac	V-5 and 15 inch sorghum
7 and 14	Atrazine Buctril 2EC	Pt/ac Pt/ac	V-5 and 15 inch sorghum
8 and 15	Aim EC 2,4-D NIS	.50oz/ac 8 oz/ac .3 pt/ac	V-5 and 15 inch sorghum
9	Huskie Atrazine Ammonium Sulfate Huskie Atrazine Ammonium Sulfate	13 oz/ac Pt/ac Lb/ac 13 oz/ac Pt/ac Lb/ac	V-5 + 15 inch sorghum

Ratings for crop tolerance and weed control were taken on selected dates (Table 2.) Since velvet leaf was the major weed species in all plots it was only one rated. Pigweed was only found in 3 plots therefore no comparisons could be made. Grain was also harvested and yields reported.

Table 2. Ratings for crop tolerance and velvet leaf control at selected dates, also grain yield for Huskie post emergent control at OPREC, 2010.

Treatment	7/26/2010		8/2/2010		8/9/2010		8/20/2010		Grain Yield bu/ac
	Injury %	Velvet Leaf control %	Injury %	Velvet Leaf control %	Injury %	Velvet Leaf control %	Injury %	Velvet Leaf control %	
1	0	0	0	0	0	0	0	0	64
2	0	92	0	97	0	93	0	95	131
3	7	100	0	87	0	100	0	97	147
4	0	100	0	97	0	100	0	93	153
5	7	100	0	93	0	100	0	98	146
6	3	100	0	93	0	100	0	97	149
7	7	88	0	87	0	93	0	97	142
8	40	100	13	80	0	98	0	93	141
9	13	100	47	100	37	100	7	100	137
10	----	----	27	87	13	95	7	92	134
11	----	----	37	90	23	97	13	90	114
12	----	----	10	90	10	90	0	87	131
13	----	----	3	90	3	95	17	98	119
14	----	----	0	63	0	37	0	67	91
15	----	----	70	80	63	90	20	100	120
								mean	128
								CV%	20.8
								L.S.D.	44

Results

The crop tolerance for Huskie is good, as can be seen by grain yields (Table 2). Although leaf blotching is observed, it grows out of it and it doesn't affect yields. As always recommended it is better to control weeds early as possible. Plots sprayed at the V-5 stage had 28 bu/ac yield increase when compared to plots sprayed at 15 inch sorghum height. A large part of the yield difference may be attributed to the reduced weed control for the Atrazine/Buctril treatment at the 15 inch stage, but all yields were lower for later applications. Larger weeds are generally more difficult to control with all herbicides. Although the Huskie shows excellent control of velvet leaf at a later application, the highest yields were obtained when applications were made at the V-5 stage.

Post Emergent Grass Control in Grain Sorghum

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Joe Armstrong, Dept. of Plant and Soil Sciences, Oklahoma State University

In 2010 in conjunction with DuPont chemical company two grain sorghum inbred lines were planted that were tolerant to post emergent grass control herbicides. One inbred was tolerant to ALS inhibitor herbicides and will have the trade name Inzen Z™. The other inbred is tolerant to "fop" herbicides from the ACCase herbicides inhibitor mode of action, such as Assure II (active ingredient: quizalofop) and will have the trade name Inzen AII™. These resistance traits were breed into sorghum from wild relatives at Kansas State University, making them 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 2011 with adequate seed supplies in 2012. The Inzen Z launch date has been delayed until 2015.

In 2010 both inbreds were 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 inbred is tolerant to the grass control herbicide. The Inzen AII rate most likely will be 8 oz/ac of Assure II and, as with the Inzen Z trait the inbred is tolerant to Assure II. The inbred is not tolerant to the "dim" herbicides of the ACCase inhibitor mode of action such as Select Max (active ingredient clethodim). In addition to excellent tolerance in the inbred lines, control of grass weeds was very good with the postemergence herbicide treatments.

TIMING OF DRY-LAND STRIP-TILLAGE FOR GRAIN SORHUM PRODUCTION IN THE HIGH PLAINS

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

With the growing interest in strip-till throughout the high plains, a study was initiated in the fall of 2003 to determine if timing of strip-till would affect yield of dry-land grain sorghum. After three years it appeared that strip-till reduced grain yields when compared to no-till. But one question that was not answered in the previous study was would strip-tilling just before planting reduce yields. Therefore in the summer of 2007 a new study with four dates of strip-tilling was initiated. The dates were immediately after wheat harvest, fall, spring, and on the same day as planting. The immediately after harvest date was selected for two reasons. It is generally a good time for producers to have time do tillage and the chance to receive rainfall and replenish the tilled strips with moisture. The fall date was selected due to data from the previous study, in 2005 yield for fall strip-till was same as no-till (Table 1). This can be explained by the strip-tillage having been done before a significant rainfall event in November of 2004. With the amount of rainfall received (3.51 inches) the tillage strips were replenished with moisture before planting, therefore no reduction in grain yields was observed. The spring date was selected because again it is time when producers can do tillage work. One of the concerns many producers have with no-till is that nitrogen (N) is tied-up in the crop residue when surface applied or volatilized. Nitrogen tie-up and volatilization is greatly reduced with strip-till due to the N being placed below (generally 3 – 8 inches) seeding depth. Many irrigated producers in the region are doing strip-till from late fall to early spring. This original study was designed to determine what the affect of strip-till (no fertilizer applied) at different dates would have on grain sorghum yield. In the new study all fertilizer in the strip-till treatments is applied with the strip-till unit, and only the no-till fertilizer is applied on the surface. Grain sorghum was selected as the crop to be grown, because it is the most widely grown summer row crop in the region. Plots were four rows wide by 50 foot long and strip-tilled with an Orthman four-row one-tripper at a depth of 7 inches.

Table 1. Grain sorghum yield (bu/ac) for selected years from a timing of dry-land strip-till experiment at OPREC.

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

†Yields with same letter not significantly different

Results

No data was collected in 2009 due to late planting.

Climate conditions varied between 2008 and 2010 as seen by the difference in yields (Table 2). The late winter and spring of 2010 had higher than normal rainfall. The 6.39 inches of precipitation received was 3.04 inches more than the long-term average. This higher precipitation may have accounted for no difference in yields between treatments in 2010. Although no differences were observed, yields for strip-till after the preceding wheat harvest and at planting are the highest when looking at two-year data. No difference in test weight has been observed in either year (data not reported). Future work will look more at N rates of strip-till compared to no-till. Planting date may also be affected, therefore strip-till and no-till will be compared looking at a very late April planting date.

Table 2. Grain sorghum yield (bu/ac) for 2008 timing of dry-land strip-till experiment at OPREC.

Strip-till Timing	2008	2010	Two-year
After harvest	48.1 a	78 a	63 a
At planting	50.7 a	74 a	63 a
No-till	44.2 a	77 a	60 a
Fall	45.4 a	70 a	58 a
Spring	31.8 b	77 a	55 a

Yields with same letter not significantly different

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

Due to climate condition and other factors obtaining results from the rotations other than the WSF has been difficult, therefore only the WSF will be reported.

Precipitation since 1999 has been erratic for the panhandle region with yearly totals ranging from a low of 12.0 inches in 2007 to a high of 20.31 in 2004. Even in 2008 the yearly total of 18.27 inches was above the long-term mean of 17.89 inches, although most of the rainfall 14.81 inches was received after July 1. The mean rainfall for the last eleven summer growing seasons (June, July, and August) of 6.55 is 1.17 inches below the long term mean (Table 1). Four of the nine years have been 3 inches or more below the long term mean therefore grain sorghum yields have been affected. Between drought and hail storms three wheat crops have failed in the duration of the study. In 2002 rainfall was not received in time to activate the preemergent herbicide and no sorghum was harvested, this was the only time it has happened.

Table 1. Summer growing season precipitation at OPREC

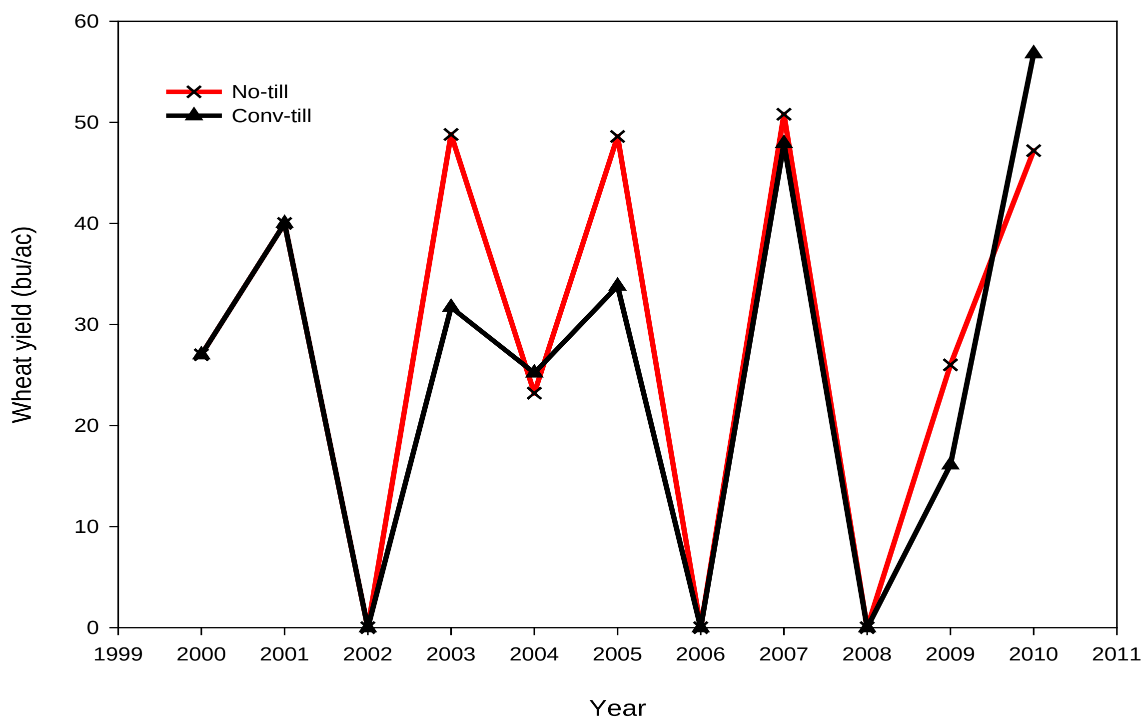
Month	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Long-term mean
June	2.29	0.61	1.32	5.26	3.82	2.01	2.34	1.62	1.51	1.74	3.16	2.86
July	0.76	0.00	2.52	1.87	2.43	1.40	2.05	2.00	3.77	2.58	1.22	2.58
August	1.09	0.66	0.27	1.19	2.87	3.21	4.06	0.26	5.64	1.36	5.42	2.28
Total	4.14	1.27	4.11	8.32	9.12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

Wheat

No wheat was harvested in 2002 and 2008 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.



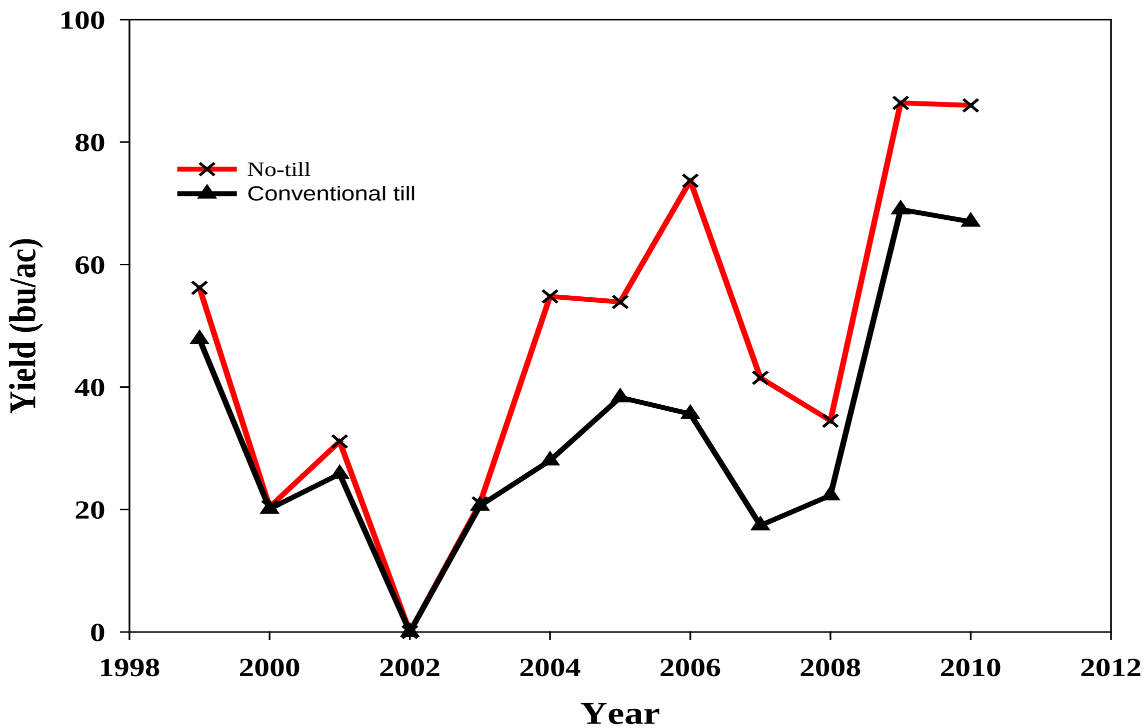
Neither tillage system produced, or will produce grain when drought occurs and no crops are harvested as in 2002 and 2008 (Figure 1). In three of the seven years that wheat was harvested grain yields were significantly higher for no-till (Fig. 1) with an average increase of 14 bu/ac. In 2010 yields for conventional tillage were significantly higher than no-till for the first time. In years that no difference was observed yields have been the same. In research conducted by

Kansas State University, they have shown a constitent 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 one tillage system makes no difference as in 2002 when no sorghum was harvested (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 (Table 3). 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 of those for minimum tillage. Part of the higher grain yield in 2006 can be attributed to higher test weights for no-till (Table 4). The delayed maturity of minimum till grain sorghum adversely affected the test weights. In 2008 with delayed planting, maturity selection was too long for the year with the cooler conditions that existed. The mean high temperatures in 2008 for July and August were 3 and 9 F^{o} cooler than in 2007 at 90 and 87 F^{o} respectively. These cooler temperatures didn't allow for maturity of the grain sorghum and reduced yields. In hybrid performance trial near this study the highest yields 75 bu/ac were obtained with shorter season hybrids than was planted in this study. Again in 2009 planting was delayed until late June due to lack of soil moisture, and with the lower than normal rainfall test weights were affected although not significantly. In all other years no difference in test weight was observed between tillage treatments, although yields for no-till were higher than minimum till. Planting was delayed in 2004 due to a lack of soil moisture; therefore, an early maturity sorghum was utilized instead of the normal medium maturity. Although test weights are not significantly different for each year, when all years are considered no-till is has a significantly higher test weight than doe's minimum tillage.

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

Tillage	2004	2005	2006	2007	2008	2009	2010	Seven-year
No-till	54.8	53.9	73.7	41.5	34.5	86.4	86.3	61.6
Minimum till	28.0	38.3	35.6	17.4	22.3	69.0	67.0	40.8
Mean	42.3	46.2	53.5	29.5	28.4	77.7	76.7	51.2
CV %	6.4	13.6	19.0	8.0	55.3	1.2	4.1	17.9
L.S.D.	6.1	NS	24.2	8.3	NS	10.9	10.9	5.9

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

Tillage	2004	2005	2006	2007	2008	2009	2010	Seven-year
No-till	56.5	57.8	56.8	57.9	50.9	57.4	59.7	56.7
Minimum till	55.8	56.9	49.6	57.9	49.5	55.4	58.1	54.8
Mean	56.3	57.2	53.1	57.9	50.2	56.4	58.9	55.8
CV %	0.8	1.6	4.2	0.4	2.3	3.0	1.9	3.6
L.S.D.	NS	NS	5.0	NS	NS	NS	NS	1.3

DRY-LAND 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. 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 millet-grain sorghum-safflower-wheat (WMSSa) most intense rotation, wheat-double crop sesame-sorghum-millet-wheat (WSeSMW), wheat-double crop millet-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 Massey 8XP plot combine.

Crops were selected to increase intensity based on when they could be planted and harvested. Proso millet was selected because it could be planted from mid May till late July. So it could be used early or as a double crop. 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. There are other crops that would work as either hay crops or as a cover crop, these were selected because grain could be harvested and yields established.

Results

The rotations are just being established, it will take a couple of years to collect any data.

Expanding Production Area and Alternative Energy Crop Market of Proso Millet for Water Deficient Lands

Kevin Larson and Jeffrey Tranel, Plainsman Research Center, Walsh
Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

Proso millet is a low water-use, low input crop. It is an ideal crop for water deficient lands, such as contract-expired CRP lands. Expanding the production area of proso millet will require development of a new end-use market. Currently, proso millet is used almost exclusively for birdseed. The birdseed market is limited and expansion is improbable. The feed grain market with recent exponential growth is ethanol. Most ethanol production in the United States is from corn. If proso millet replaces some of the corn as an ethanol feedstock, expansion of proso millet production would occur. The purpose of this study is two-fold: 1) to determine if proso millet is viable crop outside of its traditional production area and 2) to determine if proso millet is a viable ethanol crop. If our objectives for proso millet are successful, production area expansion (into new dryland areas) and market expansion (as a new ethanol feedstock) will be realized.

Material and Methods for 2009

We planted proso millet at two sites, the Plainsman Research Center at Walsh, Colorado and the Oklahoma Panhandle Research and Extension Center at Goodwell, Oklahoma. We planted four proso millet cultivars at four incremental planting dates throughout July 2009. Three of the cultivars were standard starch cultivars: Huntsman, Sunrise, and Horizon. The fourth cultivar was a waxy starch cultivar, Plateau. The four planting dates at Walsh were: PD1, July 1; PD2, July 10; PD3, July 20; and PD4, July 31, 2009. The four planting dates at Goodwell were: PD1, July 7; PD2, July 14; PD3, July 21; and PD4, July 28, 2009. The experimental designs were split-plots with planting dates as the main plot and cultivars as the subplots with four replications. The plot size at Walsh was 10 ft. by 50 ft. (harvested 10 ft. by 44 ft.). The plot size at Goodwell was 5 ft. by 35 ft. (harvested 5 ft. by 30 ft.). Both sites were irrigated to assure seed germination. All cultivars and planting dates were seeded at 15 lb/a. Nitrogen was the only fertilizer applied, 50 lb/a at Walsh and 100 lb/a at Goodwell. For weed control at Walsh, the entire site had a preplant application of glyphosate 24 oz/a and 2,4-D ester 0.5 lb/a, and a post emergence application of dicamba 4 oz/a and 2,4-D amine 0.38 lb/a. For weed control at Goodwell, the entire site had a preplant application of atrazine 1.0 lb/a, and no post emergence herbicides were applied. Both sites were harvested with a self-propelled combines equipped with conventional grain heads. For both sites at harvest, we recorded grain yield, test weight, and seed moisture. The harvest dates at Walsh were: PD1, September 29; PD2, October 16; PD3 and PD4, October 17. The harvest dates at Goodwell were: PD1, September 14 and PD3 October 19. At Goodwell, the July 14 planting date (PD2) did not establish an adequate stand and was eliminated from the study, and the July 28 planting date (PD4) was not harvested because of excessive rainfall.

To determine ethanol production, grain samples (7 lb of cleaned seed) were milled three times with a grain mill set at 0.008 in. The milled grain was diluted with water (20 gal/bu). The mash was boiled and alpha amylase was added to liquefy it. The mash was cooled and alpha amylase was again added to breakdown the starches into dextrins. The mash was further cooled and gluco amylase was added to convert the dextrins into sugars. The temperature of the mash was further lowered, yeast was added, and the mash was allowed to ferment for five days in an airlocked container. After fermentation was completed, the beer in the mash was pressed out with a fruit press. To extract the remaining beer, water was added and the dilute beer was pressed (this step was repeated twice). The remaining wet distillers grain was oven dried. The alcohol in the beer was distilled with a stainless steel still with a refractation column.

Material and Methods for 2010

All cultural practices in 2010 were similar to the cultural practices we used in 2009, except we planted the proso millet cultivars at four monthly planting dates from May to August. The four planting dates at Walsh were: PD1, May 12; PD2, June 3; PD3, July 2; and PD4, August 2, 2010. The four planting dates at Goodwell were in early May, June, July, and the August planting date was not planted due to bird damage in the previous planting dates. The Goodwell site was not harvested because of severe bird damage. Grain yield, test weight, seed moisture, plant height, and seed shattering measurements were recorded at harvest for Walsh. The harvest dates at Walsh were: PD1, August 30; PD2, August 30; PD3, September 21; and PD4, November 5.

Results for 2009

The first planting dates at both sites produced the highest average grain yield, 1645 lb/a at Walsh and 1450 lb/a at Goodwell (Tables 1 and 2). The planting date ranking for grain yield at Walsh was: PD1>>PD2>PD3=PD4 (Table 3). The planting date ranking at Goodwell was PD1>PD3 (Table 4). Huntsman produced the highest yield at all harvested planting dates at both sites, although Huntsman was not significantly different than Sunrise at Walsh, and Huntsman only significantly out yielded Plateau at Goodwell. Grain yield ranking of the four cultivars was consistent for all four planting dates at Walsh: Huntsman=Sunrise>Horizon>Plateau (Table 3 and Figure 1). The relative ranking of the four cultivars for the two harvested planting dates at Goodwell was: Huntsman>Sunrise=Horizon>Plateau, although the only significant difference was between Huntsman and Plateau (Table 4 and Figure 3).

At both sites, the first planting date produced the highest ethanol production, 59.5 gal/a for Walsh and 50.0 gal/a for Goodwell (Tables 3 and 4). The ethanol production rankings for the planting dates were: PD1>>PD2>PD3=PD4 at Walsh, and PD1>PD3 at Goodwell. These planting date ethanol production rankings have the same order and magnitude as the grain yield rankings. At both sites, Huntsman had the highest ethanol production at each planting date (Tables 1 and 2) and highest overall production, 36.6 gal/a for Walsh and 56.8 gal/a for Goodwell. Plateau produced the highest per bushel ethanol yield for each planting date at Walsh. Horizon had the highest overall ethanol yield at Goodwell with 1.98 gal/bu, and Plateau had the highest overall ethanol yield at Walsh with 2.11 gal/bu.

Test weights significantly decreased with later planting dates at Walsh (Table 3 and Figure 2), but increased, although not significantly, between the two harvested planting dates (PD1 and PD3) at Goodwell (Table 4 and Figure 3). Huntsman had the highest overall test weight at both sites, 56.9 lb/bu at Goodwell and 54.6 lb/bu at Walsh.

Plant height consistently decreased with later planting dates at Walsh (Table 1). The plant height ranking from tallest to shortest was: Huntsman, Sunrise, Horizon, and Plateau.

At Walsh, date to 50% heading averaged 33 days after planting (DAP) for all planting dates and cultivars (Table 1). With later planting dates, date of 50% heading became increasingly earlier for all cultivars, except Plateau. Plateau was the earliest maturing cultivar tested and its date to 50% heading remained at 30 to 31 DAP for the first three planting dates then dropped to 29 DAP at the last planting date. Date to 80% maturity, when the crop was ready for swathing, averaged 61 DAP for all planting dates and cultivars. Like heading, date to 80% maturity was earlier with later planting dates for all cultivars, except Plateau. Date of maturity of Plateau remained 58 to 59 DAP for all four planting dates.

Results for 2010

All the yield results for 2010 are from the Walsh site only, because the Goodwell site was lost to bird damage. At Walsh, the June planting date had the highest grain yield of 1891 lb/a, but it was not significantly higher than the July planting date with 1783 lb/a (Table 6 and Fig. 4). The May and June plantings dates were significantly higher than the July planting date, and the July planting date was significantly higher than the August planting date. The grain yield ranking for the planting dates was PD2=PD1>>PD3>>PD4. Huntsman had the single highest yield of 2170 lb/a with the June planting date, although it was not significantly different from Sunrise, which had the second highest yield of 2045 lb/a with the May planting date (Table 5). Huntsman and Sunrise produced significantly higher yield than Plateau and Horizon. The yield ranking for the cultivars was Huntsman=Sunrise>Plateau=Horizon.

The average test weight for the July planting was significantly higher than May and August planting dates, but it was not significantly higher than the June planting date (Table 6 and Fig. 5). The test weight ranking for the planting dates was PD3=PD2>PD4>PD1. Test weight for PD4 was based solely on Huntsman because there was insufficient plot yield from the other three cultivars for test weight measurements. The highest test weight of 56.4 lb/bu occurred with Huntsman at the July planting date, and the lowest test weight was 50.9 lb/bu with Plateau at the May planting date (Table 5). Huntsman had the highest test weight, 55.7 lb/bu. The test weight of Huntsman was significantly higher than Sunrise and Horizon, which were significantly higher than Plateau. The test weight ranking for the cultivars was Huntsman>Sunrise=Horizon>Plateau.

Plant height remained relatively constant at about 25 in. for the first three planting date, but it was only half as high for the last planting date (Table 5). Huntsman was the tallest cultivar; it was an inch taller than the second tallest cultivar, Sunrise, in three of the four planting dates.

It took an average of 5 to 8 days longer for the cultivars planted in May to reach 50% heading and 80% maturity than the other three planting dates (Table 5). The cultivars in the July planting date had the fewest days to heading and maturity. Huntsman required an average of an extra day more than Sunrise to reach 50% heading and 80% maturity.

We have not yet performed the fermentations and distillations on the 2010 crop needed for ethanol analyses. Ethanol analysis for the 2010 crop will be conducted later this winter. For later reports, we will include ethanol yield and ethanol production after we perform the necessary fermentations and distillations.

Discussion

In 2009, we evaluated only July planting dates for proso millet production. The first planting dates (July 1 for Walsh and July 7 for Goodwell) produced the highest grain yield and ethanol production (Tables 3 and 4). There was a significant yield decrease between the July 1 and July 10 planting dates at Walsh (990 lb/a yield drop), and the yield difference between the two harvested planting dates (July 7 and July 21) at Goodwell of 267 lb/a was also significant.

This suggests that, when planting in July, early July planting is critical for high yields at Walsh and Goodwell, but with the small yield decrease, the planting window maybe longer at Goodwell. Highest ethanol production corresponded with highest grain yield. Huntsman planted in early July had the highest grain yield and ethanol production at both Walsh and Goodland (Tables 1 and 2). Test weights decreased significantly with later planting dates at Walsh, but they actually increased at Goodwell, although the test weight increase was not significant. Moreover, at Walsh, Plateau consistently had the lowest test weight for all four planting dates; however, Plateau had the highest per bushel ethanol yield. Delayed planting, past early July, did not appear to have the severe yield and test weight penalty at Goodwell as it did at Walsh. Nonetheless, the highest grain yield and ethanol production averages were from the first planting dates at both sites.

The 2010 yield results were only from the Walsh site. Huntsman at the June 3 planting date had the single highest yield of 2170 lb/a (Table 5). The optimum planting date for Huntsman was late May (Fig. 4). We have yet to perform ethanol analysis on grain samples harvested in 2010, but ethanol analysis from 2009 indicates that high ethanol production corresponded with high grain yield. Therefore, Huntsman planted in late May/early June may produce the highest ethanol production. After we identify the optimum ethanol production window for the highest ethanol producing cultivar, we will develop crop enterprise budgets for proso millet as an ethanol crop and compare it to proso millet as a birdseed crop.

Table 1.--Proso Millet: Planting Dates and Cultivars, Walsh, CO, 2009.

Cultivar	Seed Yield	Test Weight	Ethanol Yield	Total Ethanol Production	Plant Height	50% Heading	80% Maturity
	lb/a	lb/bu	gal/bu	gal/a	in	DAP	DAP
PD1 - July 1							
Huntsman	2137	56.5	2.04	77.8	27	39	66
Sunrise	1956	56.3	1.96	68.5	26	38	65
Horizon	1411	56.0	2.03	51.1	24	36	64
Plateau	1076	53.5	2.10	40.4	21	30	58
PD1 Average	**1645**	**55.6**	**2.03**	**59.5**	**25**	**36**	**63**
PD2 - July 10							
Huntsman	981	55.8	2.04	35.7	21	36	63
Sunrise	940	54.5	2.04	34.2	20	35	62
Horizon	490	54.4	2.07	18.1	19	34	61
Plateau	208	54.1	2.10	7.8	16	30	58
PD2 Average	**655**	**54.7**	**2.06**	**24.0**	**19**	**34**	**61**
PD3 - July 20							
Huntsman	429	54.1	2.08	15.9	18	34	62
Sunrise	399	53.9	2.01	14.3	16	34	62
Horizon	139	55.0	2.08	5.2	16	33	61
Plateau	151	53.5	2.18	5.9	13	31	59
PD3 Average	**280**	**54.1**	**2.09**	**10.3**	**16**	**33**	**61**
PD4 - July 31							
Huntsman	365	51.9	2.00	13.0	16	32	59
Sunrise	316	51.5	1.94	10.9	14	32	59
Horizon	229	51.3	2.06	8.4	15	30	58
Plateau	201	50.7	2.07	7.4	12	29	58
PD4 Average	**278**	**51.4**	**2.02**	**10.0**	**14**	**31**	**59**
Average	714	53.9			18	33	61
LSD 0.05	272.1	0.94					

Harvested: PD1, Sept. 29; PD2, Oct. 16; PD3, Oct. 17; PD3, Oct. 17, 2009.
DAP is days after planting.
Seed yields adjusted to 13% seed moisture content.
Ethanol Production is 100% ethanol.

Table 2.-Proso Millet Planting Dates and Cultivars, Seed Yield and Ethanol Yield at Goodwell, OK, 2009.

	-----------PD1 - July 7-----------				-----------PD3 - July 21----------			
Cultivar	Seed Yield	Test Weight	Ethanol Yield	Total Ethanol Prod.	Seed Yield	Test Weight	Ethanol Yield	Total Ethanol Prod.
	lb/a	lb/bu	gal/bu	gal/a	lb/a	lb/bu	gal/bu	gal/a
Huntsman	1686	56.4	1.95	58.7	1558	57.3	1.97	54.8
Sunrise	1498	54.8	1.88	50.3	1065	57.6	2.03	38.6
Horizon	1450	55.4	1.97	51.0	1234	55.5	1.98	43.6
Plateau	1168	52.4	1.91	39.8	873	54.7	1.98	30.9
Mean	1450	54.8	1.93	50.0	1183	56.3	1.99	42.0
LSD 0.05	NS	NS			NS	NS		
CV %	23	3			27	3		

Seed Yield is adjusted to 13.0% seed moisture content.
Ethanol Production is 100% ethanol.

Table 3.--Proso Millet Planting Dates and Cultivar Summary at Walsh, 2009.

	Total Ethanol Production	Seed Yield		Ethanol Yield	Test Weight		Seed Moisture	
	gal/a	lb/a		gal/bu	lb/bu		%	
Planting Date								
PD1 - July 1	59.5	1645	a	2.03	55.6	a	13.0	a
PD2 - July 10	24.0	655	b	2.06	54.7	b	14.4	b
PD3 - July 20	10.3	280	c	2.09	53.9	c	14.7	b
PD4 - July 31	10.0	278	c	2.02	51.3	d	17.0	c
PD LSD 0.05		160.8			0.44		0.35	
Cultivar								
Huntsman	35.6	978	a	2.04	54.6	a	14.8	a
Sunrise	32.0	903	a	1.99	54.0	b	14.8	a
Horizon	20.7	567	b	2.06	53.9	b	14.7	a
Plateau	15.4	409	c	2.11	53.0	c	14.8	a
Cultivar LSD 0.05		135.2			0.49		0.37	
Average	26.0	715		2.05	53.9		14.8	

Seed Yield is adjusted to 13% seed moisture content.
Ethanol is adjusted to 100% alcohol.

Table 4.--Proso Millet Planting Dates and Cultivar Summary at Goodwell, 2009

	Total Ethanol Production	Seed Yield		Ethanol Yield	Test Weight		Seed Moisture	
	gal/a	lb/a		gal/bu	lb/bu		%	
Planting Date								
PD1 - July 7	50.0	1450	a	1.93	54.7	b	13.8	a
PD3 - July 21	42.0	1183	b	1.99	56.3	a	12.9	a
PD LSD 0.05		91.2			2.31		2.33	
Cultivar								
Huntsman	56.8	1622	a	1.96	56.9	a	13.8	a
Sunrise	44.5	1282	ab	1.96	56.3	a	13.5	a
Horizon	47.3	1342	ab	1.98	55.4	ab	13.3	a
Plateau	35.4	1021	b	1.95	53.5	b	12.8	a
Cultivar LSD 0.05		354.0			1.97		1.88	
Average	46.0	1317		1.96	55.5		13.4	

Seed Yield is adjusted to 13% seed moisture content.

