Oklahoma Panhandle

Research & Extension Center

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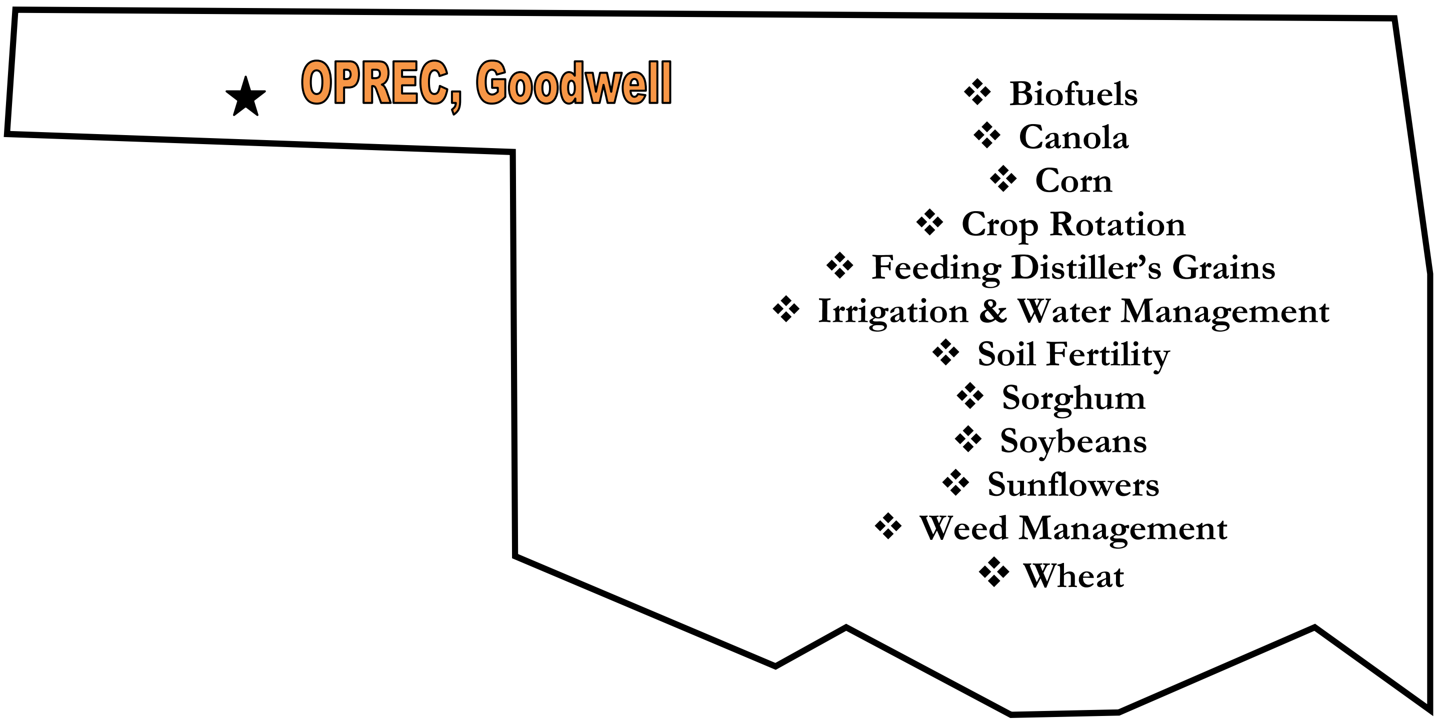
http://oaes.pss.okstate.edu/goodwell



2011 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

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 utilize OPREC to conduct research and extension efforts in the Panhandle area. Additionally, OPREC continues to serve as a “hub” for our commodity groups and agriculture industries by hosting 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.

Jonathan Edelson
Interim 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 Genetics, Inc.
Oklahoma Grain Sorghum Commission
Oklahoma Wheat Commission
Oklahoma Wheat Growers
OPSU
Orthman Manufacturing
Pioneer Seed (Ramey Seed)
Sorghum Partners
Hopkins Ag/AIM Agency (J. B. Stewart & Jarrod Stewart)
Syngenta
Texhoma Wheat Growers
Triumph Seed Company
United Sorghum Checkoff Program
Joe Webb

Oklahoma Panhandle Research and Extension Center

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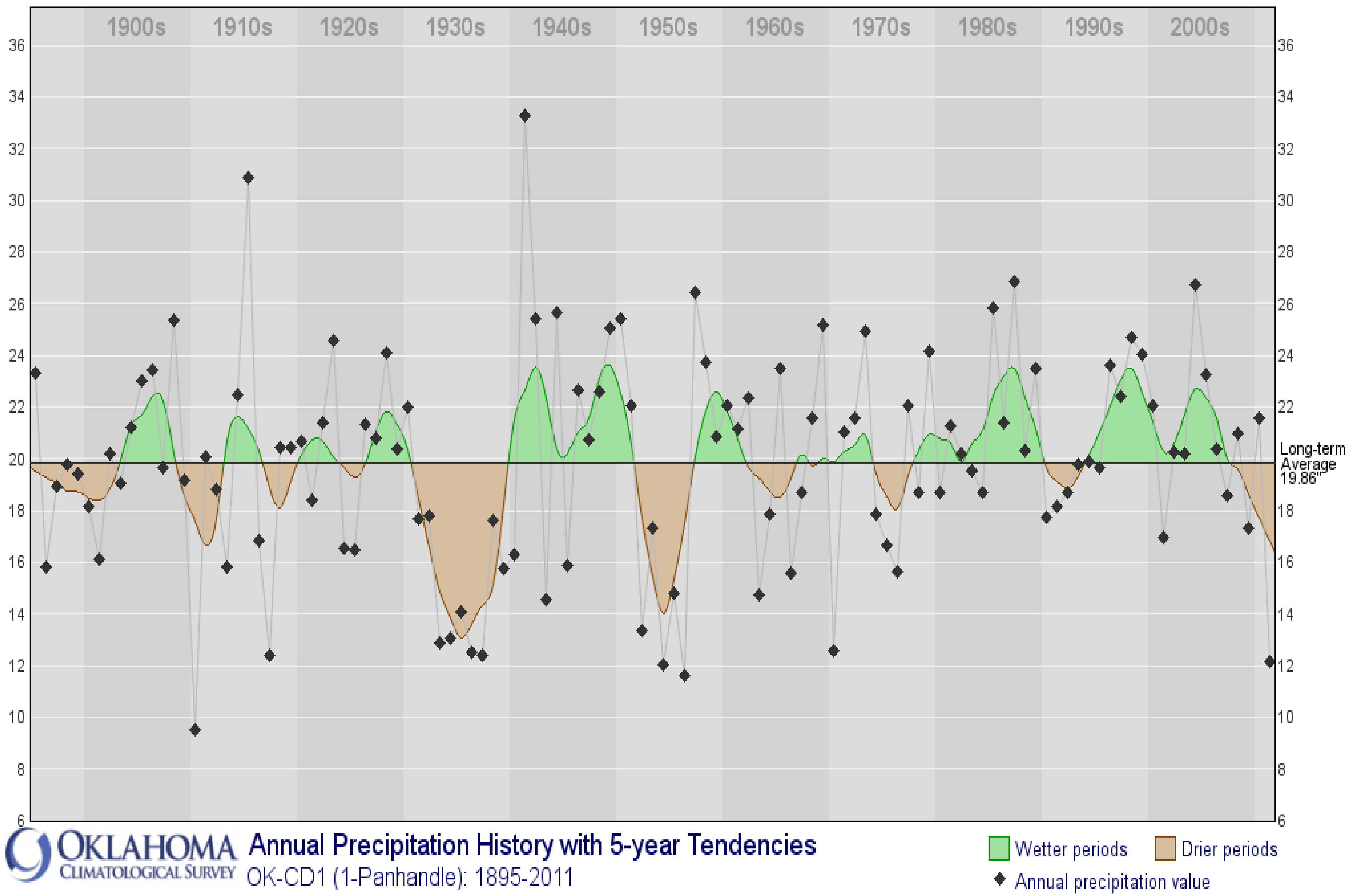
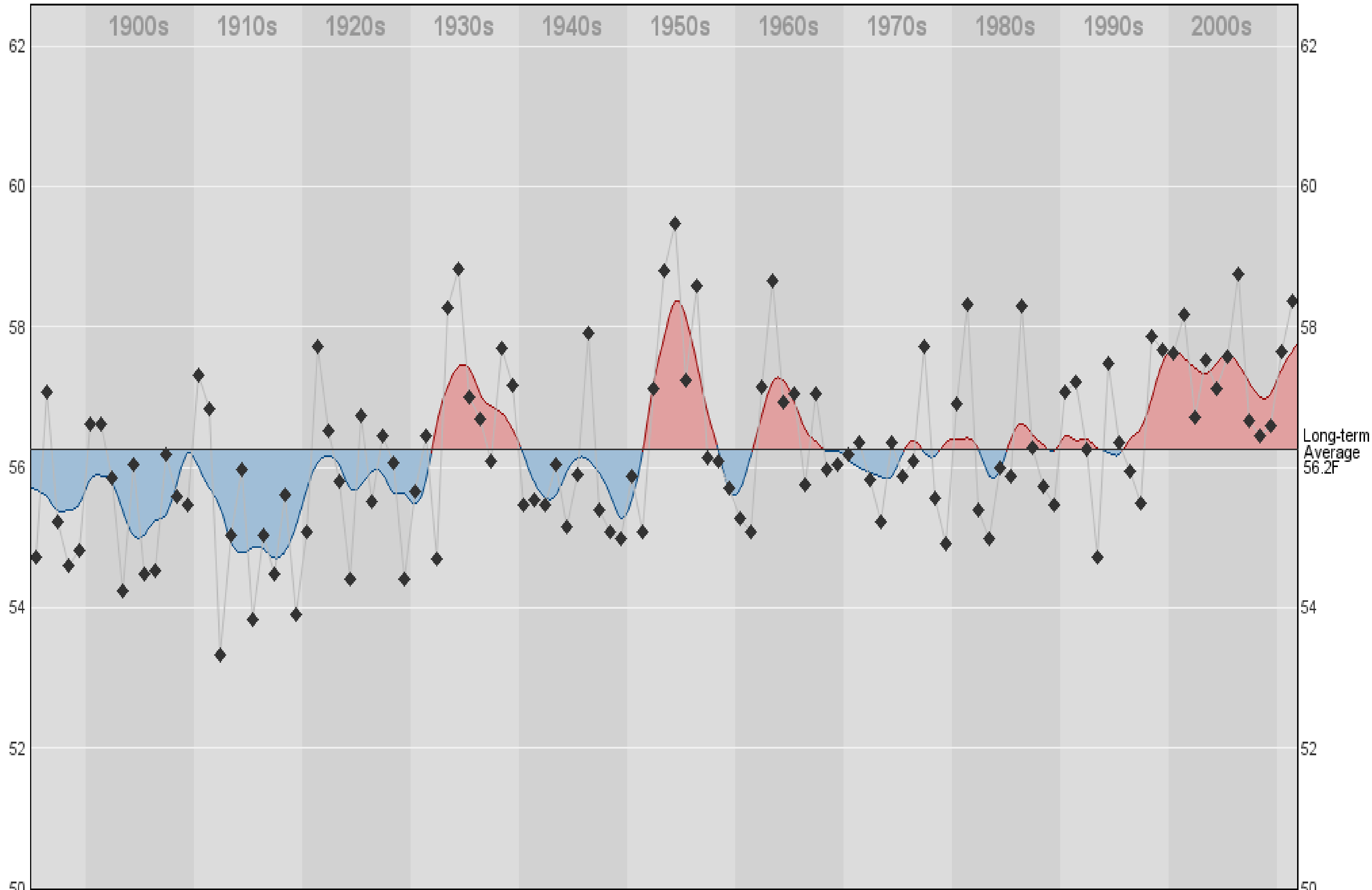

