2011 Extension Cotton Project Annual Report

Southwest Research and Extension Center, Altus

In cooperation with the Oklahoma State University Integrated Pest Management Program

2011 Extension Cotton Report

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An effective cotton integrated pest management (IPM) program includes all aspects of production. This report contains summarized data from various applied research trials and demonstrations that address many different cotton production components. Cotton Extension Team IPM efforts included considerable crop crisis management during the entire 2011 growing season. According to USDA-NASS, about 415,000 acres were planted with only about 70,000 acres harvested. This was due to extreme heat and drought conditions. Most dryland acres never emerged. Irrigated acreage emerged, but was abandoned beginning in June due to lack of irrigation water from the Lugert-Altus Irrigation District. Other marginally irrigated fields were later released after RMA approved boll count insurance adjustment procedures in September. According to USDA-NASS, the 2011 growing season in Oklahoma resulted in the lowest production and harvested acreage since records began in 1894.

Because of the extreme environment, numerous field projects were lost and completed project results should generally be viewed with caution. It should be emphasized that the data from only one year should not be used for major production decisions, and at least 2-3 year's results should be utilized before production practices should be modified. Components of this report may include data generated from "off-label" applications or practices. Although this data may be presented, the OSU Extension cotton team does not recommend any "off-label" product use or practice.

We are very appreciative of the contributions made by the OSU IPM Program. Without their support and participation, much of this work would not be possible. We also appreciate the support from producers and ginners, County Extension Educators, Oklahoma Cooperative Extension Service, and the Oklahoma Agricultural Experiment Station. Cotton Incorporated, through the Oklahoma State Support Committee, has also provided assistance through partial funding of several projects. We also appreciate the assistance from the Oklahoma Cotton Council, because their continued support of our educational programs is critical to our success. A thank you is extended to the following entities, whose specific contributions make it possible to maintain and expand our research and demonstration programs and distribute results.

Aceto Agricultural Chemicals	AgriThority	All-Tex Seed
Americot/NexGen	BASF Corporation	Bayer CropScience
Cotton Growers Co-operative, Altus	Crop Production Services	Delta and Pine Land
Dow AgroSciences	DuPont	Helena Chemical
Monsanto Company	Nichino America	Winfield Solutions
Worrell Farms		

We appreciate the interest, cooperation and support of all those involved in the cotton industry in Oklahoma and encourage your comments and suggestions for the improvement of our programs. This report can be accessed on the web at our website http://www.osucotton.com and at the NTOK website: www.ntokcotton.org

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Producers and Cooperators

Western Oklahoma State College
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Mark Nichols-Altus
Brad McKinley-Tipton
Charles Shephard-Butler
Roger Fischer-Frederick
Kevin Seddon-Hollis
Bill & Matt Steinert-Covington
Tom Coomes-Hollis
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Lost project summary.

Project Description	Locations	# of Locations
County Replicated Small Plot Trials	Jackson, Harmon, Beckham, Tillman, Greer, Washita and Custer Counties	12
Bayer CAP Demonstrations	Jackson and Canadian Counties	2
Monsanto Replicated FACT Trials	Jackson and Tillman Counties	3
Population	Jackson, Tillman and Harmon Counties	6
Gypsum smallplot	Jackson County	1
Gypsum Variable Rate	Jackson County	1
USDA Picker/Stripper Comparison	Jackson County	1
Agrithority Seed trt	Jackson County	3
Morningglory-GTLL	Jackson County	1
Liberty Link Yield	Jackson County	1
Helena Foliar	Jackson County	1
Tomahawk 5	Jackson County	1
PGR Strategies	Jackson County	1
Potassium Response	Jackson County	1
Nematode Study	Washita County	1
Official Variety Trials (OVT's) all locations	Altus, Tipton and Chickasha	7
Total of all locations/projects lost		43

Variety Performance

Replicated cotton variety demonstrations were established in several cotton producing counties of Oklahoma. A total of 13 replicated small plot trials, and 2 replicated large plot, producer-cooperator trials were initiated. The large plot trials are referenced as RACE (replicated agronomic cotton evaluation) trials and we were able to acquire and use a Lee weigh wagon and producer equipment for harvesting. Several cooperative projects with industry were also planned (4 Bayer CropScience CAP plots and 3 Monsanto FACT trials). This totals 22 sites with variety related trials planned or planted. Several of these were with no-till producers, and 6 dryland/irrigated seeding rate studies were included at various locations. Of all of these trials, only 5 survived for harvesting. Of the five irrigated small plot variety trials planted, only one survived to harvest. Of eight dryland small plot trials planted or planned all failed. One irrigated RACE trial near Hydro in Blaine County and a dryland RACE trial in Garfield County were harvested in December and January due to late rainfall in the western part of the state.

Many fields with ground water and center pivot irrigation encountered diminishing capacity or increasing salinity issues and ultimately were released for insurance purposes by producer-cooperators. The Lugert-Altus Irrigation District (LAID) reservoir was at 47% of capacity in mid-May, and the District allocated only 6 acre-inches per assessed acre. Most of this irrigation was expended to get a stand and many producers had still experienced stand failures. Irrigation was ceased by the LAID around mid-July. Essentially all irrigated fields in the LAID were ultimately released for insurance purposes including those at the OSU Center at Altus and the Western Oklahoma State College (WOSC) site.