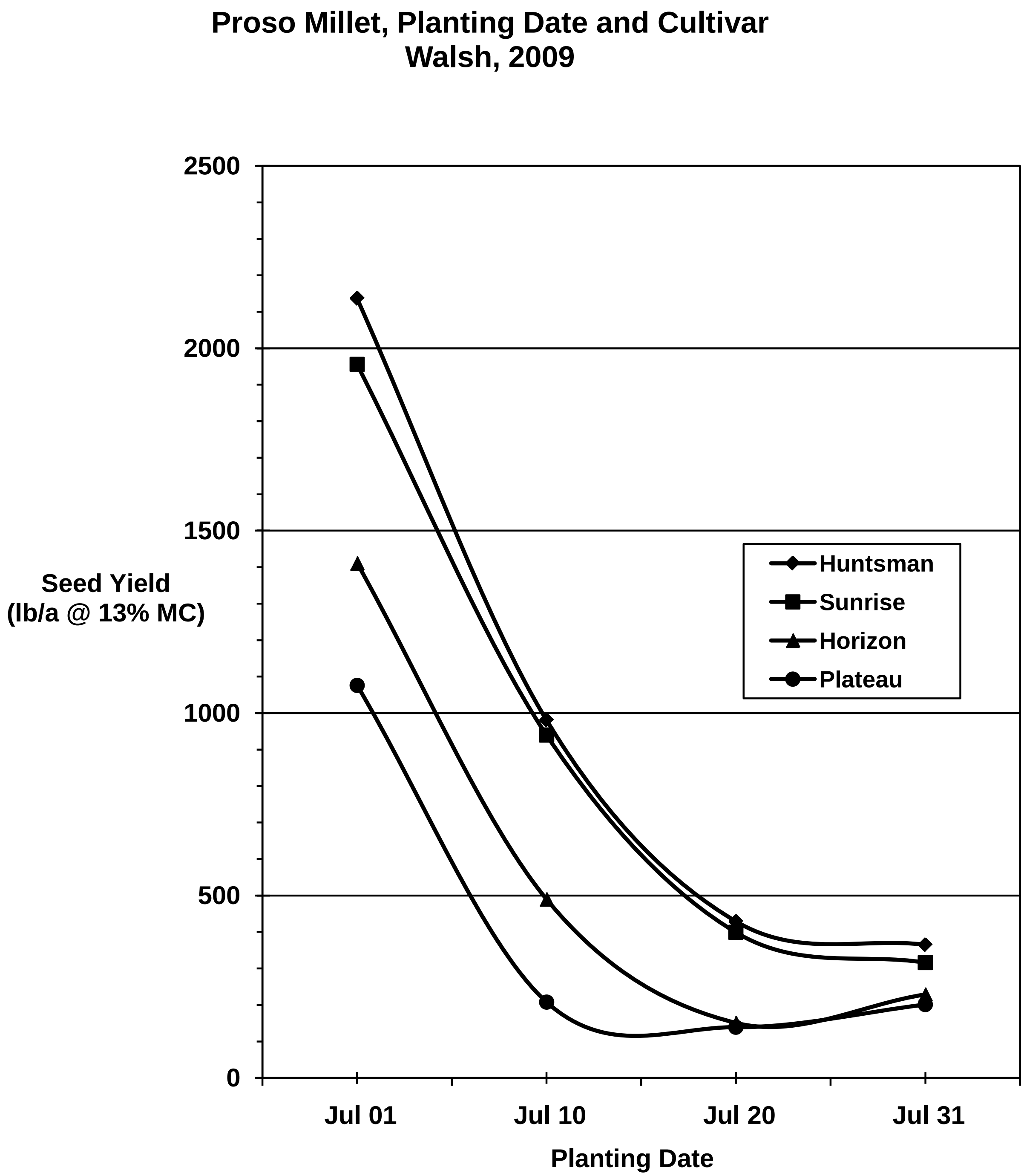


Fig. 1. Seed yield of proso millet planting dates and cultivars for ethanol production study at Walsh, CO, 2009. The planting dates were: PD1, July 1; PD2, July 10; PD3, July 20; and PD4, July 31. The cultivars were: Huntsman, Sunrise, Horizon, and Plateau. All planting dates and cultivars were seeded at 15 lb/a. Harvest dates were: PD1, September 29; PD2, October 16; PD3 and PD4, October 17.

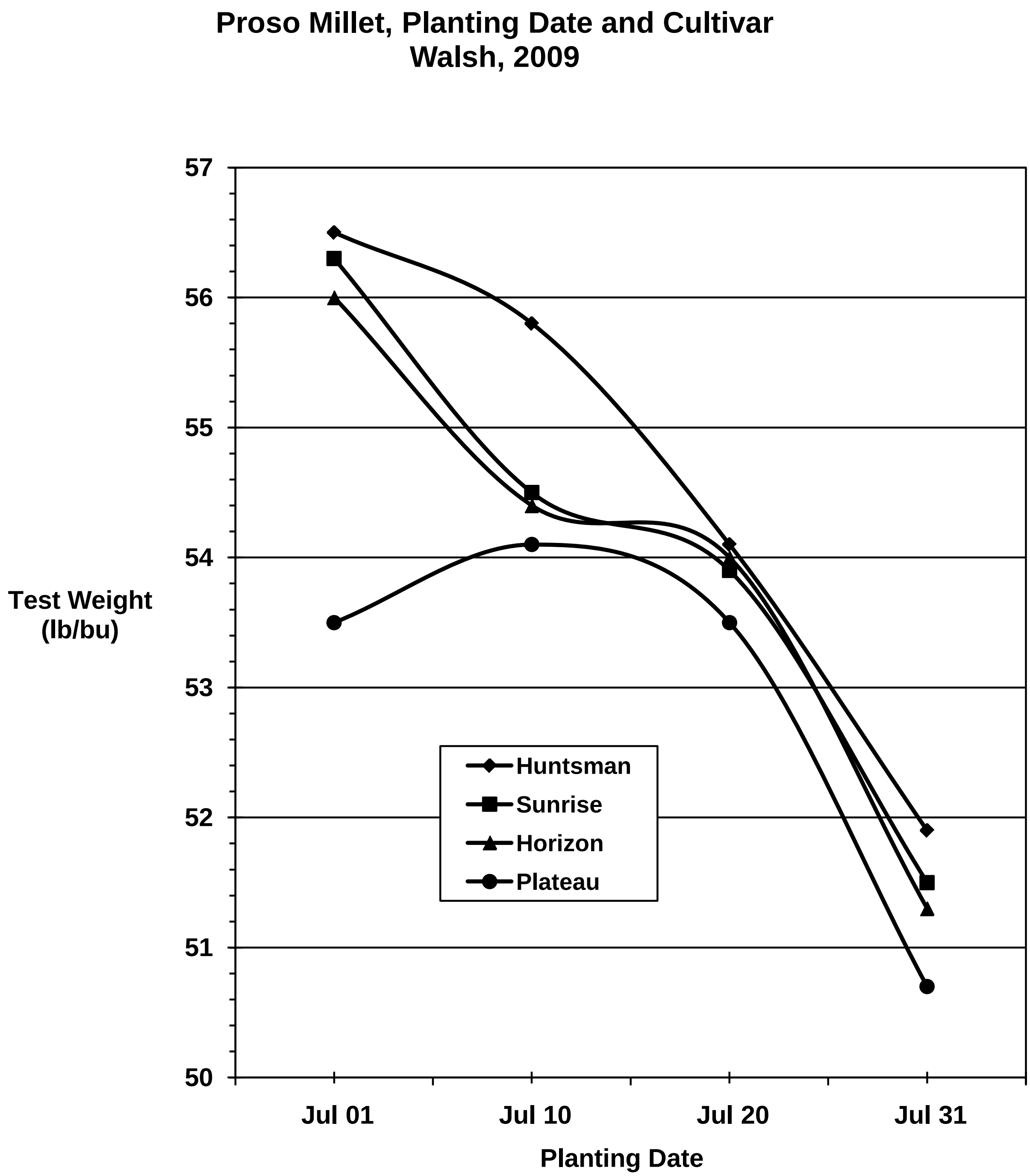


Fig. 2. Test weight of proso millet planting dates and cultivars for ethanol production study at Walsh, CO, 2009. The planting dates were: PD1, July 1; PD2, July 10; PD3, July 20; and PD4, July 31. The cultivars were: Huntsman, Sunrise, Horizon, and Plateau. All planting dates and cultivars were seeded at 15 lb/a. Harvest dates were: PD1, September 29; PD2, October 16; PD3 and PD4, October 17.

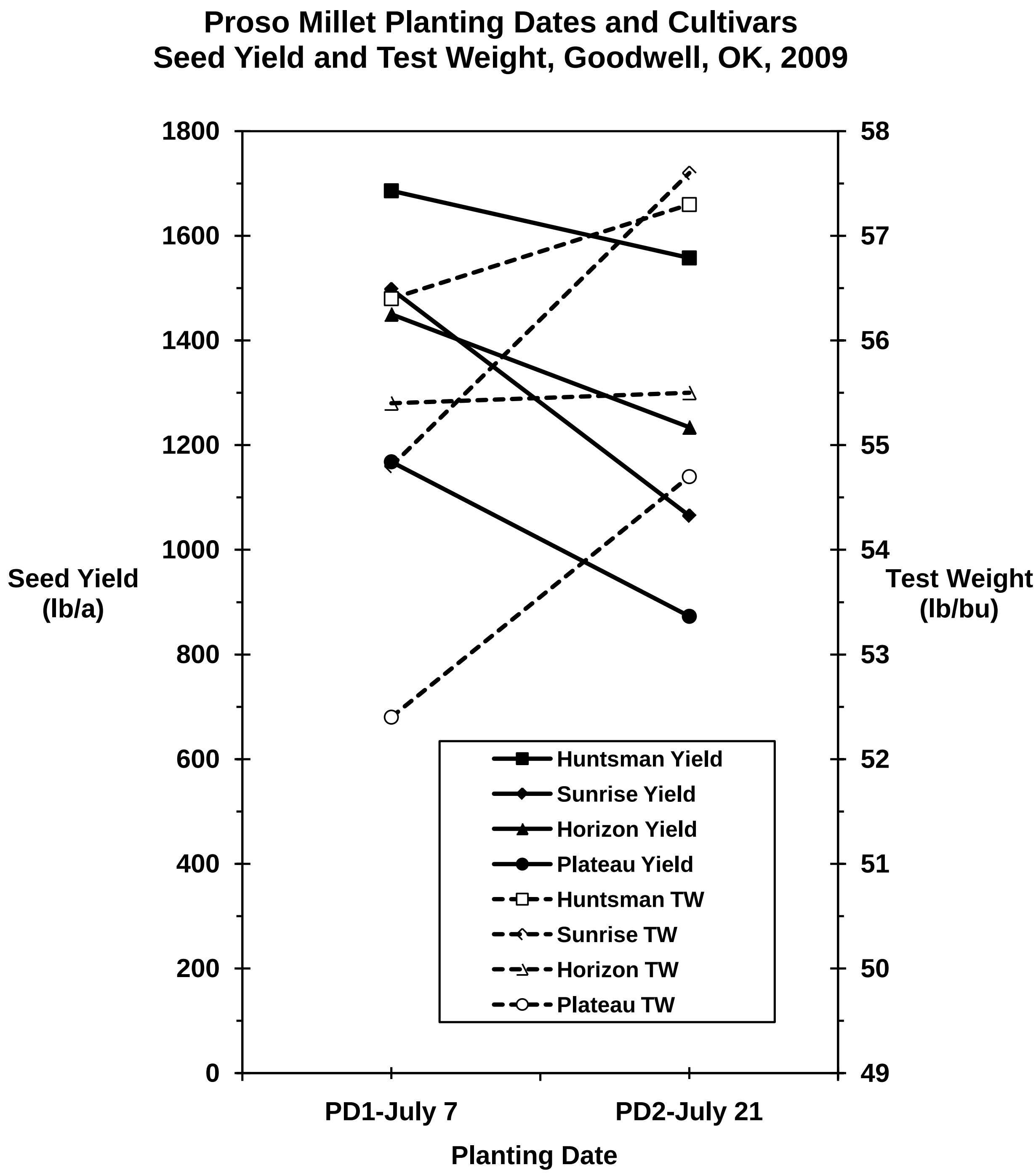


Fig. 3. Seed yield and test weight of proso millet planting dates and cultivars for ethanol production study at Goodwell, OK, 2009. The harvested planting dates were: PD1, July 7; and PD3, July 21, 2009. The cultivars were: Huntsman, Sunrise, Horizon, and Plateau. All planting dates and cultivars were seeded at 15 lb/a. Harvest dates were: PD1, September 14; and PD3, October 19. Seed yield is adjusted to 13.0% seed moisture content.

Table 5.--Proso Millet: Planting Dates and Cultivars, Walsh, CO, 2010.

Cultivar	Seed Yield	Test Weight	Moisture	Shattering	Plant Height	50% Heading	80% Maturity
	lb/a	lb/bu	%	%	in	DAP	DAP
PD1 - May 12							
Huntsman	2101	54.9	14.0	15.0	26	54	87
Sunrise	2045	54.4	13.7	12.5	25	53	86
Horizon	1466	53.7	14.3	12.5	22	51	84
Plateau	1519	50.9	14.4	9.0	22	47	80
PD1 Average	**1783**	**53.5**	**14.1**	**12.3**	**24**	**51**	**84**
PD2 - June 3							
Huntsman	2170	56.0	16.6	5.0	29	47	78
Sunrise	1985	55.1	16.4	3.5	28	46	77
Horizon	1717	55.5	14.9	5.5	25	44	75
Plateau	1692	51.9	14.6	4.0	23	40	73
PD2 Average	**1891**	**54.6**	**15.6**	**4.5**	**26**	**44**	**76**
PD3 - July 2							
Huntsman	1126	56.4	13.6	4.0	26	38	66
Sunrise	1143	55.4	14.0	3.0	25	38	65
Horizon	766	55.1	14.2	1.5	22	36	62
Plateau	926	53.5	13.9	3.0	21	32	62
PD3 Average	**990**	**55.1**	**13.9**	**2.9**	**24**	**36**	**64**
PD4 - Aug. 2							
Huntsman	79	54.3	13.7	0.0	12	49	77
Sunrise	40	--	--	0.0	13	48	76
Horizon	17	--	--	0.0	11	45	76
Plateau	30	--	--	0.0	11	43	75
PD4 Average	**42**	**54.3**	**13.7**	**0.0**	**12**	**46**	**76**
Average	1177	54.4	14.3	4.9	22	44	75
LSD 0.05	221.1	0.86	0.44	2.12			

Harvested: PD1, Aug. 30; PD2, Aug. 30; PD3, Sep. 21; PD4, Nov. 5, 2010.
DAP is days after planting.
Seed yields adjusted to 13% seed moisture content.

Table 6.--Proso Millet Planting Dates and Cultivar Summary at Walsh, 2010.

	Seed Yield		Test Weight		Seed Moisture	
	lb/a		lb/bu		%	
Planting Date						
PD1 - May 12	1783	a	53.5	c	14.1	b
PD2 - June 3	1891	a	54.6	ab	15.6	a
PD3 - July 2	990	b	55.1	a	13.9	bc
PD4 - August 2	42	c	54.3	b	13.7	c
PD LSD 0.05	134.6		0.71		0.37	
Cultivar						
Huntsman	1369	a	55.7	a	14.7	a
Sunrise	1303	a	55.0	b	14.7	a
Horizon	991	b	54.8	b	14.5	ab
Plateau	1042	b	52.1	c	14.3	b
Cultivar LSD 0.05	113.5		0.45		0.23	
Average	1177		54.4		14.3	

Seed Yield is adjusted to 13% seed moisture content.
PD4 test weight and seed moisture of Huntsman only.

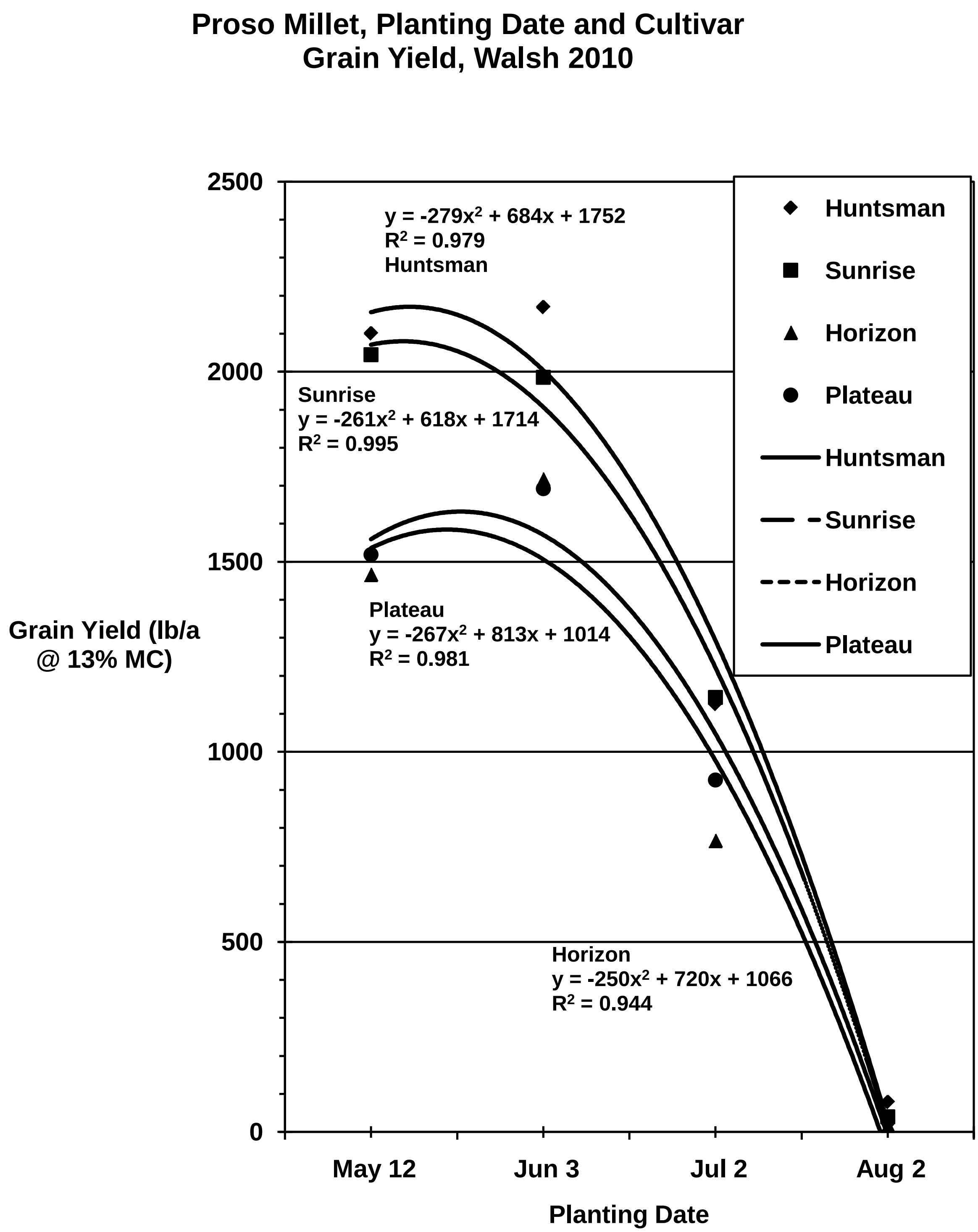


Fig. 4. Seed yield of proso millet planting dates and cultivars for ethanol production study at Walsh, CO, 2010. The planting dates were: PD1, May 12; PD2, June 3; PD3, July 2; and PD4, August 2. The cultivars were: Huntsman, Sunrise, Horizon, and Plateau. All planting dates and cultivars were seeded at 15 lb/a. Harvest dates were: PD1, August 30; PD2, August 30; PD3, September 21; and PD4, November 5.

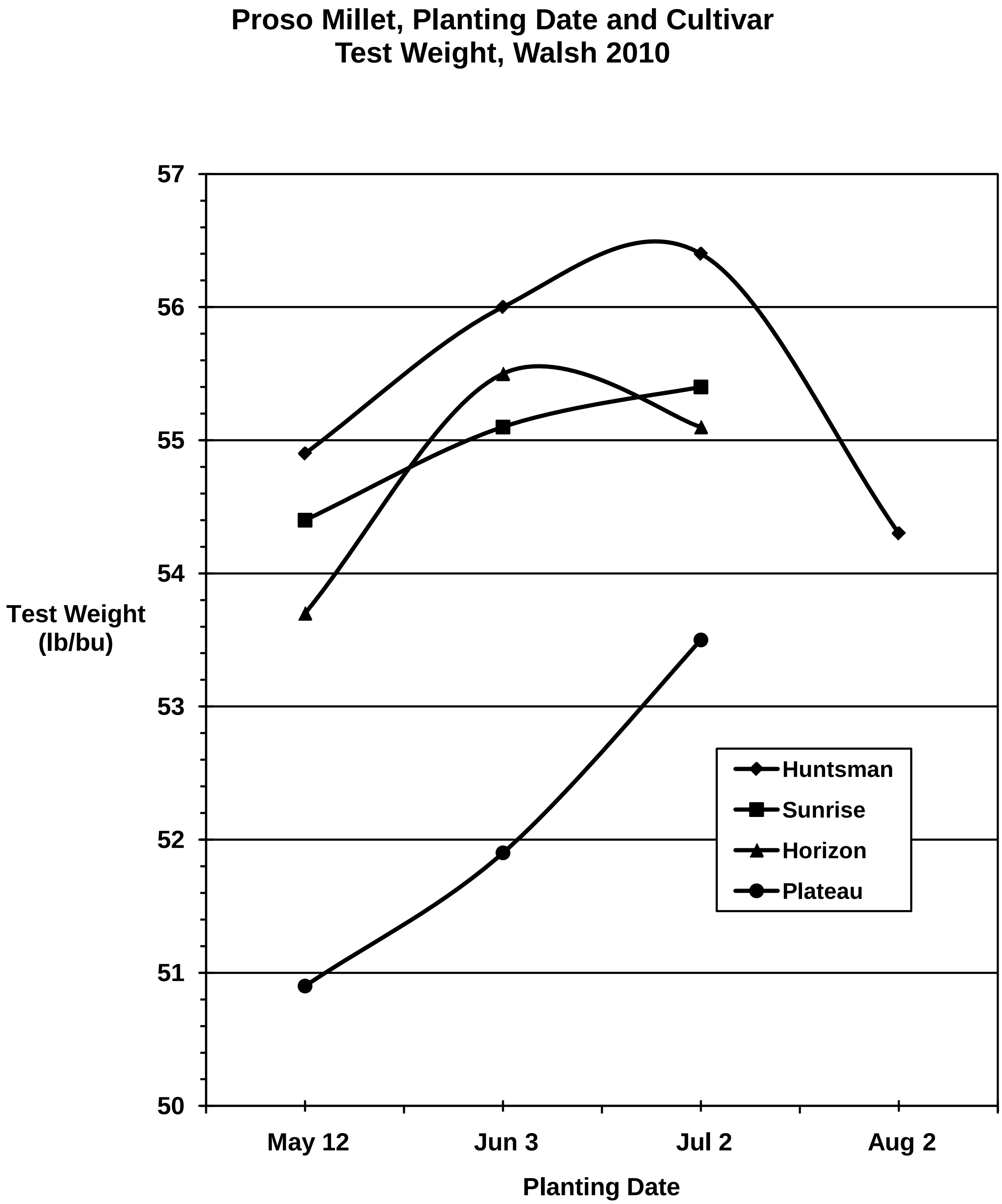


Fig. 5. Test weight of proso millet planting dates and cultivars for ethanol production study at Walsh, CO, 2010. The planting dates were: PD1, May 12; PD2, June 3; PD3, July 2; and PD4, August 2. The cultivars were: Huntsman, Sunrise, Horizon, and Plateau. All planting dates and cultivars were seeded at 15 lb/a. Harvest dates were: PD1, August 30; PD2, August 30; PD3, September 21; and PD4, November 5.

MITIGATION AND REMEDIATION OF HYDROGEN SULFIDE AND AMMONIA EMISSIONS FROM SWINE PRODUCTION FACILITIES

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INTRODUCTION

In recent years, the number of confined animal feeding operations (CAFOs) has increased within the United States to a level where CAFOs now produce approximately 40% of U.S. livestock. The reduction of costs in feed, facility management, transportation and labor has caused animal production facilities to favor this scheme of management. However, residents in communities that are in close proximity to CAFOs are concerned about their health, as well as the environment, due to the quantity of malodorous compounds, bacteria, fungi, and endotoxins that these facilities release. The Environmental Protection Agency (EPA) and United States Department of Agriculture are dedicated to regulating animal feeding operations and the pollutants they emit. As CAFOs operators attempt to decrease their emissions effectively and efficiently, the use of biofiltration in these facilities has been under research. Biofiltration systems contain biologically active media that react with volatile organic compounds and inorganic air toxins while relying on microbial catabolic reactions for waste compounds degradation to improve exflow air quality.

The greatest concentration of swine raised in CAFOs is in Oklahoma, Arkansas, North Carolina, northern Iowa and southern Minnesota (Copeland, 2007). The high concentration of animals in a small geographic area has resulted in noticeable emissions of airborne pollutants; these airborne emissions in large enough quantity can have a detrimental effect on the environment and human health, and can lead to decreased production and increased costs. To protect the surrounding population as well as the swine, the well known biofiltration technology was applied to mitigate and remediate emissions from hazardous concentrations from livestock (pig) buildings. However, little is known about what processes the biofilter technology actually uses to reduce hazardous gas concentrations. There are three major processes that biofilters use: chemical, physical, and biological. The objective of this study was to determine the pathways and processes involved in the biofiltration of the two main hazardous waste that arise from swine production: NH_3 (ammonia) and H_2S (hydrogen sulfide) at concentrations of 5 ppm and 25 respectively. This research was based on the hypothesis that physical characteristics such as surface area and pore size would have a greater effect on biofilter performance for both gases than would pH or biological species. The purpose of this study was to determine if the reactions occurring during the process of filtering these gasses was related to biological, chemical or physical factors.

Keywords: biofilter, swine, animal waste, pig housing, production, CAFOs.

Materials and Methods

This experiment was performed at Oklahoma State University at the Swine Research Farm. Fifteen Drierite polycarbonate gas purifiers (Stock # 26800, W. A. Hammond Drierite Co. LTD, Xenia, OH) with a volume of $1.009*10^{-3}m^3$ were used as replicates of a biofilter. The Drierite columns were packed with one of each of the fifteen treatments (Table 1). As the biofilter received inlet gas concentrations from the swine barn, the outlet end was attached to both a Thermo Scientific Hydrogen Sulfide Analyzer (pulsed fluorescence gas analyzer) and a Fourier transform infrared (FTIR) spectrometer made by California Analytical Instruments.

Table 1. The various treatments used as media to approve and/or disprove the hypothesis.

Control	Anionic Resin	Cationic Resin
Compost 20% Moisture	Compost 40% Moisture	Compost 70% Moisture
Autoclaved Compost	Wood Chips	50:50 Cationic/Anionic Resin Mix
50:50 Compost/Wood Chip Mix	50:50 Compost/Cationic Resin Mix	50:50 Compost Anionic Resin Mix
50:50 Autoclaved Compost/Wood Chip Mix	50:50 Autoclaved Compost/Anionic Resin Mix	50:50 Autoclaved Compost/Cationic Resin Mix

Swanson and Loehr (1997) summarized characteristics that a filtering material should posses:

- Optimal microbial environment – nutrients, moisture, pH, carbon supply should not be limiting
- Large specific surface area – maximizes attachment area, sorption capacity, and number of reaction sites per unit of medium volume
- Structural integrity – necessary to resist medium compaction which increases pressure drops and lowers gas retention times
- High moisture retention – moisture is critical in maintaining active microorganisms
- High porosity – keeps retention times high and backpressure low
- Low bulk density – reduces medium compaction potential

Most current biofilter technology uses either a straw/compost or woodchip/compost mixture as the media. The compost media and wood chip mixtures were from the Oklahoma Botanical Garden in Stillwater, OK. The initial moisture content of the compost and wood chip medias were determined by drying from more than 8 hrs at 105 C in a drying oven (Yani et al., 1998). Deionized water was then added to bring the final moisture content to 20%, 40%, and 70 % dry mass basis. These moistures contents were selected based on Nicolai and Janni (1997) to assess microbial growth during the biofiltration process. Moisture content was recorded at the beginning and the end of a 40 min sampling period.

Samples were run at an ambient temperature range of 4 – 40°C with a residence time of .504 to .336 min (1.008 L / (2 – 3 L min^{-3}) = .504 - .336 min). Also, because an acclimation period is needed for certain bacteria and organisms that biodegrade NH_3 and H_2S, the compost mixtures were placed into a biofilter at the Swine Research Farm two weeks prior to the experiment. To determine how strong pH has an effect on biofilter performance inert cationic and anionic resins were used.

Results and Discussion

Ammonia levels were determined by California Analytical Instrument's CAI 600 FTIR Analyzer. Hydrogen Sulfide concentrations were determined simultaneously with a Thermo Scientific Model 450i was used because it utilizes pulsed fluorescence technology to analyze

H_2S gas compounds. All results were analyzed using PROC GLM and PROC MIXED using SAS 9.1 statistical software (SAS Institute, Raleigh, NC).

Hydrogen Sulfide

Data suggests that the most effective media in mitigating H_2S is a 50:50 Compost/Anionic Resin Mix. The table below shows that hydrogen sulfide does rely on pore space, bacteria, and a particular pH range to achieve high reduction percentages (Table 1).

Table 1. Hydrogen Sulfide (% reduction) means and standard deviations

Treatment	No. of Observations	Mean	Std. Dev.
Control	120	2.68	3.88
Anionic Resin	120	41.72	6.27
Cationic Resin	120	97.54	4.37
50:50 Anionic/Cationic Resin Mix	120	49.16	9.99
Autoclaved Compost	120	79.54	5.77
50:50 Compost/Anionic Resin Mix	120	69.58	8.61
50:50 Compost/Cationic Resin Mix	120	9.99	8.58
50:50 Autoclaved Compost/Anionic Resin Mix	N/A	N/A	N/A
50:50 Autoclaved Compost/Cationic Resin Mix	N/A	N/A	N/A
Wood Chip	120	72.35	8.38
50:50 Wood Chip/Compost Mix	120	77.60	5.97
50:50 Wood Chip/Autoclaved Compost Mix	120	72.92	8.59
Compost 20% moisture	120	81.37	6.42
Compost 40% moisture	120	81.94	6.19
Compost 70% moisture	120	6.19	6.67

Ammonia

Preliminary data suggests that surface area places the largest role in mitigating NH_3. The 40% and 70% moisture levels were not significantly different (Table 2).

Table 2: Ammonia (% reduction) means and standard deviations

Treatment	No. of Observations	Mean	Standard Deviation
Control	120	3.12	3.10
Anionic Resin	120	83.13	7.26
Cationic Resin	120	30.30	12.01
50:50 Anionic/Cationic Resin Mix	120	54.93	22.68
Autoclaved Compost	120	50.00	22.68
50:50 Compost/Anionic Resin Mix	120	100.00	0.00
50:50 Compost/Cationic Resin Mix	120	27.26	10.19
50:50 Autoclaved Compost/Anionic Resin Mix	120	98.20	5.32
50:50 Autoclaved Compost/Cationic Resin Mix	120	51.74	20.96
Wood Chip	120	82.92	6.99
50:50 Wood Chip/Compost Mix	120	89.80	6.03
50:50 Wood Chip/Autoclaved Compost Mix	120	59.81	15.90
Compost 20% moisture	120	72.67	4.54
Compost 40% moisture	120	84.95	3.92
Compost 70% moisture	120	80.23	15.00

Other Results

These results are based off of reduction percentages

- Anionic Resin, because of its pH of 7.69, was not effective at filtering NH_3, nor H_2S
- Cationic Resin was effective at filtering NH_3 and did even better at filtering H_2S.
- H_2S filtration appeared to be primarily due to a biochemical process or as a result of small pore spaces.
- Cationic and Anionic Resin had an additive effect on NH_3 and H_2S.
- Autoclaved Compost was less effective at filtering NH_3 than Cationic Resin, but somewhat effective at removing H_2S.
- Compost was effective at removing both H_2S and NH_3, possibly because of microbial activity, numerous micro pores, and large surface area.
- Compost/Wood Chip mixture was effective at removing both H_2S and NH_3, but less effective than Compost alone.
- Moisture level played an important part in the reduction of H_2S. Popular belief is currently that biofilters need to maintain a moisture percentage of 70% to keep sulfur reducing bacteria healthy, and this research backs up that belief.

CONCLUSION

- **The factors that affect the biofiltration process:**
  - **NH_3**
    - **Biological, little requirements**
    - **Chemical, pH has small effect**
    - **Physical, requires media to have a large surface and low bulk density**
  - **H_2S**
    - **Biological, requires sulfur reducing bacteria**
    - **Chemical, requires pH of 2.5-5.0**
    - **Physical, requires media to have a large surface area and low bulk density**

Biofilters would be more effective with different design and operating parameters in order to function more efficiently for longer periods of time. There is a need for a two-stage biofilter; this could be accomplished with a top and a bottom layer. Since preliminary data suggest that the biofiltration process would work better for longer periods of time if the NH_3 was captured before the H_2S, the first (bottom) layer should contain a porous media to capture NH_3 and the second (top) layer should have porous media with a low pH in order to capture H_2S.

Acknowledgements

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Extension Reports

OKLAHOMA CORN PERFORMANCE TRIALS, 2010

PRODUCTION TECHNOLOGY CROPS

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

PT 2010-7 | December 2010 | Vol. 22, No. 7

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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, and maturity information, were provided by the companies and were not validated by OSU; therefore, we strongly recommend consulting company representatives for more detailed information regarding these traits and disease resistance ratings (Tables 3 and 4).

Irrigated test plots were established at the Oklahoma Panhandle Research and Extension Center (OPREC) near Goodwell and the Joe Webb farm near Guymon. Fertility levels, herbicide use, and soil series (when available) are listed with data. Individual plots were two 25-foot rows seeded at a target population of 32,000 plants/ac. Plots were trimmed to 20 feet prior to being harvested to determine grain yield. The ensilage trial was seeded the same as the grain trial with 10 feet of one row harvested to determine yield. Experimental design for all locations was a randomized complete block with four replications. Grain yield is reported consistent with U.S. No. 1 grade corn (56 lbs/bu and adjusted to moisture content of 15.5%). Corn ensilage was harvested at the early dent stage with average moisture content of 69% and production is reported as tons/ac adjusted to 65% moisture.

GROWING CONDITIONS

Corn planting started in early April but was delayed until mid April from rainfall. Most planting resumed April 28th and was not delayed again until mid May by which time most corn had been planted. Conditions for germination and emergence were good. Most corn acres required no pre-irrigation prior to planting, due to the 4.51 inches of precipitation received during the January through March time period. Temperatures during the growing season were near normal with no 100 °F recorded during May, June had 3, July had 4, and August had 10 days of 100 °F or greater. The number of days in August may have reduced yields on the later planted corn in 2010. Mean high temperatures for the period were near the long-term averages. The mean high temperature for May was 77 °F which is 2 degrees below the long term mean. For June, July and August the mean high temperatures were normal or slightly above, June 91°F compared to 88 °F, July 93 °F which is the long term mean, and August 93 °F compared to 91 °F. The number of 100 °F and higher than normal temperatures may have affected grain fill on the later planted corn. Rainfall for the period was above the long-term mean, but 38% was received in mid to late August (Table 1). Therefore irrigation scheduling was critical during most of the growing season. The harvest period had no major delays to weather and most producers reporting yields ranging from 200 bu/ac to over 250 bu/ac.

RESULTS

Grain yield, test weight, harvest moisture, and plant populations for OPREC and Webb trials are presented (Tables 3 and 4). 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, Matt LaMar, Eddie Pickard, Wilson Henry, Cameron Murley, and Craig Chesnut. Their efforts are greatly appreciated.

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

Location	April	May	June	July	Aug	Total
Long-term mean	1.33	3.25	2.86	2.58	2.28	12.30
2010	1.76	2.64	3.16	1.22	5.42	14.20
Irrigation						
Joe Webb	0.0	4.0	6.0	6.0	2.0	18.0
OPREC	0.0	1.3	3.9	3.9	1.3	10.4

Table 2. Characteristics of Corn Hybrids in Panhandle Corn Performance Trials, 2010.