1900s
1910s
1920s
1930s
1940s
1950s
1960s
1970s
1980s
1990s
2000s
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
Long-term Average 19.86"
OKLAHOMA CLIMATOLOGICAL SURVEY
Annual Precipitation History with 5-year Tendencies
OK-CD1 (1-Panhandle): 1895-2011
Wetter periods
Drier periods
Annual precipitation value



OKLAHOMA CLIMATOLOGICAL SURVEY

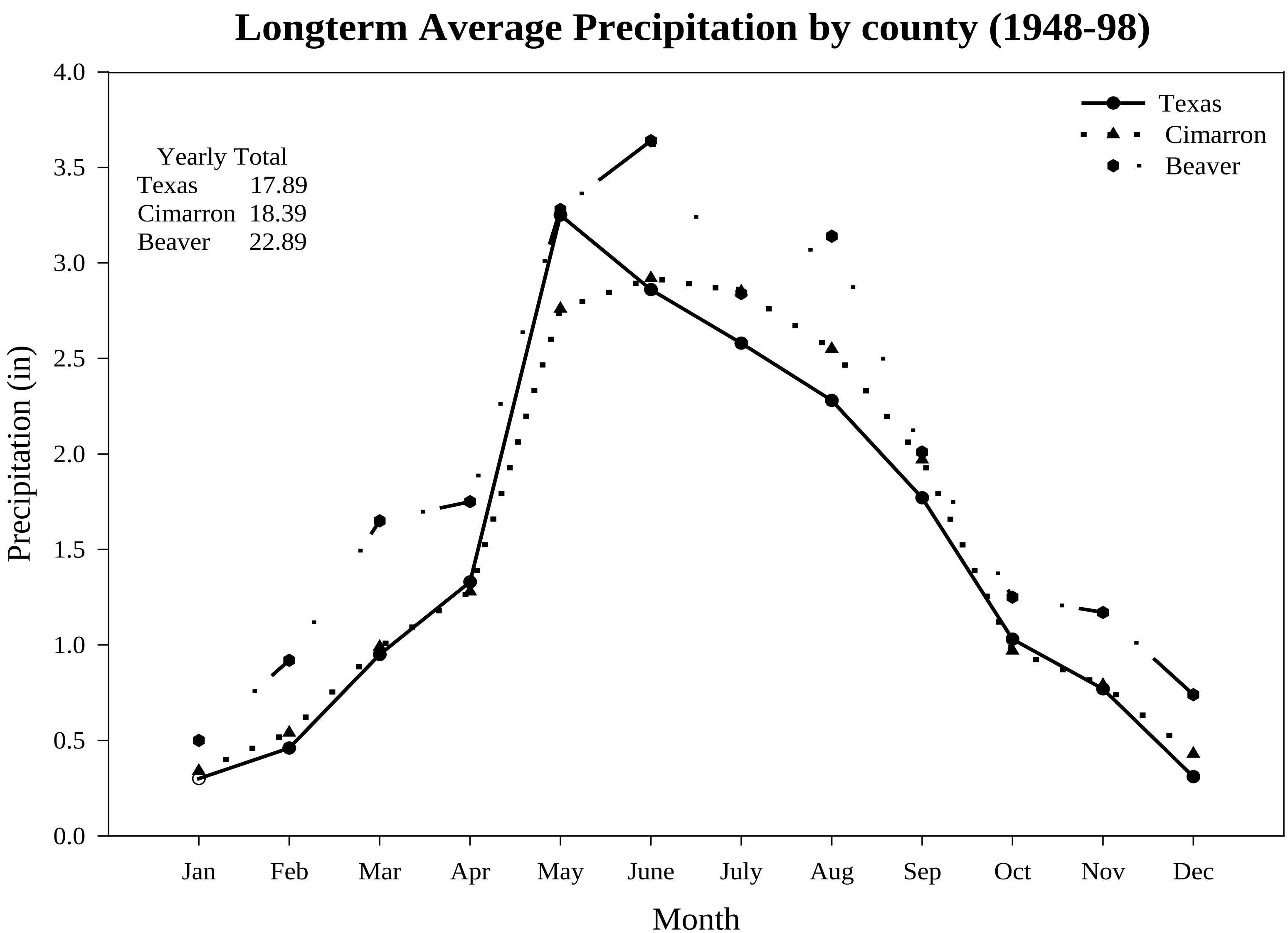
Annual Temperature History with 5-year Tendencies