One small plot county replicated trial in Beckham County was planted May 23rd and managed under a sprinkler irrigation system on the Darrell and Sherry Gamble Farm near Erick. Each variety was planted into four rows by 30 feet in length and replicated four times. In early- season, alley areas between plots were tilled to facilitate harvesting, and plots were maintained by the producer along with the rest of the field. Final stand counts were taken in July and final plant heights were taken in September. Each variety was evaluated for storm resistance prior to harvest. Harvest aids were applied by the producer, and plots were harvested with a two row stripper equipped with a bagging system, scale, and data logger to record weights. Grab samples were taken from each plot and ginned on a small plot gin. Lint samples were submitted to the Fiber Biopolymer Research Institute (FBRI) at Lubbock for HVI analysis. Micronaire, fiber length, uniformity, and strength were determined for each variety. These data were utilized to calculate CCC loan value (assuming 21 color and leaf grade of 2). Yield averaged 869 lb/acre across all entries in this trial (Table 1). Based on loan value, the range of net value/acre was from $671 to $447, a difference of about $224/acre. Eight entries were in the upper tier of significance at this site. Final populations did not differ (Table 2), however final plant height varied by as much as about 6 inches, with differences noted among entries. Storm resistance visual scale ranged from 5.5 to 7.4 on a scale of 1 to 9 with 9 being very loose. Fiber quality differences were noted, with the staple ranging from about 34 to 37 32nds inch. Strength also was different among entries and ranged from 27.9 to 35.2. g/tex. Uniformity was not different among entries.

One large plot irrigated replicated agronomic cotton evaluation (RACE) trial was planted on May 17 and harvest was completed on December 27. This site was on the Merlin Schantz Farm under a center pivot. The site was strip tilled into winter wheat which had been baled for hay. The project was 8 rows wide planted the length of the field. This was an excellent test, but because of irrigation capacity issues, the trial suffered in August. At harvest, the trial was cut down in size to 1000 ft plots. Grab samples were taken and ginned on small plot equipment. Fiber samples were submitted for HVI analysis at the FBRI. Due to considerable rainfall during October, November, and December, this test was highly weathered. The site averaged 736 lb/acre, with no significant differences in loan value (Table 3). However, net value/acre ranged from $387 to $518, a difference of $131/acre. Although no differences were observed in final plant populations, plant height differences were noted. Storm resistance was found to be different at the site, however, this was heavily influenced by weather issues and by the late "top crop" that was sought by the producer (Table 4). Staple was somewhat shorter than normal, indicating considerable stress, but strength was good to excellent.

The only dryland trial that made it to harvest in our state in 2011 was the RACE trial planted with Matt and Bill Steinert near Fairmont (Enid proximity). This trial was planted on June 2, and was 6 rows wide x about 1000 ft long, and was harvested on January 3, 2012. With this site having been severely stressed for much of the growing season, one could expect some extreme yields, etc. The yield in this trial averaged 211 lb/acre, and the average loan value of the lint was under 52 cents/lb (Table 5). This site probably represents the best of the dryland in the state in 2011. Plant heights were only 20 inches on average, micronaire was 4, staple was 32.7, and uniformity was only 79 percent (Table 6). This field not only experienced poor weather during the growing season, but also during harvest as rainfall was excessive during October, November, and December. This significantly delayed harvesting and negatively impacted both yield and fiber quality. Fortunately we did have a great year in 2010 and we will encourage producers to also consider last year's data when making decisions for 2012. This data is available on the web at either of two sites: www.osucotton.com or www.ntokcotton.org.

Table 1. Harvest results from the Beckham County small plot replicated trial, Darrell and Sherry Gamble Farm, Erick, Oklahoma, 2011.

Entry	Lint turnout	Seed turnout	Burr cotton yield	Lint yield	Seed yield	Lint loan value	Lint value	Seed value	Total value	Ginning cost	Seed/tech cost	Net value	
	---------- % ----------		----------- lb/acre -----------			--$/lb--	--------------------------- $/acre -----------------------------						
PHY 499 WRF	29.2	45.7	3628	1059	1657	0.5716	605	249	854	109	74	671	a
CG 3787 B2RF	26.8	46.2	3021	991	1712	0.5751	570	257	827	111	75	640	ab
FM 1740 B2F	27.1	46.6	3667	992	1707	0.5649	561	256	817	110	75	632	ab
CG 3156 B2RF	26.3	46.2	3804	1000	1757	0.5414	542	264	806	114	74	617	abc
PHY 367 WRF	24.8	45.1	4124	900	1669	0.5760	518	250	768	111	71	586	abc
ST 5458 B2RF	27.3	48.4	3308	905	1603	0.5715	517	241	758	99	74	585	abc
DP 1133 B2RF	26.0	43.9	3537	917	1554	0.5771	529	233	762	106	74	582	abc
AT Dinero B2RF	25.1	48.6	3387	850	1646	0.5704	485	247	732	102	65	565	abcd
DP 1032 B2RF	27.5	44.3	3041	838	1357	0.5683	477	204	680	91	69	520	bcd
AT Edge B2RF	25.0	48.5	3080	770	1495	0.5733	441	224	666	92	65	508	cd
FM 2484 B2F	25.9	47.1	3034	794	1437	0.5763	458	216	673	91	74	508	cd
ST 4288 B2F	23.9	50.6	3099	742	1569	0.5755	427	235	662	93	69	500	cd
NG 4010 B2RF	23.8	48.7	2962	704	1445	0.5739	404	217	621	89	74	458	d
NG 4012 B2RF	23.9	46.0	2891	701	1325	0.5723	401	199	599	87	66	447	d
Test average	25.9	46.8	3278	869	1567	0.5709	495	235	730	100	72	558	
CV, %	4.8	3.4	19.0	16.6	15.0	1.0	17.0	15.0	16.1	14.4	---	18.6	
OSL	0.0001	0.0001	0.0888	0.0114	0.2256	0.0001	0.0231	0.2256	0.0668	0.0783	---	0.0798	
LSD	1.8	2.3	742†	206	NS	0.0082	120	NS	140†	17†	---	124†	

For net value/acre, means within a column with the same letter are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † indicates significance at the 0.10 level, NS - not significant.
Note: some columns may not add up due to rounding error.

Assumes:
$3.00/cwt ginning cost.
$300/ton for seed.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Table 2. In-season and fiber quality results from the Beckham County small plot replicated trial, Darrell and Sherry Gamble Farm, Erick, Oklahoma, 2011.