Company Brand Name	Hybrid	Plant Characteristics SV	SS	SG	EP	MATURITY Days
Golden Acres	GA 26V21	1	1	2	M	115
Golden Acres	GA 208V81	2	2	2	M	118
Golden Acres	GA 27V01	2	2	2	High	117
Mycogen Seeds	TMF2H918	8	8	NA	NA	123
Mycogen Seeds	TMF2L844	7	7	NA	NA	119
Mycogen Seeds	F2F622	8	7	NA	NA	109
Mycogen Seeds	F2F700	8	8	NA	NA	113
Terral Seed, Inc	Rev™ 25HR39™	8	7	5	MH	115
Terral Seed, Inc	Rev™ 25R19™	8	7	5	MH	115
Terral Seed, Inc	Rev™ 26R60™	7	6	6	M	116
Terral Seed, Inc	Rev™ 28HR20™	7	7	7	MH	118
Terral Seed, Inc	Rev™ 28HR30™	7	7	8	MH	118
Terral Seed, Inc	Rev™ 28R30™	7	7	8	MH	118
Terral Seed, Inc	Rev™ 28R10™	7	7	7	MH	118
Triumph Seed Co. Inc.	1536H	2	3	3	M	115
Triumph Seed Co. Inc.	TRX01601	3	3	3	M	116
Triumph Seed Co. Inc.	7514X	3	3	3	M	114
Triumph Seed Co. Inc.	1420V	3	3	3	M	114
Triumph Seed Co. Inc.	1825V	3	2	2	MH	118
Triumph Seed Co. Inc.	2288H	3	2	1	H	122

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

Table 3. Grain Yield and Harvest Parameters Joe Webb location, Oklahoma Corn Performance Trials, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac	Test Weight Lb/bu	Harvest Moisture	Plant Population plants/ac
Triumph Seed Co. Inc.	1825V	232	58.0	13.8	33,200
Terral Seed, Inc	Rev™ 28R10™	205	60.5	13.9	31,700
Golden Acres	GA 208V81	203	59.9	13.8	29,800
Terral Seed, Inc	Rev™ 28HR20™	197	60.6	13.9	32,800
Terral Seed, Inc	Rev™ 28HR30™	192	60.5	14.5	31,300
Golden Acres	GA 27V01	190	56.9	12.3	31,500
Triumph Seed Co. Inc.	7514X	187	58.2	14.4	31,100
Triumph Seed Co. Inc.	2288H	185	59.2	17.8	28,300
Triumph Seed Co. Inc.	1420V	181	59.7	13.1	33,400
Mycogen Seeds	TMF2H918	181	58.0	20.7	30,900
Terral Seed, Inc	Rev™ 25HR39™	179	61.0	12.8	31,400
Terral Seed, Inc	Rev™ 28R30™	177	59.5	13.4	32,900
Terral Seed, Inc	Rev™ 26R60™	173	60.0	14.7	30,700
Terral Seed, Inc	Rev™ 25R19™	172	60.7	14.1	31,600
Golden Acres	GA 26V21	172	58.1	12.1	30,700
Triumph Seed Co. Inc.	1536H	164	60.3	12.6	30,500
Mycogen Seeds	TMF2L844	153	58.3	13.0	28,700
Mycogen Seeds	F2F622	145	60.3	12.3	34,300
Mycogen Seeds	F2F700	112	61.1	12.6	34,100
	Mean	179	59.5	14.0	31,500
	CV %	8.9	1.1	9.9	8.5
	L.S.D.	23	0.9	2.0	NS

Cooperator: Joe Webb
Soil Series: Richfield Clay Loam
Strip-Till: Following wheat in 2009
Soil Test: N: NA P: NA K: NA pH: NA
Fertilizer: N: 230 lbs/ac P: 50 lbs P_2O_5/ac K: 0 and 5 gal 10-34-0 in row with planter
Herbicide: 1.5qt/ac Harness Extra (Preemergence) + 3/4 oz/ac Balance
Planting Date: April 14, 2010
Harvest Date: September 21, 2010

Table 4. Ensilage Yields and Quality Panhandle Corn Performance Trial, 2010.

Company Brand Name	Hybrid	YIELD Tons/ac	Plant Population plants/ac	Harvest Moisture %
Golden Acres	GA 27V01	28.5	30,900	53.7
Triumph Seed Co. Inc.	1825V	28.2	29,200	51.9
Triumph Seed Co. Inc.	2288H	28.1	28,500	59.2
Golden Acres	GA 208V81	28.0	29,000	54.4
Mycogen Seeds	TMF2H918	27.8	28,700	57.6
Mycogen Seeds	TMF2L844	27.5	30,900	54.8
Terral Seed, Inc	Rev™ 26R60™	27.2	30,600	50.5
Terral Seed, Inc	Rev™ 25R19™	27.0	31,500	52.7
Triumph Seed Co. Inc.	1536H	26.2	30,200	49.5
Terral Seed, Inc	Rev™ 28HR30™	24.4	31,200	52.2
Terral Seed, Inc	Rev™ 28R30™	24.3	30,800	50.9
Triumph Seed Co. Inc.	1420V	24.3	32,500	52.6
Mycogen Seeds	F2F700	24.0	29,200	53.5
Terral Seed, Inc	Rev™ 28HR20™	23.8	30,200	52.1
Terral Seed, Inc	Rev™ 25HR39™	23.6	30,500	54.3
Terral Seed, Inc	Rev™ 28R10™	23.6	29,900	51.7
Golden Acres	GA 26V21	23.6	28,600	54.8
Triumph Seed Co. Inc.	7514X	23.1	29,800	52.7
Mycogen Seeds	F2F622	23.0	31,800	52.1
Triumph Seed Co. Inc.	TRX01601	22.6	27,600	52.3
	Mean	25.4	30,100	53.1
	CV %	13.9	7.4	5.3
	L.S.D.	NS	NS	4.6

Cooperator: OPREC
Soil Series: Richfield Clay Loam
Strip-till: wheat double crop sunflower in 2009
Soil Test: N: 28 P: 14 K: 876 pH: 7.6
Fertilizer: N: 230 lbs/ac P: 50 lbs/ac P_2O_5 K: 0 and 5 gal 10-34-0 in row with planter
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence) + .75 oz Balance Flex
Planting Date: April 29, 2010
Harvest Date: September 11, 2010

GRAIN SORGHUM PERFORMANCE TRIALS IN OKLAHOMA, 2010

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 ten locations in Oklahoma: Apache, Alva, Blackwell, Cherokee, Enid, Goodwell, Homestead, Keyes, Gate, and Tipton. Dry-land trials are conducted at all locations, with an additional limited irrigation trial at Goodwell. The Cherokee, Homestead, and Gate locations are uniquely designed trials to evaluate certain hybrids (generally early and medium maturity) for planting in late April. In 2010 trials were continued at Enid and Alva to evaluate hybrids for use as a double crop.

Highlights

The highlight in 2010 was the high yields at all locations. The highest dry-land yield at all locations was Cherokee with 129 bu/ac trial mean. There was also an area from Enid to Blackwell that yields were adversely affected by fusarium stalk rot. The rot was a function of the year, with high rainfall and temperatures. Double crops yields were good for most producers but the area between Fairview and Okeene was drier than surrounding areas. New in 2010 are short notes about each trial location accompanying the result tables.

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

Target populations, cooperating producers, fertilization, cultural practices, soil series, and herbicide use on all trials are listed individually in the results tables. Rainfall data from the nearest Mesonet site are also listed. Some trials are long distances from the nearest Mesonet site; therefore rainfall could be greater or less than reported.

GROWING CONDITIONS

Soil moisture conditions were excellent for planting at the April planted trials. Soil temperatures were also higher than in 2009. Therefore, better plant emergence was observed in 2010. The planting period in April did not have any major delays. Panhandle dry-land planting was delayed until moisture from rainfall in mid June. Rainfall in 2010 was plentiful for the northwest area of the state, with trial locations receiving average or above precipitation. In other regions rainfall was near the long-term average and was timely, resulting in outstanding yields. Planting was delayed for double crop sorghum due to rainfall. An extended warm fall allowed all hybrids in double crop trials to mature, although an area east of Enid experienced a frost in early October that affected yields and test weights.

Insects were not a major concern in 2010, but due to late harvest many producers reported some bird damage

RESULTS

Grain yields in 2010 were higher than 2009, and producers reported the highest yields obtained were on late May and early June plantings.

Grain yields are reported bushel per acre of threshed grain, adjusted to a moisture content of 14.0% (Tables 2-11). Test weight, plant population, and the number of heads per acre at harvest are reported.

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

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

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

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

The following people have contributed to this report by assisting in crop production, data collection, and publication: Donna George, Lawrence Bohl, Rocky Thacker, Eddie Pickard, Jeff Bedwell, Jimmy Rhodes, Tommy Puffinbarger, Todd Trennepohl, Cori Woelk, Jacob Baker, Cameron Murley, and Wilson Henry. 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.*

Table 1. Seed source and hybrid characteristics of grain sorghums in the Oklahoma Grain Sorghum Performance Trials, 2010. 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
Channel Bio LLC	5B90	Bz	NA	62	C	3
Channel Bio LLC	7B11	Bz	Hy	67	E,I	1
DeKalb	DKS 28-05	Bz	HY	58	-----	1
DeKalb	Pulsar	Bz	HY	60	C,E,I	1
DeKalb	DKS 37-07	Bz	HY	60	C,E,I	1
DeKalb	DKS 29-28	Bz	HY	59	E	1
DeKalb	DKS 44-20	BZ	HY	67	NA	1
DeKalb	DKS 36-06	Bz	Hy	63	E,I	1
DeKalb	DKS 49-45	Bz	Hy	70	E,I	1
DeKalb	DKS 53-67	Bz	HY	71	C,E,I	4
DeKalb	DKS 54-00	Bz	HY	72	C,E,I	4
DeKalb	DKS 54-03	Bz	HY	74	NA	4
Johnston Seed Co.	JS-207	Bz	Hy	58	C	1
Johnston Seed Co.	JS-222	Bz	Hy	68	C, E	1
Johnston Seed Co.	JS-012	W	HY	63	C	1
Johnston Seed Co.	JS-056	R	N	65	C	1
Johnston Seed Co.	JS-524	R	N	65	C	1
Pioneer Hi-Bred Int.	85G01	R	W	69	-----	1
Pioneer Hi-Bred Int.	86G32	R	W	65	-----	1
Pioneer Hi-Bred Int.	87P06	R	W	63	-----	1
Pioneer Hi-Bred Int.	84G62	Bz	Y	72	-----	4
Pioneer Hi-Bred Int.	85Y40	W	Y	70	-----	1
Pioneer Hi-Bred Int.	84P74	R	W	70	-----	4
Sorghum Partners Inc	SP3303	Y	Y	59	C	2
Sorghum Partners Inc	X449	Bz	HY	67	E	1
Sorghum Partners Inc	KS 585	Bz	HY	67	C, E	1
Sorghum Partners Inc	NK4420	Bz	HY	65	C,E	2
Sorghum Partners Inc	NK5418	Bz	HY	67	C,E	1
Sorghum Partners Inc	NK 7633	Bz	HY	72	C	1
Sorghum Partners Inc	NK6638	Bz	HY	70	C	1
Syngenta Seeds	5745	R	N	62	-----	1
Syngenta Seeds	5464	Bz	N	69	C, E	1
Syngenta Seeds	5613	Bz	N	65	C,D,E	1
Syngenta Seeds	5556	R	N	67	C	1
Syngenta Seeds	H-486	R	N	68	-----	1
Triumph Seed	TR 452	R	HY	65	C,E	1
Triumph Seed	TRX 84732	R	HY	68	C,E	1
Triumph Seed	TRX 05631	Bz	HY	70	-----	1

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, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Deer Damage %
Less than 60 days to mid-bloom							
DeKalb	DKS 37-07	82	57.0	11.9	37,800	1.31	0
DeKalb	DKS 28-05	79	55.0	11.4	37,600	1.64	0
DeKalb	Pulsar	67	56.2	12.0	28,100	1.60	0
Johnston Seed Co.	JS-207	42	53.3	11.2	31,100	1.36	28
DeKalb	DKS 29-28	24	51.5	12.2	34,300	1.32	33
	Mean	59	54.6	11.8	33,800	1.44	-----
	C.V.%	18.8	2.0	4.8	8.7	8.7	-----
	L.S.D.	17	1.7	NS	4,500	0.19	-----

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Deer Damage %	Lodging %
60 to 69 days to mid-bloom								
DeKalb	DKS 44-20	96	56.7	12.1	46,200	1.23	5	5
Pioneer Hi-Bred Int.	85G01	95	55.2	11.8	40,400	1.31	0	0
Sorghum Partners Inc	KS 585	94	56.3	12.0	37,200	1.51	0	0
Sorghum Partners Inc	X449	92	57.6	12.3	45,700	1.22	0	0
Channel Bio LLC	5B90	90	55.7	11.8	36,600	1.45	0	0
Syngenta Seeds	5613	89	56.3	12.2	37,600	1.29	0	0
Johnston Seed Co.	JS-222	87	56.0	12.2	34,300	1.34	0	0
Syngenta Seeds	H-486	86	54.8	12.0	40,700	1.20	5	0
Sorghum Partners Inc	NK5418	84	54.6	11.7	35,800	1.48	0	15
Channel Bio LLC	7B11	83	57.3	12.5	30,800	1.48	0	0
Triumph Seed	TR 452	83	56.6	11.9	37,000	1.28	0	0
Johnston Seed Co.	JS-056	82	55.3	11.9	34,200	1.30	0	0
Syngenta Seeds	5556	80	55.1	11.9	34,600	1.31	0	0
Pioneer Hi-Bred Int.	86G32	78	55.3	12.0	33,400	1.62	0	0
Syngenta Seeds	5745	77	53.6	11.6	35,400	1.44	0	0
DeKalb	DKS 36-06	76	55.4	11.8	38,200	1.35	0	0
Johnston Seed Co.	JS-524	75	53.2	12.0	28,200	1.47	0	35
Syngenta Seeds	5464	75	55.1	12.0	32,800	1.32	0	0
Johnston Seed Co.	JS-012	67	53.7	11.1	28,400	1.46	0	0
Triumph Seed	TRX 84732	65	55.9	12.4	25,800	1.46	0	10
Pioneer Hi-Bred Int.	87P06	52	54.2	11.2	36,200	1.50	30	0
	Mean	81	55.4	11.9	35,900	1.38	-----	-----
	C.V.%	10.9	2.7	2.2	8.7	9.9	-----	-----
	L.S.D.	13	2.1	0.4	4,400	0.19	-----	-----

Table 2. Continued.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Lodging %
70 days and greater to mid-bloom							
Pioneer Hi-Bred Int.	85Y40	85	55.8	11.7	34,600	1.38	14
DeKalb	DKS 49-45	81	56.5	11.7	37,300	1.31	0
Sorghum Partners Inc	NK6638	73	55.2	11.5	37,000	1.28	34
Sorghum Partners Inc	NK 7633	69	55.3	11.3	27,200	1.57	0
Triumph Seed	TRX 05631	57	51.1	12.1	26,700	1.40	0
	Mean	73	54.8	11.6	32,600	1.39	-----
	C.V.%	12	1.4	2.1	8.0	8.9	-----
	L.S.D.	17	1.4	0.5	4,900	NS	-----

Cooperator: Alan Mindemann
No-till Practices: Sprayed and killed wheat in early April of 2010
Fertilizer: N: 80 lbs/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 26, 2010
Seeding rate 56,000 seeds/ac
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)

Soil Series: Hollister Silt Loam
Soil Test: N: 52 P: 148 K: 611 pH: 5.9
First hybrid headed out June 26
Harvest Date: September 18, 2010
Target Population 45,000 plants/ac

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2010:	2.66	1.68	4.01	5.72	0.93	**15.00**
Long term mean:	2.99	4.79	3.83	2.23	2.55	**16.39**

Notes:

Stands were reduced due to the short interval between wheat being sprayed and planting date.

Table 3. Results from Blackwell grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Lodging %
		Less than 60 days to mid-bloom				
DeKalb	DKS 28-05	87	57.3	13.0	41,600	8
DeKalb	DKS 37-07	83	57.6	13.2	42,000	38
Johnston Seed Co.	JS-207	77	55.5	13.2	43,300	5
DeKalb	Pulsar	69	55.9	13.5	25,900	5
DeKalb	DKS 29-28	39	57.7	13.5	43,200	0
	Mean	71	56.2	13.3	39,200	-----
	C.V.%	10.7	3.7	3.0	10.1	-----
	L.S.D.	12	NS	NS	6,100	-----

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Lodging %
		60 to 69 days to mid-bloom				
DeKalb	DKS 44-20	92	58.2	14.1	45,200	0
Syngenta Seeds	H-486	89	56.6	13.5	43,800	10
Sorghum Partners Inc	KS 585	89	59.0	13.3	36,300	0
Sorghum Partners Inc	NK5418	88	56.8	13.3	37,100	0
Channel Bio LLC	5B90	87	58.8	13.2	40,000	0
Pioneer Hi-Bred Int.	87P06	85	57.2	12.9	42,500	0
Pioneer Hi-Bred Int.	85G01	83	57.6	12.7	47,200	60
Pioneer Hi-Bred Int.	86G32	83	55.5	13.1	34,400	18
Syngenta Seeds	5745	83	55.9	13.5	40,200	13
Sorghum Partners Inc	X449	81	57.6	13.5	45,300	25
Syngenta Seeds	5613	80	56.0	13.1	40,100	40
Triumph Seed	TR 452	78	57.8	13.4	39,900	5
Triumph Seed	TRX 84732	77	56.1	15.8	26,500	3
Johnston Seed Co.	JS-524	76	55.4	13.1	31,000	10
Johnston Seed Co.	JS-222	75	56.7	13.8	40,000	23
Channel Bio LLC	7B11	75	58.2	14.3	30,300	3
Johnston Seed Co.	JS-056	74	56.8	12.9	44,300	30
Syngenta Seeds	5464	74	57.2	15.0	22,300	5
Syngenta Seeds	5556	72	57.3	13.1	44,900	30
DeKalb	DKS 36-06	70	57.9	13.1	35,900	48
Johnston Seed Co.	JS - 012	69	56.2	12.8	30,500	33
	Mean	80	57.1	13.5	38,000	-----
	C.V.%	12.4	1.5	4.3	17.5	-----
	L.S.D.	14.0	1.2	0.8	9,400	-----

Table 3. Continued.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Lodging %
70 days and greater to mid-bloom						
Sorghum Partners Inc	NK 7633	82	55.7	14.6	30,500	0
Sorghum Partners Inc	NK6638	63	55.4	12.2	39,600	63
Triumph Seed	TRX 05631	63	55.0	12.2	36,700	65
DeKalb	DKS 49-45	59	55.2	12.4	39,800	83
Pioneer Hi-Bred Int.	85Y40	54	56.1	11.9	38,800	93
	Mean	64	55.5	12.6	37,100	-----
	C.V.%	14.3	3.0	5.9	15.4	-----
	L.S.D.	14.2	NS	1.2	NS	-----

Cooperator: Bill and Louise Rigdon
No-till Practices: Followed Soybean in 2009
Fertilizer: N: 120 lbs/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 27, 2010
Seeding rate 56,000 seeds/ac
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)

Soil Series: Kirkland Silt Loam
Soil Test: N: 11 P: 135 K: 461 pH: 5.3
First hybrid headed out June 25
Harvest Date: August 23, 2010
Target Population 45,000 plants/ac

Monthly Rainfall (in.)	Apr.	May	June	July	Aug.	**Total**
2010:	3.42	6.83	7.41	3.00	3.96	**24.62**
Long term mean:	3.28	5.83	4.05	2.68	3.19	**19.03**

Notes:

Yields were significantly reduced by heavy fusarium stalk rot infestation charcoal rot was also found but was minimal. The fusarium is the reason for the unusually high incidence of lodging.

Table 4. Results from Cherokee grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield bu/ac		Test weight lb/bu		Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		2010	Two-year	2010	Two-year			
Pioneer Hi-Bred Int.	85G03	150	122	57.9	57.8	12.5	38,000	1.78
Sorghum Partners Inc	KS 585	156	117	59.9	59.4	12.3	38,000	1.69
Syngenta Seeds	5613	157	112	57.7	57.5	12.7	42,100	1.35
Syngenta Seeds	H-486	142	109	57.2	56.7	12.2	41,200	1.29
Johnston Seed Co.	JS-222	145	108	58.7	57.5	12.3	35,900	1.55
DeKalb	DKS 37-07	134	105	60.0	59.1	12.1	40,100	1.39
NC+ Hybrids	5B90	124	105	59.6	59.3	12.4	39,700	1.60
Johnston Seed Co.	JS-056	134	104	57.9	57.9	12.3	42,300	1.40
DEKALB	DKS 36-06	133	103	59.7	58.7	12.3	34,100	1.71
DEKALB	DKS 44-20	119	97	59.3	59.0	13.7	51,300	1.26
Triumph Seed	TR 452	113	92	57.5	57.7	12.7	34,100	1.54
Sorghum Partners Inc	NK6638	109	89	58.6	57.8	12.2	38,400	1.42
Pioneer Hi-Bred Int.	87P06	116	89	57.7	57.0	12.8	39,300	1.91
DEKALB	DKS 28-05	112	87	57.2	57.1	12.5	39,200	1.88
Johnston Seed Co.	JS-207	88	65	55.0	55.4	11.9	29,800	1.76
Sorghum Partners Inc	X 449	144	-----	59.6	-----	12.5	42,800	1.36
Triumph Seed	TRX 84732	125	-----	57.7	-----	13.3	23,900	2.11
	Mean	129	100	58.3	57.9	12.1	38,200	1.59
	C.V.%	12.1	13.6	1.8	1.9	7.1	8.8	9.9
	L.S.D.	22	14	1.5	1.1	NS	4,800	0.22

Cooperator: Doug McMurtrey
No-till Practices: Followed soybean in 2009
Fertilizer: N: 118 lbs N/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 27, 2010
Seeding rate 56,000 seeds/ac
Herbicide 2.5 qt/ac Degree Extra

Soil Series: Kay Silt Loam
Soil Test: N: 17 P: 110 K: 500 pH: 5.8
First hybrid headed out June 23
Harvest Date: August 30, 2010
Target Population 45,000 plants/ac

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2010:	1.99	8.16	2.89	4.42	6.44	**23.90**
Long term mean:	3.28	5.83	4.05	2.68	3.19	**19.03**

Notes:

Best yield in dry-land test plots in last 12 years.

Table 5. Results from Enid double crop grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield bu/ac		Test weight lb/bu		Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		2010	Two-year	2010	Two-year			
Johnston Seed Co.	JS-056	106	84	58.1	57.0	18.5	25,000	1.62
Triumph Seed	TR 452	111	83	59.3	58.0	17.4	24,700	1.50
Channel Bio LLC	5B90	108	78	59.7	57.6	17.3	19,300	2.27
DeKalb	DKS 44-20	94	77	60.3	58.7	17.5	24,300	1.46
Johnston Seed Co.	JS 222	98	76	58.7	57.6	18.4	20,700	1.42
Sorghum Partners Inc	NK5418	87	72	59.2	57.2	17.4	19,500	2.07
DeKalb	DKS 37-07	93	71	59.3	57.7	17.5	23,300	1.59
Syngenta Seeds	H-486	81	70	58.0	56.5	17.6	19,100	1.61
Pioneer Hi-Bred Int.	86G32	89	69	58.4	56.8	17.0	16,100	2.45
Syngenta Seeds	5464	72	62	58.9	57.1	18.6	13,900	1.53
Pioneer Hi-Bred Int.	87P06	34	39	56.6	56.1	17.4	14,700	1.94
Sorghum Partners Inc	X449	117	-----	60.1	-----	17.8	21,900	1.78
Pioneer Hi-Bred Int.	85G01	108	-----	58.5	-----	17.7	21,800	1.94
Channel Bio LLC	7B11	106	-----	59.2	-----	19.0	17,600	1.93
DeKalb	DKS 28-05	94	-----	57.9	-----	16.6	19,700	2.49
Triumph Seed	TRX 84732	94	-----	55.8	-----	21.3	16,000	2.22
Sorghum Partners Inc	NK4420	78	-----	59.9	-----	17.4	20,900	1.88
Johnston Seed Co.	JS-012	75	-----	58.8	-----	17.0	18,000	1.66
Syngenta Seeds	5613	71	-----	58.2	-----	18.1	15,500	1.61
	Mean	90	72	58.7	57.3	17.8	19,600	1.84
	C.V.%	12.1	20.3	1.5	2.1	2.4	20.1	17.5
	L.S.D.	16	16	1.2	1.3	0.6	5,600	0.46

Cooperator: James and Richard Wuerflein
No-till Practices: Fallowing wheat in 2010
Fertilizer: N: 100 lbs N/ac + 5 gal/ac 10-34-0 with planter
Planting Date: June 23, 2010
Seeding rate 56,000 seeds/ac

Soil Series: Pond Creek Silt Loam
Soil Test: NA
Herbicide 2 qt/ac Cinch ATZ Lite
Harvest Date: November 23, 2010
Target Population 45,000 plants/ac

Monthly Rainfall (in.)

	June	July	Aug	Sept	Oct	**Total**
010:	3.71	6.56	3.58	3.37	1.45	**18.67**
Long term mean:	4.26	2.89	3.35	3.39	3.17	**17.06**

Notes:

Stand was reduced due to heavy rainfall after planting and some injury due to atrazine was observed when counting plants.

Pioneer 87P06 yield was reduced due to heavy deer damage, was only one with significant damage.

Table 6. Results from Gate grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Bird Damage %
Sorghum Partners Inc	KS 585	71	60.1	13.7	19,200	2.28	15
Johnston Seed Co.	JS-056	62	56.7	16.0	21,900	1.86	20
Pioneer Hi-Bred Int.	85G03	60	56.8	14.2	22,100	2.00	25
Johnston Seed Co.	JS-222	60	58.7	13.6	23,400	1.70	40
NC+ Hybrids	5B90	59	57.1	15.0	18,100	2.46	30
Pioneer Hi-Bred Int.	87P06	58	57.3	11.7	18,400	2.56	40
DEKALB	DKS 28-05	57	56.2	11.8	21,900	2.26	30
DEKALB	DKS 44-20	57	58.3	13.6	28,600	1.58	45
DeKalb	DKS 37-07	54	58.5	17.8	23,400	1.91	50
Sorghum Partners Inc	X 449	54	57.1	18.9	21,600	1.90	65
Triumph Seed	TRX 84732	49	55.2	18.7	11,900	2.57	25
Johnston Seed Co.	JS-207	48	56.3	13.4	18,300	1.81	25
Syngenta Seeds	H-486	47	54.2	18.4	20,300	1.63	50
Syngenta Seeds	5613	41	56.6	13.6	20,200	1.69	50
Sorghum Partners Inc	NK6638	40	54.8	19.0	17,400	1.90	55
Triumph Seed	TR 452	37	55.7	15.6	18,700	1.83	50
DEKALB	DKS 36-06	32	54.5	16.2	17,000	2.28	75
	Mean	52	56.7	15.0	20,100	2.01	-----
	C.V.%	15.6	2.7	7.7	9.9	7.3	-----
	L.S.D.	17.2	3.2	2.5	4,200	0.31	-----

Cooperator: Gary Graves
No-till Practices: Followed grazed volunteer wheat
Fertilizer: N: 120 lbs/ac + 5 gal/ac 10-34-0 with planter
Planting Date: April 27, 2010
Seeding rate 47,000 seeds/ac
Herbicide: 2 qt/ac Cinch ATZ Lite (Preemergence)

Soil Series: Bippus Clay Loam
Soil Test: N: 6 P: 56 K: 1,468 pH: 7.9
First hybrid headed out June 23
Harvest Date: August 30, 2010
Target Population 30,000 plants/ac

Monthly Rainfall (in.)	Apr.	May	June	July	Aug.	**Total**
2010:	2.00	2.83	4.51	4.51	2.37	**14.26**
Long term mean:	1.91	3.19	3.00	2.66	2.56	**13.32**

Notes:

First year of trial, with the trial being only early planted sorghum in the area, bird damage affected yields significantly.

Table 7. Results from Homestead grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
Sorghum Partners Inc	X 449	110	59.0	11.9	35,000	1.43
Pioneer Hi-Bred Int.	85G03	110	57.6	11.7	29,000	2.02
DEKALB	DKS 44-20	109	59.1	11.8	39,000	1.36
Johnston Seed Co.	JS-222	107	58.0	11.7	28,700	1.51
Syngenta Seeds	5613	102	57.3	11.7	31,700	1.41
Sorghum Partners Inc	NK6638	98	57.8	11.4	22,300	1.78
Triumph Seed	TR 452	93	58.6	11.6	26,500	1.51
DeKalb	DKS 37-07	92	58.5	11.8	26,400	1.68
Syngenta Seeds	H-486	91	58.1	11.7	32,700	1.23
DEKALB	DKS 36-06	91	58.8	11.8	23,800	1.67
Pioneer Hi-Bred Int.	87P06	89	56.9	11.9	27,600	2.20
NC+ Hybrids	5B90	86	58.2	11.5	27,100	1.66
Triumph Seed	TRX 84732	85	57.5	11.7	18,200	2.06
Johnston Seed Co.	JS-056	84	57.3	11.6	34,500	1.32
DEKALB	DKS 28-05	83	53.9	12.5	26,800	1.99
Sorghum Partners Inc	KS 585	80	59.1	11.6	22,100	1.62
Johnston Seed Co.	JS-207	74	56.0	11.1	29,600	1.49
	Mean	93	57.7	11.7	28,300	1.64
	C.V.%	8.6	1.7	3.8	11.3	18.5
	L.S.D.	11	1.4	NS	4,600	0.43

Cooperator: Brook Strader
Min-till tillage Practices: Grain sorghum in 2009
Fertilizer: N: 130 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 56,000 plants/ac
Planting Date: April 26, 2010
Herbicide: Cinch ATZ Lite 2.0 qts/ac (Preemergence)

Soil Series: Canadian Fine Sandy Loam
Soil Test: N: 9 P: 39 K: 409 pH: 7.0
First hybrid headed out June 20
Target Population 45,000 plants/ac
Harvest Date: August 30, 2010

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2010:	3.96	5.05	2.05	3.78	0.63	**15.47**
Long term mean:	2.50	4.20	3.20	2.70	2.80	**15.40**

Notes:

Stands were reduced due to heavy rainfall just prior to emergence.

Table 8. Results from Keyes grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
Less than 60 days to mid-bloom						
DeKalb	DKS 37-07	132	59.7	12.4	16,700	3.02
DeKalb	DKS 28-05	128	56.7	11.5	18,300	3.44
Johnston Seed Co.	JS-207	103	57.8	11.8	13,200	3.58
DeKalb	Pulsar	97	58.2	12.4	12,600	3.32
DeKalb	DKS 29-28	93	58.1	11.6	17,600	3.25
Sorghum Partners Inc	SP3303	74	58.9	11.8	8,400	3.59
	Mean	105	58.2	11.9	14,400	3.37
	C.V.%	17.2	1.0	2.9	23.0	18.7
	L.S.D.	27	0.9	0.5	5,000	NS

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant	Lodging %
60 to 69 days to mid-bloom							
Johnston Seed Co.	JS-222	128	58.5	12.9	17,900	2.42	0
DeKalb	DKS 36-06	122	59.3	12.7	15,600	2.76	0
Triumph Seed	TR 452	120	59.0	12.0	13,700	2.98	0
DeKalb	DKS 44-20	119	59.6	12.5	20,000	2.22	0
Sorghum Partners Inc	KS 585	116	59.6	12.6	13,400	3.25	0
Johnston Seed Co.	JS-524	112	58.0	12.2	12,600	3.28	0
Syngenta Seeds	5464	112	58.3	12.6	15,700	2.70	0
Pioneer Hi-Bred Int.	85G01	111	58.7	11.8	18,300	2.29	15
Sorghum Partners Inc	X449	110	59.7	12.8	16,700	2.95	5
Pioneer Hi-Bred Int.	86G32	110	57.3	12.1	14,000	3.59	0
Syngenta Seeds	5613	109	59.0	12.1	14,200	2.92	0
Syngenta Seeds	H-486	109	58.0	13.3	15,700	3.01	0
Triumph Seed	TRX 84732	105	59.0	14.1	10,800	3.56	0
Sorghum Partners Inc	NK5418	103	58.9	12.0	14,200	3.27	15
Johnston Seed Co.	JS-012	100	59.3	12.0	14,200	2.80	0
Johnston Seed Co.	JS-056	100	59.0	12.0	13,400	2.82	5
Syngenta Seeds	5556	99	58.9	12.3	13,600	2,87	5
Sorghum Partners Inc	NK4420	87	58.9	12.3	16,000	2.40	8
Syngenta Seeds	5745	82	57.1	11.5	15,000	2.75	0
Pioneer Hi-Bred Int.	87P06	80	57.5	11.4	13,000	3.47	5
	Mean	107	58.7	12.3	14,900	2.91	-----
	C.V.%	18.2	1.3	3.6	18.2	18.2	-----
	L.S.D.	28	1.1	0.6	3,800	0.78	-----

Table 8. Continued.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
70 days and greater to mid-bloom						
Sorghum Partners Inc	NK6638	131	59.1	12.9	14,700	3.06
Triumph Seed	TRX 05631	116	58.2	12.3	10,500	2.82
DeKalb	DKS 49-45	130	59.1	13.3	13,700	3.23
Sorghum Partners Inc	NK 7633	118	59.2	13.7	12,000	3.14
Pioneer Hi-Bred Int.	85Y40	133	59.6	12.6	14,700	3.31
	Mean	126	59.0	12.9	13,100	3.11
	C.V.%	10.9	0.8	2.0	20.5	11.4
	L.S.D.	21	0.7	0.4	NS	NS

Cooperator: JB Stewart
Min-till tillage Practices: Wheat in 2009
Fertilizer: N: 50 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 27,400 plants/ac
Planting Date: April 26, 2010
Herbicide: Cinch ATZ Lite 2.0 qts/ac (Preemergence)

Soil Series: Richfield Clay Loam
Soil Test: N: 9 P: 39 K: 409 pH: 7.0

Target Population 25,000 plants/ac
Harvest Date: November 5, 2010

Monthly Rainfall (in.)	May	June	July	Aug.	Sep.	**Total**
2010:	0.87	1.90	3.99	3.51	0.47	**10.74**
Long term mean:	2.76	2.92	2.85	2.55	1.97	**13.05**

Notes:

Rainfall was higher at trial location than reported at the Mesonet site near Boise City.
Lodging in plots may have been due to areas of soil compaction.
The trial was planted into marginal moisture which accounts for reduced stands.