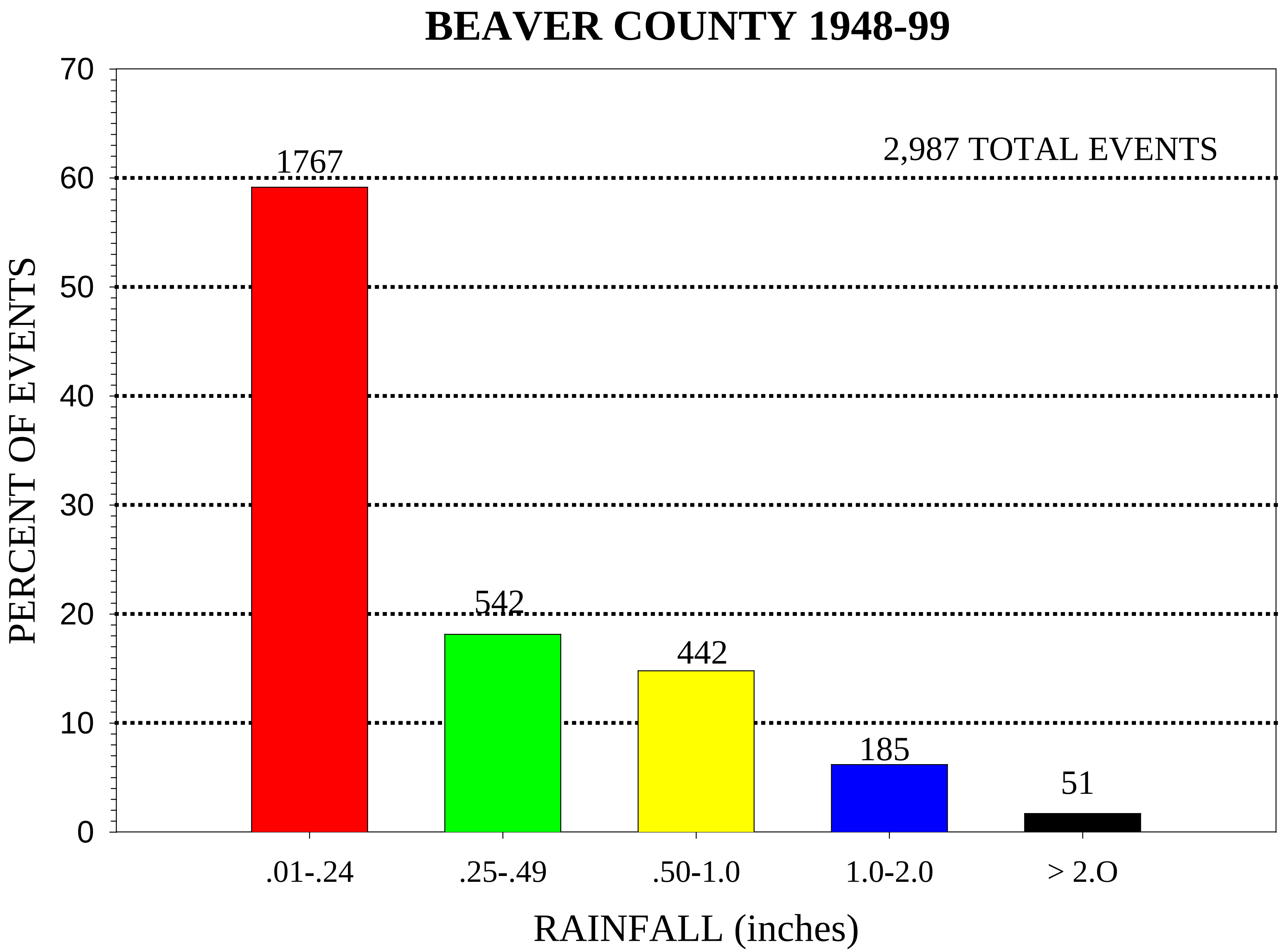
OK-CD1 (1-Panhandle): 1895-2011

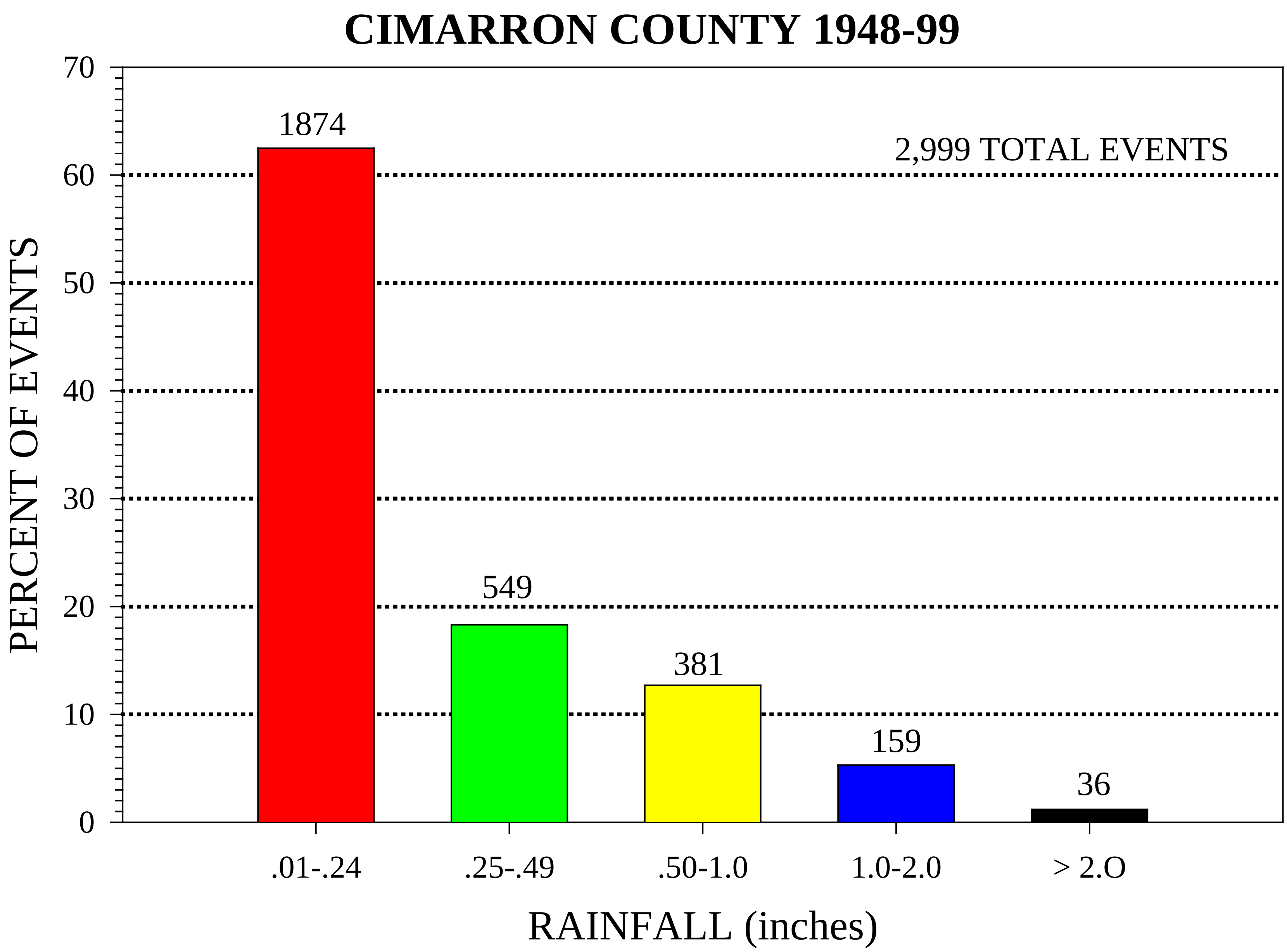
Climatological data for Oklahoma Panhandle Research and Extension Center, 2011.

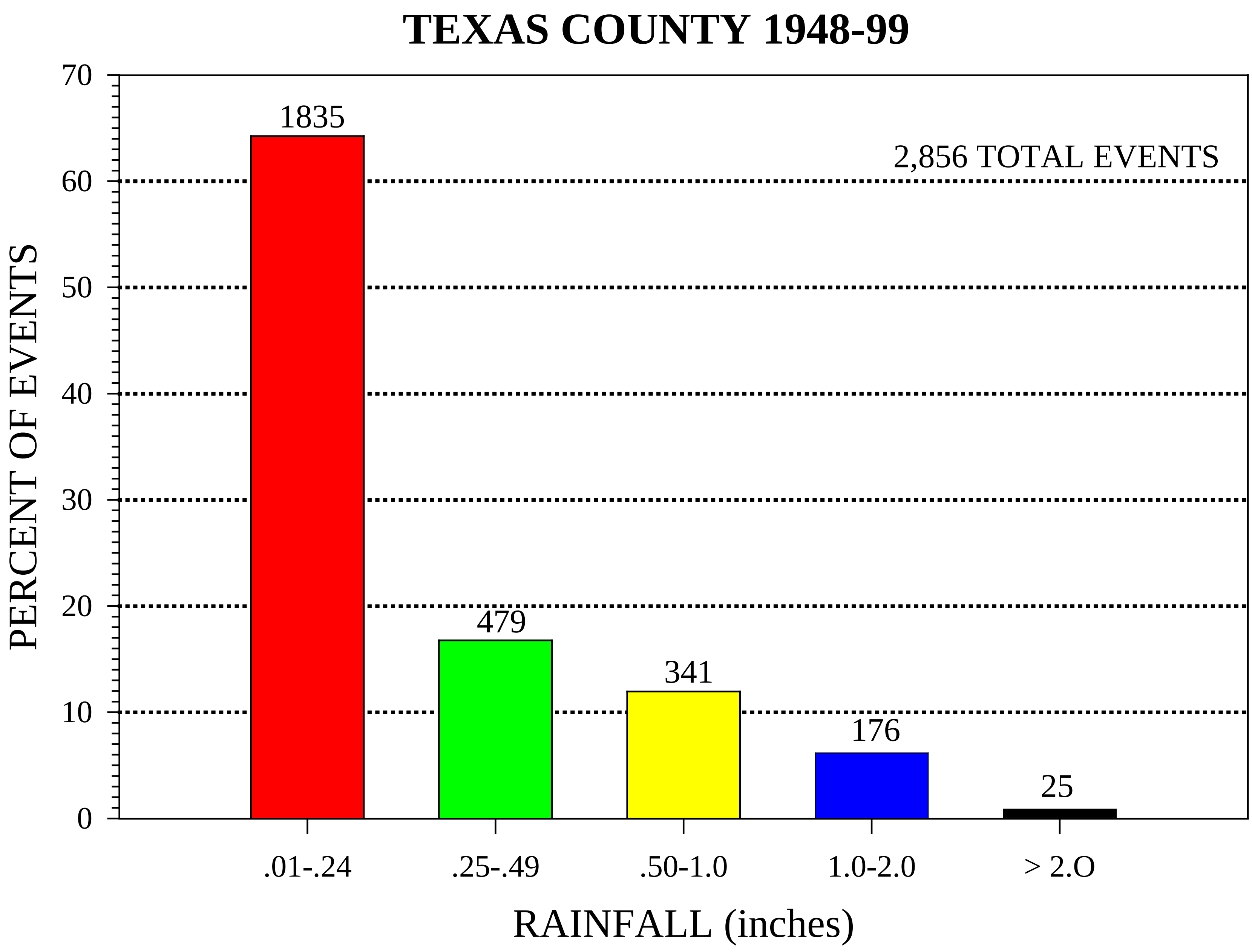
	Temperature								Precipitation				Wind	
Month	Max		Min		Max. mean		Min. mean		Inches		Long term mean	Largest one day total	AVG mph	Max mph
	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010				
Jan	73	67	-5	-6	49	48	17	17	0.12	0.49	0.30	0.04	10.5	43.7
Feb	81	57	-8	9	52	39	18	20	0.09	1.51	0.46	0.05	13.7	51.6
March	85	87	9	18	63	60	31	30	0.06	2.51	0.95	0.03	13.1	55.2
April	92	87	27	24	74	69	39	41	0.94	1.76	1.33	0.63	15.5	63.2
May	103	92	31	31	81	77	47	47	0.51	2.64	3.25	0.42	15.0	63.3
June	111	103	53	51	97	91	62	63	0.53	3.16	2.86	0.29	15.1	61.6
July	108	102	62	58	101	93	68	66	0.17	1.22	2.58	0.06	11.8	51.2
Aug	105	103	62	49	98	93	68	64	2.05	5.42	2.28	0.67	10.6	51.3
Sept	102	99	41	42	83	88	54	56	1.67	0.20	1.77	0.75	11.3	45.5
Oct	91	89	29	26	76	76	43	43	0.61	0.81	1.03	0.32	13.5	53.1
Nov	76	81	20	8	61	61	31	27	0.79	0.29	0.77	0.44	13.7	57.2
Dec	64	71	2	2	41	51	21	22	1.17	0.34	0.31	0.62	12.8	52.2
	Annual total				73	70	41.5	40.5	8.71	13.03	17.9	NA	NA	NA

Data from Mesonet Station at OPREC


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


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


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


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

Oklahoma Panhandle Research & Extension Center
2011 Research Highlights

Crops

Extension Publications

Oklahoma Corn Performance Trial, 2011
Grain Sorghum Performance Trials in Oklahoma, 2011
Oklahoma Wheat Variety Trails 2010-11

The reason for fewer reports in 2011 edition

As many know the region and entire state experienced a drought in 2011. The drought for the panhandle actually began in September of 2010. The station received 5.42 inches of rainfall in August of 2010, but only received 4.06 inches of precipitation in the following 12 months. Therefore much of the wheat planted in dry-land research plots was no-till and did not emerge due to lack of precipitation. The only dry-land research plots harvested were plots that were tilled before planting. With the lack of precipitation through winter and spring, none of the summer crops were planted due to lack of soil moisture for germination, therefore no data was able to be collected.

Wheat was planted in the fall of 2011 and emerged with good stands, but soil moisture has been very limited. At the time of planting, soil moisture was measured to the 8 inch depth. Although precipitation has been received this winter, moisture is still very limited at OPREC. The latest data from the Mesonet station and from observations when taking soil samples, moisture is still only 10-12 inches deep in the soil. Without significant rain-fall the 2012 year is not looking very promising either.

Also as many producers know the summer of 2011 was not a good year for irrigated corn, yields ranged from 0 to 250 bu/ac. With limited water available at OPREC corn yields were affected like most producers, although grain sorghum and sunflower yields were good. This is expected, because both crops are more efficient in water use than is corn.

Therefore reports of dry-land research at OPREC will be the same as they were in the 2010 edition of the research highlights book.

Rick Kochenower
Area Research and Extension Specialist (agronomy)

Corn Seed Spacing Uniformity As Affected by Metering System

E. Miller, W. Porter, A. Koller, J. Rascon, R. Taylor R. Kochenower, and B. Raun

This study was conducted in the spring of 2011 to assess the performance of three types of corn metering devices for vacuum planters. The metering systems were John Deere standard corn and ProMax 40 plates and Precision Planting's eSet metering system. Corn was planted at approximately 32,000 seeds/acre in a strip till system at the Oklahoma Panhandle Research and Extension Center at four ground speeds (3, 5, 7, and 9 mph). Planter vacuum settings were determined for each meter by seed characteristics. Treatments were replicated three times.

The metering systems were installed in a John Deere 4-row MaxEmerge 2 Planter (Model 7300) with 30 inch row spacing. A John Deere 6430 tractor equipped with RTK GPS system with autosteer was used for this study. Post emergence a length was recorded at each plant to the nearest 0.05 feet. The measurements indicated a spacing value between plants that will be compared to the desired plant spacing, based on planting density and found in the planter charts. The data will also be used to calculate mean plant spacing, standard deviation in plant spacing, skips and doubles of each metering system.