Entry	Final population	Final plant height	Storm resistance	Micronaire	Staple	Strength	Uniformity
	plants/acre	inches	1-9 visual scale*	units	32nds inch	g/tex	%
PHY 499 WRF	28,423	33.1	6.4	4.1	35.8	35.2	82.4
CG 3787 B2RF	21,889	29.6	6.6	4.3	36.8	31.6	82.4
FM 1740 B2F	20,582	29.0	5.8	4.5	36.3	30.4	81.7
CG 3156 B2RF	26,789	28.1	5.8	4.0	36.0	27.9	81.3
PHY 367 WRF	32,343	27.2	6.9	4.1	35.0	33.2	82.5
ST 5458 B2RF	26,463	26.9	6.1	4.7	36.8	32.6	81.6
DP 1133 B2RF	25,483	29.9	7.1	4.2	36.0	34.8	83.4
AT Dinero B2RF	29,076	27.9	6.1	4.4	36.5	30.0	81.7
DP 1032 B2RF	18,949	30.0	7.4	4.2	36.5	30.4	81.0
AT Edge B2RF	25,156	28.6	5.9	4.3	34.0	32.3	81.3
FM 2484 B2F	32,343	29.7	5.5	4.1	35.8	32.1	81.7
ST 4288 B2F	28,096	27.1	6.5	4.4	37.3	32.2	82.0
NG 4010 B2RF	20,255	29.0	5.9	4.1	36.0	32.9	81.4
NG 4012 B2RF	25,483	31.2	6.8	4.0	36.3	32.1	81.6
Test average	26,027	28.9	6.4	4.2	36.1	32	81.9
CV, %	31.1	5.8	8.2	4.9	1.8	2.7	1.3
OSL	0.4293	0.0001	0.0001	0.0009	0.0001	0.0001	0.1746
LSD	NS	2.4	0.8	0.3	0.9	1.2	NS

For net value/acre, means within a column with the same letter are not significantly different at the 0.05 probability level.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, NS - not significant.
*Visual storm resistance scale: 1=tight, 9=loose.

Assumes:
Value for lint based on CCC loan value from grab samples and FBRI HVI results.
Note: Color grades set to 21, leaf grades set to 2 for entire test.

Table 3. Harvest results from the Blaine County irrigated RACE trial, Merlin Schantz Farm, Hydro, OK, 2011.

Entry	Lint turnout	Seed turnout	Burr cotton yield	Lint yield	Seed yield	Lint loan value	Lint value	Seed value	Total value	Ginning cost	Seed/tech cost	Net value	
	---------- % ----------		----------- lb/acre -----------			--$/lb--	--------------------------- $/acre -----------------------------						
FM 1740 B2F	31.6	52.7	2556	808	1350	0.5718	462	203	665	77	70	518	a
DG 2570 B2F	31.9	52.5	2555	815	1342	0.5563	454	201	656	77	68	511	ab
DP 1044 B2F	30.9	51.8	2563	790	1327	0.5687	450	199	649	77	66	506	ab
AT Dinero B2F	29.7	53.1	2583	766	1373	0.5695	437	206	643	77	65	500	ab
AM 1511 B2F	32.5	49.5	2331	758	1154	0.5588	423	173	596	70	66	460	abc
FM 2484 B2F	29.9	52.5	2395	716	1259	0.5715	409	189	598	72	70	456	bc
DP 1133 B2F	32.3	49.2	2232	720	1097	0.5755	414	165	579	67	70	442	cd
ST 4288 B2F	27.7	54.7	2230	617	1218	0.5608	346	183	529	67	70	392	d
PHY 367 WRF	29.7	50.6	2143	636	1085	0.5618	357	163	520	64	69	387	d
Test average	30.7	51.8	2399	736	1245	0.5661	417	187	604	72	68	464	
CV, %	2.5	2.9	6.0	6.7	6.7	1.9	6.6	6.7	6.3	6.0	---	7.3	
OSL	<0.0001	0.0067	0.0065	0.0010	0.0020	0.3843	0.0006	0.0021	0.0011	0.0065	---	0.0007	
LSD	1.4	2.6	249	86	144	NS	48	22	66	7	---	59	

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OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † indicates significance at the 0.10 level, NS - not significant.
Note: some columns may not add up due to rounding error.

Assumes:
$3.00/cwt ginning cost.
$300/ton for seed.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Table 4. In-season and fiber quality results from the Blaine County irrigated RACE trial, Merlin Schantz Farm, Hydro, OK, 2011.

Entry	Final population	Final plant height	Storm resistance	Micronaire	Staple	Strength	Uniformity
	plants/acre	inches	1-9 visual scale*	units	32nds inch	g/tex	%
FM 1740 B2F	42,108	22.2	4.3	4.6	35.7	32.5	82.7
DG 2570 B2F	35,816	26.1	6.0	4.7	34.6	31.6	82.6
DP 1044 B2F	40,172	24.3	5.3	4.7	35.1	32.6	82.0
AT Dinero B2F	37,268	26.1	6.0	4.4	35.9	30.6	82.1
AM 1511 B2F	35,332	26.5	5.7	4.5	34.5	31.9	81.5
FM 2484 B2F	41,140	22.7	4.7	4.3	36.0	32.0	81.4
DP 1133 B2F	36,784	25.3	7.7	4.5	36.2	34.4	82.6
ST 4288 B2F	39,688	22.5	4.3	4.2	35.0	30.8	80.9
PHY 367 WRF	39,688	26.2	4.7	4.1	34.8	32.0	81.5
Test average	38,666	24.7	5.4	4.5	35.3	32.0	81.9
CV, %	8.0	7.0	15.5	6.1	1.8	2.8	0.7
OSL	0.1403	0.0244	0.0032	0.0853	0.0298	0.0033	0.0124
LSD	NS	3.0	1.5	0.47†	1.1	1.5	1.0

For net value/acre, means within a column with the same letter are not significantly different at the 0.05 probability level.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † indicates significance at the 0.10 level, NS - not significant.
*Visual storm resistance scale: 1=tight, 9=loose.