Table 9. Results from OPREC limited irrigation grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield bu/ac		Test weight lb/bu		Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		2010	Two-year	2010	Two-year			
Less than 60 days to mid-bloom								
DeKalb	DKS 37-07	161	160	60.0	59.8	12.4	50,900	1.13
DeKalb	Pulsar	148	148	58.4	58.1	12.4	42,500	1.34
DeKalb	DKS 28-05	144	143	56.9	57.2	11.6	59,100	1.20
Johnston Seed Co.	JS-207	138	142	56.3	56.4	11.6	51,500	1.10
DeKalb	DKS 29-28	127	126	56.4	56.8	11.8	50,300	1.25
Sorghum Partners Inc	SP3303	119	-----	58.4	-----	11.9	42,000	1.27
	Mean	140	144	57.7	57.7	11.9	49,400	1.21
	C.V.%	5.3	5.4	1.3	1.6	1.3	5.2	6.1
	L.S.D.	11	8	1.1	1.0	0.2	3,800	0.11

Company Brand Name	Hybrid	Grain Yield bu/ac		Test weight lb/bu		Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
		2010	Two-year	2010	Two-year			
60 to 69 days to mid-bloom								
Sorghum Partners Inc	KS 585	145	158	60.3	59.4	12.5	40,900	1.45
DeKalb	DKS 44-20	157	156	60.8	59.6	12.4	64,100	1.11
Johnston Seed Co.	JS-222	157	156	59.5	58.9	12.4	56,100	1.01
Syngenta Seeds	5464	154	153	59.2	59.3	12.5	42,900	1.27
Syngenta Seeds	5556	141	151	58.7	58.3	12.3	48,900	1.17
Johnston Seed Co.	JS-056	139	151	58.9	58.9	12.2	55,200	1.11
Pioneer Hi-Bred Int.	86G32	138	150	58.1	58.0	12.0	45,800	1.30
DeKalb	DKS 36-06	152	148	58.1	58.3	12.8	49,400	1.14
Triumph Seed	TR 452	145	148	59.0	58.7	12.2	47,200	1.12
Syngenta Seeds	5613	137	146	58.8	58.7	12.0	51,000	1.11
Johnston Seed Co.	JS-524	133	146	57.3	56.8	12.2	45,500	1.22
Sorghum Partners Inc	NK5418	142	145	58.5	57.7	12.2	49,800	1.30
Syngenta Seeds	H-486	140	138	58.2	57.8	12.5	44,800	1.16
Johnston Seed Co.	JS-012	131	137	58.0	57.8	11.9	39,400	1.30
Pioneer Hi-Bred Int.	87P06	121	130	57.7	58.2	11.9	49,400	1.46
Triumph Seed	TRX 84732	155	-----	58.8	-----	13.0	39,400	1.48
Sorghum Partners Inc	X449	151	-----	60.5	-----	12.9	52,300	1.17
Pioneer Hi-Bred Int.	85G01	142	-----	59.5	-----	11.8	54,200	1.08
Sorghum Partners Inc	NK4420	139	-----	58.3	-----	12.6	55,300	1.19
Syngenta Seeds	5745	138	-----	57.2	-----	12.2	48,400	1.22
	Mean	143	148	58.7	58.4	12.3	49,000	1.22
	C.V.%	5.8	6.9	1.2	2.2	1.9	9.5	11.40
	L.S.D.	12	10	1.0	1.3	0.3	6,600	0.20

Table 9. Continued.

Company Brand Name	Hybrid	Grain Yield 2010	Grain Yield Two-year	Grain Yield Three-year	Test weight 2010	Test weight Two-year	Test weight Three-year	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
70 days and greater to mid-bloom										
DEKALB	DKS 53-67	147	150	141	58.4	59.2	58.3	13.8	42,300	1.31
DEKALB	DKS 54-03	152	150	140	57.4	57.3	56.9	12.6	50,200	1.01
DEKALB	DKS 54-00	145	144	133	56.3	57.5	56.9	13.3	43,900	1.09
Sorghum Partners Inc	NK6638	136	137	128	57.8	58.2	57.9	12.2	49,400	1.13
Pioneer Hi-Bred Int.	84G62	159	156	-----	58.5	58.7	-----	12.6	46,700	1.16
Pioneer Hi-Bred Int.	84P74	133	138	-----	58.4	58.1	-----	13.5	46,100	1.01
DeKalb	DKS 49-45	150	-----	-----	57.7	-----	-----	12.4	50,500	1.05
Pioneer Hi-Bred Int.	85Y40	147	-----	-----	59.1	-----	-----	12.5	47,500	1.10
Sorghum Partners Inc	NK 7633	145	-----	-----	57.6	-----	-----	12.8	43,700	1.24
Triumph Seed	TRX 05631	132	-----	-----	55.2	-----	-----	12.7	38,200	1.08
	Mean	145	146	135	57.6	58.2	57.5	12.8	45800	1.1
	C.V.%	6.9	6.5	7.2	1.7	2.4	2.7	3.6	12.9	10.4
	L.S.D.	14	10	8	1.5	NS	1.3	0.7	NS	0.17

Cooperator: OPREC
Strip-till following wheat and double crop sunflower in 2009
Herbicide: Cinch ATZ Lite 2 qts/ac (Preemergence)
Seeding rate 64,500 plants/ac
Planting Date: June 7, 2010

Soil Series: Richfield Clay Loam
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: November 2, 2010

Monthly Rainfall (in.)	May	June	July	Aug.	Sep.	**Total**
2010:	2.64	3.16	1.22	5.42	0.20	**12.64**
Long term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**

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

Jun.	Jul.	Aug.	Sept.	Oct
1.3	1.3	1.3	2.6	1.3

Notes:

Rainfall was received in very timely manner when irrigation was not scheduled. There was a 68 bu/ac yield difference between hybrids entered in both dry-land and irrigated which equals 8.7 bushels per inch of irrigation.

Table 10. Results from OPREC dry-land grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield bu/ac 2010	Grain Yield bu/ac Two-year	Test weight lb/bu 2010	Test weight lb/bu Two-year	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
Less than 60 days to mid-bloom								
DeKalb	DKS 37-07	86	89	55.9	57.1	12.9	26,700	1.40
DeKalb	DKS 28-05	71	80	56.4	56.9	11.4	24,100	1.61
DeKalb	DKS 29-28	73	76	56.3	56.4	12.2	26,700	1.49
DeKalb	Pulsar	72	75	56.2	56.4	12.3	21,400	1.74
Johnston Seed Co.	JS-207	74	71	54.9	55.9	11.8	22,400	1.77
Sorghum Partners Inc	SP3303	56	-----	55.6	-----	11.5	23,200	1.39
	Mean	72	78	55.8	56.5	12.0	24,100	1.57
	C.V.%	14.3	12.5	2.2	3.4	3.3	4.9	9.9
	L.S.D.	16	10	NS	NS	0.6	1,800	0.23

Company Brand Name	Hybrid	Grain Yield bu/ac 2010	Grain Yield bu/ac Two-year	Test weight lb/bu 2010	Test weight lb/bu Two-year	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
60 to 69 days to mid-bloom								
DeKalb	DKS 44-20	96	89	57.8	58.0	12.7	23,400	1.73
DeKalb	DKS 36-06	78	81	57.3	56.8	12.0	22,700	1.58
Pioneer Hi-Bred Int.	87P06	73	78	56.4	56.6	12.0	23,000	1.28
Johnston Seed Co.	JS-524	75	76	56.7	56.3	12.5	27,200	1.07
Sorghum Partners Inc	NK5418	64	76	58.1	57.7	11.2	20,000	1.51
Pioneer Hi-Bred Int.	86G32	70	75	57.0	57.1	12.2	18,700	1.71
Sorghum Partners Inc	KS 585	72	75	57.8	57.9	12.5	23,000	1.44
Syngenta Seeds	5613	66	72	56.6	57.5	12.1	23,600	1.42
Syngenta Seeds	5556	68	72	57.1	57.4	11.9	20,100	1.62
Johnston Seed Co.	JS-056	67	72	58.4	57.8	11.9	16,400	1.88
Syngenta Seeds	H-486	78	71	56.8	54.9	13.0	27,400	1.21
Johnston Seed Co.	JS 222	67	71	57.1	56.9	12.2	21,000	1.49
Syngenta Seeds	5464	67	70	56.7	56.5	12.0	23,400	1.40
Johnston Seed Co.	JS-012	65	66	56.0	56.3	11.7	22,600	1.62
Sorghum Partners Inc	NK4420	80	-----	58.2	-----	12.0	22,000	1.69
Sorghum Partners Inc	X449	76	-----	56.8	-----	11.7	24,700	1.37
Triumph Seed	TRX 84732	69	-----	57.0	-----	12.4	20,500	1.81
Pioneer Hi-Bred Int.	85G01	67	-----	56.9	-----	11.7	19,000	1.65
Syngenta Seeds	5745	66	-----	56.6	-----	12.0	23,100	1.40
Triumph Seed	TR 452	60	-----	56.7	-----	12.4	24,000	1.32
	Mean	71	74	57.1	57.0	12.1	22,300	1.51
	C.V.%	15.3	13.2	2.3	2.8	8.3	12.1	17.40
	L.S.D.	15	9.7	NS	1.6	NS	3,800	0.37

Table 10. Continued.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
70 days and greater to mid-bloom						
Pioneer Hi-Bred Int.	85Y40	89	58.2	11.7	19,500	1.54
DeKalb	DKS 49-45	88	57.1	11.3	16,500	1.86
Triumph Seed	TRX 05631	83	58.5	11.6	20,000	1.59
Sorghum Partners Inc	NK 7633	82	56.3	11.3	18,700	1.62
Sorghum Partners Inc	NK6638	76	56.5	11.9	17,800	1.86
	Mean	84	57.3	11.5	18,500	1.69
	C.V.%	10.8	3.5	3.2	13.6	19.9
	L.S.D.	NS	NS	NS	NS	NS

Cooperator: 0PREC
No-till tillage Practices: Wheat in 2009
Fertilizer: N: 50 lbs N + 5 gal/ac 10-34-0 with planter
Seeding rate 27,400 plants/ac
Planting Date: June 2, 2010
Herbicide: Cinch ATZ Lite 2.0 qts/ac (Preemergence)

Soil Series: Richfield Clay Loam
Soil Test: N: 67 P: 14 K: 1277 pH: 7.6

Target Population 25,000 plants/ac
Harvest Date: October 29, 2010

Monthly Rainfall (in.)	May	June	July	Aug.	Sep.	**Total**
2010:	2.64	3.16	1.22	5.42	0.20	**12.64**
Long term mean:	3.25	2.86	2.58	2.28	1.77	**12.74**

Notes:

Due to planter error the early hybrids were replanted 2 weeks after the date above.

Table 11. Results from Tipton grain sorghum performance trial, 2010.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
Less than 60 days to mid-bloom						
DeKalb	Pulsar	91	57.8	12.5	39,900	1.89
DeKalb	DKS 37-07	89	59.1	12.5	49,700	1.36
DeKalb	DKS 28-05	80	55.1	11.7	46,300	1.76
Johnston Seed Co.	JS-207	74	54.4	11.8	42,000	1.86
DeKalb	DKS 29-28	69	55.1	11.5	45,300	1.58
	Mean	81	56.3	12.0	44,600	1.69
	C.V.%	6.7	1.2	3.2	8.2	11.1
	L.S.D.	10	0.7	NS	NS	NS

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
60 to 69 days to mid-bloom						
DeKalb	DKS 44-20	110	59.1	13.3	55,000	1.34
Syngenta Seeds	5613	110	57.2	13.2	45,300	1.41
Pioneer Hi-Bred Int.	86G32	109	57.1	12.4	43,600	1.57
Johnston Seed Co.	JS-222	106	57.9	12.7	45,200	1.39
Syngenta Seeds	5464	104	57.5	13.0	35,400	1.63
Triumph Seed	TRX 84732	99	56.4	12.3	36,900	1.62
Syngenta Seeds	5556	94	58.1	13.1	47,300	1.35
Syngenta Seeds	5745	92	57.9	13.0	42,400	1.52
Channel Bio LLC	5B90	91	58.0	12.1	50,100	1.47
Johnston Seed Co.	JS-012	91	57.5	11.8	36,400	1.70
Pioneer Hi-Bred Int.	87P06	91	58.5	12.5	50,100	1.50
Pioneer Hi-Bred Int.	85G01	90	56.6	12.3	46,500	1.37
Sorghum Partners Inc	X449	90	58.9	13.2	43,700	1.62
Channel Bio LLC	7B11	88	58.6	12.7	43,600	1.41
Johnston Seed Co.	JS-056	87	56.7	12.6	42,800	1.62
Sorghum Partners Inc	KS 585	85	59.4	12.2	42,000	1.61
DeKalb	DKS 36-06	84	59.2	13.2	44,000	1.42
Syngenta Seeds	H-486	83	57.8	12.5	46,500	1.18
Triumph Seed	TR 452	80	57.3	12.3	43,200	1.41
Sorghum Partners Inc	NK5418	80	55.8	12.1	45,400	1.69
Johnston Seed Co.	JS-524	65	56.7	12.0	38,000	1.49
	Mean	92	57.7	12.6	44,000	1.49
	C.V.%	15.2	1.7	3.8	11.6	11.6
	L.S.D.	23	1.6	0.8	8,400	NS

Table 11. Continued.

Company Brand Name	Hybrid	Grain Yield Bu/ac 2010	Test weight Lb/bu 2010	Harvest Moisture	Plant Population plants/ac	Head Population heads/plant
70 days and greater to mid-bloom						
Pioneer Hi-Bred Int.	85Y40	110	57.3	12.4	48,800	1.42
DeKalb	DKS 49-45	105	58.6	12.0	54,300	1.26
Sorghum Partners Inc	NK6638	103	57.0	12.1	52,000	1.33
Sorghum Partners Inc	NK 7633	96	57.7	12.5	39,100	1.62
Triumph Seed	TRX 05631	80	56.4	12.2	40,500	1.25
	Mean	99	57.4	12.3	46,900	1.38
	C.V.%	18.6	1.1	1.6	9.5	7.3
	L.S.D.	NS	1.2	NS	8,400	0.19

Cooperator: Southwest Research and Extension Center
Conventional Tillage Practices: Sorghum-fallow-sorghum rotation
Fertilizer: N: 80 lbs/ac P: 20 lbs P_2O_5 K: 0
Seeding rate: 56,000 seeds/ac
Planting Date: April 26, 2010
Herbicide: 2 qt/ac Cinch ATZ Lite Preemergence

Soil Series: Tipton Silt Loam
Soil Test: N: 111 P: 84 K: 634 pH: 6.6
First hybrid headed out June 14
Target population 45,000 plants/ac
Harvest Date: August 20, 2010

Monthly Rainfall (in.)

	Apr.	May	June	July	Aug.	**Total**
2010:	2.79	1.34	2.07	9.93	1.10	**17.23**
Long term mean:	2.30	4.30	3.45	2.08	2.71	**14.84**

Notes:

The 9.93 inches of rainfall in July (57 %) was received after all hybrids were headed out.

2010 Soybean Variety Performance Tests

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Oklahoma State University
Department of Plant and Soil Sciences

Production Technology Report
PT 2011-1

2010 Soybean

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CONTENTS

Information on Soybean Variety Trials

Numerous soybean lines and varieties were evaluated in performance tests during 2010. Commercially available varieties, both public and private, and advanced experimental lines were included within the tests. Tests were designed to provide information to assist producers in identifying superior varieties and make crop management decisions. Tests include both early-season and full-season environments. Early-season tests were planted during April and contained maturity group (MG) III and IV. Full-season test were planted during June and into the beginning of July and included varieties in MG IV, V, and VI.

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

2010 Soybean Crop Overview

The 2010 Oklahoma soybean growing season started off excellent but heat and lack of soil moisture in late July and early August decreased yield in a lot of locations throughout the state. In most cases double crop soybeans planted in late June have turned out the best due to reproduction stages occurring after mid-August. In a lot of cases, we observed some significant shattering due to weather and perhaps weak pods from environmental stresses during grain fill.

Planted acreage of this year's soybean crop was estimated at 500,000 acres. Average yield at the time of this report was estimated at 23 bushels per acre.

Pest problems

Plant disease was minimal during the 2010 growing season; Asian soybean rust was not detected in Oklahoma. We did observe several different insect problems during 2010. Early in the growing season we had relatively heavy infestations of garden webworm that had to be controlled. Later in the season fall armyworm and corn earworm were problems in some areas. Grasshoppers were also a problem in some areas. Blister beetles were observed in some fields and treated for but overall pest problems were minor, especially in later planted soybean fields.

Methods

Full-season test locations were near Webbers Falls, Pauls Valley, Newkirk, Fort Cobb, Cherokee, Lahoma, Miami, Vinita, and Stillwater. All test plots were planted using four 30-inch rows that were 25 feet long. Plots were seeded at a rate of eight seeds per row foot (139,392 seeds per acre). At planting, *Bradyrhizobium japonicum* in a liquid formulation was applied with the seed. Tests were conducted using randomized complete block design with four replications. All locations were conventionally tilled prior to seeding with the exception of Cherokee, Miami, and Stillwater. Irrigation was used only at the Fort Cobb location. Two rows the entire length of the plot was harvested with a small plot combine to determine grain yield.

Interpreting Data

Performance of soybean varieties is affected by many factors, including year, location, soil type, and time of planting. Details of establishment and management of each test are listed in footnotes below the tables.

Small differences in yield are usually of little importance. The reason being that two varieties at a single location can differ because of "chance" factors which may include soil fertility, soil type, depth of top soil, etc. To decide if a yield difference is "real", use the Least significant differences (LSD) at the bottom of all tables. Differences between varieties are significant only if they are equal to or greater than the LSD value. If a given variety out yields another variety by as much or more than the LSD value, then we are 95% sure that the yield difference is real, with only a 5% probability that the difference is due to chance alone. For example, if variety X is 5 bushels/acre higher in yield than variety Y, then this difference is statistically significant if the LSD is 5 or less. If the LSD is 5 or greater, then we are less confident that variety X really is higher yielding than variety Y under the conditions of the test.

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

Additional information on the Web

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

www.soybean.okstate.edu/

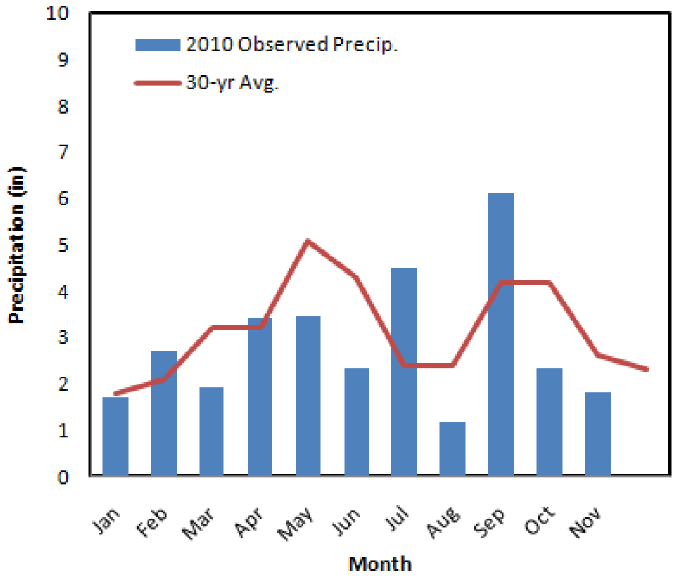
An individual is encouraged to review 2 to 3 years of variety test results before making a variety selection. Because soybean varieties change often multiple years of data are not compared in this publication but previous years data can be found at the previously mention website.

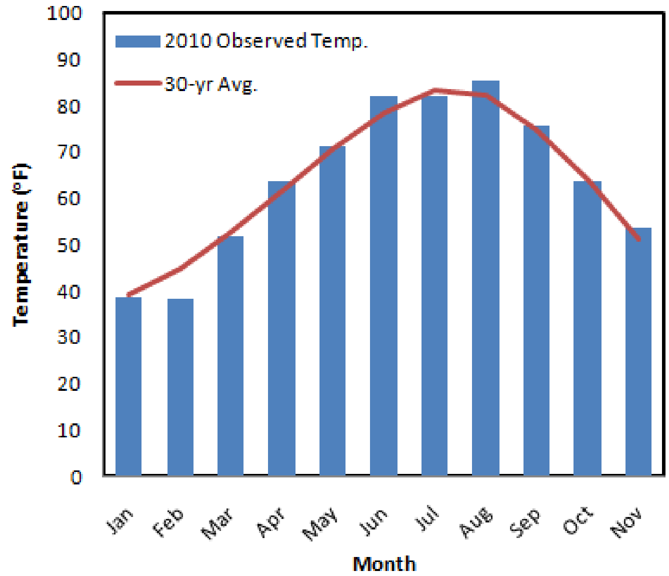
Table 1. Sources of seed for the 2010 Oklahoma Soybean Variety Trials.

Name/Address	Contact	Entries	Maturity Group	Type	Soybean Cyst Nematode Reistance	Root Knot Nematode Resistance
Cache River Valley Seed, LLC		Morsoy RTS 4824	4.8	RR, STS		
PO Box						
10	870-477-5427	Morsoy RTS 4955N	4.9	RR, STS	3, 14	
Cash, AR 72421		Morsoy RT 5388N	5.3	RR	3, 14	
		Morsoy RT 5429	5.4	RR	3	I
		Morsoy R2S 480	4.8	RR, STS		
		Morsoy R2 490	4.9	RR2		
		Morsoy R2 520	5.2	RR2	3, 14	
		Morsoy R2 540	5.3	RR2		
Croplan Genetics	405-747-4415	RC5007S	5.0	RR	3	R
		RC4998	4.9	RR	3, 14	R
Hornbeck Seed, Co.	870-946-2087	HBK R4729	4.7	RR	3	I
PO Box 472		HBK R4924	4.9	RR	3, 14	I
De Witt, AR 72042		HBK RY5220	5.2	RR2	3	
		HBK RY4920	4.9	RR2		
		HBK R5529	5.5	RR	3	
		HBK R5525	5.5	RR	3, 14	I
		HBK R5425	5.4	RR	3	
		HBK C5025	5.0	CONV		
		HBK C5528	5.5	CONV	3	I
		HALO 4:94	4.9	Liberty Link	3	
		HALO 5:25	5.2	Liberty Link	3	
University of Arkansas	479-575-2230	UA4805	4.8	CONV		
115 Plant Science Bldg		UA4910	4.9	CONV		
Fayetville, AR 72701		Ozark	5.2	CONV		
		Osage	5.6	CONV		
Progeny Ag Products	870-238-2079	4807 RR	4.8	RR	3	
1529 Hwy 193		4906 RR	4.9	RR		
Wynne, AR 72396		4908 RR	4.9	RR		
		4949 RR	4.9	RR		
		5115 RR	5.1	RR	3	I
		5218 RR	5.2	RR	3	I
		5330 RR	5.3	RR	2	I
		5622 RR	5.6	RR	2, 3, 6, 9, 14	
		5650 RR	5.6	RR	3, 14	
		5706 RR	5.7	RR	3, 14	
Syngenta Seeds	254-424-8570	S46-U6	4.6	RR	3, 14	
		S49-A5	4.9	RR	3	
		S51-T8	5.1	RR	3, 14	A
Terral Seed, Inc.	318-559-2840	REV 44R22	4.4	RR		
PO Box 826		REV 45R10	4.5	RR	3	A
Lake Providence, LA						
71254		REV 47R22	4.7	RR		
		REV 48R10	4.8	RR	3	A
		REV 48R21	4.8	RR		
		REV 48R22	4.8	RR		
		REV 49R10	4.9	RR	9	A
		REV 49R11	4.9	RR	3	A
		REV 49R22	4.9	RR		

REV 54R10	5.4	RR	3	A
REV 56R21	5.6	RR		A
REV 57R21	5.7	RR		

Ardmore





Location Summary:

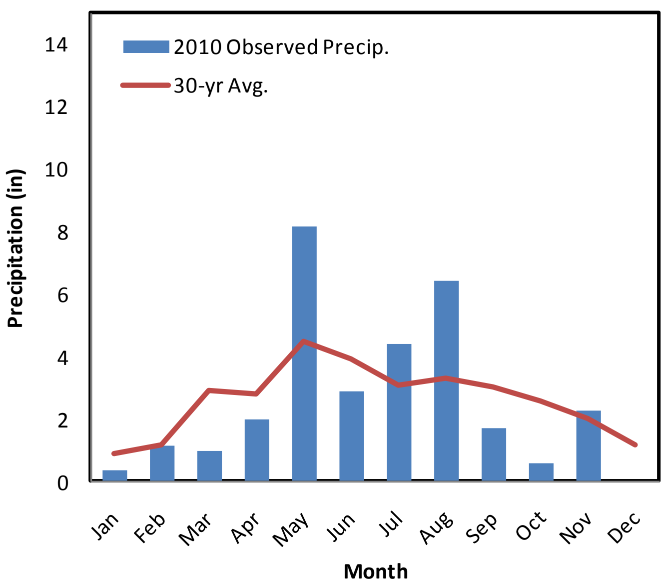
The Ardmore location was a full-season test. The average yield was 25 bu/ac, which is good considering the extremely dry June and August that was experienced. In addition, the above normal temperatures in August probably reduced yield potential as this time period overlapped with blooming and early pod-fill.

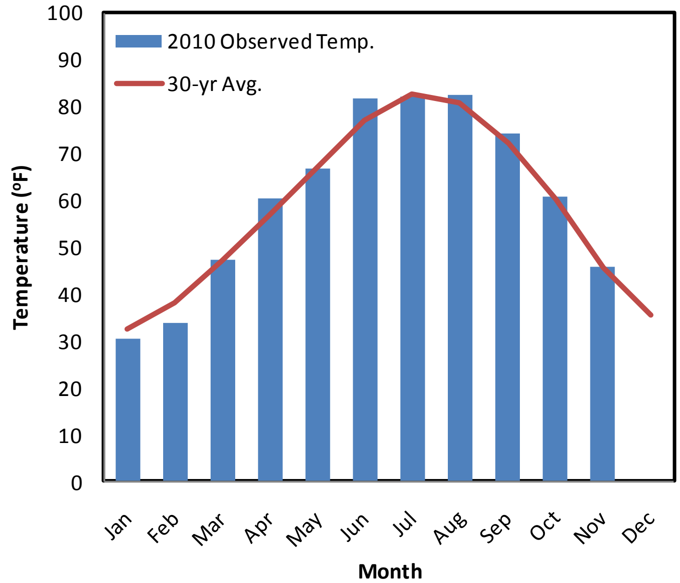
Table 3. Full-season glyphosate resistant soybean production variety trail Ardmore, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
Morsoy Xtra 49X10	Cache River Valley Seed	4.9	na	na	na	na	39	156
HBK RY5220	Hornbeck Seed Co.	5.2					36	144
REV 57R21	Terral Seed, Inc.	5.7					33	132
HBK R5425	Hornbeck Seed Co.	5.4					32	128
HBK RY4920	Hornbeck Seed Co.	4.9					31	124
RC4998	Croplan Genetics	4.9					30	120
HBK R5525	Hornbeck Seed Co.	5.5					30	120
RC 5007S	Croplan Genetics	5.0					29	116
4949 RR	Progeny Ag Products	4.9					29	116
HBK R4729	Hornbeck Seed Co.	4.7					29	116
REV 56R21	Terral Seed, Inc.	5.6					28	112
Morsoy Xtra 52X10	Cache River Valley Seed	5.2					28	112
REV 48R21	Terral Seed, Inc.	4.8					27	108
REV 54R10	Terral Seed, Inc.	5.4					27	108
MORSOY RT 5388N	Cache River Valley Seed	5.3					27	108
4906 RR	Progeny Ag Products	4.9					27	108
5218 RR	Progeny Ag Products	5.2					27	108
REV 48R10	Terral Seed, Inc.	4.8					26	104
Morsoy Xtra 54X10	Cache River Valley Seed	5.4					26	104
5622 RR	Progeny Ag Products	5.6					26	104
HBK R4924	Hornbeck Seed Co.	4.9					26	104
REV 44R22	Terral Seed, Inc.	4.4					25	100
MORSOY RTS 4955N	Cache River Valley Seed	4.9					25	100
HBK R5529	Hornbeck Seed Co.	5.5					25	100
REV 49R10	Terral Seed, Inc.	4.9					24	96
S46-U6 Brand	Syngenta Seeds	4.6					24	96
MORSOY RT 5429	Cache River Valley Seed	5.4					24	96
4908 RR	Progeny Ag Products	4.9					24	96
4807 RR	Progeny Ag Products	4.8					23	92
5115 RR	Progeny Ag Products	5.1					22	88
REV 47R22	Terral Seed, Inc.	4.7					21	84
5330 RR	Progeny Ag Products	5.3					21	84
S49-A5 Brand	Syngenta Seeds	4.9					20	80
Morsoy Xtra 47X10	Cache River Valley Seed	4.7					20	80
S51-T8 Brand	Syngenta Seeds	5.1					19	76
MORSOY RTS 4824	Cache River Valley Seed	4.8					19	76
5706 RR	Progeny Ag Products	5.7					19	76
5650 RR	Progeny Ag Products	5.6					18	72
REV 45R10	Terral Seed, Inc.	4.5					17	68
REV 49R22	Terral Seed, Inc.	4.9					16	64
REV 49R11	Terral Seed, Inc.	4.9					15	60
REV 48R22	Terral Seed, Inc.	4.8					14	56
LSD (P=0.05)							14	

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

Cherokee





Location Summary:
Growing conditions at the Cherokee location were excellent early in the growing season, however, in September during pod fill the location experienced drier than normal conditions which resulted in a yield loss. In addition, temperatures in August were above normal for a 2 week period that probably lowered yield potential. This was a full-season crop following a cover crop mix that was terminated in early spring. Shattering at this location was relatively severe, most likely a result of the environmental conditions during pod fill.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Cherokee, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	5.8	Planting Date	6/3/2010[1]
Soil Test P Index	110	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	500	Seeding Depth (in)	1
		Irrigation	none
Previous Crop	Winter cover crop	Harvest Date	10/28[2]
		Soil Moisture at Planting	good

[1]Planting dates for the full season test.

[2]Harvest dates for full season test.

Table 3. Full-season glyphosate resistant soybean production variety trail Cherokee, OK 2010.

Variety	Company	Maturity Group	Height	Shattering [1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				- bu/acre -	- - % - -
HBK RY5220	Hornbeck Seed Co.	5.2	31	1	0	3150	25	135
MORSOY RT 5388N	Cache River Valley Seed	5.3	40	0	0	3700	25	131
MORSOY RTS4955N	Cache River Valley Seed	4.9	38	0	0	2800	25	131
REV 56R21	Terral Seed, Inc.	5.6	36	1	0	3150	24	129
MORSOY RT 5429	Cache River Valley Seed	5.4	33	0	0	3350	24	128
5218 RR	Progeny Ag Products	5.2	28	0	0	2900	23	124
HBK R5425	Hornbeck Seed Co.	5.4	34	0	0	2750	23	121
MORSOY Xtra 49X10	Cache River Valley Seed	4.9	34	0	0	3200	23	121
RC 5007S	Croplan Genetics	5.0	34	0	0	3400	23	120
S46-U6 Brand	Syngenta Seeds	4.6	39	0	0	3000	22	119
REV 48R21	Terral Seed, Inc.	4.8	32	2	0	3200	22	118
MORSOY Xtra 52X10	Cache River Valley Seed	5.2	30	1	0	3600	22	118
4807 RR	Progeny Ag Products	4.8	33	2	0	2950	22	118
MORSOY Xtra 47X10	Cache River Valley Seed	4.7	32	0	0	2600	22	116
5622 RR	Progeny Ag Products	5.6	34	0	0	3150	22	116
HBK R4924	Hornbeck Seed Co.	4.9	33	1	0	3050	21	110
HBK R5525	Hornbeck Seed Co.	5.5	33	0	0	2700	20	107
S49-A5 Brand	Syngenta Seeds	4.9	39	1	0	2850	20	105
MORSOY Xtra 54X10	Cache River Valley Seed	5.4	35	1	0	3100	19	100
5706 RR	Progeny Ag Products	5.7	35	0	0	3150	19	99
HBK RY4920	Hornbeck Seed Co.	4.9	31	2	0	3600	19	99
S51-T8 Brand	Syngenta Seeds	5.1	38	1	0	2600	19	98
MORSOY RTS 4824	Cache River Valley Seed	4.8	37	1	0	2650	18	98
REV 44R22	Terral Seed, Inc.	4.4	34	3	0	3000	18	97
4949 RR	Progeny Ag Products	4.9	31	2	0	2750	18	97
5650 RR	Progeny Ag Products	5.6	33	0	0	3650	18	96
HBK R5529	Hornbeck Seed Co.	5.5	28	0	0	3150	18	96
REV 54R10	Terral Seed, Inc.	5.4	30	2	0	3300	18	94
REV 57R21	Terral Seed, Inc.	5.7	32	0	0	3050	18	94
5330 RR	Progeny Ag Products	5.3	32	1	0	3200	17	91
4908 RR	Progeny Ag Products	4.9	29	2	0	3250	17	91
REV 49R10	Terral Seed, Inc.	4.9	26	2	0	3000	16	86
REV 49R22	Terral Seed, Inc.	4.9	27	2	0	2750	15	82
5115 RR	Progeny Ag Products	5.1	29	1	0	2950	15	81
HBK R4729	Hornbeck Seed Co.	4.7	26	2	0	3050	15	81
REV 47R22	Terral Seed, Inc.	4.7	40	2	0	3100	15	78
RC 4998	Croplan Genetics	4.9	34	0	0	2850	14	74
4906 RR	Progeny Ag Products	4.9	26	2	0	3050	13	67
REV 45R10	Terral Seed, Inc.	4.5	31	2	0	3050	12	63
REV 48R22	Terral Seed, Inc.	4.8	26	1	0	2900	11	58
REV 48R10	Terral Seed, Inc.	4.8	36	2	0	3000	11	57
REV 49R11	Terral Seed, Inc.	4.9	32	0	0	2550	10	53
LSD (P=0.05)							8	

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

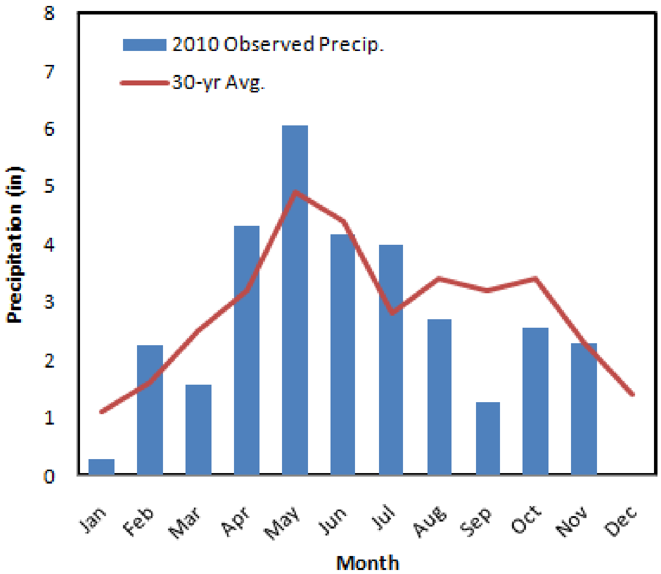
Table 4. Full-season conventional and Liberty Link soybean production variety trail Cherokee, OK 2010.