Results

Figure 1 Example Standard Corn Meter Plot

Figure 2 Example ProMax 40 Meter Plot

Figure 3 Example eSet Meter Plot

Results

Meter	Speed (mph)	Theoretical (ft)	Mean (ft)	Std Dev.	Skips	Doubles
STD	3	0.55	0.57	0.20	11%	4 %
	5	0.55	0.60	0.26	15 %	4 %
	7	0.55	0.65	0.33	23 %	10 %
	9	0.55	0.74	0.49	29 %	16 %
Pro40	3	0.41*	0.40	0.13	7 %	7 %
	5	0.41*	0.41	0.18	8 %	12 %
	7	0.41*	0.46	0.25	22 %	18 %
	9	0.41*	0.54	0.36	30 %	19 %
eSet	3	0.55	0.55	0.18	8 %	4 %
	5	0.55	0.55	0.19	8 %	5 %
	7	0.55	0.55	0.23	9 %	10%
	9	0.55	0.55	0.23	12 %	10 %

*Setting on planter for this meter was wrong during planting resulting in a higher population

Figure 4 shows the mean spacing that each meter system attained at various speeds. The Pro40 is starting at 4 due to the seeding rate that was used for this meter only. The trends are similar for the STD and Pro40, increasing spacing with increasing planting speed. The eSet had a stable mean spacing for all of the speeds tested.

The standard deviations for the plant spacing are shown in Figure 4. The standard deviations increase significantly with planter speeds for the STD and Pro40 systems. The standard deviation in plant spacing was not affected by speed with the eSet metering system. There was no significant difference in standard deviation at the 3 and 5 mph. However, the uniformity of plant spacing at 7 and 9 mph degraded at 7 and 9 mph with the STD and Pro40 metering systems.

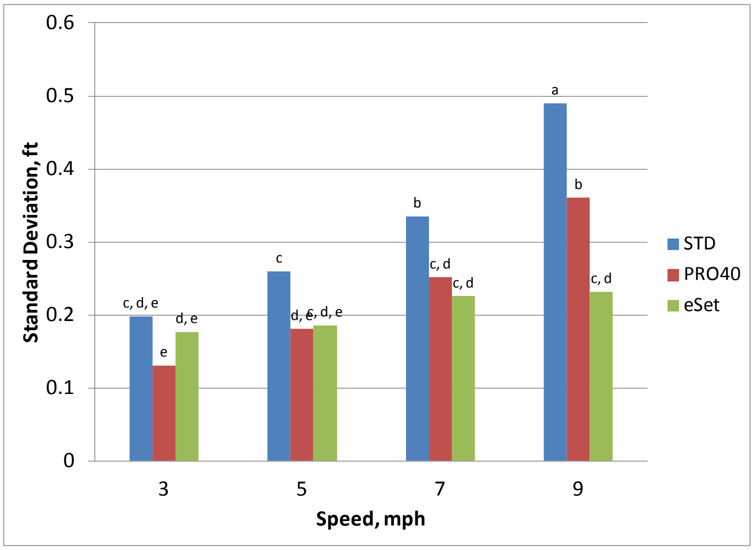


Figure 4 Deviations from the Desired Spacing

Figure 5 shows the percentage of skips at each speed. The eSet meter had the fewest skips, and was unaffected by travel speed. The STD and Pro40 had a similar amount of skips at the 2 highest travel speeds and were significantly greater than the eSet. Though the magnitude of skips with the standard plate was greater at 3 and 5 mph there was no significant difference among the metering systems at these speeds.

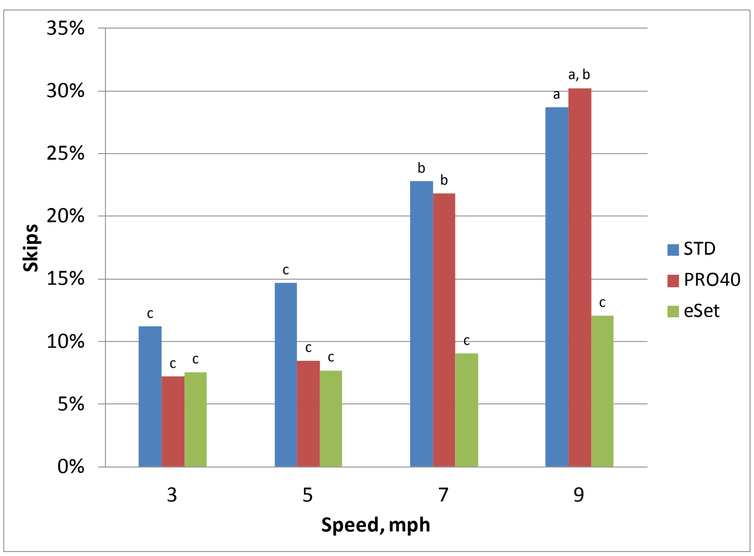


Figure 5 Percent skips by speed for each meter

The amount of doubles for each meter is shown in Figure 6. All meters had similar rates of doubles at 3 mph. The eSet had the least amount of doubles at 7 and 9 mph, while the STD and Pro40 varied more with speed.

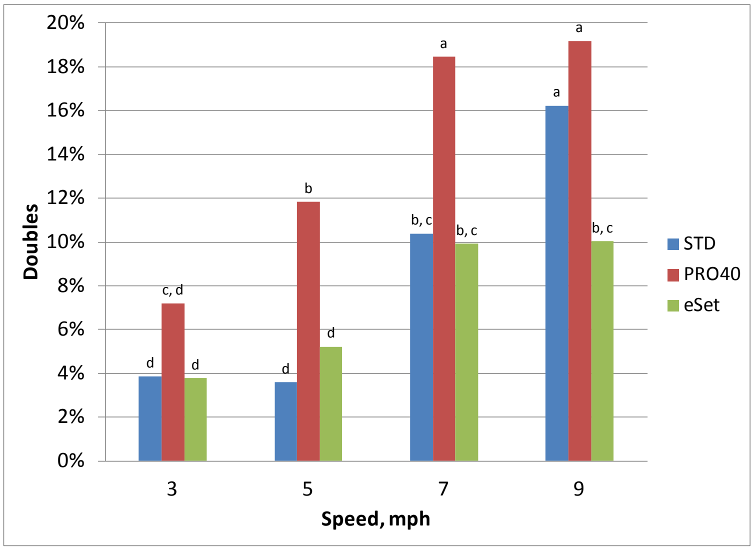


Figure 6 Percent doubles by speed for each meter

Conclusions

Overall the results show that the eSets provide more uniform metering at higher planting speeds and at a high planting rate(both which increase plate speed) with less doubles and skips. The Pro40 meter system had more uniform metering results than the Standard, but was not able to match the performance of the eSet at the speeds tested. The Standard meter system had a performance similar to the eSet at the lowest speed, but varied after this speed. The eSet metering system appears less sensitive to higher rotational speeds. This is an advantage at higher ground speeds and higher seeding rates.

EXTENSION

RELEASE ANNOUNCEMENT

Two Hard Red Winter Wheat Cultivars

OKLAHOMA CROP IMPROVEMENT ASSOCIATION
11 FEBRUARY 2012

Experimental Designation: OK07209 (Iba), OK07214 (Gallagher)
Pedigree: Each a single cross, with Duster as a common parent (see over)

Yield Performance: 2011 OSU WVPT (WIT - Jeff Edwards)

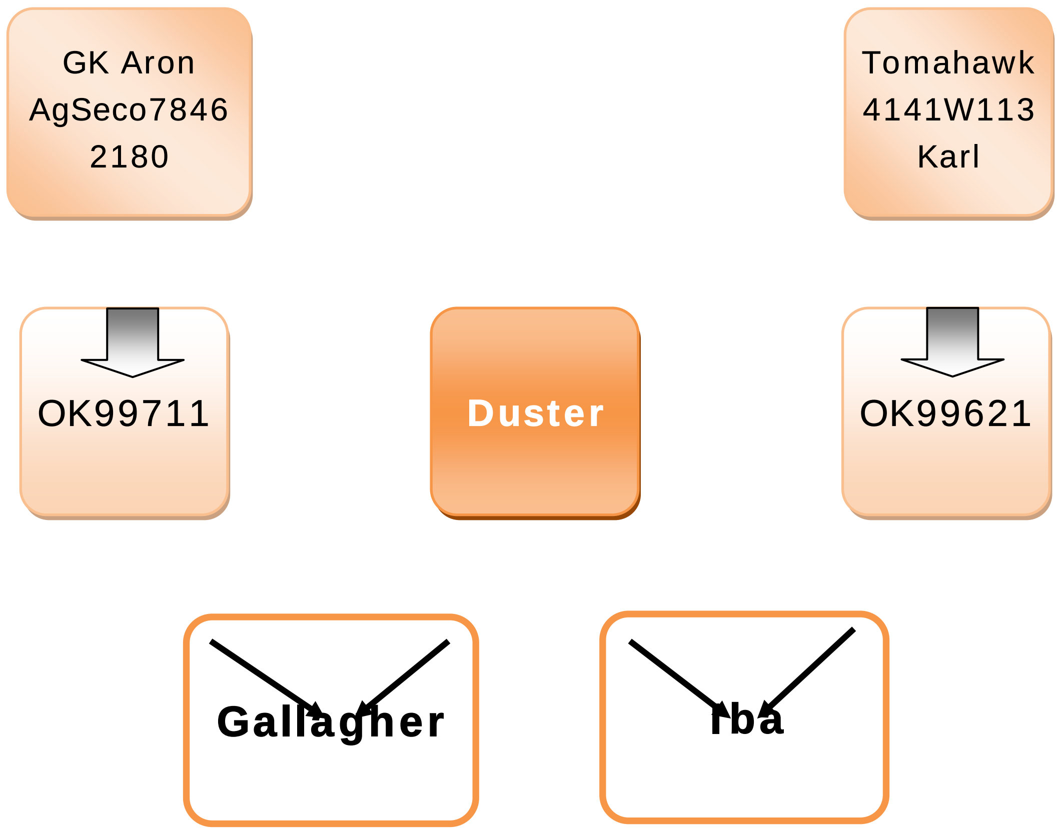
Variety	*Forage Yield (n=1 year)*	*Grain Yield (n=8 sites)*
	------lb/A------	------bu/A------
Iba	**3,120**	**41**
Gallagher	**-**	**39**
Duster	2,820	39
Endurance	2,830	35
Fuller	2,690	36
Armour	2,750	35
Jackpot	3,040	32

For more detailed data, see report, *Proposal for Release of Two HRW Candidate Cultivars, OK07209 and OK07214*.