Assumes:
Value for lint based on CCC loan value from grab samples and FBRI HVI results.
Note: Color grades set to 21, leaf grades set to 2 for entire test.

Table 5. Harvest results from the Garfield County dryland RACE trial, Steinert Farm, Fairmont, OK, 2011.

Entry	Lint turnout	Seed turnout	Burr cotton yield	Lint yield	Seed yield	Lint loan value	Lint value	Seed value	Total value	Ginning cost	Seed/tech cost	Net value	
	---------- % ----------		----------- lb/acre -----------			--$/lb--	--------------------------- $/acre -----------------------------						
PHY 367 WRF	31.6	50.8	821	259	415	0.5282	137	62	199	25	48	175	a
FM 1740 B2F GS	31.4	54.2	769	241	416	0.5032	121	62	184	23	48	161	ab
ST 4288 B2F	27.9	56.1	711	199	398	0.5237	104	60	164	21	48	142	bc
DP 1044 B2F	30.2	56.6	651	197	369	0.5148	101	55	157	20	45	137	bc
AT EPIC RF	32.3	50.6	614	197	307	0.4972	98	46	144	18	38	126	c
NG 4012 B2F	30.3	54.7	593	180	325	0.5210	94	49	143	18	43	125	c
FM 2484 B2F	31.5	52.5	569	179	299	0.5272	94	45	139	17	48	122	c
Test average	30.7	53.6	675	207	361	0.5164	107	54	161	20	46	141	
CV, %	1.3	6.6	14.2	14.3	17.2	3.1	14.3	17.2	14.9	14.2	---	15.1	
OSL	<0.0001	0.2713	0.0575	0.0372	0.1490	0.2461	0.0343	0.1478	0.0656	0.0575	---	0.0677	
LSD	0.7	NS	140†	53	NS	NS	27	NS	35†	4.2†	---	31†	

For net value/acre, means within a column with the same letter are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † indicates significance at the 0.10 level, NS - not significant.
Note: some columns may not add up due to rounding error.

Assumes:
$3.00/cwt ginning cost.
$300/ton for seed.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Table 6. In-season and fiber quality results from the Garfield County dryland RACE trial, Steinert Farm, Fairmont, OK, 2011.

Entry	Final population	Final plant height	Micronaire	Staple	Strength	Uniformity
	plants/acre	inches	units	32nds inch	g/tex	%
PHY 367 WRF	29,040	20.7	3.9	33.0	29.0	79.6
FM 1740 B2F GS	30,782	18.6	4.1	32.0	26.4	77.7
ST 4288 B2F	25,555	20.5	3.9	33.4	26.7	78.3
DP 1044 B2F	30,782	21.1	3.9	32.4	29.5	79.3
AT EPIC RF	26,136	21.2	4.2	31.5	27.6	78.1
NG 4012 B2F	26,717	22.5	4.0	33.0	27.9	79.6
FM 2484 B2F	29,040	21.0	3.8	33.1	27.5	79.1
Test average	28,293	20.8	4.0	32.6	27.8	78.8
CV, %	10.8	3.9	2.0	2.5	3.1	1.1
OSL	0.2046	0.0013	0.0017	0.1308	0.0069	0.1218
LSD	NS	1.4	0.1	NS	1.5	NS

For net value/acre, means within a column with the same letter are not significantly different at the 0.05 probability level.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † indicates significance at the 0.10 level, NS - not significant.
*Visual storm resistance scale: 1=tight, 9=loose.

Assumes:
Value for lint based on CCC loan value from grab samples and FBRI HVI results.
Note: Color grades set to 21, leaf grades set to 2 for entire test.

Weed Control

Horseweed Control in Limited Tillage Cotton

Currently there are very few effective chemical options for controlling horseweed pre-plant in cotton. The lack of pre-season tillage (due to the rapid adoption of no-till production) and ineffectiveness of glyphosate has led producers to primarily depend on hormone-type herbicides (2,4-D or dicamba) for effective pre-plant control. In addition even the most effective hormone-based programs begin to lose effectiveness as weed size at application increases. This suggests that there may be a benefit from the addition of tank-mix partners that have the potential to improve horseweed control. Sharpen (saflufenacil) is a new PPO (protoporphyrinogen) inhibitor introduced by BASF which has the potential to provide effective burn-down (post-emergence) acitivity on horseweed. Unlike other PPO inhibitors that provide burn-down activity (such as ET or Aim) Sharpen has the potential to also provide residual activity on some broadleaf weed species. In addition, Sharpen belongs to a class of chemistry (pyrimidinediones) which currently has no documented cases of chemical resistance. The treatments presented below in table 1 were applied in the spring of 2011 in order to evaluate their effectiveness.

Table 1. Treatments evaluated for horseweed control project:

1. Untreated Check
2. 1 oz/A Sharpen + 1% MSO + 17 lb/100 gal AMS
3. 1 oz/A Sharpen + 1% MSO + 17 lb/100 gal AMS + 24 oz/A 2,4-D (4lb)
4. 1 oz/A Sharpen + 1% MSO + 17 lb/100 gal AMS + 29 oz/A Ignite 280
5. 1 oz/A Sharpen + 1% MSO + 17 lb/100 gal AMS + 8 oz/A Dicamba
6. 1 oz/A Aim + 1% MSO + 17 lb/100 gal AMS + 32 oz/A Glyphosate (4lb)
7. 2 oz/A ET + 1% MSO + 17 lb/100 gal AMS + 32 oz/A Glyphosate (4lb)
8. 1 oz/A Sharpen + 1% MSO + 17 lb/100 gal AMS + 32 oz/A Glyphosate (4lb)
9. 8 oz/A Dicamba + 32 oz/A Glyphosate (4lb) + 17 lb/100 gal AMS + ¼% NIS
10. 32 oz/A 2,4-D (4lb) + 32 oz/A Glyphosate (4lb) + 17 lb/100 gal AMS + ¼% NIS
11. 32 oz/A 2,4-D (4lb) + ¼% NIS
12. 8 oz/A Dicamba + ¼% NIS