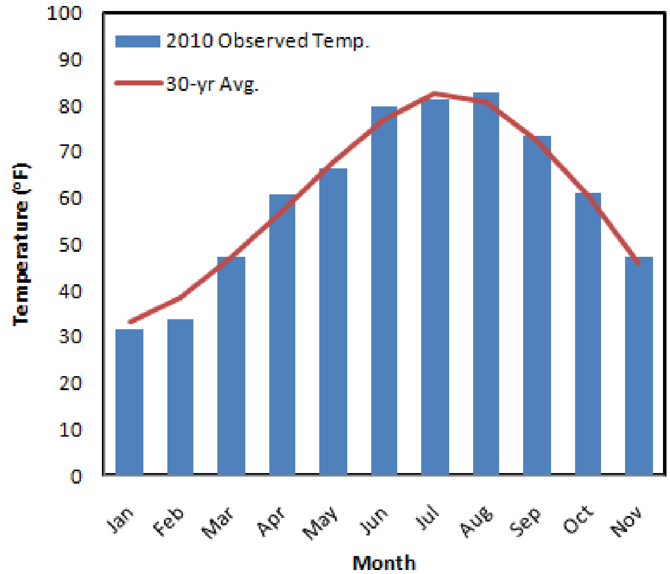
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				- bu/acre -	- - % - -
HALO 4:94[2]	Hornbeck Seed Co.	4.9	31	1	0	2800	29	129
Osage	University of Arkansas	5.6	27	1	0	3600	29	128
HBK C 5025	Hornbeck Seed Co.	5.0	33	0	0	2850	28	123
UA 4805	University of Arkansas	4.8	27	1	0	3450	27	121
Glenn		5	42	0	0	2850	23	105
Hutcheson		5.5	30	0	0	3100	22	99
HALO 5:25[2]	Hornbeck Seed Co.	5.5	24	0	0	3050	22	100
HBK C5528	Hornbeck Seed Co.	5.5	39	2	0	2950	22	97
Jake		5	24	1	0	3650	20	89
Ozark	University of Arkansas	5.2	21	1	0	3700	19	87
Stoddard		5	27	1	0	3600	19	87
Avg. of 3 RR Varieties		4.8-5.5		1		3117	19	87
UA 4910	University of Arkansas	4.9	27	2	0	2950	17	76
LSD (P=0.05)							7	

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

[2]Liberty Link soybean variety

Enid





Location Summary:

The Enid location was a double-crop test planted on June 24th. Plots were direct seeded into a long-term no-till filed. The average yield was 15 bu/acre when averaged across all varieties. The yield potential of this test was hurt by the below normal precipitation in August and September.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Enid, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	na[1]	Planting Date	June 24, 2010
Soil Test P Index	na	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	na	Seeding Depth (in)	1.5
		Irrigation	none
Previous crop	Wheat	Harvest Dates	8-Nov
		Soil Moisture at Planting	good

[1]Not available.

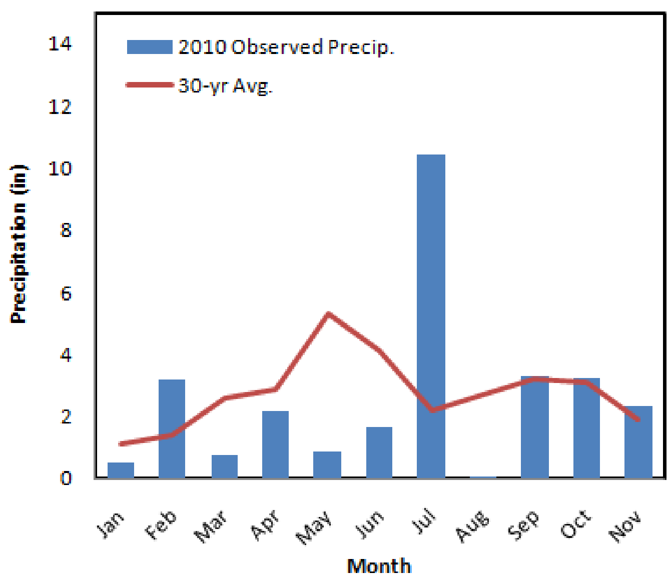
Table 3. Full-season conventional and Liberty Link soybean production variety trail Enid, OK 2010.

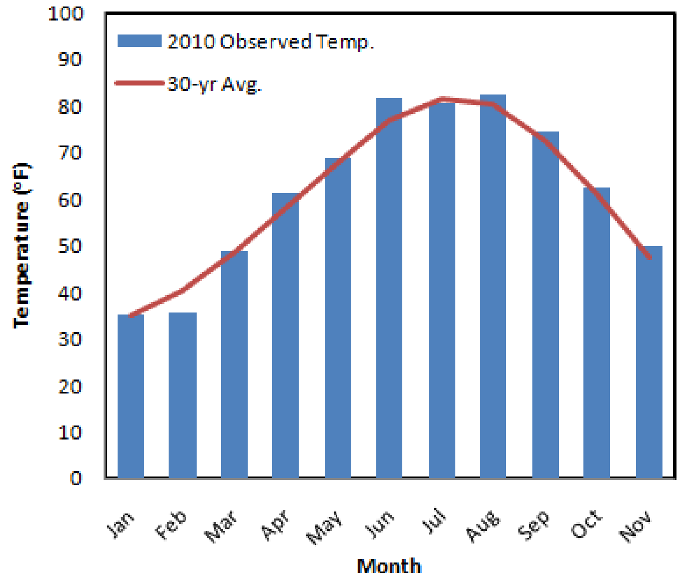
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				- bu/acre -	- - % - -
Ozark	University of Arkansas	5.2	18	0	0	3500	19	128
Glenn		5	16	0	0	3850	18	126
Osage	University of Arkansas	5.6	19	0	0	3800	18	124
Hutcheson		5.5	15	0	0	3400	17	118
HBK C 5025	Hornbeck Seed Co.	5.0	18	0	0	3250	17	117
Jake		5	19	0	0	3450	15	103
HALO 5:25[2]	Hornbeck Seed Co.	5.2	17	0	0	3450	15	100
HALO 4:94[2]	Hornbeck Seed Co.	4.9	13	1	0	3350	14	93
Stoddard		5	19	1	0	3500	14	92
Avg. of 3 RR Varieties		4.8-5.5	19	1	0	3600	13	85
UA 4910	University of Arkansas	4.9	19	0	0	3200	12	84
UA 4805	University of Arkansas	4.8	15	0	0	3800	12	81
HBK C5528	Hornbeck Seed Co.	5.5	18	0	0	3300	11	78
LSD (P=0.05)							4	

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

[2]Liberty Link soybean variety

Fort Cobb





Location Summary:

The Fort Cobb location was a full-season irrigated test planted on May 20th. The average yield was 38 and 48 bu/acre when averaged across all glyphosate resistant varieties and conventional varieties, respectively. Yield was reduced just prior to harvest due to a hailstorm that caused shattering.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Fort Cobb, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	7	Planting Date	May 20, 2010
Soil Test P Index	35	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	223	Seeding Depth (in)	1
		Harvest Dates	20-Oct
Previous Crop	Peanut	Irrigation	as needed

Table 3. Full-season glyphosate resistant soybean production variety trail Fort Cobb, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
5650 RR	Progeny Ag Products	5.6	41	1	1	2950	54	142
HBK R5529	Hornbeck Seed Co.	5.5	39	2	1	3050	51	133
5622 RR	Progeny Ag Products	5.6	43	2	1	2700	49	127
5218 RR	Progeny Ag Products	5.2	46	2	1	2400	48	126
4949 RR	Progeny Ag Products	4.9	43	2	1	2300	47	122
5706 RR	Progeny Ag Products	5.7	40	1	1	2600	46	120
4906 RR	Progeny Ag Products	4.9	44	2	1	2550	45	118
Morsoy Xtra 47X10	Cache River Valley Seed	4.7	36	2	0	2600	45	116
Morsoy Xtra 52X10	Cache River Valley Seed	5.2	33	1	0	2900	45	116
REV 56R21	Terral Seed, Inc.	5.6	38	2	1	2900	43	112
REV 54R10	Terral Seed, Inc.	5.4	34	2	0	2850	42	109
5330 RR	Progeny Ag Products	5.3	34	1	0	2550	41	106
Morsoy Xtra 54X10	Cache River Valley Seed	5.4	33	2	0	2750	41	105
RC 5007S	Croplan Genetics	5.0	45	1	0	2800	40	105
HBK R5425	Hornbeck Seed Co.	5.4	37	1	0	2550	39	102
4807 RR	Progeny Ag Products	4.8	43	1	1	2700	39	101
REV 48R21	Terral Seed, Inc.	4.8	42	2	0	2700	39	101
4908 RR	Progeny Ag Products	4.9	45	1	1	3000	38	100
REV 47R22	Terral Seed, Inc.	4.7	0	0	0	2800	38	99
REV 48R22	Terral Seed, Inc.	4.8	37	3	0	2750	38	99
REV 57R21	Terral Seed, Inc.	5.7	38	2	1	2900	38	98
Morsoy Xtra 49X10	Cache River Valley Seed	4.9	35	2	0	3150	37	97
MORSOY RTS 4824	Cache River Valley Seed	4.8	46	2	1	2750	37	96
RC4998	Croplan Genetics	4.9	35	1	0	2700	37	96
S51-T8 Brand	Syngenta Seeds	5.1	43	1	0	2350	37	95
REV 44R22	Terral Seed, Inc.	4.4	35	2	0	2450	36	93
S46-U6 Brand	Syngenta Seeds	4.6	38	2	0	2850	36	93
MORSOY RT 5388N	Cache River Valley Seed	5.3	35	1	0	3250	36	93
HBK RY4920	Hornbeck Seed Co.	4.9	38	2	0	3200	36	93
HBK R4729	Hornbeck Seed Co.	4.7	40	1	2	2700	35	91
REV 49R22	Terral Seed, Inc.	4.9	44	2	2	2800	35	90
REV 49R10	Terral Seed, Inc.	4.9	36	1	0	2700	34	89
5115 RR	Progeny Ag Products	5.1	44	2	2	2600	34	89
MORSOY RT 5429	Cache River Valley Seed	5.4	42	1	2	2950	34	89
HBK R5525	Hornbeck Seed Co.	5.5	34	2	0	2400	34	87
HBK R4924	Hornbeck Seed Co.	4.9	38	2	1	2950	33	85
S49-A5 Brand	Syngenta Seeds	4.9	38	1	1	3250	31	82
REV 49R11	Terral Seed, Inc.	4.9	35	2	1	2800	30	79
HBK RY5220	Hornbeck Seed Co.	5.2	45	2	1	2650	30	78
MORSOY RTS 4955N	Cache River Valley Seed	4.9	44	1	1	2650	30	77
REV 48R10	Terral Seed, Inc.	4.8	39	3	1	2750	29	75
REV 45R10	Terral Seed, Inc.	4.5	40	2	0	2650	28	73
LSD (P=0.05)							7	

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

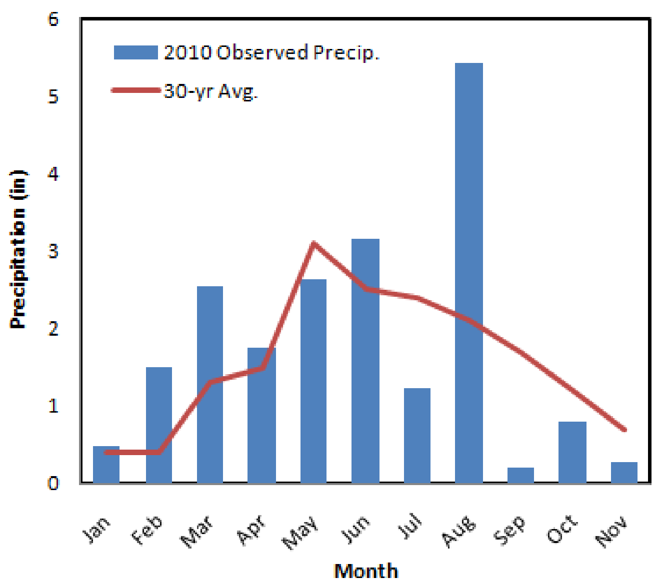
Table 4. Full-season conventional and Liberty Link soybean production variety trail Fort Cobb, OK 2010.

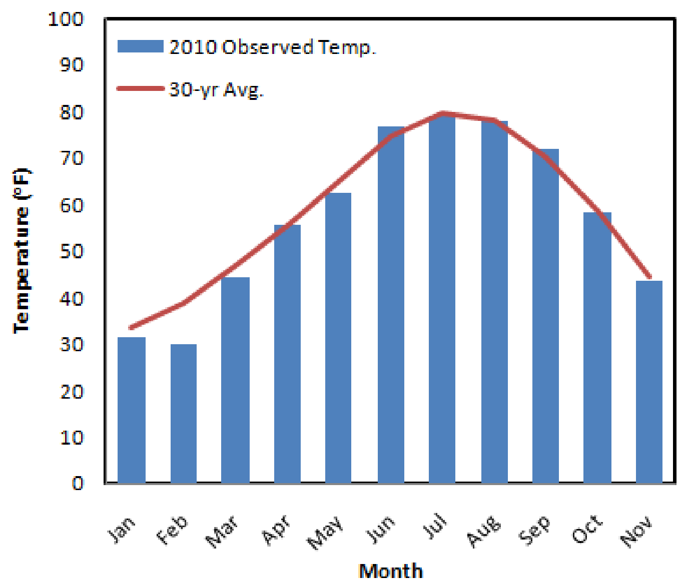
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
Stoddard		5	21	2	0	2750	61	128
Osage	University of Arkansas	5.6	22	2	1	3100	57	120
Ozark	University of Arkansas	5.2	30	2	1	2900	54	114
HALO 5:25[2]	Hornbeck Seed Co.	5.2	22	1	0	2750	54	113
HBK C 5025	Hornbeck Seed Co.	5.0	45	2	1	2500	50	105
Jake		5	29	2	1	2750	49	104
UA 4805	University of Arkansas	4.8	25	2	1	3400	48	101
Avg. of 3 RR Varieties		4.8-5.5	32	1	0	2600	47	98
HALO 4:94[2]	Hornbeck Seed Co.	4.9	42	2	1	2600	46	96
HBK C5528	Hornbeck Seed Co.	5.5	40	2	1	2650	40	84
Hutcheson		5.5	28	1	0	2300	38	81
Glenn		5	26	1	1	2750	38	80
UA 4910	University of Arkansas	4.9	24	2	1	2800	38	80
LSD (P=0.05)							10	

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

[2]Liberty Link soybean variety

Goodwell





Location Summary:

The Goodwell location was a full-season irrigated test planted in early May. The average yield was 59 and 50 bu/acre when averaged across all glyphosate resistant varieties and conventional varieties, respectively.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Goodwell, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	na	Planting Date	May 6, 2010
Soil Test P Index	na	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	na	Seeding Depth (in)	1
		Irrigation	Yes
		Harvest Date	12-Oct
		Soil Moisture at Planting	good

Table 3. Full-season glyphosate resistant soybean production variety trail Goodwell, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
REV 47R22	Terral Seed, Inc.	4.7	na	0	0	3350	72	122
HBK RY5220	Hornbeck Seed Co.	5.2		0	0	4200	69	116
REV 48R10	Terral Seed, Inc.	4.8		0	0	2850	69	116
4908 RR	Progeny Ag Products	4.9		0	0	2900	69	116
S46-U6 Brand	Syngenta Seeds	4.6		0	0	2550	67	114
Morsoy Xtra 49X10	Cache River Valley Seed	4.9		0	0	2800	67	114
MORSOY RTS 4955N	Cache River Valley Seed	4.9		0	0	3150	65	110
5330 RR	Progeny Ag Products	5.3		1	0	2750	65	109
REV 44R22	Terral Seed, Inc.	4.4		0	0	2600	64	109
REV 48R22	Terral Seed, Inc.	4.8		0	0	2700	64	107
Morsoy Xtra 52X10	Cache River Valley Seed	5.2		0	0	2600	63	105
HBK RY4920	Hornbeck Seed Co.	4.9		0	0	2600	62	105
MORSOY RT 5388N	Cache River Valley Seed	5.3		0	0	3150	62	104
HBK R5525	Hornbeck Seed Co.	5.5		1	0	2600	62	104
4949 RR	Progeny Ag Products	4.9		1	0	2700	61	104
MORSOY RTS 4824	Cache River Valley Seed	4.8		0	0	2750	61	103
HBK R5529	Hornbeck Seed Co.	5.5		0	0	2700	60	102
REV 57R21	Terral Seed, Inc.	5.7		0	0	3250	60	102
MORSOY RT 5429	Cache River Valley Seed	5.4		0	0	2750	60	101
REV 49R11	Terral Seed, Inc.	4.9		0	0	3700	59	100
REV 56R21	Terral Seed, Inc.	5.6		0	0	2850	59	99
REV 49R10	Terral Seed, Inc.	4.9		0	0	3150	59	99
REV 48R21	Terral Seed, Inc.	4.8		1	0	3050	59	99
RC 5007S	Croplan Genetics	5.0		0	0	3650	58	98
5622 RR	Progeny Ag Products	5.6		0	0	2800	58	98
Morsoy Xtra 47X10	Cache River Valley Seed	4.7		0	0	2700	58	98
HBK R5425	Hornbeck Seed Co.	5.4		1	0	3000	57	97
HBK R4729	Hornbeck Seed Co.	4.7		1	0	3650	56	94
HBK R4924	Hornbeck Seed Co.	4.9		0	0	3350	56	94
REV 54R10	Terral Seed, Inc.	5.4		2	0	3000	56	94
RC4998	Croplan Genetics	4.9		0	0	2850	56	94
REV 49R22	Terral Seed, Inc.	4.9		0	0	3850	55	93
4807 RR	Progeny Ag Products	4.8		0	0	3550	55	93
5115 RR	Progeny Ag Products	5.1		0	0	2800	55	92
5650 RR	Progeny Ag Products	5.6		4	0	2800	54	92
Morsoy Xtra 54X10	Cache River Valley Seed	5.4		1	0	3200	54	91
5218 RR	Progeny Ag Products	5.2		0	0	2950	53	90
S51-T8 Brand	Syngenta Seeds	5.1		0	0	3200	53	89
S49-A5 Brand	Syngenta Seeds	4.9		0	0	2650	53	89
4906 RR	Progeny Ag Products	4.9		0	0	3600	53	88
REV 45R10	Terral Seed, Inc.	4.5		0	0	3600	47	78
5706 RR	Progeny Ag Products	5.7		1	0	3700	46	78
LSD (P=0.05)							12	

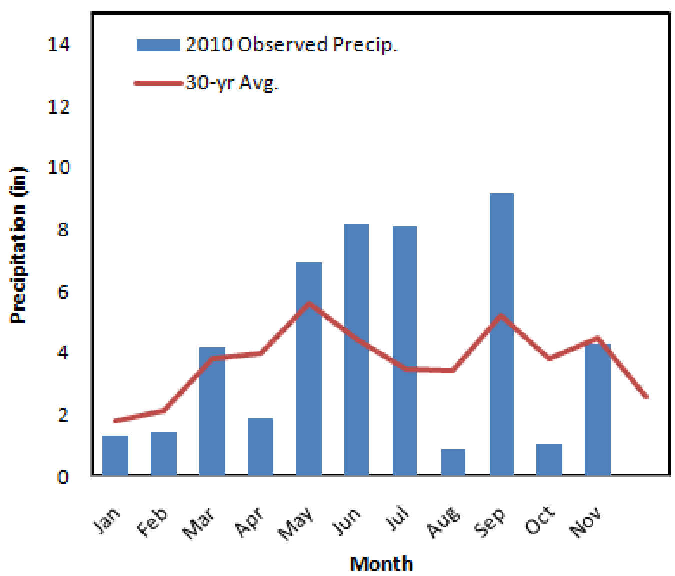
[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

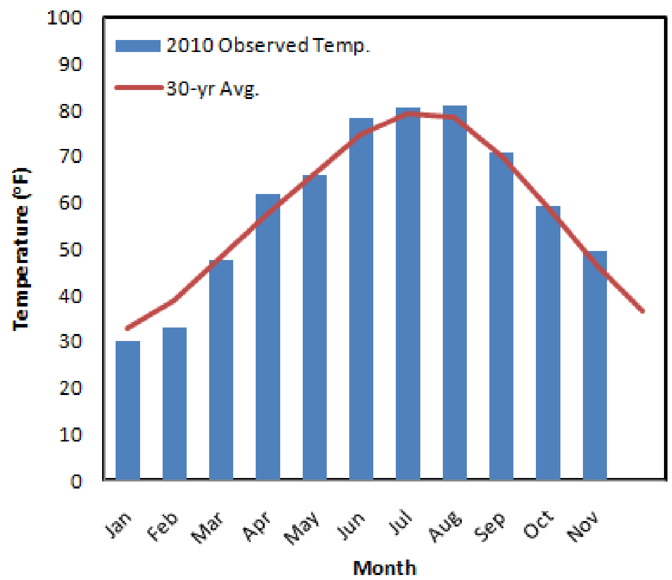
Table 4. Full-season conventional and Liberty Link soybean production variety trail Goodwell, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
HALO 5:25[2]	Hornbeck Seed Co.	5.2	na	1	0	3600	61	121
HALO 4:94[2]	Hornbeck Seed Co.	4.9		2	0	3700	57	114
Avg. of 3 RR Varieties		4.8-5.5		0	0	3500	55	110
UA 4910	University of Arkansas	4.9		0	0	3050	52	103
Glenn		5		1	0	3500	52	103
UA 4805	University of Arkansas	4.8		3	0	4250	50	99
Stoddard		5		0	0	2950	49	96
HBK C 5025	Hornbeck Seed Co.	5.0		3	0	3450	49	96
Osage	University of Arkansas	5.6		0	0	3650	47	93
HBK C5528	Hornbeck Seed Co.	5.5		0	0	3400	45	89
Jake		5		1	0	3350	44	87
Hutcheson		5.5		1	0	4100	43	86
Ozark	University of Arkansas	5.2		0	0	4150	43	84
LSD (P=0.05)							7	

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.
[2]Liberty Link soybean variety

Miami





Location Summary:

The Miami location was a full-season test planted on June 2nd. The test was planted into a conventional tilled seedbed. The average yield was 28 bu/acre when averaged across all varieties. The average yield was consistent with what area producers observed in 2010. The yield potential of this test was hurt by the below normal precipitation in August.

Table 2. Information on soil chemical properties and management practices for the Conventional Soybean Production Test at Miami, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	7.4	Planting Date	6/2
Soil Test P Index	48	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	172	Seeding Depth (in)	1
		Irrigation	none
		Harvest Date	11/3
		Soil Moisture at Planting	good

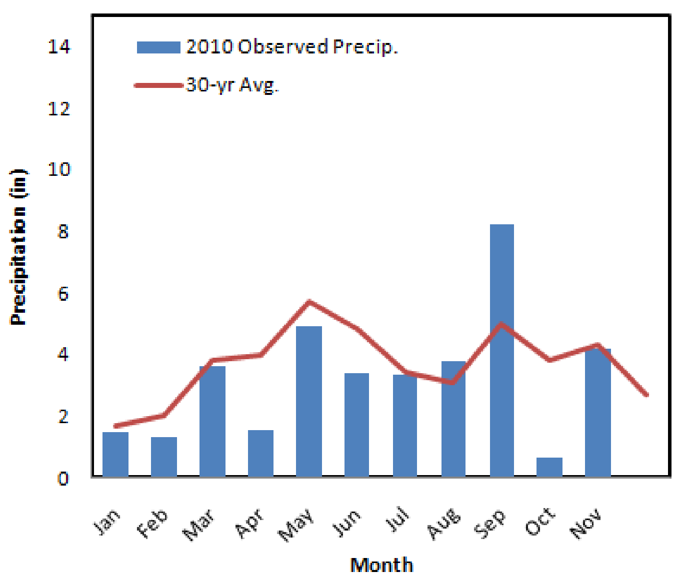
Table 3. Full-season conventional and Liberty Link soybean production variety trail Miami, OK 2010.

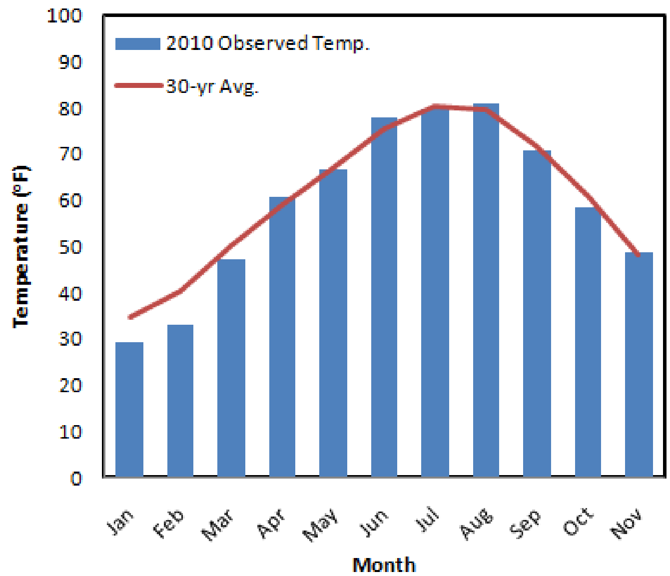
Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
HBK C5528	Hornbeck Seed Co.	5.5	33	0	0	2600	36	123
Stoddard		5	26	0	0	2500	35	122
Jake		5	30	0	0	2500	35	119
Avg. of 3 RR Varieties		4.8-5.5	31	0	0	2383	33	114
UA 4910	University of Arkansas	4.9	30	0	0	2200	32	109
HBK C 5025	Hornbeck Seed Co.	5.0	39	0	0	2650	29	101
Glenn		5	29	0	0	2500	28	98
Osage	University of Arkansas	5.6	24	0	0	3000	28	96
Hutcheson		5.5	34	0	0	2350	26	90
HALO 5:25[2]	Hornbeck Seed Co.	5.2	23	0	0	2800	23	79
UA 4805	University of Arkansas	4.8	25	0	0	2950	22	75
Ozark	University of Arkansas	5.2	32	0	0	2600	21	74
HALO 4:94[2]	Hornbeck Seed Co.	4.9	21	0	0	2950	21	72
LSD (P=0.05)							7	

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

[2]Liberty Link soybean variety

Vinita





Location Summary:

The Vinita location was a full-season test planted on June 2nd. The test was planted into a long-term no-till seedbed. The average yield was 13 bu/acre when averaged across all varieties. Yield potnatial was greatly reduced with the below normal precipitation in June. The lack of rainfall in June put the crop behind in available soil moisture most of the season. The crop was stressed during flowering and early pod fill.

Table 4. Information on soil chemical properties and management practices for the RR Soybean Production Test at Vinita, OK in 2010.

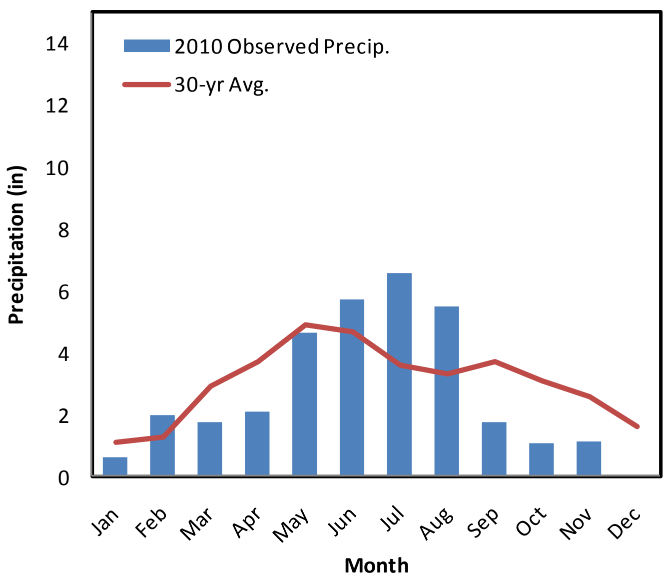
Soil Properties	Result	Cultural Practice	Information
pH	5.4	Planting Date	6/2
Soil Test P Index	72	Seeding Rate (seeds/foot of row)	8
	20		
Soil Test K Index	1	Seeding Depth (in)	1
		Irrigation	none
		Harvest Date	11/3
		Soil Moisture at Planting	good

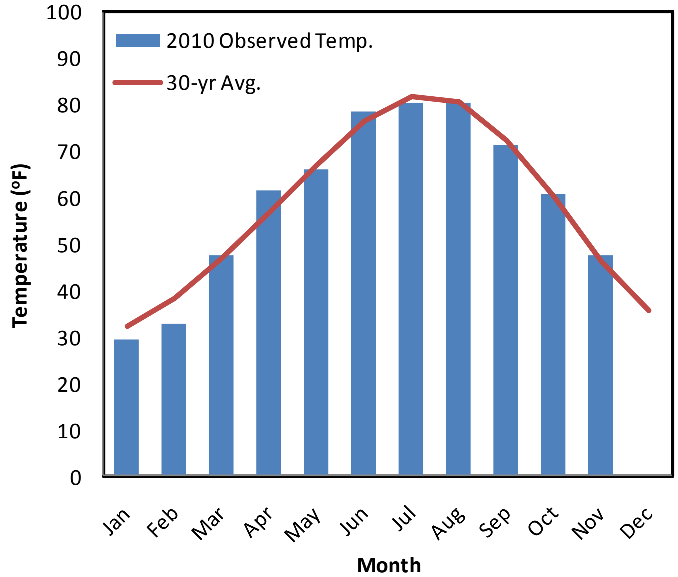
Table 5. Full-season glyphosate resistant soybean production variety trail Vinita, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
5622 RR	Progeny Ag Products	5.6	41	0	0	2650	25	186
MORSOY RT 5388N	Cache River Valley Seed	5.3	39	1	0	3300	24	179
REV 57R21	Terral Seed, Inc.	5.7	40	0	0	2650	23	168
5650 RR	Progeny Ag Products	5.6	47	0	0	3000	22	164
4908 RR	Progeny Ag Products	4.9	31	1	0	2450	21	157
REV 56R21	Terral Seed, Inc.	5.6	33	0	0	2950	21	153
MORSOY RT 5429	Cache River Valley Seed	5.4	39	0	0	2800	20	149
REV 54R10	Terral Seed, Inc.	5.4	40	0	0	2600	19	143
Morsoy Xtra 52X10	Cache River Valley Seed	5.2	30	1	0	2850	19	140
5706 RR	Progeny Ag Products	5.7	42	0	0	2750	18	136
RC4998	Croplan Genetics	4.9	33	0	0	2350	17	124
5330 RR	Progeny Ag Products	5.3	38	0	0	2500	16	121
REV 49R22	Terral Seed, Inc.	4.9	39	0	0	2650	16	118
RC 5007S	Croplan Genetics	5.0	35	1	0	2450	16	119
REV 48R22	Terral Seed, Inc.	4.8	31	0	0	2250	15	112
HBK R5525	Hornbeck Seed Co.	5.5	34	0	0	2450	15	111
HBK RY5220	Hornbeck Seed Co.	5.2	39	0	0	2750	15	108
Morsoy Xtra 47X10	Cache River Valley Seed	4.7	34	0	0	2450	14	106
5218 RR	Progeny Ag Products	5.2	36	1	0	2200	14	102
S51-T8 Brand	Syngenta Seeds	5.1	34	0	0	2350	14	101
4906 RR	Progeny Ag Products	4.9	33	0	0	2400	13	97
MORSOY RTS 4955N	Cache River Valley Seed	4.9	32	0	0	2350	13	96
HBK R4729	Hornbeck Seed Co.	4.7	36	0	0	2850	12	89
HBK R4924	Hornbeck Seed Co.	4.9	40	0	0	2350	12	89
HBK R5425	Hornbeck Seed Co.	5.4	42	0	0	2350	12	87
MORSOY RTS 4824	Cache River Valley Seed	4.8	31	0	0	2500	11	85
5115 RR	Progeny Ag Products	5.1	30	0	0	2450	11	85
REV 49R11	Terral Seed, Inc.	4.9	28	0	0	2600	11	84
REV 48R21	Terral Seed, Inc.	4.8	30	1	0	2250	11	83
Morsoy Xtra 49X10	Cache River Valley Seed	4.9	31	0	0	2800	11	83
REV 49R10	Terral Seed, Inc.	4.9	34	0	0	2200	10	73
S46-U6 Brand	Syngenta Seeds	4.6	36	0	0	2950	8	63
S49-A5 Brand	Syngenta Seeds	4.9	39	0	0	2800	8	62
4949 RR	Progeny Ag Products	4.9	33	0	0	2250	8	62
REV 48R10	Terral Seed, Inc.	4.8	31	1	0	2350	8	61
REV 47R22	Terral Seed, Inc.	4.7	30	1	0	2650	8	56
HBK RY4920	Hornbeck Seed Co.	4.9	29	0	0	3500	7	55
REV 44R22	Terral Seed, Inc.	4.4	23	0	0	2350	7	48
4807 RR	Progeny Ag Products	4.8	30	0	0	2250	5	40
HBK R5529	Hornbeck Seed Co.	5.5	33	0	0	2850	5	40
Morsoy Xtra 54X10	Cache River Valley Seed	5.4	26	0	0	2500	5	36
REV 45R10	Terral Seed, Inc.	4.5	33	0	0	2400	4	28
LSD (P=0.05)							7	

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

Newkirk





Location Summary:
Growing conditions at the Newkirk location were excellent early in the growing season, however, in September during pod fill the location experienced drier than normal conditions which resulted in a yield loss. This test was planted in late June.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Newkirk, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH		Planting Date	6/23
Soil Test P Index		Seeding Rate (seeds/foot of row)	8
Soil Test K Index		Seeding Depth (in)	1
		Irrigation	none
		Harvest Date	10/27
		Soil Moisture at Planting	good