Adaptation and Trait Summary: (Data provided by OSU's WIT)

Trait	Gallagher	Iba
Maturity	Moderately early	Moderately late
Adaptation range	Statewide, especially central OK	Southern/Central Plains
Acid soil tolerance	Tolerant	Intolerant
SBWMV/WSSMV complex	Resistant	Resistant
Barley yellow dwarf	Strong	Strong
Stripe rust	Strong	Moderately weak
Leaf rust	Resistant without *Lr34*	Resistant with *Lr34*
Leaf spotting pathogens	Strength on Septoria leaf blotch	Strength on tan spot
Powdery mildew	Intermediate	Strong
Hessian fly	Tolerant	Intolerant
Test weight	Good	Exceptional
Kernel size	17% better than Duster	9% better than Duster
Protein profile	Higher but weaker	Lower but stronger

Gallagher and Iba have this in common:
Parentage
Yield and test weight history


GK Aron
AgSeco7846
2180
Tomahawk
4141W113
Karl
OK99711
Duster
OK99621
Gallagher
Iba

Oklahoma Panhandle Research and Extension Center
Wheat Improvement Program
Annual Report, 2012

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

SRPN Testing at the OPREC Continued in 2011 Despite the Drought

The Oklahoma Panhandle Research and Extension Center plays a pivotal role in the final stages of OSU wheat variety development. The Center is used as one of three cornerstone testing sites for replicated yield and quality trials. The other two sites include a farmer-cooperator site near Granite in SW Oklahoma and the North Central Research Station at Lahoma. Breeding lines in their first year of replicated yield trials, all the way up to those in their fifth year of replicated trials, typically appear at the Center in both dryland and irrigated plots. Two such trials contain the most advanced (i.e., elite) breeding lines each year, called the Oklahoma Elite Trial (typically OET3) and a uniform regional cooperative nursery called the Southern Regional Performance Nursery (SRPN) coordinated by USDA-ARS.

The 2011 SRPN featured 36 experimental lines from seven public breeding programs in the region, four long-term check cultivars, and two local checks (Duster and Billings). Topping the list for yields across the state and at OPREC were Duster and a progeny of Duster, OK08328. The latter is an experimental line that, along with several other candidates, are being closely watched during the 2011-2012 for future targeted release in the panhandle and other areas of western Oklahoma. Drought stress, even in the irrigated nursery at the OPREC, lowered Billings' ranking, yet it still performed well enough to be considered in the top-yielding group. In years with more favorable moisture patterns, Billings is expected to exceed Duster, especially under supplemental irrigation in the Oklahoma panhandle.

Another OSU experimental line tested in the 2011 SRPN, but did not make the 25% cut shown in Table 1, was OK07209, another progeny of Duster. OK07209 had an uncharacteristically poor showing at the OPREC, but ranked first across Kansas and second across Texas. Its region-wide rank in the 2011 SRPN was 3rd, and in the 2010 SRPN, OK07209 ranked in a tie for 1st place. We have not observed an OSU elite line perform so consistently well for two consecutive years in the SRPN, the closest being Duster or Endurance. The unusual 2011 performance at the OPREC is likely an aberration for OK07209, as it is will be positioned for all regions of Oklahoma if released by the Oklahoma Agricultural Experiment Station.

Testing of Elite Materials from the OSU Wheat Improvement Program

Eight of the 32 slots in the 2011 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. The highest yielding checks in the 2011 trial at the OPREC (under supplemental irrigation) were Ruby Lee, Garrison, Billings, and Duster.

Taking the top spot in the 2011 OET was OK08229, a newcomer to our candidate lineup that has performed exceptionally well in the panhandle in previous years, going back to 2008. Parentage of OK08229 is TAM 303 and an OSU experimental line, OK98697. Look for OK08229 at any of the variety trial locations in the Oklahoma panhandle. It appears to have equal competitiveness in dryland or irrigated production systems

Other experimental lines that have our attention as potential releases in the near future, with specific adaptation to the Oklahoma panhandle, are the two lines previously mentioned, OK08328 and OK07209, and OCW00S063S-1B, a line developed by Dr. Klatt that has shown a pattern of above-average drought tolerance. 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.

OK08707W, a HW candidate, deserves special mentioning for its untouched performance in the very low yielding dryland trial of the OET at the OPREC (Table 2). While a 14 bu/ac yield was nothing to write about in the *Guymon Daily Herald*, we should mention all plots of this line could be spotted with ease from the station road adjacent to the nursery area. Yes, 14 bu/ac is low but this yield level was 14-fold greater than several desirable experimentals and reliable checks. We have maintained focus on this line as a HW candidate targeted specifically for the Oklahoma panhandle. OK08707W is currently under breeder-seed increase at the OPREC.

Update on OSU Plans for Breeding Resistance to WSM

Disease resistance is the keystone of a variety developed by the OSU Wheat Improvement Team. We consider disease resistance on par with yield potential and end-use quality when devoting resources to creating and selecting progeny as experimental lines. As should be expected then, we have 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 *Soilborne wheat mosaic virus*, *Wheat spindle streak mosaic virus*, *Barley yellow dwarf virus*, and *High Plains virus*.

Readers will notice one key viral disease missing from that list, i.e., wheat streak mosaic (WSM). We do realize the severity of the disease and the yield limitations it causes in the Oklahoma panhandle. We reported last year about our awareness of this disease while participating in the USDA-CAP grant from 2005 to 2010, where molecular markers were employed across several generations to select directly for WSM resistance using germplasm developed at the University of Nebraska-Lincoln in partnership with USDA-ARS and at Kansas State University. Resistance to WSM in that germplasm has common roots to the resistant variety from Nebraska called ‘Mace’. At the front of this genetic pipeline are two sister experimental lines named OK0986146W (a HW line) and OK0986130 (a HRW line), which we have confirmed to contain, albeit at <100% frequency, the targeted and highly effective resistance gene, *Wsm1*, also present in Mace.

Yield data collected in 2011 at the OPREC for these and other experimental lines are presented in Table 3, along with yield data for five check varieties. The HW sister, OK0986146W, holds more promise as a high-yielding WSM-resistant candidate with good end-use quality, so much that we are aggressively using this line as a gene donor to perpetuate WSM resistance throughout OSU germplasm. Fortunately, a molecular marker for *Wsm1* is available that enables us to detect the presence of this trait, in both the line itself or its progeny, without actually having to field-test the materials in the presence of disease at the OPREC. Pictured in Figure 1 are laboratory assistants to WIT member, Dr. Liuling Yan, who recently inspected and tested OSU germplasm growing in our greenhouses for the presence of *Wsm1*. Unfortunately the molecular marker only detects this particular mode of resistance. At the OPREC, OK0986146W yields equal to or better than Duster, TAM 112, Endurance, OK Rising, or Deliver, all of which are well adapted in the Oklahoma panhandle (Table 3). Look for this candidate in the 2012 OSU Wheat Variety Performance Tests coordinated by WIT member Dr. Jeff Edwards and by Rick Kochenower. Test sites are currently established at the OPREC (irrigated), Hooker, and Keyes, OK.

Figure 1. Dr. Liuling Yan's laboratory assists OSU's Wheat Improvement Team in locating WSM resistance through DNA testing rather than conventional field testing.

As reported last year, we have expanded our breeding strategy to combine two distinct gene forms of WSM resistance known as *Wsm1* and *Wsm2* with a gene (likely *Cmc4*) that confers resistance to the vector of *Wheat streak mosaic virus* (curl mite). Once deployed, this three-pronged approach will uniquely provide the best protection to date for this disease. One curl-mite resistant experimental, OK05312, has progressed through the program to qualify for foundation seed increase, after it went through a "clean-up" phase in a headrow purification nursery at Yuma, AZ in 2011. We will 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 Rick Kochenower), in the 2012 OSU Wheat Variety Performance Tests.

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

Table 1. The top 25% of entries, based on yield performance in bu/ac at the OPREC, of the 2011 Southern Regional Performance Nursery containing 40 entries. Statewide means included data from Stillwater, Lahoma, Granite, and Goodwell (OPREC), OK. OSU entries are shown in bold font.

		OPREC		**Statewide**	
Selection or check	**Pedigree**	**Mean**	**Rank**	**Mean**	**Rank**
Duster	Local check	67	*1*	46	*3*
OK08328	GK Keve/Ok101//OK93P656-RMH3299	67	*2*	47	*1*
CO050233-2	CO950043/Above//CO970547	67	*3*	41	*12*
TX03A0563-07AZHR247	X96V107/OGALLALA	65	*4*	45	*4*
OK07218	OK99219/OK99621	65	*5*	41	*13*
NX04Y2107	NW98S061/99Y1442	64	*6*	40	*18*
CO050337-2	CO980829/TAM 111	64	*7*	40	*19*
KS020319-7-2	KS940786-17-2/JAGALENE//TREGO	63	*8*	41	*14*
Billings	Local check	62	*9*	42	*9*
Brawl CL Plus (CSU)	Teal 11A/Above//CO99314	61	*10*	44	*5*
TX07A001118	Composite	61	*11*	39	*23*
Mean		**53**		**39**	
CV		**12**		**13**	
LSD (0.05)		**9**		**6**	

Table 2. The Oklahoma Elite Trial (OET) conducted at 3 High Plains sites in 2010-2011. Entry mean yields (bu/ac) and ranks are shown in each column, with 32 entries sorted by yield at OPREC-irrigated. The first eight entries listed, i.e., the top-yielding group, could not be differentiated statistically based on yield performance at OPREC-irrigated. The OPREC is located at Goodwell, OK. Entries in bold font remain as candidates for potential release.

Selection or check	Pedigree	OPREC irrigated		Walsh, CO		OPREC dryland		State [a]	
OK08229	TX98D1170/OK98697	67	*1*	39	*5*	3	*25*	38	*1*
Ruby Lee	KS94U275/OK94P549	63	*2*	34	*19*	8	*6*	36	*3*
OK07209	OK93P656-RMH 3299/OK99621	63	*3*	40	*2*	1	*30*	35	*4*
Garrison	OK95616-1/Hickok//Betty	62	*4*	30	*30*	4	*16*	32	*17*
Billings	Check	62	*5*	36	*13*	4	*20*	32	*11*
Duster	Check	61	*7*	33	*22*	3	*27*	37	*2*
OK08328	GK Keve/Ok101//Duster	61	*6*	38	*7*	4	*24*	34	*6*
OK07226	OK99207/OK99621	59	*8*	31	*25*	5	*14*	32	*15*
OK08413	2174/CIMMYT seln//Duster	58	*9*	33	*23*	4	*18*	32	*16*
OK07218	OK99219/OK99621	58	*10*	35	*15*	4	*17*	31	*21*
OK07214	OK93P656-RMH 3299/OK99711	58	*11*	37	*8*	7	*8*	35	*5*
OCW00S063S-1B	KAUZ/STAR//U1254/TX89V4213	57	*12*	36	*12*	9	*2*	33	*10*
OK08826W	TX89V4132/TX90V6913//PYN/BAU	57	*13*	31	*26*	7	*7*	29	*26*
OK05511-RHf2	TAM 110/2174	57	*14*	37	*10*	5	*13*	29	*25*
OK07231	OK92P577-RMH 3099/Duster	57	*15*	39	*3*	4	*21*	33	*9*
Everest	Check	56	*16*	37	*9*	1	*32*	34	*7*
Armour	Check	56	*17*	35	*17*	4	*22*	34	*8*
OK07216	OK99219/OK93P656-RMH 3299	56	*18*	29	*31*	8	*5*	32	*18*
OK08127	Intrada/Dominator//Duster	56	*19*	39	*4*	4	*23*	30	*24*
Greer	Check	54	*20*	36	*14*	9	*3*	32	*12*
OK05312	complex cross with Endurance	54	*21*	44	*1*	6	*11*	32	*19*
OK06336	Magvars/2174//Enhancer	53	*22*	33	*24*	4	*19*	31	*22*
OK08306	Ludwig/2174//OK93P656-RMH3299	53	*23*	34	*20*	7	*9*	31	*23*
OK08214	GA84414/Ok102//OK99215	53	*24*	30	*27*	5	*12*	32	*13*
Endurance	Check	52	*25*	35	*16*	9	*4*	31	*20*
OK08539	NE93405/TAM 302//OK99711	51	*26*	36	*11*	2	*29*	29	*27*
OK08707W	OK98G508W/Lakin//Trego	49	*27*	38	*6*	14	*1*	32	*14*
OK07418	RWA-R exp. line/OK98699	47	*28*	30	*29*	2	*28*	29	*28*
OK06617-RHf	FAWWON 06/2137//OK95G703	45	*29*	29	*32*	1	*31*	27	*30*
OK07820W	OK97611/Tgo//OK81306/TR810200	45	*30*	34	*18*	7	*10*	28	*29*
OK07S117	Synthetic der./OK98G508W	36	*31*	33	*21*	3	*26*	21	*32*
Chisholm	Check	34	*32*	30	*28*	5	*15*	23	*31*
Mean		**55**		**35**		**5**		**31**	
CV		**11**		**11**		**>15**		**13**	
LSD (0.05)		**8**		**6**		**5**		**5**	