Horseweed treatments were evaluated at 7, 14 and 30 days after treatment. However, only data from the 30 day observation are presented in Figure 1. 2011 was a very unique and challenging year. Conditions through the winter remained very dry and spring weed emergence was limited. No significant rainfall was received before or after treatment application. Therefore, these treatments were subjected to very stressful conditions. When Sharpen was applied alone, approximately 50% control was observed 30 days after treatment (DAT). Similar control was observed when Sharpen was tank-mixed with Ignite 280. However, when Sharpen was tank-mixed with either dicamba or 24 oz/A of 2,4-D, greater control (72-75%) was obtained. Sharpen, Aim or ET tank-mixed with glyphosate provided 82-88% control. Dicamba applied alone or 2,4-D applied alone at 32 oz/A provided 87-92% control. Only tank-mixes of 2,4-D (at 32 oz/A) or dicamba with glyphosate provided greater than 92% control of horseweed 30 DAT. Although the standard treatments (8 oz/A dicamba or 32 oz/A 2,4-D + 32 oz/A glyphosate) performed well in 2011, some Sharpen treatments seemed to be less effective compared to previous observations. Sharpen applied alone or tank-mixed with dicamba or the lower rate of 2,4-D did not control horseweed as effectively in 2011 as we have seen in prior years. This may be attributable to the extreme dry conditions in 2011. These treatments should be evaluated further. In addition, glyphosate clearly had a positive impact on treatment performance which suggests that horseweed at this site is not currently a resistant population. Since resistant populations of horseweed have already been found in Oklahoma we should continue to explore effective alternatives such as Sharpe

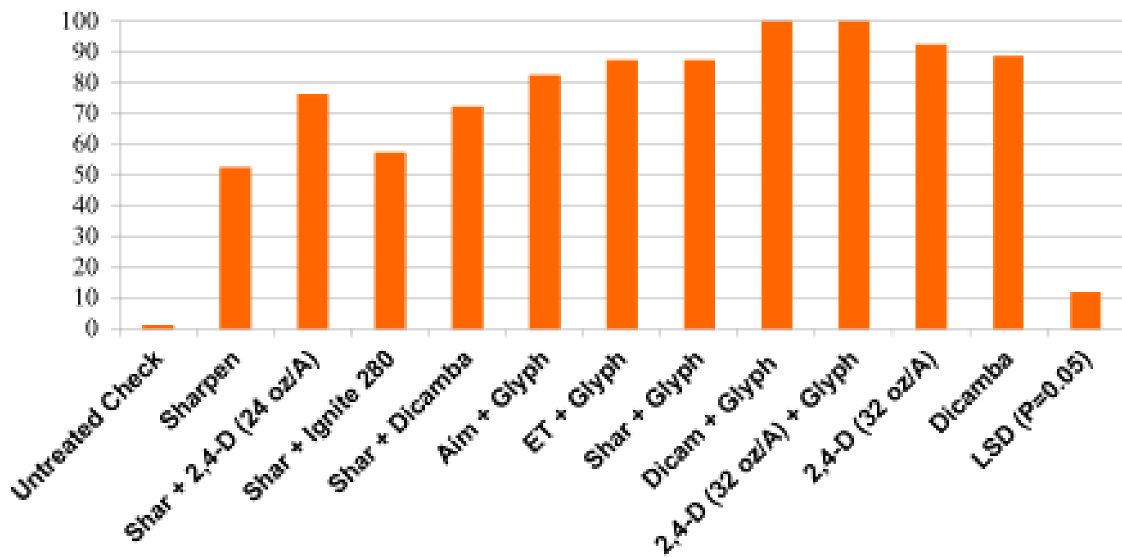

Figure 1. Horseweed control 30 DAT.

Controlling Volunteer Glyphosate Tolerant Cotton

Volunteer glyphosate tolerant cotton has gradually become a legitimate problem for cotton producers adopting no-till production practices. In fact, circumstances often make it impossible for growers to control volunteer without some form of tillage. As is the case with certain weed control situations, volunteer cotton germinates and emerges at the same time planted cotton emerges leaving producers with very few options. The lack of height differential between the crop and the volunteer make it almost impossible to safely and effectively control the volunteer with hooded or shielded applications. For this reason it is imperative that no-till producers make every attempt to control any volunteer present prior to planting in hopes of avoiding this situation. Prior work from both OSU and other universities has confirmed that volunteer glyphosate tolerant cotton under the four leaf stage can be (relatively) easily controlled with several chemical options. However, at the same time they also concluded that larger cotton quickly becomes more difficult to control. Therefore the 2011 study was focused on targeting larger volunteer cotton (in the 6-8 leaf stage). The treatments applied and observation data from that project are presented below.

Trt No.	Treatment Name	Rate	Rate Unit
1	Untreated Check		
2	Sharpen	1	oz/a
	MSO	1	% v/v
3	Sharpen	2	oz/a
	MSO	1	% v/v
4	Aim	1	oz/a
	Crop Oil Concentrate	1	% v/v
5	Aim	1.6	oz/a
	Crop Oil	1	% v/v
6	ET	2	oz/a
	Crop Oil Concentrate	1	% v/v
7	ET	2.5	oz/a
	Crop Oil	1	% v/v
8	Gramoxone Inteon	24	oz/a
	Induce	0.5	% v/v
9	Gramoxone Inteon	32	oz/a
	Induce	0.5	% v/v
10	Gramoxone Inteon	48	oz/a
	Induce	0.5	% v/v

Table 2. Volunteer glyphosate tolerant cotton treatments

Treatments were applied in 10 gallons of water with TurboTee nozzles at 26 PSI. At the 7 day (DAT) observation stand counts were taken and compared to the untreated. These data are reported as a percentage of the untreated. Therefore, higher stand percentages indicate less effective treatments. That data along with the 21 day weed control observation is listed below in figure 2.