Table 3. Full-season glyphosate resistant soybean production variety trail Newkirk, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				- bu/acre -	- - % - -
MORSOY Xtra 49X10	Cache River Valley Seed	4.9	26	0	0	3050	32	134
4908 RR	Progeny Ag Products	4.9	29	0	0	3200	29	122
MORSOY RT 5388N	Cache River Valley Seed	5.3	29	0	0	2850	28	118
4949 RR	Progeny Ag Products	4.9	27	0	0	2950	28	117
HBK R4924	Hornbeck Seed Co.	4.9	31	0	0	2800	28	117
MORSOY Xtra 54X10	Cache River Valley Seed	5.4	25	0	0	3050	28	116
5622 RR	Progeny Ag Products	5.6	30	0	0	3300	27	114
MORSOY Xtra 52X10	Cache River Valley Seed	5.2	28	0	0	3250	27	114
RC 5007S	Croplan Genetics	5.0	29	0	0	2750	27	113
MORSOY Xtra 47X10	Cache River Valley Seed	4.8	23	0	0	3500	27	111
HBK R5529	Hornbeck Seed Co.	5.5	26	0	0	3200	27	111
HBK RY4920	Hornbeck Seed Co.	4.9	22	0	0	2950	26	109
S49-A5 Brand	Syngenta Seeds	4.9	29	0	0	2550	26	108
4906 RR	Progeny Ag Products	4.9	27	0	0	2700	26	108
5706 RR	Progeny Ag Products	5.7	33	0	0	3050	26	108
REV 48R21	Terral Seed, Inc.	4.8	29	0	0	3600	26	108
REV 49R10	Terral Seed, Inc.	4.9	37	0	0	2250	25	105
S46-U6 Brand	Syngenta Seeds	4.6	33	0	0	2650	25	104
4807 RR	Progeny Ag Products	4.8	27	0	0	3350	25	104
RC4998	Croplan Genetics	4.9	24	0	0	2950	25	103
HBK R5525	Hornbeck Seed Co.	5.5	28	0	0	3150	25	103
5330 RR	Progeny Ag Products	5.3	31	0	0	2700	25	103
REV 56R21	Terral Seed, Inc.	5.6	31	0	0	2700	24	102
S51-T8 Brand	Syngenta Seeds	5.1	29	0	0	3500	24	100
MORSOY RT 5429	Cache River Valley Seed	5.4	30	0	0	3350	24	100
REV 49R11	Terral Seed, Inc.	4.9	27	0	0	2850	23	96
REV 54R10	Terral Seed, Inc.	5.4	32	0	0	2750	23	94
5650 RR	Progeny Ag Products	5.6	29	0	0	3050	22	93
MORSOY RTS 4824	Cache River Valley Seed	4.8	23	0	0	3500	22	92
REV 57R21	Terral Seed, Inc.	5.7	38	0	0	2950	22	91
REV 47R22	Terral Seed, Inc.	4.7	24	0	0	3100	22	90
MORSOY RTS 4955N	Cache River Valley Seed	4.9	26	0	0	3500	22	90
REV 49R22	Terral Seed, Inc.	4.9	30	0	0	3400	21	87
REV 48R10	Terral Seed, Inc.	4.8	25	0	0	3550	21	87
REV 44R22	Terral Seed, Inc.	4.4	20	0	0	2650	21	86
5115 RR	Progeny Ag Products	5.1	29	0	0	3050	21	86
HBK R4729	Hornbeck Seed Co.	4.7	26	0	0	3250	19	81
HBK R5425	Hornbeck Seed Co.	5.4	30	0	0	3350	19	81
HBK RY5220	Hornbeck Seed Co.	5.2	29	0	0	2800	19	80
5218 RR	Progeny Ag Products	5.2	29	0	0	3750	18	76
REV 48R22	Terral Seed, Inc.	4.8	30	0	0	2700	17	69
REV 45R10	Terral Seed, Inc.	4.5	29	0	0	3200	16	68
LSD (P=0.05)							7	

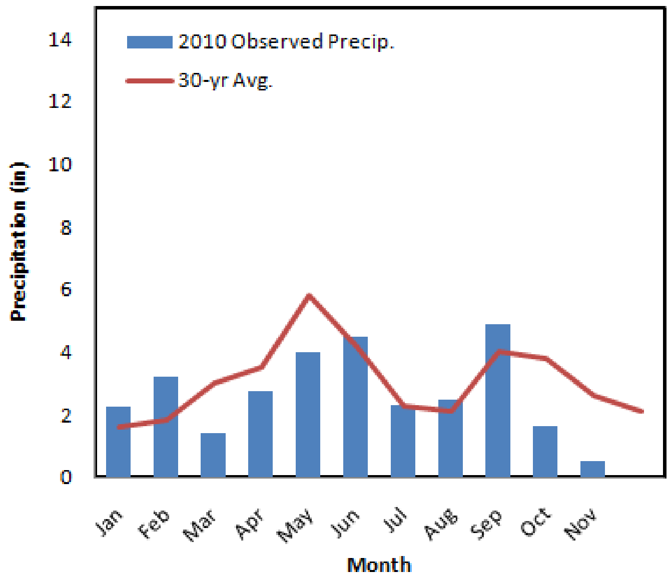
[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.

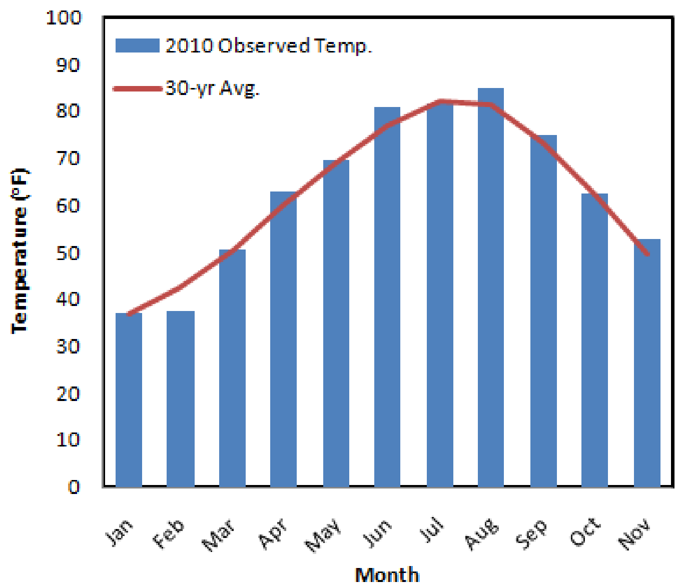
Table 4. Full-season conventional and Liberty Link soybean production variety trail Newkirk, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				- bu/acre -	- - % - -
Hutcheson		5.5	27	0	0	3000	24	113
UA 4805	University of Arkansas	4.8	18	0	0	3650	24	110
Ozark	University of Arkansas	5.2	24	0	0	3350	24	110
HALO 5:25[2]	Hornbeck Seed Co.	5.2	21	0	0	3200	23	110
HALO 4:94[2]	Hornbeck Seed Co.	4.9	21	0	0	3100	23	106
HBK C 5025	Hornbeck Seed Co.	5.0	26	0	0	2850	22	104
Osage	University of Arkansas	5.6	21	0	0	3700	22	103
HBK C5528	Hornbeck Seed Co.	5.5	29	0	0	3050	21	101
Jake		5	22	0	0	3200	21	99
Stoddard		5	21	0	0	3500	21	97
Glenn		5	23	0	0	3450	20	96
UA 4910	University of Arkansas	4.9	18	0	0	3050	19	90
Avg. of 3 RR Varieties		4.8-5.5	28	0	0	2866	18	87
LSD (P=0.05)							5	

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.
[2]Liberty Link soybean variety

Pauls Valley





Location Summary:

The Pauls Valley location was a full-season test planted on June 22nd. The test was planted into a conventional tilled seedbed. The average yield was 46bu/acre when averaged across all glyphosate resistant varieties. Yields were excellent at this location based primarily on planting date. Soybean fields planted earlier then mid-June were hit hard by the late July/early August heat and lack of rainfall. The majority of rainfall that fell in July and Aug was in the early part of July and the late part of August. This period of stress corresponded to the earlier planted soybean's reproduction stages which resulted in yield reduction.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Pauls Valley, OK in 2010.

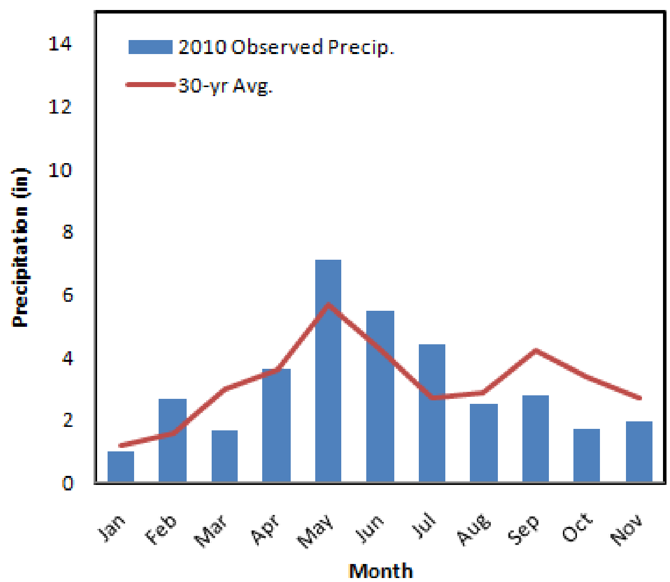
Soil Properties	Result	Cultural Practice	Information
pH	6.9	Planting Dates	June 22, 2010
Soil Test P Index	37	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	330	Seeding Depth (in)	1
		Irrigation	none
		Harvest Dates	21-Oct
		Soil Moisture at Planting	good

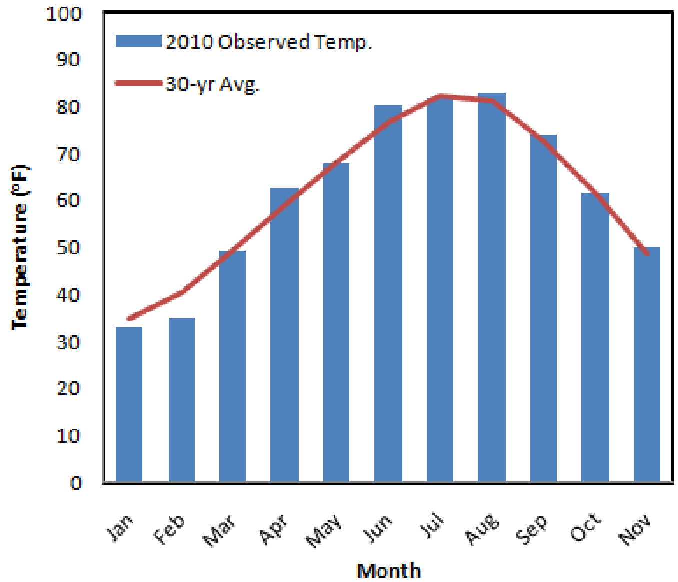
Table 3. Full-season glyphosate resistant soybean production variety trail Pauls Valley, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
Morsoy Xtra 47X10	Cache River Valley Seed	4.7	32	0	0	2550	65	140
5622 RR	Progeny Ag Products	5.6	27	0	0	2700	62	133
HBK R5425	Hornbeck Seed Co.	5.4	27	0	0	2700	59	125
REV 49R22	Terral Seed, Inc.	4.9	20	0	0	2850	57	122
5650 RR	Progeny Ag Products	5.6	29	0	0	3050	56	119
HBK R5525	Hornbeck Seed Co.	5.5	23	0	0	2000	54	116
REV 48R22	Terral Seed, Inc.	4.8	23	0	0	2300	53	114
REV 54R10	Terral Seed, Inc.	5.4	29	0	0	2450	53	114
RC4998	Croplan Genetics	4.9	29	0	0	2650	53	114
Morsoy Xtra 52X10	Cache River Valley Seed	5.2	26	0	0	3200	52	110
4908 RR	Progeny Ag Products	4.9	27	0	0	2650	51	110
5706 RR	Progeny Ag Products	5.7	34	0	0	2800	50	107
MORSOY RT 5388N	Cache River Valley Seed	5.3	30	0	0	3100	50	107
5115 RR	Progeny Ag Products	5.1	25	0	0	2850	50	107
4906 RR	Progeny Ag Products	4.9	33	0	0	2700	50	106
4949 RR	Progeny Ag Products	4.9	31	0	0	2200	49	105
Morsoy Xtra 49X10	Cache River Valley Seed	4.9	24	0	0	3200	48	103
MORSOY RTS 4955N	Cache River Valley Seed	4.9	26	0	0	2400	48	102
S49-A5 Brand	Syngenta Seeds	4.9	27	0	0	2500	48	102
REV 49R10	Terral Seed, Inc.	4.9	28	0	0	2500	47	101
REV 48R21	Terral Seed, Inc.	4.8	30	0	0	2700	47	100
S46-U6 Brand	Syngenta Seeds	4.6	30	0	0	2450	47	100
HBK R5529	Hornbeck Seed Co.	5.5	23	0	0	3200	46	99
HBK RY5220	Hornbeck Seed Co.	5.2	25	0	0	2700	46	97
5218 RR	Progeny Ag Products	5.2	30	0	0	2400	45	96
5330 RR	Progeny Ag Products	5.3	30	0	0	2500	45	95
HBK R4924	Hornbeck Seed Co.	4.9	29	0	0	2550	44	95
RC 5007S	Croplan Genetics	5.0	24	0	0	2950	43	93
REV 44R22	Terral Seed, Inc.	4.4	21	0	0	2700	43	93
REV 57R21	Terral Seed, Inc.	5.7	32	0	0	3050	43	92
REV 47R22	Terral Seed, Inc.	4.7	23	0	0	2800	42	90
REV 45R10	Terral Seed, Inc.	4.5	23	0	0	2800	42	89
REV 48R10	Terral Seed, Inc.	4.8	24	0	0	2850	42	89
4807 RR	Progeny Ag Products	4.8	28	0	0	2450	42	89
MORSOY RTS 4824	Cache River Valley Seed	4.8	18	0	0	2650	41	88
HBK RY4920	Hornbeck Seed Co.	4.9	29	0	0	2950	39	84
S51-T8 Brand	Syngenta Seeds	5.1	26	0	0	2550	38	81
Morsoy Xtra 54X10	Cache River Valley Seed	5.4	26	0	0	2800	37	80
REV 49R11	Terral Seed, Inc.	4.9	28	0	0	2500	37	79
REV 56R21	Terral Seed, Inc.	5.6	30	0	0	2900	36	76
HBK R4729	Hornbeck Seed Co.	4.7	33	0	0	2500	35	75
MORSOY RT 5429	Cache River Valley Seed	5.4	28	0	0	2850	30	63
LSD (P=0.05)							14	

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

Stillwater





Location Summary:

The Stillwater location was a double-crop test planted on July 12. The average yield was 23 bu/ac, which is good considering the late planting date. Yield potential was reduced from below normal precipitation in August and September.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Stillwater, OK in 2010.

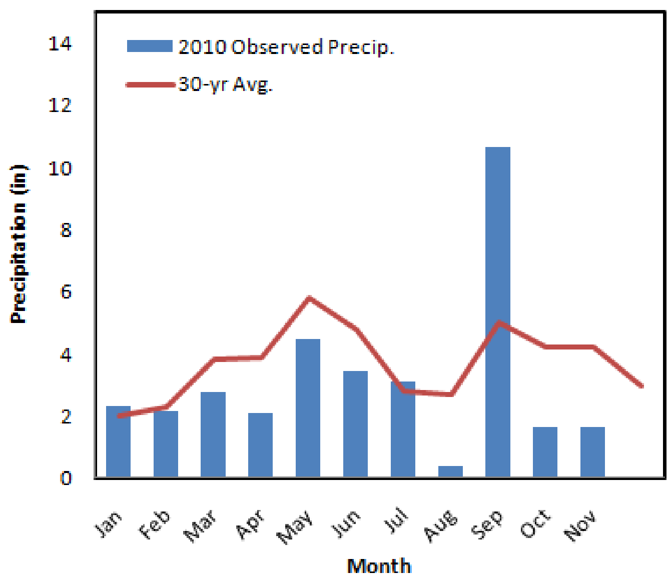
Soil Properties	Result	Cultural Practice	Information
pH	6.2	Planting Date	7/12
Soil Test P Index	28	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	324	Seeding Depth (in)	1.5
		Irrigation	none
		Harvest Date	11/8/2010
		Soil Moisture at Planting	good

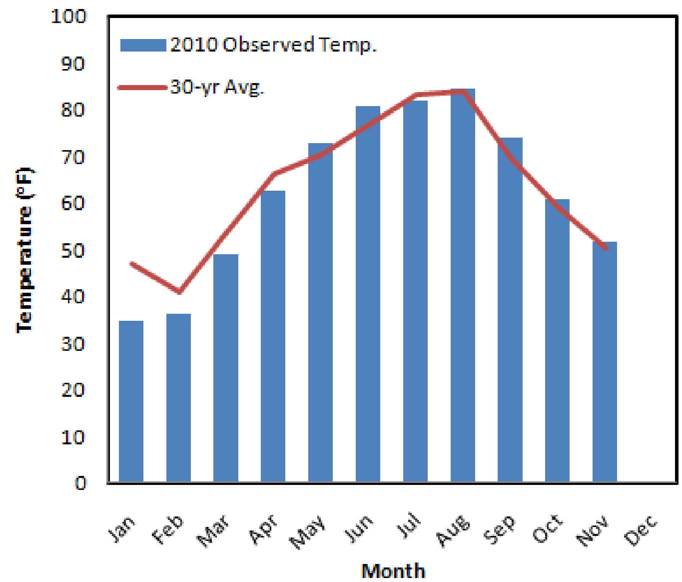
Table 3. Full-season conventional and Liberty Link soybean production variety trail Stillwater, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
Glenn		5	13	1	0	3600	30	130
HALO 5:25[2]	Hornbeck Seed Co.	5.2	11	0	0	3100	29	127
Osage	University of Arkansas	5.6	12	1	0	3900	27	118
Hutcheson		5.5	13	1	0	2950	24	108
Avg. of 3 RR Varieties		4.8-5.5	17	0	0	3300	24	108
Ozark	University of Arkansas	5.2	11	1	0	3300	23	101
UA 4910	University of Arkansas	4.9	11	0	0	3100	23	100
Jake		5	12	1	0	3400	22	98
HBK C 5025	Hornbeck Seed Co.	5.0	22	0	0	3200	22	97
Stoddard		5	12	1	0	3250	19	85
HALO 4:94[2]	Hornbeck Seed Co.	4.9	18	0	0	3450	18	78
UA 4805	University of Arkansas	4.8	10	1	0	4050	17	73
HBK C5528	Hornbeck Seed Co.	5.5	11	0	0	3150	14	63
LSD (P=0.05)							9	

[1]0 = no shattering or lodging, 5 = very severe shattering or lodging.
[2]Liberty Link soybean variety

Webbers Falls





Location Summary:

The Webbers Falls location was a full-season test planted on May 28th. The test was planted into a conventional tilled seedbed. The average yield was 50 bu/acre when averaged across all glyphosate resistant varieties.

Table 2. Information on soil chemical properties and management practices for the Soybean Production Test at Webbrs Falls, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	5.7	Planting Date	May 28, 2010
Soil Test P Index	215	Seeding Rate (seeds/foot of row)	8
Soil Test K Index	522	Seeding Depth (in)	1
		Irrigation	Yes
		Harvest Date	10-Nov
		Soil Moisture at Planting	excellent

Table 3. Full-season glyphosate resistant soybean production variety trail Webbers Falls, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
5650 RR	Progeny Ag Products	5.6	44	4	1	3650	69	139
MORSOY RT 5429	Cache River Valley Seed	5.4	43	2	1	3000	65	132
RC4998	Croplan Genetics	4.9	54	2	1	2650	65	131
HBK RY5220	Hornbeck Seed Co.	5.2	43	2	2	2800	62	125
5115 RR	Progeny Ag Products	5.1	58	4	1	2800	60	122
HBK RY4920	Hornbeck Seed Co.	4.9	49	3	2	2850	59	119
REV 57R21	Terral Seed, Inc.	5.7	46	0	2	2650	58	118
HBK R5425	Hornbeck Seed Co.	5.4	57	3	0	2600	58	117
5330 RR	Progeny Ag Products	5.3	44	2	1	2600	58	116
5622 RR	Progeny Ag Products	5.6	49	4	1	3100	58	116
HBK R5529	Hornbeck Seed Co.	5.5	32	3	0	2550	57	115
REV 49R22	Terral Seed, Inc.	4.9	52	3	1	2550	56	113
HBK R5525	Hornbeck Seed Co.	5.5	41	2	1	2650	55	111
REV 54R10	Terral Seed, Inc.	5.4	56	4	1	2900	54	109
Morsoy Xtra 49X10	Cache River Valley Seed	4.9	49	3	1	3100	53	107
S46-U6 Brand	Syngenta Seeds	4.6	53	3	1	2200	53	106
REV 48R10	Terral Seed, Inc.	4.8	43	3	2	2500	53	106
REV 49R11	Terral Seed, Inc.	4.9	47	2	1	2250	51	104
MORSOY RT 5388N	Cache River Valley Seed	5.3	40	2	1	3600	51	103
REV 48R22	Terral Seed, Inc.	4.8	48	3	1	2150	51	103
5706 RR	Progeny Ag Products	5.7	45	4	1	2950	50	100
RC 5007S	Croplan Genetics	5.0	43	4	1	3000	49	100
5218 RR	Progeny Ag Products	5.2	43	2	1	2400	49	99
MORSOY RTS 4955N	Cache River Valley Seed	4.9	55	3	1	2400	47	94
4807 RR	Progeny Ag Products	4.8	54	3	1	2350	46	94
REV 48R21	Terral Seed, Inc.	4.8	49	2	1	2800	46	92
HBK R4924	Hornbeck Seed Co.	4.9	57	4	1	2850	46	92
4908 RR	Progeny Ag Products	4.9	51	4	1	2650	46	92
HBK R4729	Hornbeck Seed Co.	4.7	47	4	1	2600	45	91
REV 49R10	Terral Seed, Inc.	4.9	59	4	1	2350	45	91
REV 44R22	Terral Seed, Inc.	4.4	42	2	1	2400	45	91
REV 56R21	Terral Seed, Inc.	5.6	40	2	1	3200	45	90
REV 47R22	Terral Seed, Inc.	4.7	49	2	2	2550	44	89
Morsoy Xtra 54X10	Cache River Valley Seed	5.4	48	4	1	2900	43	86
4906 RR	Progeny Ag Products	4.9	53	4	1	2850	42	86
Morsoy Xtra 47X10	Cache River Valley Seed	4.7	52	3	1	2550	42	84
MORSOY RTS 4824	Cache River Valley Seed	4.8	50	3	1	2750	40	81
REV 45R10	Terral Seed, Inc.	4.5	57	3	1	2850	39	79
Morsoy Xtra 52X10	Cache River Valley Seed	5.2	37	4	2	3700	37	74
S51-T8 Brand	Syngenta Seeds	5.1	56	2	1	2400	34	69
4949 RR	Progeny Ag Products	4.9	48	4	2	2650	33	66
S49-A5 Brand	Syngenta Seeds	4.9	54	4	1	2800	25	51
LSD (P=0.05)							9	

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

Table 4. Full-season conventional and Liberty Link soybean production variety trail Webbers Falls, OK 2010.

Variety	Company	Maturity Group	Height	Shattering[1] Score	Lodging[1] Score	Seed/Lb	Yield	Percent Yield of Trial Average
			- in -				bu/acre	- - % - -
Avg. of 3 RR Varieties		4.8-5.5	46	3	1	2500	44	187
Stoddard		5	30	0	0	2700	30	128
HALO 5:25[2]	Hornbeck Seed Co.	5.2	36	2	0	2350	30	127
Ozark	University of Arkansas	5.2	38	0	2	2200	22	95
UA 4910	University of Arkansas	4.9	37	1	0	2450	20	85
Glenn		5	29	0	0	2500	19	80
HALO 4:94[2]	Hornbeck Seed Co.	4.9	42	2	1	2300	19	80
Hutcheson		5.5	27	1	2	2350	17	74
UA 4805	University of Arkansas	4.8	33	1	0	2900	17	71
Osage	University of Arkansas	5.6	30	1	1	2350	14	61
HBK C 5025	Hornbeck Seed Co.	5.0	46	3	0	1850	14	58
HBK C5528	Hornbeck Seed Co.	5.5	46	4	0	2350	12	50
Jake		5	32	2	1	2050	7	30
LSD (P=0.05)							9	

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

[2]Liberty Link soybean variety

EXTENSION

2010 Sunflower Performance Tests

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B. Heister
W. Vaughan
R. Kochenower

Oklahoma State University
Department of Plant and Soil Sciences
Production Technology Report
PT 2011-2

Cooperators

Brent Rendel, Ottawa County Producer
Ed Regier, Garfield County Producer
Jeff Bedwell, Garfield County Extension Educator

CONTENTS

Information on Sunflower Performance Trials

Numerous hybrids were evaluated in performance tests during 2010. Commercially available hybrids and experimental lines were included within the tests. Tests were designed to provide information to assist producers in identifying superior hybrids and make crop management decisions.

Hybrids of private seed company origin are submitted based on decisions by the respective company and hybrid characteristics listed were provided by the companies (Table 2).

Methods

Test locations were near Miami, Enid, and Goodwell. All test plots were planted using four or two 30-inch rows (2 row Goodwell) that were 25 feet long. Plots were seeded at a rate of 18,000-21,000 seeds/ac depending on location. Tests were conducted using randomized complete block design with four replications. Irrigation was used only at the Goodwell location. Two rows the entire length of the plot was harvested with a small plot combine to determine grain yield.

Interpreting Data

Details of establishment and management of each test are listed in footnotes below the tables. Least significant differences (LSD) are listed at the bottom of all but the Performance Summary tables. Differences between varieties are significant only if they are equal to or greater than the LSD value. If a given variety out yields another variety by as much or more than the LSD value, then we are 95% sure that the yield difference is real, with only a 5% probability that the difference is due to chance alone. For example, if variety X is 200 lb/ac higher in yield than variety Y, then this difference is statistically significant if the LSD is 200 or less. If the LSD is 200 or greater, then we are less confident that variety X really is higher yielding than variety Y under the conditions of the test.

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

Additional information on the Web

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

http://oilseeds.okstate.edu/

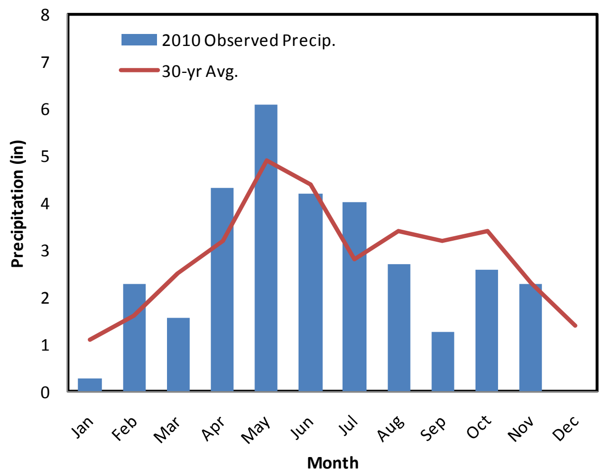
Table 1. Sources of Seed for the 2010 Sunflower Performance Tests.

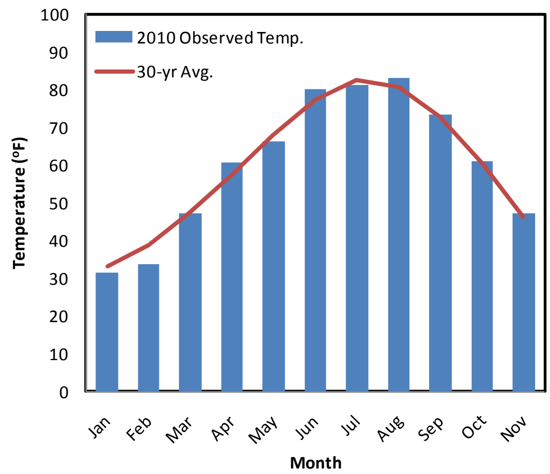
Croplan Genetics 525 55th ST SE Minot, ND 58701	Telephone: 701-852-3556
Syngenta 4102 Timberline Dr. Fargo, ND 58104	www.syngenta.com
Mycogen Seeds 1614 Safford Ave. Garden City, KS 67846	Telephone: 1-800-MYCOGEN
Seeds 2000 115 North 3rd St. Breckenridge, MN 56520	Telephone: 218-643-2410
Advanta US, Inc. 6109 53rd Ave. SW Fargo, ND 58104	Telephone: 701-282-2952
Triumph Seed Co., Inc PO Box 1050 Ralls, TX 79357	Telephone: 888-521-7333

Table 2. Characteristics of sunflower hybrids (provided by the company) entered in the 2010 performance trials.

Entry	Company	Maturity	Oil Type	Oil Content	Plant Height	Disease Resistance	Herbicide Resistance
				- - % - -	- - in - -		
AP462NS	Advanta US Inc.	105	NuSun			Phoma, Phomopsis	
F51122NS,CL	Advanta US Inc.	mid-late	NuSun			Phomopsis	Clearfield
F30008NS,CL	Advanta US Inc.	99	NuSun				Clearfield
CG 3080 DMR NS	Croplan Genetics	90	NuSun	48	medium	Downy Mildew	
CG 356A NS	Croplan Genetics	95	NuSun	46	short		
CG 460 E NS	Croplan Genetics	95	NuSun	48	medium		Express
CG 559 CL DMR NS	Croplan Genetics	94	NuSun	46	med-tall	Downy Mildew	
CG 306 DMR NS	Croplan Genetics	87	NuSun	46	short	Downy Mildew	
4651 NS/DM	Syngenta	97	NuSun	42	58	Downy Mildew	
3732 NS	Syngenta	100	NuSun	43	62		
3845 HO	Syngenta	105	High Oleic	45	62		
3980 NSCL	Syngenta		NuSun	44			Clearfield
8N453DM	Mycogen Seeds	97	NuSun	45	62	Downy Mildew	
8N443DM	Mycogen Seeds	96	NuSun			Downy Mildew	
8H449DM	Mycogen Seeds	97	High Oleic	45	64	Downy Mildew	
8N510	Mycogen Seeds	100	NuSun	40	59		
BLAZER CL	Seeds 2000 Inc.	95	NuSun	43-45	62		Clearfield
SIERRA	Seeds 2000 Inc.	97	High Oleic	43-45	65		
Firebird	Seeds 2000 Inc.	98	NuSun	42-44	60		Express
X9866	Seeds 2000 Inc.	95	NuSun	43-45	62	Downy Mildew	Clearfield
X9464	Seeds 2000 Inc.		High Oleic				Clearfield
s671	Triumph Seed Co.	94-104	NuSun	44-48	Short stature (38-44)	Rust	
s674	Triumph Seed Co.	94-104	NuSun	45-49	Short stature (38-44)	Rust	
s878HO	Triumph Seed Co.	96-106	High Oleic	43-47	Short stature (48-54)	Rust	
s668	Triumph Seed Co.	96-106	NuSun	45-49	Short stature (42-48)	Rust	
s673	Triumph Seed Co.	94-104	NuSun	44-48	Short stature (40-46)	Rust	
859 CL	Triumph Seed Co.	95-105	High Oleic	42-46	55-65	Rust	Clearfield

Enid





Location Summary:

The Enid location was a double-crop test planted on June 24th. Plots were direct seeded into a long-term no-till field. The average yield was 1028 lb/acre when averaged across all varieties. This test was affected by a wind storm around mid bloom that caused some lodging, especially in the taller hybrids. The yield potential of this test was hurt by the below normal precipitation in August and September but overall yields were good for a double crop.

Table 3. Information on soil chemical properties and management practices for the Dryland Sunflower Performance Test near Enid, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	na	Planting Date	June 24, 2011
Soil Test P Index	na	Harvest Date	October 28, 2011
Soil Test K Index	na		
		Previous Crop	winter wheat
Fertilizer Applied		Herbicide Applications	Prowl H_2O and Spartan pre-plant with glyphosate
N	100	Pesticide Applications	1 time
P	0		
K	0	Harvest Aid	none

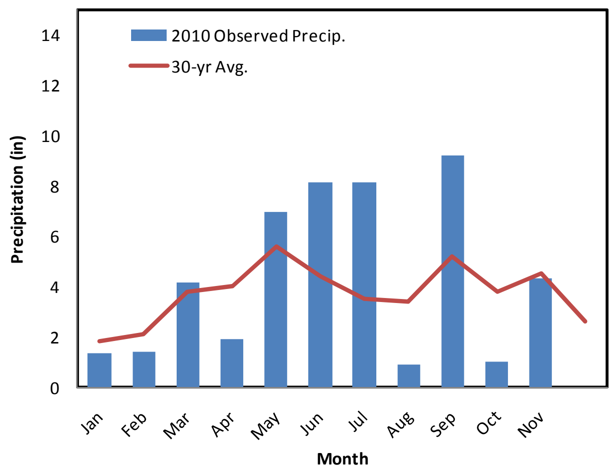
Table 4. Sunflower growth characteristics, oil content, and yield for 2010 near Enid, OK.