[a] Mean determined at Granite, Kingfisher, Lahoma, Cherokee, the OPREC (irrigated), and Walsh, CO.

Table 3. A yield nursery conducted at Granite, Lahoma, and the ORPREC in 2010-2011, containing 30 experimental lines and 5 checks. Entry mean yields (in bu/ac) and ranks are shown in each column, with 35 entries ranked by grain yield at the OPREC. Only two experimental lines with WSM resistance are reported, with all checks.

Selection or check	**Pedigree**	**OPREC irrigated**		**Statewide [a]**	
OK0986146W	N02Y5106/OK03716W	60	*1*	40	*10*
Duster	Check	60	*2*	43	*2*
Endurance	Check	57	*4*	42	*3*
TAM 112	Check	54	*7*	45	*1*
OK0986130	N02Y5106/OK03716W	53	*9*	37	*16*
OK Rising	Check	48	*15*	37	*19*
Deliver	Check	45	*20*	35	*27*
Mean		46		37	
CV		13		11	
LSD (0.05)		10		8	

[a] Mean determined at Granite, Lahoma, and the OPREC (irrigated).

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

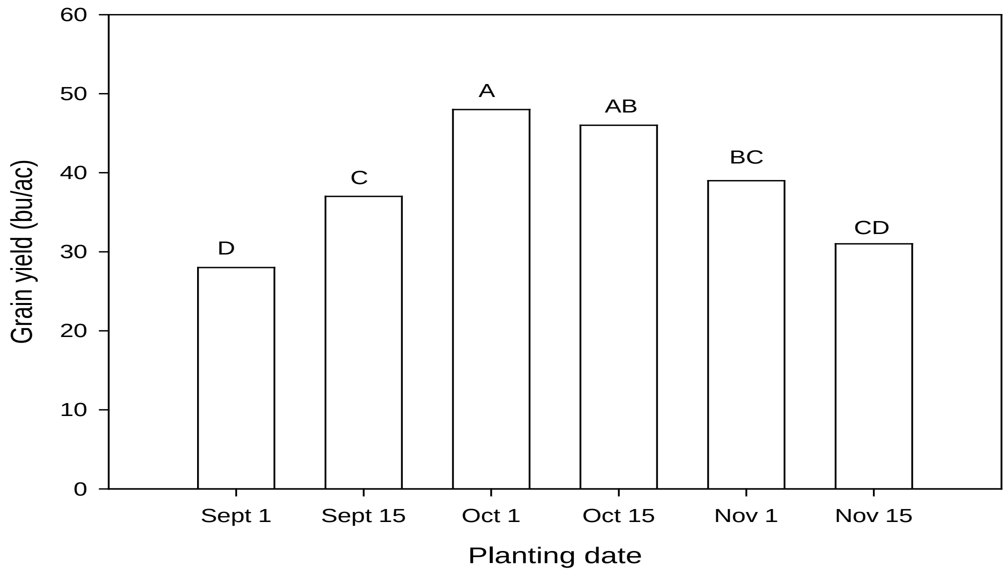
Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell
Jeff Edwards, Dept. of Plant and Soil Sciences, Oklahoma State University, Stillwater

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

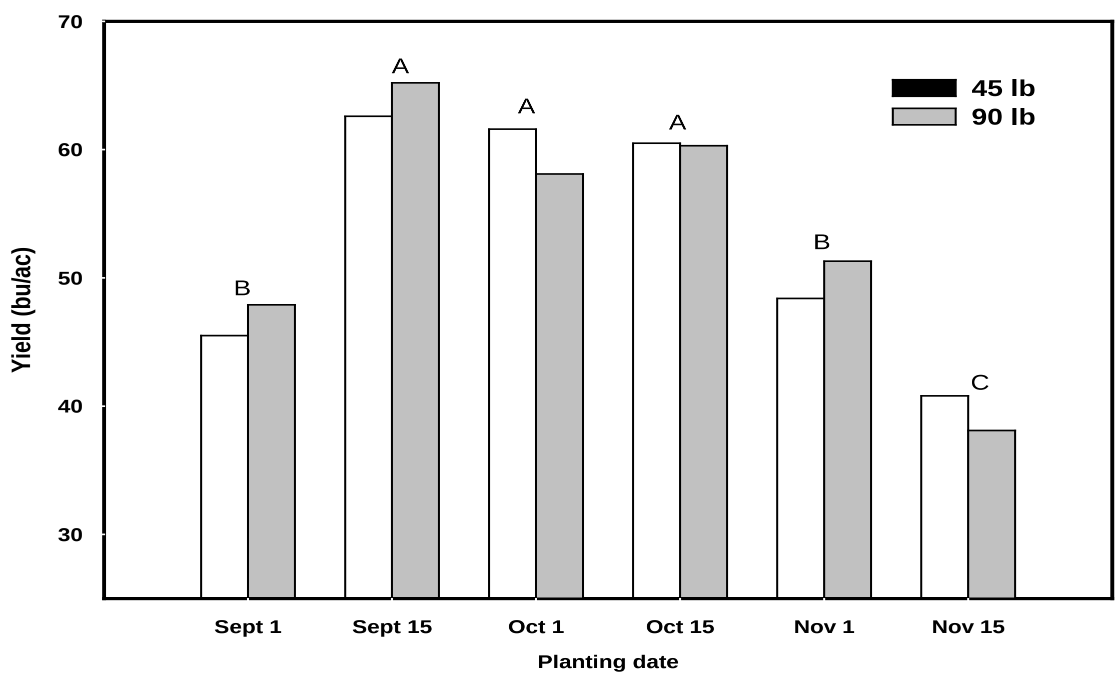
Previous research at OPREC has shown the first two weeks of October to be the optimal planting time with the highest yields obtained when planted October 1 (Fig. 1). Recommendations for planting after the optimum date have been to increase seeding rate to potentially increase yield. These recommendations 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

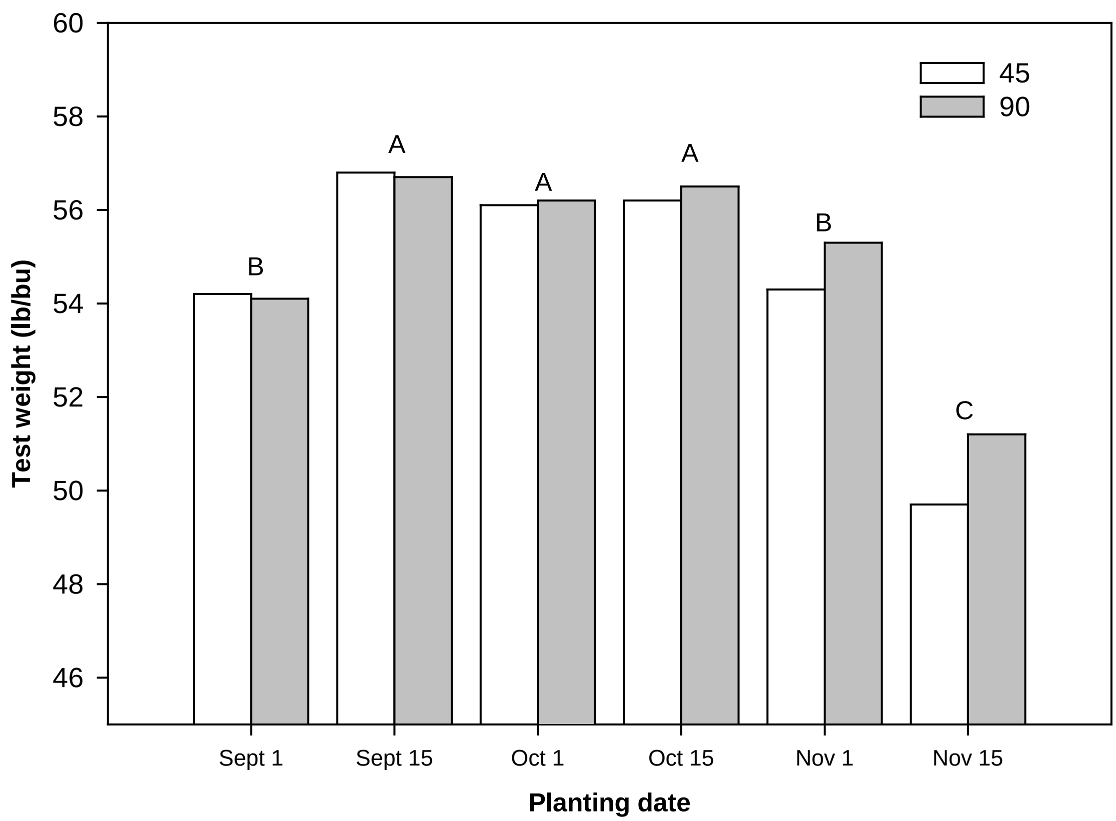
Figure 2. Grain yields for Duster planted dry-land at selected dates and seeding rates at OPREC in 2009.



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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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 and twice in 2011 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. Yield data were subjected to two-factor ANOVA with treatment and block as the factors.