Seven day stand counts showed significant reductions in stand from the higher rates of Sharpen, Aim and ET. However by 21 days after treatment, plots previously showing stand loss (at 7 DAT) indicated that in many cases plots had made a near complete recovery. Six to eight leaf cotton treated with Sharpen, Aim or ET showed this type of “near complete” recovery by the 21 day observation (see figure 3). Plots receiving Gramoxone Inteon did not show any signs of recovery at any time after treatment. In fact, the only cotton present in these plots was from new seedlings which germinated and emerged well after application. Sharpen applied at either rate (1 or 2 oz/A) + 1% MSO provided insufficient (2.5-3.8%) control of 6-8 leaf cotton 21 days after treatment. Aim applied at 1-1.6 oz/A with 1% crop oil controlled the cotton slightly better (10-12%) but was still inadequate. This was similar to the lower rate (2 oz/A) of ET with 1% crop oil. When the ET rate was increased to 2.5 oz/A control observed 21 DAT was significantly increased (to 32%). All Gramoxone Inteon (paraquat) treatments (regardless of rate, i.e. 24-48 oz/A) controlled 6-8 leaf cotton 99.5% 21 DAT.

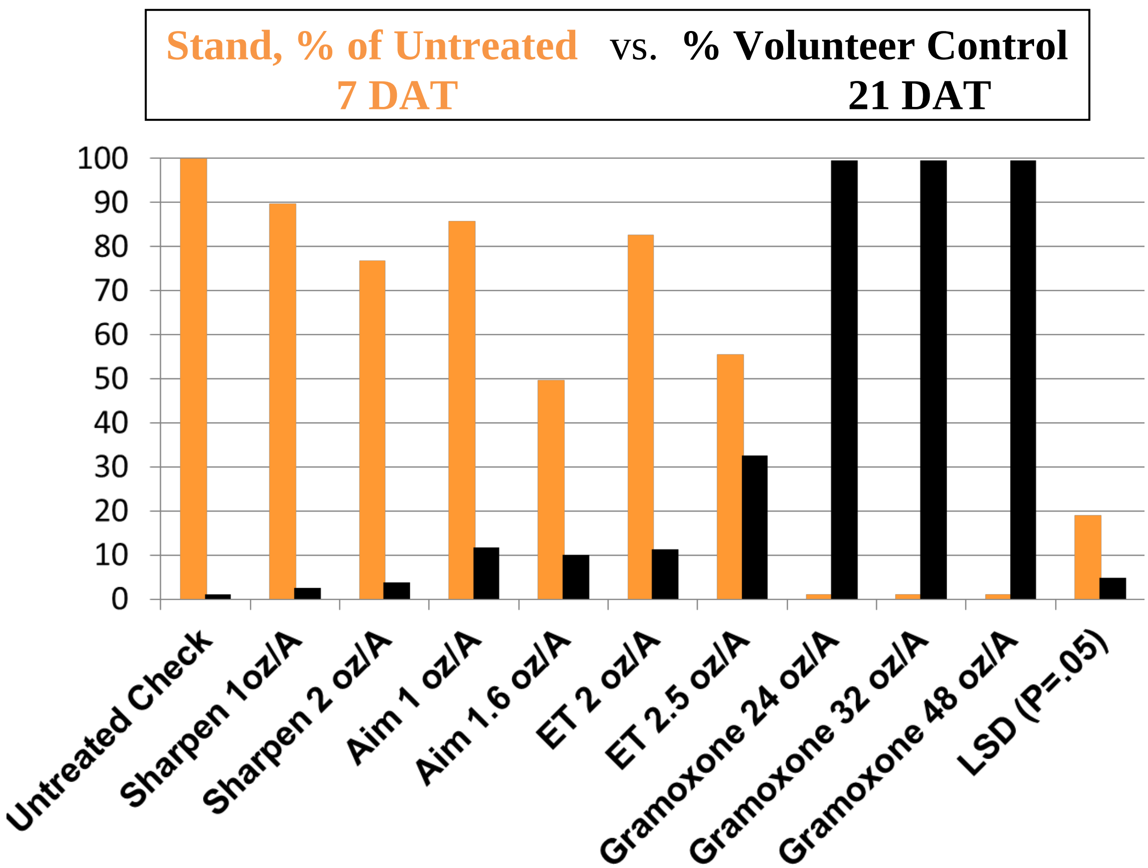

Figure 2. Volunteer cotton control data.

24 oz/A Gramoxone Inteon + nis **1.6 oz/A Aim + crop oil**

21 DAT

In summary there is no doubt that the weather in 2011 had a significant impact on treatment performance. This is evidenced by the fact that previous Oklahoma data has indicated that several products previously evaluated such as Aim (even at 1 oz/A) can be very effective for controlling volunteer cotton. We plan to continue exploring control options in 2012.