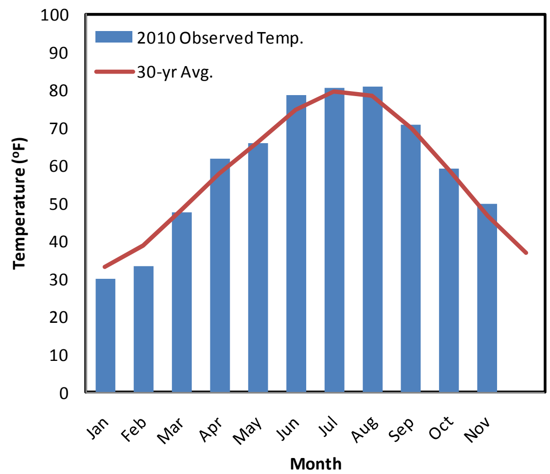
Entry	Company	Lodging†	Height	Oil‡	Yield	Percent of Trial Average
			- - in - -	- - % - -	- - lb/ac - -	- - % - -
s671	Triumph Seed Co.	0	34	40	1883	183
s668	Triumph Seed Co.	3	40	38	1665	162
s674	Triumph Seed Co.	0	34	37	1515	147
F30008NS,CL	Advanta US Inc.	1	39	35	1259	122
AP462NS	Advanta US Inc.	1	47	36	1235	120
3732 NS	Syngenta	2	47	37	1224	119
3980 NSCL	Syngenta	1	43	35	1223	119
8N433DM	Mycogen Seeds	1	47	39	1196	116
s673	Triumph Seed Co.	0	40	40	1178	115
s878HO	Triumph Seed Co.	1	43	35	1095	106
3080 DMR NS	Croplan Genetics	0	42	41	1078	105
306 DMR NS	Croplan Genetics	2	46	40	1073	104
8N510	Mycogen Seeds	1	46	35	1007	98
Sierra	Seeds 2000 Inc.	3	45	34	991	96
F51122NS,CL	Advanta US Inc.	1	44	35	967	94
Firebird	Seeds 2000 Inc.	1	46	33	921	90
X9464	Seeds 2000 Inc.	1	39	36	874	85
460 E NS	Croplan Genetics	2	42	38	868	84
8N453DM	Mycogen Seeds	1	44	35	858	83
559 CL DMR NS	Croplan Genetics	1	47	35	844	82
356A NS	Croplan Genetics	1	45	39	806	78
Blazer CL	Seeds 2000 Inc.	0	47	32	781	76
859HCL	Triumph Seed Co.	1	50	36	721	70
8H499DM	Mycogen Seeds	3	46	38	720	70
X9866	Seeds 2000 Inc.	5	52	32	694	67
4651 NS/DM	Syngenta	3	42	34	552	54
3845 HO	Syngenta	3	41	37	528	51
	LSD (P=0.05)				324	
	Trial Mean			36	1028	

† Lodging is based on a scale of 1 to 5, with 5 being the most severe.

‡Oil analysis was performed on one composite sample, so statistical analysis was not possible.

Miami





Location Summary:

The trial near Miami was planted on 30 inch beds. The sunflower seemed to perform well on the beds that created a more favorable environment early in the growing season. Yields at Miami in 2010 were good, especially in the top group of hybrids. Average yield, when averaged across hybrid, was 1150 lb/ac and average oil percentage was 45%. Yield was reduced by head clipping weevil in the field. The lack of rainfall in August most likely reduced yield potential.

Table 5. Information on soil chemical properties and management practices for the Dryland Sunflower Performance Test near Miami, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	5.7	Planting Date	April 28, 2011
Soil Test P Index	19	Harvest Dates	September 23, 2011
Soil Test K Index	130		
		Previous Crop	Soybean
Fertilizer Applied		Herbicide Applications	Spartan and Prowl H_20
N	100	Pesticide Applications	June 29, 2011
P	40		
K	50	Harvest Aid	Yes - Glyphosate

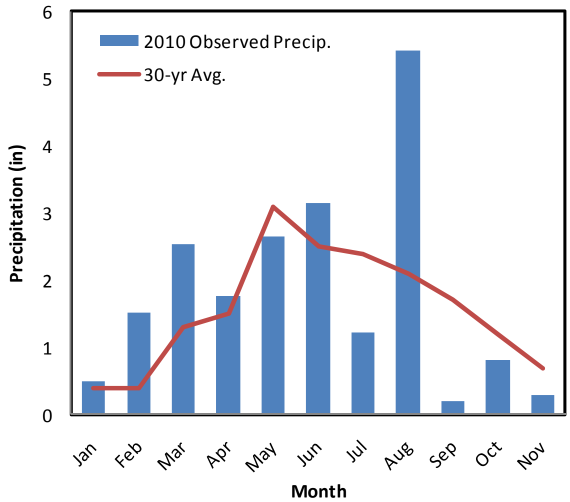
Table 6. Sunflower growth characteristics, oil content, and yield for 2010 near Miami, OK.

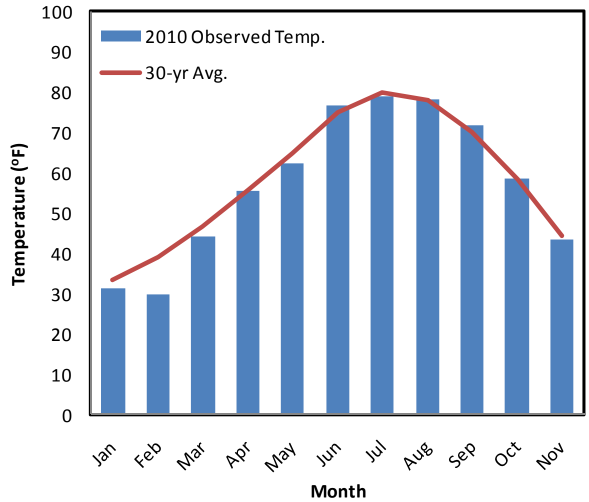
Entry	Company	Lodging†	Height	Oil‡	Yield	Percent of Trial Average
			- - in - -	- - % - -	- - lb/ac - -	- - % - -
306 DMR NS	Croplan Genetics	0	50	44	2246	195
s674	Triumph Seed Co.	0	38	45	1834	159
356A NS	Croplan Genetics	0	50	46	1786	155
3080 DMR NS	Croplan Genetics	0	47	45	1711	149
AP462NS	Advanta US Inc.	0	51	44	1398	122
s668	Triumph Seed Co.	1	44	43	1332	116
4651 NS/DM	Syngenta	2	46	47	1248	108
460 E NS	Croplan Genetics	3	49	46	1246	108
Firebird	Seeds 2000 Inc.	3	51	43	1209	105
s671	Triumph Seed Co.	1	38	46	1145	99
8N510	Mycogen Seeds	2	49	42	1131	98
8N433DM	Mycogen Seeds	0	51	44	1126	98
Blazer CL	Seeds 2000 Inc.	0	52	45	1099	96
859HCL	Triumph Seed Co.	0	54	47	1073	93
X9464	Seeds 2000 Inc.	0	42	45	1056	92
F30008NS,CL	Advanta US Inc.	4	53	41	1025	89
3732 NS	Syngenta	2	51	44	1000	87
3980 NSCL	Syngenta	3	48	44	960	83
559 CL DMR NS	Croplan Genetics	2	51	47	955	83
F51122NS,CL	Advanta US Inc.	2	48	41	941	82
X9866	Seeds 2000 Inc.	3	56	45	886	77
Sierra	Seeds 2000 Inc.	3	50	44	844	73
3845 HO	Syngenta	3	45	44	840	73
s878HO	Triumph Seed Co.	2	47	47	815	71
s673	Triumph Seed Co.	2	44	47	810	70
8N453DM	Mycogen Seeds	1	49	43	735	64
8H499DM	Mycogen Seeds	3	50	43	623	54
	LSD (P=0.05)				598	
	Trial Mean			45	1150	

† Lodging is based on a scale of 1 to 5, with 5 being the most severe.

‡Oil analysis was performed on one composite sample, so statistical analysis was not possible.

Goodwell





Location Summary:

This trial was planted after wheat. Yields at Goodwell in 2010 were a little lower than average. Average yield, when averaged across hybrid, was 1045 lb/ac.

Table 7. Information on soil chemical properties and management practices for the Irrigated Sunflower Performance Test near Goodwell, OK in 2010.

Soil Properties	Result	Cultural Practice	Information
pH	7.3	Planting Date	July 13, 2011
Soil Test P Index	36	Harvest Dates	November 10, 2011
Soil Test K Index	987	Previous Crop	Wheat
Fertilizer Applied		Herbicide Applications	Spartan and Prowl H_20
N	130†	Pesticide Applications	none
P	30		
K	0	Harvest Aid	none
		Irrigation	as needed

† Fertilizer was applied to the preceding wheat crop but sufficient amount of residual N should have been present.

Table 8. Sunflower growth characteristics, oil content, and yield for 2010 near Goodwell, OK.

Entry	Company	Lodging†	Oil	Yield	Percent of Trial Average
			- - % - -	- - lb/ac - -	- - % - -
s673	Triumph Seed Co.	1	41	1590	152
s671	Triumph Seed Co.	1	39	1383	132
AP462NS	Advanta US Inc.	0	39	1383	132
s668	Triumph Seed Co.	1	40	1372	131
8N510	Mycogen Seeds	1	37	1351	129
s674	Triumph Seed Co.	1	40	1264	121
8N433DM	Mycogen Seeds	1	41	1252	120
Firebird	Seeds 2000 Inc.	1	37	1230	118
s878HO	Triumph Seed Co.	1	38	1133	108
559 CL DMR NS	Croplan Genetics	1	39	1133	108
3080 DMR NS	Croplan Genetics	2	43	1089	104
Sierra	Seeds 2000 Inc.	2	34	1078	103
4651 NS/DM	Syngenta	2	36	1078	103
8N453DM	Mycogen Seeds	1	41	1067	102
8H499DM	Mycogen Seeds	1	40	1056	101
859HCL	Triumph Seed Co.	2	39	958	92
F30008NS,CL	Advanta US Inc.	2	37	956	92
460 E NS	Croplan Genetics	2	40	948	91
3732 NS	Syngenta	2	38	882	84
X9464	Seeds 2000 Inc.	1	36	871	83
F51122NS,CL	Advanta US Inc.	2	35	817	78
356A NS	Croplan Genetics	2	38	806	77
Blazer CL	Seeds 2000 Inc.	2	39	795	76
3980 NSCL	Syngenta	2	37	795	76
306 DMR NS	Croplan Genetics	2	40	708	68
3845 HO	Syngenta	1	39	686	66
X9866	Seeds 2000 Inc.	2	37	523	50
	LSD (P=0.05)		2	350	
	Trial Mean		39	1045	

† Lodging is based on a scale of 1 to 5, with 5 being the most severe.

EXTENSION

Oklahoma Small Grains Variety Performance Tests 2009-2010

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This and other wheat-related publications can be found at

www.wheat.okstate.edu

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Seed donated by:
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Don Schieber, Kildare

Carl Simon, Elk City

CONTENTS

Protein data will be reported in a separate publication in August of 2010

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

www.wheat.okstate.edu

2010 WHEAT CROP OVERVIEW

From an agronomic perspective, the 2009-2010 Oklahoma wheat crop was a huge improvement over the previous year. While final production numbers are not available at the time of this report, it is likely that Oklahoma wheat production will exceed 140 million bushels in 2010, which is roughly double the amount produced in 2009. Unfortunately, excess world ending stocks, a depressed world economy, and lower-than-optimal protein resulted in at-harvest cash prices under $3.00 in many areas of the state.

Planting was in full swing in southwest Oklahoma shortly after Labor Day, and most fields in this region had adequate moisture for emergence and fall forage growth. Timely planting was much more of a challenge in northcentral Oklahoma, however, due to wet soil conditions throughout much of October. Challenges presented by wet soil conditions in the region were compounded by rotational crops planted after failed wheat in the spring of 2009. Yields and prices for these rotational and double-crops were generally good, but the later maturity of these crops prevented wheat sowing in many cases. Similarly, very little wheat was sown in northeastern Oklahoma because of wet conditions and rotational crops that were not harvested in time to sow wheat. Conditions in northwestern Oklahoma and the Panhandle were mostly favorable for wheat sowing in 2009, but dry conditions in the region restricted fall forage growth. Hardest hit by dry conditions were parts of Beaver, Harper, and Woods counties which experienced moderate to severe drought conditions throughout the growing season.

With the exception of northwestern Oklahoma and the Panhandle, the wet conditions last fall persisted through the winter with significant amounts of ice and/or snow. Bitter cold temperatures resulted in winter kill of early-sown wheat that had outpaced cattle stocking density and late-sown wheat that had not established an adequate root system. Cool temperatures prevailed during the spring of 2010, which slowed crop development somewhat but also increased grain yield potential. A brief cold snap during April resulted in some slight freeze injury, but there were no reports of widespread losses from freeze in Oklahoma. May was marked by severe hail storms that were devastating in localized areas. By the first of June, heat had returned and harvest was in full swing. Most of southwest Oklahoma was harvested by June 8, but lingering rain showers and high humidity brought harvest to a crawl during mid June. Heat and dry air returned by June 18 and harvest quickly resumed at full pace. Most of the state was harvested by June 30.

A large portion of the Oklahoma wheat crop was nitrogen deficient in 2009-2010. There are several reasons for this. First, many producers were coming off of several years of poor production and/or crop failures and were simply not in a sound enough cash flow situation to purchase nitrogen in the quantities the crop needed. Second, the wet soil conditions during fall and winter resulted in nitrogen leaching in some areas and inadequate root growth to access nitrogen that had been moved lower in the profile. The wet soil conditions also prevented topdress application of nitrogen fertilizer, especially in southwestern Oklahoma. Some producers attempted to address the issue by aerially applying 25 – 30 lbs./A nitrogen, which probably helped. Still others applied N in quantities under 10 lbs./A, which probably did not help grain yield much. Finally, the cold winter and cool spring did not provide much opportunity for nitrogen mineralization from previous crop residue. Research has shown that this can be a significant source of nitrogen for wheat, but favorable soil conditions for microbial activity are required for that to happen.

Weeds were a major wheat production factor in 2010, just as they have been for over twenty years; however, a few changes occurred during the 2009-2010 crop year. The presence of ALS-resistant ryegrass and cheat were confirmed in the state of Oklahoma, with some ryegrass samples showing signs of resistance to ACCase inhibitors as well. The other big change in the wheat industry is the strict enforcement of stringent dockage discount schedules at the elevator. Once word of the dockage schedules was released, some producers with extremely weedy fields chose to cut them for hay even though the wheat was past the optimal growth for doing so. One promising development during the crop year, however, was an increase in acreage sown to winter canola and other rotational crops. Crop rotation is the best long-term, weed-control strategy available to producers and it is reassuring to see more acres being rotated.

The fall of 2009 was relatively quiet in terms of insect activity. There were isolated reports of winter grain mite and brown wheat mite activity and a few fields were sprayed for aphids. There were several reports of spraying for greenbugs and bird cherry oat aphids in February, March and April of 2010. The amount of Barley Yellow Dwarf Virus (BYDV) that became evident in April and May of 2010, indicated that most of these applications were well-justified. BYDV symptoms such as yellowing and purpling of leaves were not hard to find. There was not much stunting of plants, however, indicating that most of the infections occurred after the first of the year. Hessian fly was a factor in 2009-2010, but there were not as many reports of crops being completely devastated by Hessian fly as was the case in 2008-2009. Some of this can likely be attributed to farmers being more aware of Hessian fly and using seed treatments and/or resistant varieties in fields likely to be affected by Hessian fly.

The cold winter prevented fall leaf-rust infestations from overwintering, and for a while, it seemed that foliar disease pressure in Oklahoma could be fairly light. Reports from Texas early in the season, however, clearly indicated that something was different this year. Varieties such as Jagger and Jagalene that had been very resistant to stripe rust in the past were being hammered by stripe rust. By late March, it was clear that the predominant stripe rust race had shifted and the resistance gene(s) in Jagger that had held out so long could no longer be relied upon for protection. By mid April, Jagger and Jagalene plots were completely devastated by stripe rust and could be picked out from a distance at Frederick and Olustee variety trials. Warmer temperatures and drier plant canopies prevailed by late April and much of the concern shifted to leaf rust. Powdery mildew was present as well in susceptible varieties. Consequently, significant application of foliar fungicides occurred in Oklahoma to help limit losses from foliar disease in 2010.

Wheat quality was a concern in 2010. Dockage schedules were strictly enforced by elevators and made clear to producers that weed-infested wheat fields were costing them more than just grain yield. A surplus of wheat on the world market meant that buyers could pick and choose, and many buyers chose not to purchase wheat that was less than 12% protein. Much of the Oklahoma crop fell below this benchmark and left elevator managers and producers scrambling to market the 2010 crop.

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. 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
Art
Doans
Greer
Fannin
Jackpot
Jagalene
TAM 111
TAM 203
TAM 401
OK Rising (W)

Husker Genetics
Mace

Kansas Wheat Alliance
Everest
Fuller
Jagger
Overley

OK Foundation Seed
Deliver
Endurance

Oklahoma Genetics, Inc.
Billings
Centerfield
Duster
Guymon (W)
OK Bullet
Pete

WestBred
Armour
Aspen (W)
Keota
Santa Fe
Shocker
Winterhawk

Whatley Seed
TAM 112

2010 Oklahoma Wheat Variety Trial Summary

Variety	Afton	Alva	Apache	Apache Fung.	Balko	Buffalo	Cherokee	El Reno	Frederick	Gage	Goodwell Irr.	Goodwell Nonirr.
Armour	56	-	-	-	-	-	-	-	-	-	-	-
Art	46	32	-	-	-	-	19	-	-	-	-	-
Aspen (W)	-	-	-	-	-	-	-	-	-	-	67	58
Billings	54	34	-	-	75	22	24	61	-	22	67	62
Centerfield	44	33	47	54	68	27	22	49	44	23	58	56
Deliver	43	32	51	49	70	26	23	49	30	21	54	52
Doans	-	30	60	54	71	27	19	54	47	22	58	55
Duster	47	45	68	68	74	30	33	61	53	24	68	69
Endurance	57	37	57	59	65	31	29	60	35	19	57	60
Everest	59	-	-	-	-	-	31	-	-	-	-	-
Fannin	-	-	55	55	-	-	-	57	40	-	-	-
Fuller	45	32	52	49	73	24	21	56	41	21	60	57
Greer	52	40	56	57	-	22	30	49	46	21	64	61
Guymon (W)	-	-	-	-	-	-	-	-	-	-	57	58
Jackpot	57	31	57	63	75	26	22	65	47	19	60	61
Jagalene	32	35	44	58	59	28	25	44	26	24	56	60
Jagger	50	32	48	52	65	24	24	48	30	22	55	65
Keota	-	38	-	-	67	31	25	-	-	25	62	61
Mace	-	-	-	-	64	-	-	-	-	-	61	54
OK Bullet	45	33	46	53	68	25	22	50	43	24	58	56
OK Rising (W)	-	-	-	-	-	-	-	-	-	-	60	59
Overley	49	39	50	59	67	25	28	55	35	21	50	64
Pete	46	31	52	52	68	26	20	58	39	17	57	64
Santa Fe	48	34	62	52	66	25	23	53	39	21	55	60
Shocker	50	32	52	54	65	25	20	51	38	17	55	55
TAM 111	-	46	-	-	79	22	19	-	-	23	73	61
TAM 112	-	39	-	-	74	32	22	-	-	27	66	71
TAM 203	42	32	52	54	62	24	21	49	36	21	56	51
TAM 401	52	34	63	56	-	29	22	59	42	20	64	60
Winterhawk	-	43	-	-	74	38	32	-	-	24	66	71
OK05212	-	46	-	-	70	-	30	50	-	-	61	58
OK05312	-	37	-	-	73	23	-	-	-	-	65	55
OK05511	-	-	52	56	70	-	-	53	47	-	-	58
OK05526	61	42	57	56	72	-	25	56	-	-	63	-
OK06618	-	-	-	-	-	-	-	-	-	-	-	-
OK07231	-	35	-	-	-	-	-	51	-	-	67	-
STARS 0601W	-	-	-	-	65	26	-	-	-	-	57	51
Mean	**49**	**36**	**54**	**56**	**69**	**27**	**24**	**54**	**40**	**22**	**61**	**59**
LSD $_{(0.05)}$	**7**	**5**	**7**	**7**	**5**	**9**	**5**	**11**	**6**	**4**	**7**	**9**

Partial financial support provided by the Oklahoma Wheat Commission

2010 Oklahoma Wheat Variety Trial Summary

Variety	Haskell	Homestead	Hooker	Keyes	Kingfisher	Lahoma	Lahoma Fung.	Lamont	Marshall DP	Marshall GO	Olustee
Armour	19	-	-	-	-	26	32	51	-	-	-
Art	16	-	-	-	-	18	23	39	-	-	-
Aspen (W)	-	-	-	-	-	-	-	-	-	-	-
Billings	20	43	85	42	54	32	34	50	45	40	-
Centerfield	15	42	-	-	48	27	27	41	50	36	41
Deliver	14	41	-	-	48	21	23	41	38	33	36
Doans	-	37	72	41	56	20	20	47	49	35	48
Duster	21	49	73	43	61	30	39	45	58	45	49
Endurance	21	44	66	43	56	30	39	48	49	40	42
Everest	22	-	-	-	-	37	38	56	-	-	-
Fannin	-	-	-	-	-	-	-	-	-	-	40
Fuller	18	42	77	42	53	23	26	43	48	38	49
Greer	16	44	-	-	51	26	34	43	37	35	45
Guymon (W)	-	-	-	-	-	-	-	-	-	-	-
Jackpot	24	44	84	46	56	27	29	51	44	40	42
Jagalene	16	28	72	45	42	16	29	27	30	23	33
Jagger	17	31	80	49	45	20	27	38	39	26	39
Keota	-	-	75	38	-	-	-	-	-	-	-
Mace	-	-	69	37	-	-	-	-	-	-	-
OK Bullet	17	36	69	41	51	22	29	37	42	32	43
OK Rising (W)	-	-	-	-	-	-	-	-	-	-	-
Overley	15	42	-	-	50	22	26	41	37	32	46
Pete	13	41	72	41	55	18	21	34	49	36	45
Santa Fe	18	37	-	-	52	25	30	36	42	35	43
Shocker	23	36	-	-	51	20	25	38	49	38	43
TAM 111	-	-	80	41	-	-	-	-	-	-	-
TAM 112	-	-	82	42	-	-	-	-	-	-	-
TAM 203	18	39	74	44	46	18	22	38	41	30	37
TAM 401	23	41	-	-	51	18	23	44	38	40	43
Winterhawk	-	-	81	40	-	-	-	-	-	-	-
OK05212	17	-	77	-	54	33	38	49	34	41	-
OK05312	-	-	58	50	-	-	-	-	-	-	-
OK05511	-	48	70	42	55	31	39	-	-	-	41
OK05526	24	-	-	42	59	29	35	49	58	43	-
OK06618	-	-	-	-	-	-	-	45	54	-	-
OK07231	-	-	-	-	-	31	35	-	55	-	-
STARS 0601W	-	-	80	38	-	-	-	-	-	-	-
Mean	**19**	**40**	**75**	**42**	**52**	**25**	**30**	**43**	**45**	**36**	**42**
LSD $_{(0.05)}$	**6**	**5**	**5**	**7**	**4**	**4**	**4**	**6**	**6**	**5**	**4**

Oklahoma Cooperative Extension Service publication CR-2143

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Afton Wheat Variety Trial

Cooperator: Greg Leonard
Soil type: Parsons silt loam
Planting date: 11-12-09
Harvest date: 6-24-10

Tillage: Conventional till
Management: Grain only
Previous crop: Corn
Soil test: pH = 7.1, P = 164, K = 266

		Grain Yield		Test Weight
Source	Variety	2009-10	2-Year	2009-10
		----------bu/ac---------		-----lb/bu-----
KSU	Everest	59	-	57.8
OSU	Endurance	57	44	54.9
AgriPro	Jackpot	57	37	55.4
WestBred	Armour	56	46	55.3
OSU	Billings	54	37	55.1
AgriPro	Greer	52	-	53.7
TAMU	TAM 401	52	-	55.2
KSU	Jagger	50	37	56.5
WestBred	Shocker	50	37	54.7
KSU	Overley	49	32	53.3
WestBred	Santa Fe	48	37	54.4
OSU	Duster	47	35	53.3
AgriPro	Art	46	-	53.9
OSU	Pete	46	29	54.9
KSU	Fuller	45	37	52.8
OSU	OK Bullet	45	32	55.8
OSU	Centerfield	44	33	53.7
OSU	Deliver	43	34	53.8
TAMU	TAM 203	42	35	54.5
AgriPro	Jagalene	32	26	54.0
Experimentals				
	OK05526	61	43	56.8
	Mean	49	36	54.8
	LSD $_{(0.05)}$	7	4	2.6

Partial financial support provided by the Oklahoma Wheat Commission

Alva Wheat Variety Trial

Cooperator: Wes Mallory
Soil type: Grant silt loam
Planting date: 10-26-09
Harvest date: 6-21-10

Tillage: Conventional till
Management: Grain only
Previous crop: Wheat
Soil test: pH = 6.2, P = 109, K = 586

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		------------	bu/ac	-----------	---lb/bu---
TAMU	TAM 111	46	43	49	58.5
OSU	Duster	45	46	52	58.3
WestBred	Winterhawk	43	44	-	58.8
AgriPro	Greer	40	-	-	53.4
KSU	Overley	39	42	46	55.7
TAMU	TAM 112	39	42	-	56.2
WestBred	Keota	38	40	-	57.5
OSU	Endurance	37	44	50	54.7
AgriPro	Jagalene	35	41	47	57.2
OSU	Billings	34	40	47	56.5
WestBred	Santa Fe	34	41	47	55.5
TAMU	TAM 401	34	-	-	54.2
OSU	Centerfield	33	39	46	56.4
OSU	OK Bullet	33	37	45	56.8
AgriPro	Art	32	-	-	54.7
OSU	Deliver	32	39	46	56.1
KSU	Fuller	32	37	47	56.2
KSU	Jagger	32	39	46	55.2
WestBred	Shocker	32	37	44	54.7
TAMU	TAM 203	32	40	-	54.9
AgriPro	Jackpot	31	39	48	55.1
OSU	Pete	31	38	45	57.4
AgriPro	Doans	30	36	45	57.5
Experimentals					
	OK05212	46	-	-	57.1
	OK05526	42	46	-	57.7
	OK05312	37	-	-	57.5
	OK07231	35	-	-	56.7
	Mean	36	40	47	56.3
	LSD $_{(0.05)}$	5	4	3	0.9

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Apache Wheat Variety Trial

Cooperator: Bryan Vail
Soil type: Hollister silt loam
Planting date: 10-26-09
Harvest date: 6-09-10

Management: No-till grain only
Soil test: pH = 5.9, P = 73, K = 571
Previous crop: Soybean
Fungicide = 10 oz/A Stratego on 20 April 2010

		Grain Yield						Test Weight		
		2009-10			2-Year			2009-10		
Source	Variety	No Fungicide	Fungicide	*Diff.*	No Fungicide	Fungicide	*Diff.*	No Fungicide	Fungicide	*Diff.*
		bu/ac						lb/bu		
OSU	Duster	68	68	*0*	69	67	*-2*	62.3	62.7	*0.4*
TAMU	TAM 401	63	56	*-7*	-	-	-	58.9	59.3	*0.4*
WestBred	Santa Fe	62	52	*-10*	60	56	*-4*	60.9	61.4	*0.5*
AgriPro	Doans	60	54	*-6*	60	54	*-6*	62.8	62.8	*0.0*
OSU	Endurance	57	59	*2*	56	56	*0*	59.9	60.3	*0.4*
AgriPro	Jackpot	57	63	*6*	59	58	*-1*	61.0	61.5	*0.5*
AgriPro	Greer	56	57	*1*	-	-	-	58.0	58.9	*0.9*
AgriPro	Fannin	55	55	*0*	52	52	*0*	62.5	62.5	*0.0*
KSU	Fuller	52	49	*-3*	60	58	*-2*	60.0	60.2	*0.2*
OSU	Pete	52	52	*0*	59	56	*-3*	61.2	61.5	*0.3*
WestBred	Shocker	52	54	*2*	57	61	*4*	60.1	60.1	*0.0*
TAMU	TAM 203	52	54	*2*	55	58	*3*	60.2	61.0	*0.8*
OSU	Deliver	51	49	*-2*	49	51	*2*	61.0	60.5	*-0.5*
KSU	Overley	50	59	*9*	54	58	*4*	60.1	61.9	*1.8*
KSU	Jagger	48	52	*4*	54	58	*4*	59.4	61.0	*1.6*
OSU	Centerfield	47	54	*7*	50	54	*4*	60.2	61.0	*0.8*
OSU	OK Bullet	46	53	*7*	55	53	*-2*	60.5	61.6	*1.1*
AgriPro	Jagalene	44	58	*14*	54	59	*5*	60.1	62.0	*1.9*
Experimentals										
	OK05526	57	56	*-1*	-	-	-	61.4	61.7	*0.3*
	OK05511	52	56	*4*	-	-	-	60.7	61.5	*0.8*
	Mean	54	56	*2*	56	57	*1*	60.6	61.2	*0.6*
	LSD $_{(0.05)}$		7			6			0.7	

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Balko Wheat Variety Trial

Cooperator: Johnny Lane
Soil type: Ulysses-Richfield complex
Planting date: 9-25-09
Harvest date: 6-25-10

Tillage: Conventional till
Management: Grain only
Previous crop: Wheat/fallow
Soil test: pH = 7.6, P = 28, K = 926

		Grain Yield				Test Weight
Source	Variety	2009-10	Shatter rating*	2-Year	3-Year	2009-10
		-------------bu/ac------------				---lb/bu---
TAMU	TAM 111	79	1	67	77	60.4
OSU	Billings	75	1	-	-	61.8
AgriPro	Jackpot	75	3	61	-	61.1
OSU	Duster	74	1	62	72	61.1
TAMU	TAM 112	74	1	66	-	61.3
WestBred	Winterhawk	74	1	62	-	61.7
KSU	Fuller	73	1	60	69	60.0
AgriPro	Doans	71	2	61	69	62.1
OSU	Deliver	70	1	58	67	60.4
OSU	Centerfield	68	1	57	67	60.4
OSU	OK Bullet	68	1	58	69	60.9
OSU	Pete	68	1	59	-	60.6
WestBred	Keota	67	1	58	-	60.6
KSU	Overley	67	4	60	71	60.9
WestBred	Santa Fe	66	2	59	70	58.7
OSU	Endurance	65	2	62	73	59.9
KSU	Jagger	65	1	60	68	57.6
WestBred	Shocker	65	3	57	65	60.0
UNL	Mace	64	1	59	-	59.0
TAMU	TAM 203	62	5	58	-	59.0
AgriPro	Jagalene	59	2	59	68	59.3
Experimentals						
	OK05312	73	4	67	-	61.8
	OK05526	72	1	61	-	60.9
	OK05212	70	1	-	-	60.5
	OK05511	70	0	-	-	60.6
	STARS 0601W	65	0	58	-	61.5
	Mean	69		60	70	60.5
	LSD $_{(0.05)}$	5		4	4	1.3

* Shatter ratings recorded at harvest using a 0 - 10 scale, with 0 indicating no shattering and 10 indicating severe shattering

Partial financial support provided by the Oklahoma Wheat Commission

Buffalo Wheat Variety Trial

Cooperator: NRCS
Soil type: St. Paul silt loam
Planting date: 10-16-09
Harvest date: 6-21-10

Tillage: Conventional till
Management: Grain only
Previous crop: Wheat
Soil test: pH = 7.2, P = 60, K = 664

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		-----------bu/ac----------			---lb/bu---
WestBred	Winterhawk	38	52	-	60.7
TAMU	TAM 112	32	48	-	58.1
OSU	Endurance	31	52	56	57.3
WestBred	Keota	31	50	-	59.5
OSU	Duster	30	50	55	60.0
TAMU	TAM 401	29	-	-	56.4
AgriPro	Jagalene	28	48	49	59.8
OSU	Centerfield	27	44	48	58.3
AgriPro	Doans	27	44	50	58.3
OSU	Deliver	26	45	52	58.8
AgriPro	Jackpot	26	42	-	56.4
OSU	Pete	26	-	-	58.9
OSU	OK Bullet	25	42	49	58.1
KSU	Overley	25	43	49	56.7
WestBred	Santa Fe	25	40	48	57.6
WestBred	Shocker	25	37	44	56.4
KSU	Fuller	24	39	48	57.2
KSU	Jagger	24	39	43	56.0
TAMU	TAM 203	24	43	-	57.7
OSU	Billings	22	-	-	55.5
AgriPro	Greer	22	-	-	54.4
TAMU	TAM 111	22	40	47	58.3
Experimentals					
	STARS 0601W	26	-	-	59.0
	OK05312	23	-	-	59.5
	Mean	27	44	49	57.9
	LSD $_{(0.05)}$	9	5	4	1.0

Partial financial support provided by the Oklahoma Wheat Commission

Cherokee Wheat Variety Trial

Cooperator: Kenneth Failes
Soil type: Dale silt loam
Planting date: 10-26-09
Harvest date: 6-18-10

Tillage: Conventional till
Management: Grain Only
Previous crop: Wheat
Soil test: pH = 6.1, P = 109, K = 715

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		-------------bu/ac------------			-----lb/bu-----
OSU	Duster	33	38	44	57.3
WestBred	Winterhawk	32	39	-	57.6
KSU	Everest	31	-	-	55.7
AgriPro	Greer	30	-	-	52.1
OSU	Endurance	29	38	44	53.6
KSU	Overley	28	32	35	54.9
AgriPro	Jagalene	25	37	41	56.6
WestBred	Keota	25	33	-	56.2
OSU	Billings	24	-	-	55.8
KSU	Jagger	24	30	37	54.7
OSU	Deliver	23	30	36	55.1
WestBred	Santa Fe	23	32	38	54.9
OSU	Centerfield	22	30	36	55.0
AgriPro	Jackpot	22	28	35	54.0
OSU	OK Bullet	22	31	37	55.5
TAMU	TAM 112	22	31	-	53.9
TAMU	TAM 401	22	-	-	53.7
KSU	Fuller	21	30	36	53.8
TAMU	TAM 203	21	32	-	54.2
OSU	Pete	20	29	-	56.3
WestBred	Shocker	20	26	33	52.3
AgriPro	Art	19	-	-	54.2
AgriPro	Doans	19	30	37	55.3
TAMU	TAM 111	19	29	-	54.5
Experimentals					
	OK05212	30	-	-	55.1
	OK05526	25	35	-	55.8
	Mean	24	32	38	54.9
	LSD $_{(0.05)}$	5	3	4	1.2

Partial financial support provided by the Oklahoma Wheat Commission

El Reno Wheat Variety Trial

Cooperator: Bornemann Farms
Soil type: Pond Creek silt loam
Planting date: 9-29-09
Harvest date: 6-10-10

Tillage: Conventional till
Management: Dual Purpose
Previous crop: Wheat
Soil test: pH = 6.5, P = 59, K = 354

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		-----------bu/ac----------			-----lb/bu-----
AgriPro	Jackpot	65	46	52	60.8
OSU	Billings	61	-	-	60.5
OSU	Duster	61	49	62	60.0
OSU	Endurance	60	51	59	58.3
TAMU	TAM 401	59	-	-	59.0
OSU	Pete	58	36	-	60.7
AgriPro	Fannin	57	40	41	61.4
KSU	Fuller	56	41	50	60.0
KSU	Overley	55	38	42	59.5
AgriPro	Doans	54	46	52	61.4
WestBred	Santa Fe	53	44	51	58.5
WestBred	Shocker	51	39	45	59.5
OSU	OK Bullet	50	36	45	60.9
OSU	Centerfield	49	38	45	59.5
OSU	Deliver	49	42	50	59.7
AgriPro	Greer	49	-	-	57.1
TAMU	TAM 203	49	40	-	58.9
KSU	Jagger	48	33	42	58.7
AgriPro	Jagalene	44	33	41	59.3
Experimentals					
	OK05526	56	46	-	59.9
	OK05511	53	-	-	59.3
	OK07231	51	-	-	59.7
	OK05212	50	-	-	56.8
	Mean	54	41	48	59.5
	LSD $_{(0.05)}$	11	7	6	2.1