Results and Discussion

A primary concern related to corn residue harvest is the increased potential for wind erosion due to inadequate ground cover. Conservation tillage systems may be rendered ineffective for wind erosion prevention by the practice of residue harvest. Typically, a tillage system must maintain <70% bare soil (or >30% residue cover) after planting to qualify as conservation tillage. The strip-till treatment with 100% residue removal exceeded this threshold in May 2010, and March and May 2011 (Fig. 1). Likewise, the no-till treatment with 100% removal had >70% bare soil in March and May 2011. Therefore, these management practices leave the soil vulnerable to wind erosion. Removing just 50% of the corn residue offered a marginal level of protection against erosion with maximum bare soil exposure reaching 60% in May 2011. The control (strip-till with no residue removal) and the strip-till plus cover crop treatment with 100% residue removal offered more protection against erosion as indicated by bare soil exposure consistently below 50%.

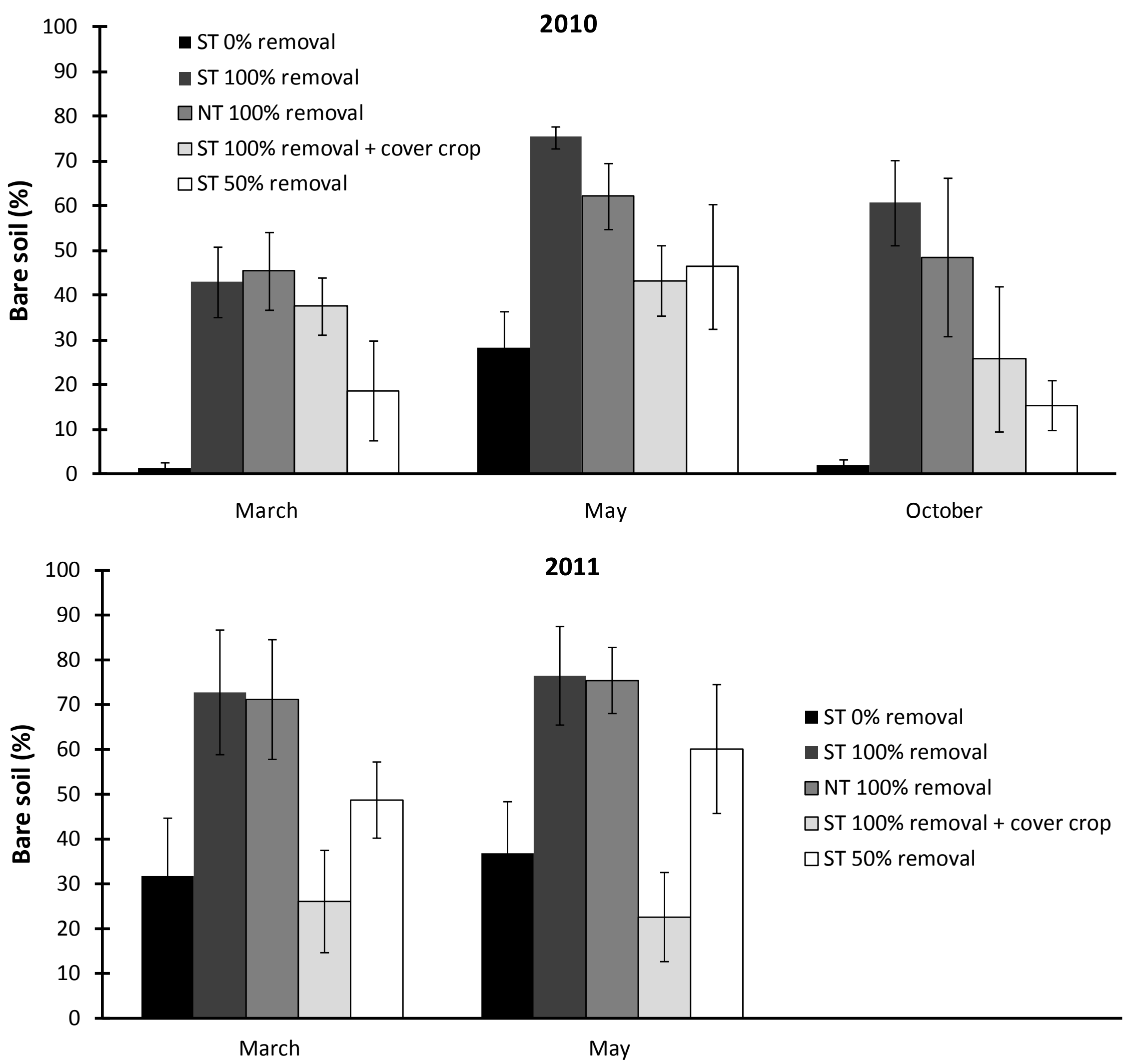


Fig. 1. Percent bare soil during March, May, and October 2010 and March and May 2011 for strip-till (ST) with 0%, 50%, and 100% residue removal, for no-till (NT) with 100% residue removal, and for strip-till with 100% residue removal and a winter wheat cover crop. Corn was planted in all treatments in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

Soil samples collected on 30 October 2010 show highest saturated hydraulic conductivity and lowest bulk density under the strip-till plus cover crop treatment (Fig. 2). 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. Additional soil samples will be collected in March 2011 to clarify treatment impacts on soil physical properties.

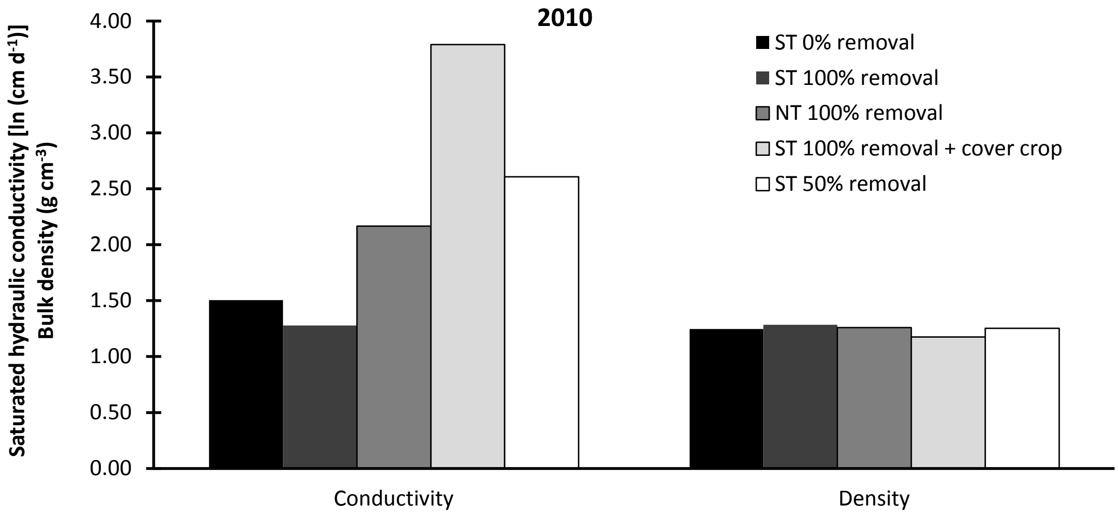


Fig. 2. Saturated hydraulic conductivity and bulk density for the 0-5 cm soil depth under strip-till (ST) with 0%, 50%, and 100% residue removal, for no-till (NT) with 100% residue removal, and for strip-till with 100% residue removal and a winter wheat cover crop. Corn was planted in all treatments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

Corn yields average from 84 to 104 bu ac^{-1} in 2010 and 61 to 72 bu ac^{-1} in 2011 with no statistically significant (p<0.05) differences between treatments in either year (Table 1). Numerically, the 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 the extent to which these treatments affect the yield of the subsequent corn crop.

Table 1. Corn yields for residue removal treatments in 2010 and 2011. No significant treatment effect on yield was detected in either year.

Treatment	2010	2011
	bu ac^{-1}	
ST 0% removal	104	72
ST 100% removal	100	72
NT 100% removal	87	62
ST 100% removal + cover crop	84	61
ST 50% removal	92	64

Evaluation of two Fungicides for use in Grain Sorghum

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In 201,1fungicides from Syngenta (Quilt) and BASF (Headline) were tested for use in limited irrigated grain sorghum. The timing of application for Quilt was boot and 100% headed, for Headline the timing was boot, 50% heading, and 100% heading. An untreated check was also included. Ratings for disease, grain yield, and test weight were taken. The grain sorghum hybrid planted was DK 37-07, the plots were harvested with a Kincaid XP 8 combine with harvest master classic grain gauge instrumentation for plot weight, test weight, and grain moisture.

Results

Although the yields were the higher for all treatments, no significant difference was found (Table 1). No difference was observed in disease pressure with any treatment. This could have been because the grain sorghum hybrid selected. It also may have been due to the climate in 2011, with little or no precipitation diseases, were not present.

Table 1. Grain yields and test weight from fungicide evaluations at OPREC in 2011.

Treatment	Grain yield (bu/ac)	Test weight (lb/bu)
Quilt (boot)	163	58
Headline (50% headed)	163	58
Headline (100% headed)	160	58
Quilt (100% headed)	156	58
Headline (boot)	152	58
Untreated check	150	58
Mean	157	58
CV%	6.4	0.8
L.S.D.	15	58

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 2011 in conjunction with DuPont chemical company a grain sorghum inbred line was planted that was tolerant to post emergent grass control herbicides. The inbred was tolerant to ALS inhibitor herbicides and will have the trade name Inzen Z™. And additional tolerance trait allowing for the use of Assure II as a post emergent grass control treatment is also being developed and will be marketed with the trade name Inzen AII™. This resistance trait was breed into sorghum from wild relatives by Kansas State University, making it non-genetically modified organisms (non-GMO). Since the resistance came from wild relatives and could potentially move from the grain sorghum back to johnsongrass and shattercane, best management practices will be **CRITICAL** for the long-term viability of the technology. The present timetable for release for Inzen AII is a limited supply of seed in 2014 with adequate seed supplies in 2015. A release date for Inzen AII is not known.

Results

In 2011 the inbred was planted to evaluate and demonstrate tolerance to the herbicides. The Inzen Z herbicide formulation has not been determined as of yet, but we can report that the inbred is tolerant to the grass control herbicide from the ALS inhibitor mode of action. Also, the inbred used in 2011 did not exhibit the yellowing during the early growth stages that was observed in 2010. Johnsongrass the most common grass weed at the OPREC trial location, control has been excellent both years the grain sorghum has been evaluated.

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.