Herbicide Resistance in Oklahoma

I think we all have read extensively about how herbicide resistant weeds have taken most of the countryside. In fact with the recent discovery of glyphosate resistant palmer amaranth to our west (in Texas South Plains counties including Hale, Hockley and Terry near Lubbock) Oklahoma seems to be surrounded. Actually there are already several species of herbicide resistant weeds in Oklahoma. ALS resistant Italian ryegrass, cheat and palmer amaranth, and glyphosate resistant waterhemp and horseweed have been already been documented in several areas of Oklahoma. For a few years now Dr. Joe Armstrong has been testing weed populations around the state for signs of or the development of herbicide resistance. Thanks to funding from several producer and/or commodity organizations (Oklahoma Cotton Council, Cotton Incorporated, the Oklahoma Peanut Commission, Oklahoma Soybean Board, and the Oklahoma Wheat Commission) this testing is provided as a FREE service to Oklahoma producers. Dr. Armstrong has issued a fact sheet (PSS-2279) explaining this diagnostic service in detail and we encourage everyone to review the fact sheet below and become familiar with this program**.** Our biggest concern at this point is preventing (or at least delaying) the development of glyphosate resistant palmer amaranth populations in Oklahoma. I think the road map provided by other areas of the country shows us that this particular weed has the potential to have the greatest negative impact on Oklahoma due to its prolific nature. Currently we have no indications of any “confirmed” glyphosate resistant palmer in Oklahoma. Unfortunately this could easily change in 2012. We use the word “confirmed” not to boast about how much we currently know but rather to point out how little we currently know. Without extensive testing it is difficult to identify these populations. The fact sheet from Dr. Armstrong addresses exactly what is entailed in the confirmation process. In 2011 we sampled twenty cotton fields throughout Oklahoma. We were specifically looking for surviving, mature horseweed and palmer amaranth. These samples were shipped to Dr. Armstrong later in the fall. As stated earlier we were <u>not able</u> to identify any herbicide resistant populations of palmer amaranth but we did identify several populations of glyphosate resistant horseweed in several counties. In fact, there is enough glyphosate resistant horseweed in Oklahoma that everyone should assume (as far as management strategies go) that their population is also resistant and devise control strategies accordingly. The two photographs below represent samples taken in 2011 and the results of the screening. Figure 3 is the susceptible check used for comparison or a baseline. Figure 4 represents a population of horseweed sampled last fall and I think the results speak for themselves.

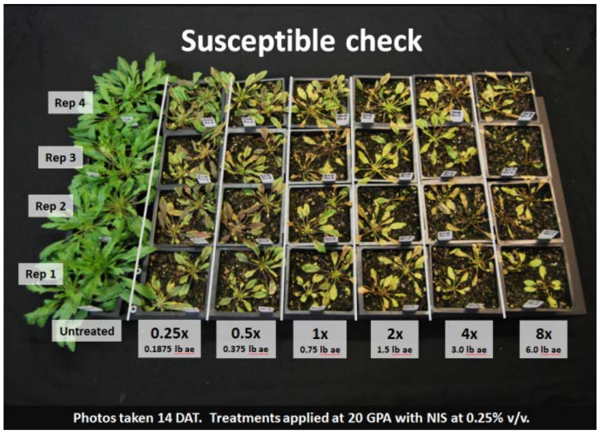

Figure 3. Susceptible check population

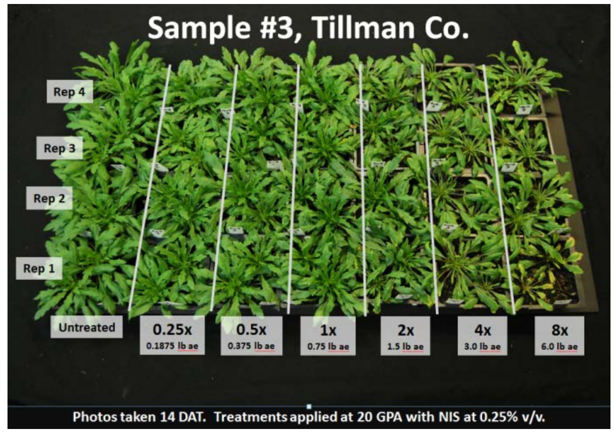

Figure 4. Resistant population

As you can see from the photos, glyphosate resistant horseweed populations can survive even 8 times the normal rate. Fortunately as it pertains to (preplant) horseweed control we have effective alternatives (see flyer below). So, the question becomes: What can we do to prevent or delay the development of glyphosate resistant palmer amaranth in Oklahoma? Well, the answers are the same as what you have been reading in ag-based literature for several years. The use of residual herbicides are the key component in our defense against this threat. Fortunately in cotton we still have many effective options. I think there are multiple reasons why glyphosate resistant palmer hasn't taken over the southwest just yet. One that is agreed upon by most is the continued use of yellow herbicides. This continues to be the best (and most economical) advice we can give cotton producers. Tank-mixing preplant burndown and early post herbicides is another key component for us. In the southwest when we do receive adequate rainfall it is usually in the early part of the season (spring on into June). In order for residual herbicides to be effective one of the following three requirements must be met - shallow tillage, rainfall or irrigation. Taking advantage of the rainfall component is critical. Therefore we place more importance on incorporating residuals early-season…when we still have good chances to receive the activating rains. Once we hit July, our chances of getting the full benefit out of a residual herbicide depend highly upon whether or not we own a sprinkler. <u>Defending against this threat in the southwest is an early-season battle.</u> In closing, while visiting with producers some have made the comment that things will soon take care of themselves because technological advances coming in the pipeline will bail us out of this train wreck we have thus-far avoided. Unfortunately these technologies are several years out and don't currently provide us with any guarantees that life will be a breeze in the future. In addition, the best way to find out if this comes true is to still be in business when the life-saving technology arrives.


Horseweed Control
Suggestions In No-till Cotton
AGRICULTURE
OKLAHOMA STATE UNIVERSITY
✓ Use an effective control strategy ...tank-mix with Glyphosate
Include 1.0 lb ai/acre - 2,4-D or 0.25 lb ai/acre - Dicamba
✓ Spray when weeds are small
-Rosettes are easiest to control
✓ Remember labeled plant back intervals
-30 days after 2,4-D
-21 days after 1" rainfall following Dicamba*
*Do not apply Dicamba in regions receiving less than 25" of average annual rainfall.
Don't Let Horseweed Get the Jump on Your Cotton . . .
Start Clean and Stay Clean!

Diagnostic Service to Test for Herbicide-resistant Weeds in Oklahoma

Joe Armstrong
Extension Weed Science Specialist

Why should I be concerned about herbicide-resistant weeds?