Partial financial support provided by the Oklahoma Wheat Commission

Frederick Wheat Variety Trial

Cooperator: Great Plains Technology Center
Soil type: Tillman and Foard silt loam
Planting date: 10-20-09
Harvest date: 6-04-10
Tillage: Conventional till
Management: Grain only
Previous crop: Fallow
Soil test: pH = 8.0, P = 31, K = 806

		Grain Yield	Test Weight
Source	Variety	2009-10	2009-10
		-----bu/ac----	-----lb/bu-----
OSU	Duster	53	60.3
AgriPro	Doans	47	61.8
AgriPro	Jackpot	47	59.5
AgriPro	Greer	46	57.1
OSU	Centerfield	44	60.4
OSU	OK Bullet	43	60.7
TAMU	TAM 401	42	57.9
KSU	Fuller	41	58.9
AgriPro	Fannin	40	62.0
OSU	Pete	39	61.2
WestBred	Santa Fe	39	58.9
WestBred	Shocker	38	59.0
TAMU	TAM 203	36	57.8
OSU	Endurance	35	58.0
KSU	Overley	35	58.8
OSU	Deliver	30	60.5
KSU	Jagger	30	57.3
AgriPro	Jagalene	26	57.1
Experimentals			
	OK05511	47	60.8
	Mean	40	59.4
	LSD $_{(0.05)}$	6	0.8

Partial financial support provided by the Oklahoma Wheat Commission

Gage Wheat Variety Trial

Cooperator: Curtis Torrance | **Tillage: Conventional till**
Soil type: St. Paul silt loam | **Management: Dual Purpose**
Planting date: 9-23-09 | **Previous crop: Wheat**
Harvest date: 6-22-10 | **Soil test: pH = 7.6, P = 52, K = 798**

Source	Variety	Grain Yield 2009-10	2-Year	3-Year
		------------bu/ac-----------		
TAMU	TAM 112	27	29	-
WestBred	Keota	25	27	-
OSU	Duster	24	25	31
AgriPro	Jagalene	24	26	31
OSU	OK Bullet	24	24	28
WestBred	Winterhawk	24	24	-
OSU	Centerfield	23	25	28
TAMU	TAM 111	23	25	30
OSU	Billings	22	-	-
AgriPro	Doans	22	24	28
KSU	Jagger	22	25	28
OSU	Deliver	21	22	26
KSU	Fuller	21	22	28
AgriPro	Greer	21	-	-
KSU	Overley	21	23	27
WestBred	Santa Fe	21	23	27
TAMU	TAM 203	21	24	-
TAMU	TAM 401	20	-	-
OSU	Endurance	19	24	30
AgriPro	Jackpot	19	22	29
OSU	Pete	17	20	-
WestBred	Shocker	17	19	24
	Mean	22	24	28
	LSD $_{(0.05)}$	4	3	2

* Sample size was too small in 2010 to obtain a test weight measurement

Partial financial support provided by the Oklahoma Wheat Commission

Goodwell Irrigated Wheat Variety Trial

Cooperator: OK Panhandle Research and Extension Center

Soil type: Richfield clay loam | **Tillage: No-till**

Planting date: 10-06-09 | **Management: Grain only**

Harvest date: 6-29-10 | **Previous crop: Soybean**

Source	Variety	Grain Yield 2009-10	Test Weight 2009-10
		-----bu/ac-----	-----lb/bu-----
TAMU	TAM 111	73	59.9
OSU	Duster	68	59.5
WestBred	Aspen (W)	67	57.6
OSU	Billings	67	59.3
TAMU	TAM 112	66	59.4
WestBred	Winterhawk	66	60.6
AgriPro	Greer	64	58.2
TAMU	TAM 401	64	57.1
WestBred	Keota	62	59.7
UNL	Mace	61	58.2
KSU	Fuller	60	57.8
AgriPro	Jackpot	60	57.7
OSU	OK Rising (W)	60	58.6
OSU	Centerfield	58	58.3
AgriPro	Doans	58	58.9
OSU	OK Bullet	58	59.7
OSU	Endurance	57	58.4
OSU	Guymon (W)	57	59.9
OSU	Pete	57	59.1
AgriPro	Jagalene	56	60.2
TAMU	TAM 203	56	58.6
KSU	Jagger	55	58.9
WestBred	Santa Fe	55	57.2
WestBred	Shocker	55	57.2
OSU	Deliver	54	58.6
KSU	Overley	50	58.6
Experimentals			
	OK07231	67	58.9
	OK05312	65	60.4
	OK05526	63	59.2
	OK05212	61	59.2
	STARS 0601W	57	58.5
	Mean	61	58.8
	LSD $_{(0.05)}$	7	1.2

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Goodwell Nonirrigated Wheat Variety Trial

Cooperator: OK Panhandle Research and Extension Center | **Tillage: No-till**
Soil type: Richfield clay loam | **Management: Grain only**
Planting date: 9-23-09 | **Previous crop: Sunflower/Fallow**
Harvest date: 6-25-10 | **Soil test: pH = 7.8, P = 46, K = 105**

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		-------------bu/ac------------			-----lb/bu-----
TAMU	TAM 112	71	57	62	56.5
WestBred	Winterhawk	71	53	-	57.4
OSU	Duster	69	55	65	57.6
KSU	Jagger	65	47	54	56.8
KSU	Overley	64	52	60	57.4
OSU	Pete	64	49	-	58.8
OSU	Billings	62	-	-	57.1
AgriPro	Greer	61	-	-	54.6
AgriPro	Jackpot	61	43	-	56.5
WestBred	Keota	61	51	-	57.1
TAMU	TAM 111	61	50	58	57.5
OSU	Endurance	60	52	60	57.0
AgriPro	Jagalene	60	50	59	58.3
WestBred	Santa Fe	60	46	54	56.0
TAMU	TAM 401	60	-	-	55.4
OSU	OK Rising (W)	59	41	53	56.4
WestBred	Aspen (W)	58	47	-	55.2
OSU	Guymon (W)	58	47	54	57.5
KSU	Fuller	57	43	55	56.9
OSU	Centerfield	56	45	49	56.8
OSU	OK Bullet	56	39	53	57.9
AgriPro	Doans	55	43	50	57.7
WestBred	Shocker	55	40	49	55.4
UNL	Mace	54	42	-	57.0
OSU	Deliver	52	43	53	57.0
TAMU	TAM 203	51	43	-	56.4
Experimentals					
	OK05212	58	-	-	56.8
	OK05511	58	-	-	57.4
	OK05312	55	47	-	58.8
	STARS 0601W	51	42	-	57.6
	Mean	59	47	56	57.0
	LSD $_{(0.05)}$	9	6	6	0.9

(W) = Hard white wheat variety

Partial financial support provided by the Oklahoma Wheat Commission

Haskell Wheat Variety Trial

Cooperator: Eastern Research Station | **Tillage: Conventional till**
Soil type: Taloka silt loam | **Management: Grain only**
Planting date: 11-13-09 | **Previous crop: Wheat**
Harvest date: 6-25-10 | **Soil test: pH = 5.4, P = 33, K = 123**

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		------------bu/ac-----------			-----lb/bu-----
AgriPro	Jackpot	24	18	-	54.7
WestBred	Shocker	23	17	27	54.8
TAMU	TAM 401	23	-	-	54.6
KSU	Everest	22	-	-	58.5
OSU	Duster	21	20	34	53.9
OSU	Endurance	21	21	36	52.9
OSU	Billings	20	-	-	54.8
WestBred	Armour	19	21	-	51.8
KSU	Fuller	18	18	32	56.1
WestBred	Santa Fe	18	18	30	55.2
TAMU	TAM 203	18	19	-	53.5
KSU	Jagger	17	16	26	54.4
OSU	OK Bullet	17	17	28	53.8
AgriPro	Art	16	-	-	54.2
AgriPro	Greer	16	-	-	53.4
AgriPro	Jagalene	16	17	25	54.9
OSU	Centerfield	15	17	28	52.0
KSU	Overley	15	11	23	55.8
OSU	Deliver	14	14	28	53.8
OSU	Pete	13	13	-	54.6
Experimentals					
	OK05526	24	-	-	55.9
	OK05212	17	-	-	54.2
	Mean	19	17	29	54.4
	LSD $_{(0.05)}$	6	4	3	1.6

Partial financial support provided by the Oklahoma Wheat Commission

Homestead Wheat Variety Trial

Cooperator: Brook Strader | **Tillage: Conventional till**
Soil type: Canadian fine sandy loam | **Management: Grain only**
Planting date: 10-27-09 | **Previous crop: Wheat**
Harvest date: 6-10-10 | **Soil test: pH = 5.8, P = 69, K = 632**

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		-----bu/ac----			-----lb/bu-----
OSU	Duster	49	44	40	59.2
OSU	Endurance	44	42	39	55.2
AgriPro	Greer	44	-	-	56.1
AgriPro	Jackpot	44	39	40	58.6
OSU	Billings	43	-	-	59.3
OSU	Centerfield	42	39	37	57.9
KSU	Fuller	42	39	38	57.0
KSU	Overley	42	38	34	57.8
OSU	Deliver	41	37	35	58.4
OSU	Pete	41	-	-	58.9
TAMU	TAM 401	41	-	-	55.6
TAMU	TAM 203	39	38	-	56.3
AgriPro	Doans	37	36	35	60.2
WestBred	Santa Fe	37	38	38	56.4
OSU	OK Bullet	36	36	35	58.3
WestBred	Shocker	36	36	35	56.8
KSU	Jagger	31	30	32	54.7
AgriPro	Jagalene	28	30	29	55.6
Experimental					
	OK05511	48	-	-	59.6
	Mean	40	37	36	57.5
	LSD $_{(0.05)}$	5	4	4	1.2

Partial financial support provided by the Oklahoma Wheat Commission

Hooker Wheat Variety Trial

Cooperator: Dan Herald
Soil type: Dalhart fine sandy loam
Planting date: 9-29-09
Harvest date: 6-25-10

Tillage: No-till
Management: Grain only
Previous crop: Wheat
Soil test: pH = 7.3, P = 53, K = 789

		Grain Yield				Test Weight
Source	Variety	2009-10	Shatter rating*	2-Year	3-Year	2009-10
		---------------bu/ac-------------				-----lb/bu-----
OSU	Billings	85	1	-	-	59.3
AgriPro	Jackpot	84	1	53	-	58.8
TAMU	TAM 112	82	1	56	45	58.0
WestBred	Winterhawk	81	1	54	-	58.5
KSU	Jagger	80	2	51	42	56.5
TAMU	TAM 111	80	0	52	43	57.5
KSU	Fuller	77	0	49	41	56.8
WestBred	Keota	75	1	48	-	58.0
TAMU	TAM 203	74	1	48	-	55.8
OSU	Duster	73	0	47	40	56.3
AgriPro	Doans	72	1	47	-	59.7
AgriPro	Jagalene	72	2	46	39	57.9
OSU	Pete	72	0	-	-	58.2
UNL	Mace	69	3	51	41	56.9
OSU	OK Bullet	69	3	45	38	58.0
OSU	Endurance	66	3	45	38	57.5
Experimentals						
	STARS 0601W	80	1	-	-	59.3
	OK05212	77	1	-	-	56.7
	OK05511	70	4	-	-	57.5
	OK05312	58	8	-	-	57.3
	Mean	75		49	41	57.7
	LSD $_{(0.05)}$	5		3	2	1.3

* Shatter ratings recorded at harvest using a 0 - 10 scale, with 0 indicating no shattering and 10 indicating severe shattering

Partial financial support provided by the Oklahoma Wheat Commission

Keyes Wheat Variety Trial

Cooperator: J.B. Stewart
Soil type: Richfield clay loam
Planting date: 9-25-09
Harvest date: 6-29-10
Tillage: Minimum-till
Management: Grain only
Previous crop: Wheat/Fallow

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		------------bu/ac-----------			-----lb/bu-----
KSU	Jagger	49	41	31	60.8
AgriPro	Jackpot	46	38	37	61.0
AgriPro	Jagalene	45	44	-	60.5
TAMU	TAM 203	44	41	-	61.0
OSU	Duster	43	43	37	59.9
OSU	Endurance	43	47	39	60.8
TAMU	TAM 112	42	44	39	60.4
KSU	Fuller	42	38	31	60.7
OSU	Billings	42	-	-	60.4
OSU	OK Bullet	41	37	32	61.3
OSU	Pete	41	-	-	60.3
TAMU	TAM 111	41	45	40	60.2
AgriPro	Doans	41	37	-	60.9
WestBred	Winterhawk	40	39	-	61.4
WestBred	Keota	38	38	-	59.3
UNL	Mace	37	43	36	58.3
Experimentals					
	OK05312	50	46	-	61.5
	OK05511	42	-	-	59.8
	OK05526	42	-	-	60.0
	STARS 0601W	38	-	-	59.1
	Mean	42	41	36	60.4
	LSD $_{(0.05)}$	7	6	4	1.3

* Note: all plots were treated with Headline fungicide in April

Partial financial support provided by the Oklahoma Wheat Commission

Kingfisher Wheat Variety Trial

Cooperator: Rodney Mueggenborg
Soil type: Tillman silt loam
Planting date: 10-27-09
Harvest date: 6-08-10
Tillage: Conventional till
Management: Grain only
Previous crop: Wheat
Soil test: pH = 6.5, P = 47, K = 501

Source	Variety	Grain Yield 2009-10	Grain Yield 2-Year	Grain Yield 3-Year	Test Weight 2009-10
			-----bu/ac----		-----lb/bu-----
OSU	Duster	61	55	59	63.2
AgriPro	Doans	56	48	51	63.1
OSU	Endurance	56	50	54	61.3
AgriPro	Jackpot	56	45	50	62.4
OSU	Pete	55	41	47	63.0
OSU	Billings	54	41	46	63.5
KSU	Fuller	53	44	50	62.0
WestBred	Santa Fe	52	46	49	62.7
AgriPro	Greer	51	-	-	60.1
OSU	OK Bullet	51	46	50	62.2
WestBred	Shocker	51	39	43	61.6
TAMU	TAM 401	51	-	-	60.0
KSU	Overley	50	40	45	61.9
OSU	Centerfield	48	43	48	62.0
OSU	Deliver	48	43	45	62.3
TAMU	TAM 203	46	44	-	60.5
KSU	Jagger	45	37	44	59.8
AgriPro	Jagalene	42	41	46	60.9
Experimentals					
	OK05526	59	43	-	62.6
	OK05511	55	-	-	62.2
	OK05212	54	-	-	62.5
	Mean	52	44	48	61.9
	LSD $_{(0.05)}$	4	3	3	0.6

Partial financial support provided by the Oklahoma Wheat Commission

Lahoma Wheat Variety Trial

Cooperator: North Central Research Station
Soil type: Pond Creek Silt Loam
Planting date: 10-28-09
Harvest date: 6-23-10
Management: Grain only
Soil test: pH = 5.9, P = 51, K = 443
Previous crop: Wheat
Fungicide = 14 oz/A Quilt on 27 April 2010

		Grain Yield								
		2009-10			2-Year			3-Year		
Source	Variety	No Fungicide	Fungicide	*Diff.*	No Fungicide	Fungicide	*Diff.*	No Fungicide	Fungicide	*Diff.*
		bu/ac								
KSU	Everest	37	38	*1*	-	-	-	-	-	-
OSU	Billings	32	34	*2*	41	43	*2*	53	55	*2*
OSU	Duster	30	39	*9*	44	54	*10*	51	62	*11*
OSU	Endurance	30	39	*9*	46	53	*7*	53	60	*7*
OSU	Centerfield	27	27	*0*	43	42	*-1*	49	51	*2*
AgriPro	Jackpot	27	29	*2*	39	40	*1*	52	59	*7*
AgriPro	Greer	26	34	*8*	-	-	-	-	-	-
WestBred	Armour	26	32	*6*	-	-	-	-	-	-
WestBred	Santa Fe	25	30	*5*	46	45	*-1*	55	56	*1*
KSU	Fuller	23	26	*3*	37	41	*4*	49	54	*5*
KSU	Overley	22	26	*4*	34	39	*5*	45	51	*6*
OSU	OK Bullet	22	29	*7*	35	43	*8*	41	53	*12*
OSU	Deliver	21	23	*2*	36	40	*4*	46	52	*6*
WestBred	Shocker	20	25	*5*	34	39	*5*	50	54	*4*
AgriPro	Doans	20	20	*0*	34	39	*5*	47	51	*4*
KSU	Jagger	20	27	*7*	35	41	*6*	39	52	*13*
AgriPro	Art	18	23	*5*	-	-	-	-	-	-
TAMU	TAM 401	18	23	*5*	-	-	-	-	-	-
TAMU	TAM 203	18	22	*4*	37	42	*5*	-	-	-
OSU	Pete	18	21	*3*	30	35	*5*	-	-	-
AgriPro	Jagalene	16	29	*13*	34	47	*13*	37	55	*18*
Experimentals										
	OK05212	33	38	*5*	-	-	-	-	-	-
	OK05511	31	39	*8*	-	-	-	-	-	-
	OK07231	31	35	*4*	-	-	-	-	-	-
	OK05526	29	35	*6*	43	48	5	-	-	-
	Mean	25	30	*5*	*38*	*43*	*5*	48	55	*7*
	LSD $_{(0.05)}$	4	4		*3*	*3*		3	3	

* Sample size was too small in 2010 to obtain a test weight measurement

Partial financial support provided by the Oklahoma Wheat Commission

Lamont Wheat Variety Trial

Cooperator: Kirby Farms
Soil type: Pond Creek silt loam
Planting date: 10-28-09
Harvest date: 6-23-10
Tillage: Conventional till
Management: Grain only
Previous crop: Wheat
Soil test: pH = 5.8, P = 48, K = 481

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		------------bu/ac-----------			-----lb/bu-----
KSU	Everest	56	-	-	58.4
WestBred	Armour	51	-	-	55.4
AgriPro	Jackpot	51	43	53	56.9
OSU	Billings	50	42	50	57.2
OSU	Endurance	48	46	48	54.4
AgriPro	Doans	47	45	52	58.2
OSU	Duster	45	41	50	55.1
TAMU	TAM 401	44	-	-	53.7
KSU	Fuller	43	40	51	55.7
AgriPro	Greer	43	-	-	51.9
KSU	Overley	41	41	47	55.4
OSU	Deliver	41	42	44	56.1
OSU	Centerfield	41	44	45	55.2
AgriPro	Art	39	-	-	53.9
TAMU	TAM 203	38	43	-	54.0
WestBred	Shocker	38	44	48	54.1
KSU	Jagger	38	41	43	53.9
OSU	OK Bullet	37	37	41	55.0
WestBred	Santa Fe	36	43	50	53.2
OSU	Pete	34	-	-	56.4
AgriPro	Jagalene	27	36	39	52.8
Experimentals					
	OK05526	49	43	-	56.3
	OK05212	49	-	-	55.8
	OK06618	45	-	-	57.7
	Mean	43	42	47	55.3
	LSD $_{(0.05)}$	6	5	4	1.1

Partial financial support provided by the Oklahoma Wheat Commission

Marshall Wheat Variety Trial

Cooperator: Henry Fuxa | **Tillage: Conventional till** | **Previous crop: Wheat** | **Soil type: Kirkland silt loam**

Planting date: 9-17-09 (Dual purpose) & 10-26-09 (Grain only) | **Harvest date: 6-10-10** | **Soil test: pH = 5.3, P = 60, K = 329**

		Grain Yield									Test Weight		
		2009-10			2-Year			3-Year			2009-10		
Source	Variety	Grain only	Dual purpose	***Diff.***	Grain only	Dual purpose	***Diff.***	Grain only	Dual purpose	***Diff.***	Grain only	Dual purpose	***Diff.***
		bu/ac									lb/bu		
OSU	Duster	45	58	*13*	38	35	*-3*	47	43	*-4*	56.4	61.1	*5*
OSU	Centerfield	36	50	*14*	30	29	*-1*	39	36	*-3*	55.3	59.4	*4*
AgriPro	Doans	35	49	*14*	31	31	*0*	40	38	*-2*	57.9	60.3	*2*
OSU	Endurance	40	49	*9*	35	29	*-6*	44	39	*-5*	54.7	58.8	*4*
OSU	Pete	36	49	*13*	24	26	*2*	-	-	-	56.8	59.9	*3*
WestBred	Shocker	38	49	*11*	29	31	*2*	39	39	*0*	55.0	59.5	*5*
KSU	Fuller	38	48	*10*	30	29	*-1*	42	39	*-3*	56.1	59.1	*3*
OSU	Billings	40	45	*5*	28	24	*-4*	39	35	*-4*	57.6	60.4	*3*
AgriPro	Jackpot	40	44	*4*	28	26	*-2*	41	38	*-3*	57.4	59.3	*2*
OSU	OK Bullet	32	42	*10*	24	26	*2*	34	36	*2*	55.9	60.1	*4*
WestBred	Santa Fe	35	42	*7*	30	26	*-4*	39	36	*-3*	56.1	59.0	*3*
TAMU	TAM 203	30	41	*11*	29	27	*-2*	-	-	-	53.8	56.9	*3*
KSU	Jagger	26	39	*13*	19	22	*3*	27	34	*7*	52.2	57.9	*6*
OSU	Deliver	33	38	*5*	27	22	*-5*	36	31	*-5*	55.6	58.3	*3*
TAMU	TAM 401	40	38	*-2*	-	-	-	-	-	-	53.4	56.1	*3*
AgriPro	Greer	35	37	*2*	-	-	-	-	-	-	51.4	56.6	*5*
KSU	Overley	32	37	*5*	22	21	*-1*	35	34	*-1*	54.5	58.6	*4*
AgriPro	Jagalene	23	30	*7*	18	18	*0*	24	27	*3*	53.3	57.2	*4*
Experimentals													
	OK05526	43	58	*15*	33	35	*2*	-	-	-	57.9	60.4	*3*
	OK07231	-	55	-	-	-	-	-	-	-	-	60.5	-
	OK06618	-	54	-	-	-	-	-	-	-	-	61.0	-
	OK05212	41	34	*-7*	-	-	-	-	-	-	55.0	58.7	*4*
	Mean	36	45	*9*	28	27	*-1*	38	36	*-2*	55.3	59.1	*4*
	LSD $_{(0.05)}$	5	6		4	4		3	4		1.6	0.9	

Partial financial support provided by the Oklahoma Wheat Commission

Olustee Wheat Variety Trial

Cooperator: David Bush
Soil type: Tillman silt loam
Planting date: 10-20-09
Harvest date: 6-04-10

Tillage: Conventional till
Management: Grain only
Previous crop: Wheat
Soil test: pH = 7.8, P = 23, K = 1026

		Grain Yield			Test Weight
Source	Variety	2009-10	2-Year	3-Year	2009-10
		------------bu/ac----------			-----lb/bu-----
OSU	Duster	49	38	42	62.0
KSU	Fuller	49	37	44	62.0
AgriPro	Doans	48	35	41	63.0
KSU	Overley	46	36	42	62.0
AgriPro	Greer	45	-	-	58.0
OSU	Pete	45	34	40	62.0
OSU	OK Bullet	43	36	43	61.0
WestBred	Santa Fe	43	35	42	61.0
WestBred	Shocker	43	34	40	60.0
TAMU	TAM 401	43	-	-	59.0
OSU	Endurance	42	33	40	60.0
AgriPro	Jackpot	42	33	40	62.0
OSU	Centerfield	41	32	39	60.0
AgriPro	Fannin	40	28	35	63.0
KSU	Jagger	39	32	40	59.0
TAMU	TAM 203	37	32	-	58.0
OSU	Deliver	36	29	38	62.0
AgriPro	Jagalene	33	30	39	60.0
Experimentals					
	OK05511	41	-	-	62.0
	Mean	42	33	40	60.8
	LSD $_{(0.05)}$	4	2	2	0.5

Partial financial support provided by the Oklahoma Wheat Commission

Plant height, lodging score, and heading date for selected variety trials in Oklahoma in 2010

	Plant Height									Lodging			Shattering		Heading date		
	Afton	Apache	Homestead	Kingfisher	Lahoma	Lamont	Marshall DP	Marshall GO	Olustee	Alva	Cherokee	Marshall GO	Balko	Hooker	Lahoma	Stillwater early	Stillwater late
Variety	--------inches--------									--------0 - 10 scale†--------							
Armour	28	-	-	-	25	31	-	-	-	-	-	-	-	-	4/30	4/21	4/22
Art	30	-	-	-	26	33	-	-	-	5	4	-	-	-	4/30	4/22	4/24
Aspen (W)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/20	4/22
Billings	31	-	30	31	29	33	27	28	-	6	5	4	1	1	4/28	4/20	4/22
Centerfield	30	32	29	30	28	31	30	30	28	4	3	4	1	-	5/1	4/24	4/25
Deliver	30	33	32	30	31	33	28	26	31	5	4	7	1	-	5/1	4/22	4/24
Doans	-	35	31	33	28	35	30	28	32	8	6	6	2	1	4/30	4/20	4/23
Duster	30	34	31	31	30	32	29	28	32	5	4	5	1	0	5/1	4/24	4/24
Endurance	32	34	32	32	29	33	30	30	32	4	4	3	2	3	4/30	4/24	4/24
Everest	30	-	-	-	27	31	-	-	-	-	5	-	-	-	4/27	4/19	4/22
Fannin	-	32	-	-	-	-	-	-	31	-	-	-	-	-	-	4/19	4/21
Fuller	32	32	31	33	30	34	30	27	31	4	4	5	1	0	4/28	4/19	4/22
Greer	31	33	32	28	28	32	28	28	31	2	5	2	-	-	5/2	4/21	4/24
Guymon (W)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/24	4/25
Jackpot	31	35	31	32	30	34	29	29	29	4	4	4	3	1	4/28	4/20	4/23
Jagalene	29	33	29	31	31	33	27	28	30	3	5	3	2	2	4/30	4/22	4/24
Jagger	31	33	30	31	29	33	26	29	31	4	5	3	1	2	4/29	4/18	4/23
Keota	-	-	-	-	-	-	-	-	-	4	5	-	1	1	-	4/24	4/24
Mace	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	4/30	5/1
OK Bullet	32	34	31	34	32	34	33	28	30	3	4	2	1	3	4/30	4/23	4/24
OK Rising (W)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/22	4/23
Overley	31	36	33	32	31	33	28	29	34	4	6	5	4	-	4/27	4/16	4/20
Pete	29	31	30	30	30	29	28	28	29	3	4	5	1	0	4/26	4/20	4/19
Santa Fe	28	34	30	31	29	31	28	26	30	7	7	2	2	-	4/29	4/19	4/21
Shocker	29	33	31	31	28	30	28	27	31	5	5	6	3	-	4/30	4/16	4/20
TAM 111	-	-	-	-	-	-	-	-	-	4	4	-	1	0	-	4/26	4/30
TAM 112	-	-	-	-	-	-	-	-	-	6	7	-	1	1	-	4/23	4/30
TAM 203	31	34	31	31	29	35	30	27	31	4	4	5	5	1	4/30	4/23	4/25
TAM 401	31	31	31	32	30	35	24	29	27	5	5	5	-	-	4/28	4/17	4/20
Winterhawk	-	-	-	-	-	-	-	-	-	4	5	-	1	1	-	4/22	4/23
OK05212	-	-	-	30	28	32	30	29	-	3	4	2	1	1	5/1	4/23	4/23
OK05312	-	-	-	-	-	-	-	-	-	4	-	-	4	8	-	4/24	4/24
OK05511	-	34	31	31	29	-	-	-	31	-	-	-	0	4	5/1	4/23	4/24
OK05526	33	36	-	35	32	33	30	31	-	5	4	5	1	-	4/28	4/20	4/22
OK06618	-	-	-	-	-	33	31	-	-	-	-	-	-	-	-	4/23	4/24
OK07231	-	-	-	-	28	-	30	-	-	4	-	-	-	-	4/30	4/24	4/24
STARS 0601W	-	-	-	-	-	-	-	-	-	-	-	-	0	1	-	4/21	4/23

† Scale of 0 - 10 with 0 representing no lodging or shattering and 10 representing severe lodging or shattering

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Fall forage production and date of first hollow stem in winter wheat varieties during the 2009-2010 crop year

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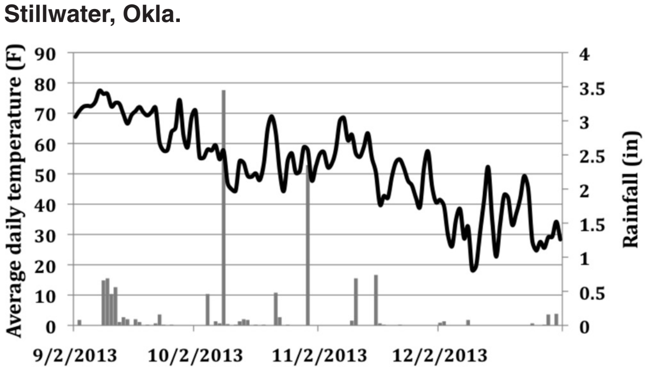
Introduction

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.

Figure 1. Average daily temperature (line graph) and rainfall (bar chart) from Sept. 1, 2009 to Dec 31, 2009, Stillwater, Okla.



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 Oklahoma. The forage trials are conducted under the umbrella of the Oklahoma State University winter wheat variety trials at the El Reno and Stillwater, OK test sites. Due to extremely wet conditions this year, however, no data were collected from the El Reno site. Weather data for the Stillwater site is provided in Figure 1.

A randomized complete block design with four replications was used at each site. Forage was measured by hand clipping two 1-meter by 1-row samples at random sites within each plot. Samples were then placed in a forced-air dryer for approximately seven 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

Varieties that have been consistent top-performers during the years were in the top yield grouping once again in 2009 (Table 2). The fact that nine out of the 26 commercially-available wheat cultivars tested were statistically equivalent in terms of forage yield indicates that farmers have a wide variety of choices when it comes to dual-purpose wheat cultivars.

Average occurrence of hollow stem was 71 days after January 1, which was approximately ten days later than typical (Table 3). This delay in onset of first hollow stem was primarily due to wet and cold conditions during most of the winter months. In addition to overall later occurrence of first hollow stem, some varieties moved places in the relative rankings. Endurance, for example, is almost always one of the last varieties to reach first hollow stem, but was medium-late this year. TAM 203 is generally an early-medium first hollow stem variety, but was late this year. The presence of wheat soil borne mosaic virus in the plot area probably explains some of the abnormalities in susceptible varieties, and there are likely several physiological and morphological plant controls impacted by the cold, wet winter. It is likely the relative occurrence of first hollow stem will be closer to normal next year.

Table 1. Location Information.

	Planting date	*Sampling date*	*pH*	*N*	*P*	*K*
Stillwater	9/21/2009	11/30/2009	5.1	126	104	318

Table 2. Fall forage production by winter wheat varieties at Stillwater, OK in 2009.

Source	*Variety*	*2009*	*2-Year*	*3-Year*	*4-Year*
		------lbs dry forage/acre------			
TAMU	TAM 203	2,830	2,910	2,520	-
OSU	Duster	2,810	3,220	2,920	2,790
AgriPro	Fannin	2,770	3,150	2,790	2,700
OSU	OK Bullet	2,700	3,020	2,740	2,620
WestBred	Santa Fe	2,600	2,880	2,450	2,340
TAMU	TAM 401	2,570	-	-	-
KSU	Overley	2,560	2,980	2,630	2,530
WestBred	Shocker	2,530	3,080	2,690	2,570
AgriPro	Jackpot	2,520	2,940	2,620	-
AgriPro	Doans	2,480	2,850	2,520	2,490
OSU	Billings	2,460	-	-	-
OSU	Endurance	2,450	2,700	2,410	2,370
WestBred	Armour	2,440	-	-	-
AgriPro	Art	2,430	-	-	-
KSU	Fuller	2,430	2,860	2,520	2,510
WestBred	Keota	2,380	2,900	-	-
OSU	Deliver	2,350	2,680	2,460	2,480
TAMU	TAM 112	2,340	2,810	-	-
KSU	Jagger	2,320	2,790	2,290	2,260
OSU	Pete	2,320	-	-	-
TAMU	TAM 111	2,280	2,810	2,560	2,500
OSU	Centerfield	2,270	2,810	2,680	2,610
AgriPro	Jagalene	2,270	2,730	2,330	2,330
AgriPro	Greer	2,150	-	-	-
WestBred	Winterhawk	2,130	2,540	-	-
KSU	Everest	1,980	-	-	-
Experimentals					
	OK05526	2,520	-	-	-
	OK07231	2,470	-	-	-
	OK05511	2,400	-	-	-
	STARS 0601W	2,200	-	-	-
	OK06618	2,190	-	-	-
	OK05312	1,990	-	-	-
	OK05212	1,840	-	-	-
Average		**2,390**	**2,880**	**2,570**	**2,510**
LSD		340	290	230	190

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

Table 3. Occurrence of first hollow stem (day of year) for winter wheat varieties sown in 2009 and measured in 2010 at Stillwater, Okla.

Variety	*Stillwater*
	---day of year---
TAM 401	40
Fannin	49
Jagger	62
Overley	62
Santa Fe	62
Shocker	62
Greer	62
Jagalene	66
Fuller	66
Billings	66
Guymon	68
OK Bullet	70
Jackpot	70
Armour	70
Everest	71
TAM 112	71
OK Rising	73
Duster	76
Endurance	76
Winterhawk	76
Aspen	78
Doans	80
TAM 203	82
Deliver	82
Pete	82
Art	82
Centerfield	83
Keota	83
TAM 111	83
Mace	88
Average	**71**

As mentioned in the introduction, fall forage production is only one parameter to be considered when choosing a dual-purpose wheat variety. Date of first hollow stem, for example, will determine how long fall forage production can be utilized into the spring and should be considered in conjunction with fall forage production. Varieties such as TAM 401 and Fannin are outstanding forage producers, but also have very early dates of first hollow stem. Varieties such as Doans and Endurance are not consistently as good of forage producers as TAM 401 and Fannin, but are above-average forage producers and much later to first hollow stem. Dual-purpose producers should consider these two parameters in conjunction with grain yield after grazing before making a variety choice.

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