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

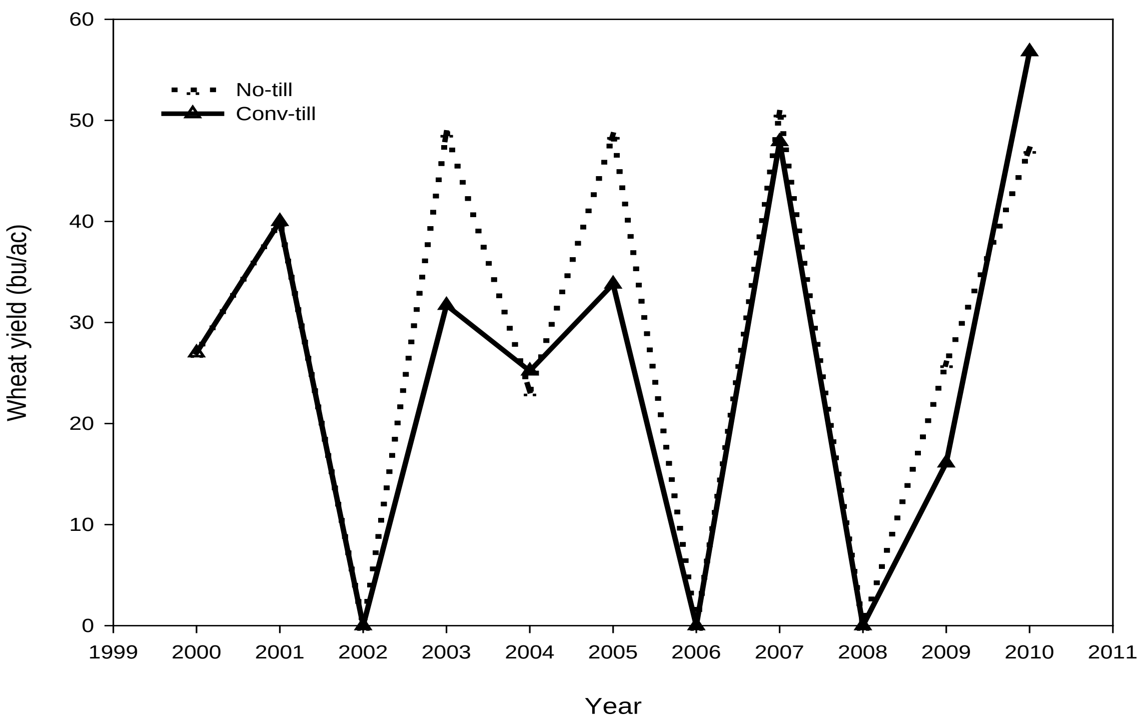
Table 1. Summer growing season precipitation at OPREC

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.



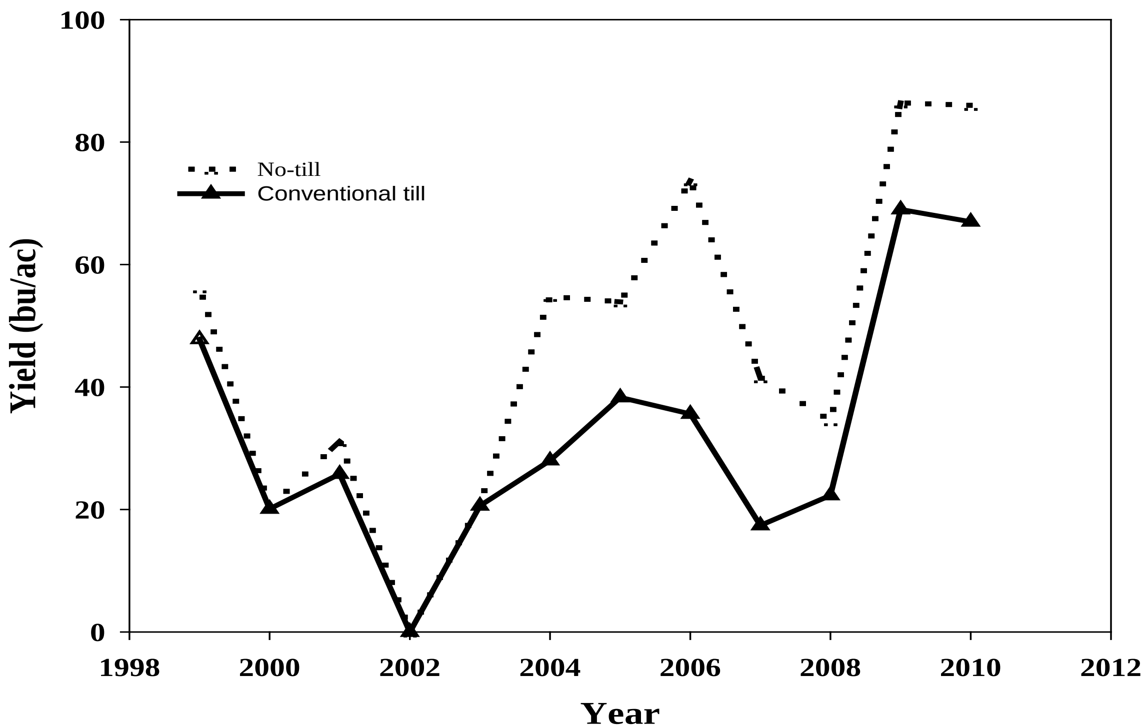
Neither tillage system produced, or will produce grain when drought occurs and no crops are harvested as in 2002 and 2008 (Figure 1). In three of the seven years that wheat was harvested grain yields were significantly higher for no-till (Fig. 1) with an average increase of 14 bu/ac. In 2010 yields for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

Evaluating Nitrogen Use Efficiency in Grain Sorghum

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

In 2011 a multi-university project to evaluate nitrogen use efficiency in grain sorghum was initiated, the universities involved were Kansas State, Texas A&M, and Oklahoma State. Multiple locations in each state were planted, but due to drought condition in the southern plains only a few were harvested. There were to be two trials at OPREC, a limited irrigation and dry-land. Only the limited irrigated trial was planted, due to the lack of precipitation and soil moisture necessary for emergence, the OPREC dry-land trial was never planted. There were 14 core treatments at each location (Table 1). The limited irrigated trial at OPREC also included a 200 lb N/ac applied with coulter treatment and no additives.

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

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

Two other locations were also planted in north central Oklahoma. But neither was harvested due to higher than normal temperatures that affected flowering, although adequate soil moisture was available at planting and good stands were observed. The grain sorghum hybrid planted was DK 37-07, the plots were harvested with a Kincaid XP 8 combine with harvest master classic grain gauge instrumentation for plot weight, test weight, and grain moisture.

Results

After the harvest results were obtained, it seems a good representative soil sample may not have been obtained. The grain yield for the untreated check was the same as the higher N rates and no nitrogen deficiency was observed during the growing season. No difference in yield was observed between application methods of surface band, broadcast, and coulter at rate of 60 lb N/ac. A difference was observed between the N-serve additive when compared to surface band and broadcast application at the same N rate, this difference is difficult to explain. No difference was observed in plant population at OPREC, although differences were observed at the north central Oklahoma locations.

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

N Rate	Yield bu/ac	Test weight lb/bu	Population plants/ac	Population heads/plant
60 lbs UAN surface band	159	58.3	37,800	1.60
60 lbs UAN broadcast	157	58.5	36,100	1.62
120 lbs UAN coulter	155	58.4	37,300	1.57
150 lbs UAN coulter	155	58.2	32,300	1.76
30 lbs coulter	155	58.1	36,800	1.45
60 lbs Super U broadcast	152	58.2	35,600	1.57
60 lbs UAN coulter	151	58.3	36,900	1.64
0 check	151	57.6	36,400	1.55
60 lbs ESN broadcast	151	58.0	35,300	1.59
60 lbs Urea broadcast	150	58.3	34,300	1.70
60 lbs Urea Agrotain	150	58.3	37,800	1.56
60 lbs UAN Agrotain Plus coulter	149	58.1	39,500	1.44
60 lbs UAN N-serve coulter	138	58.7	32,600	1.78
200 lbs UAN coulter	136	58.6	32,500	1.97
90 lbs UAN coulter	135	57.9	29,300	1.91
Mean	150	58.2	35,400	1.65
CV %	8.2	0.8	17.4	22.6
L.S.D.	18	0.6	NS	NS

In north central Oklahoma differences were observed when N was applied at 90 lb N/ac and higher with the coulter. This result can be attributed to planting the seed to close to the coulter strip were the N was applied. This was not observed at OPREC due to moving the coulter application to make sure the seed was not planted as close the N fertilizer.

Evaluating a New Formulation of Lumax for use in Grain Sorghum

Rick Kochenower, Oklahoma Panhandle Research and Extension Center, Goodwell

In 2011 in cooperation with Syngenta a new formulation of Lumax was evaluated at OPREC. Lumax is a premix of Dual Magnum (s-metolachlor), atrazine, and Callisto (mesotrione). Lumax was evaluated alone and as two pass treatments (Table 1) as well as an untreated check. Other herbicides utilized in the evaluation were Traxion (glyphosate), Dual Magnum, Peak, and Sequence (glyphosate and Dual Magnum). Ratings for crop injury, weed control, grain yield,

Table 1. Herbicide treatments and application timing for lumax evaluation at OPREC in 2011.

Treatment number	Herbicide	Rate	When applied
1	Untreated check		
2	Traxion	28 oz	Preemergent
	AMS	17 lb/100 gal	Preemergent
	Lumax	80oz	Preemergent
3	Traxion	28 oz	Preemergent
	AMS	17 lb/100 gal	Preemergent
	Lumax	48 oz	Preemergent
	Dual Magnum	16 oz	6 inch sorghum
4	Traxion	28 oz	Preemergent
	AMS	17 lb/100 gal	Preemergent
	Lumax	80oz	Preemergent
	Peak	0.75 oz	3 – 4 inch weeds
	Atrazine	16 oz	3 – 4 inch weeds
	COC	1% v/v	3 – 4 inch weeds
5	Sequence	40	Preemergent
	AMS	17 lb/100 gal	Preemergent
	Peak	0.75 oz	3 – 4 inch weeds
	Atrazine	16 oz	3 – 4 inch weeds
	COC	1% v/v	3 – 4 inch weeds

and test weight were taken. The grain sorghum hybrid planted was DK 37-07, the plots were harvested with a Kincaid XP 8 combine with harvest master classic grain gauge instrumentation for plot weight, test weight, and grain moisture.

Results

Weed control and injury ratings were taken 5 and 42 days after the post application. No significant injury to the crop was observed, although slight interveinal chlorosis was observed for treatments 4 and 5, after the post application. Also, a delay in head emergence was observed for treatment 5 that may have reduced yields (Table 2). No significant difference was observed in weed control among treatments, with control of 95 to 99% for both pigweed and kochia. This control was excellent considering the pigweed pressure (Fig 1 and 2). The pigweed pressure was so high that no sorghum was harvested from the untreated check plots.

Table 2. Grain yields and test weight from Lumax evaluation at OPREC in 2011.

Treatment number	Grain yield (bu/ac)	Test weight (lb/bu)
2	160	59
4	157	58
3	150	59
5	148	58
1	0	0
Mean	123	58
CV%	7.9	0.8
L.S.D.	12	0.6

Figure 1. Untreated check plot of Lumax evaluation at OPREC in 2011.

Figure 2. Treatment 2 of Lumax evaluation at OPREC in 2011.