Herbicide resistance is an increasing concern in Oklahoma crop production. Continual use of a single herbicide or single mode of action places heavy selection pressure on a population of weeds to find the few resistant individuals that may be present. Given enough time and enough herbicide applications, resistant weeds will develop and can quickly take over large areas. This is especially true in no-till or monocrop production, where herbicides are used more frequently. If populations of herbicide-resistant weeds increase, effective herbicide options will become very limited.

Why should I submit a sample?

The only way to know for sure if resistance is developing in your field is to test the suspected weeds. Early detection of herbicide-resistant weeds is an important step in designing an effective weed management program to prevent the development and spread of the resistant weed. Plus, thanks to the support of the Oklahoma Peanut Commission, Oklahoma Soybean Board, and the Oklahoma Wheat Commission, screening of potentially resistant weeds is provided as a FREE service to any producer in Oklahoma.

Which weeds are of greatest concern?

Pigweed species, Italian ryegrass, cheat, marestail, giant ragweed, and johnsongrass are some of the weeds most likely to develop resistance to commonly used herbicides in Oklahoma crop production. However, because of the diversity of crop production in Oklahoma, there are many other weeds that also may be of concern.

What happens after I submit a sample?

After a sample is received at OSU, the seed will be grown in greenhouse facilities. Depending on the weed species, the crop from which the sample was collected, and the herbicide use history, the sample will be screened with several herbicides from different modes of action at multiple rates. Approximately three weeks after treatment, treated plant samples will be compared to untreated and known-susceptible check samples to determine if resistance is present. Once the sample has been evaluated, the results will be summarized and returned to the producer who submitted the sample. The entire process should take 8 to 12 weeks.

How do I collect and submit a sample?

- Seed should be collected from fields sprayed during the current cropping season. Avoid collecting seed from field edges or areas that were not treated.
- If possible, collect seeds from at least five mature plants. Maturity can usually be determined by seeing how easily the seed will shatter from the seedhead. It is also important to collect enough seed for greenhouse testing—enough to fill a small coffee cup will provide plenty of seed for testing. Place seeds in a paper bag or large envelope for mailing.
- Each weed species should be submitted as a separate sample. Likewise, samples from multiple fields should be submitted separately.
- Complete the information form included with this fact sheet and submit it with your seed sample. Seed samples and information should be sent to:

OSU Extension Weed Science Diagnostic Services
Attn: Joe Armstrong
Dept. of Plant and Soil Sciences
368 Ag Hall
Stillwater, OK 74078

For more information on herbicide mode of action, please see Extension Fact Sheet PSS-2778, "Herbicide How-to: Understanding Herbicide Mode of Action."

If you have any questions, please contact your county OCES agricultural educator or Joe Armstrong, OSU Extension Weeds Specialist, at (405) 744-9588 or joe.armstrong@okstate.edu for more information.

Sample submission form

Please provide as much information as possible. All results will be kept confidential, however they may be referenced in OCES reports by the county from which the sample was submitted.

Grower information

Name: ____

Address: ____

City: ______________________________, OK Zip: ____________________

County: ____

Phone: ____________________Email: ______________________________

Field information and history

Weed species submitted: ____

Herbicide(s) that you suspect the weed is resistant to: ______________________________

Location (legal description, nearest intersection, GPS coordinates, etc.): ____________________

Year & crop grown (List most recent crop first)	***Tillage practices*** (conventional, no-till, etc.)	***Herbicides applied***
		PRE: POST:
		PRE: POST:
		PRE: POST:
		PRE: POST:

Seed samples and information should be sent to:
OSU Extension Weed Science Diagnostic Services
Attn: Joe Armstrong
Dept. of Plant and Soil Sciences
368 Ag Hall
Stillwater, OK 74078

If you have any questions, please contact your county OCES agricultural educator or Joe Armstrong, OSU Extension Weeds Specialist, at (405) 744-9588 or joe.armstrong@okstate.edu for more information. Funding for testing herbicide-resistant weeds provided by:

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NTOK and Cotton Comments Newsletter Outreach

The NTOK (North Texas, Oklahoma, Kansas) program and Website (www.ntokcotton.org) was supported by generation of timely articles on important issues during the growing season. Mr. Vic Schoonover provided 20+ news articles for release to local newspapers.

Seventeen newsletters were published and directly sent to 167 email recipients. A total of 35 recipients responded to an end-of-season survey. It was evident based on this survey and respondents, that an additional 112 people were forwarded the newsletter. Therefore, the best estimate we have for direct distribution of the newsletters would total 279. These newsletters were also published to the web sites www.osucotton.com and www.ntokcotton.org. The yearly number of unique visitors was 6,024. Based on a returned survey size of 35 newsletter recipients, results provided some excellent information pertaining to the value and content. The recipients were asked to rate on a scale of 1-5 (1 being not very useful) and 5 (being extremely useful). The result was an average ranking of 4.58 for usefulness. On the question of topics being “timely and discussed” the result was 4.48. For the question on whether the newsletter should be continued the result was 100% of the respondents.

Crop and Pest Conditions

According to USDA-NASS, 415,000 acres were planted with only 70,000 acres harvested. This was due to extreme drought conditions. Most dryland acres never emerged. Irrigated acreage emerged, but was abandoned beginning in June due to lack of irrigation water from the Lugert-Altus Irrigation District. Other marginally irrigated fields were later abandoned after RMA approved boll count insurance adjustment procedures in September. This is very likely the lowest production and harvested acreage since records began in 1894 (USDA-NASS).

Early thrips pressure decreased as extreme heat and drought conditions prevailed. Other pest populations failed to develop. Population trends, insect updates, and control tips were published in the Cotton Comments Newsletter and distributed to the state’s cotton producers and consultants to help formulate management strategies to enhance profitability.

Field surveys were conducted in 8 counties with a total of 21 fields. Insect pressure as well as plant development (see Figures 1 and 2 for nodes above white flower for some projects) were recorded and reported in the newsletter. This was performed weekly.

Figure 1. Dryland trial nodes above white flower (NAWF), 2011.

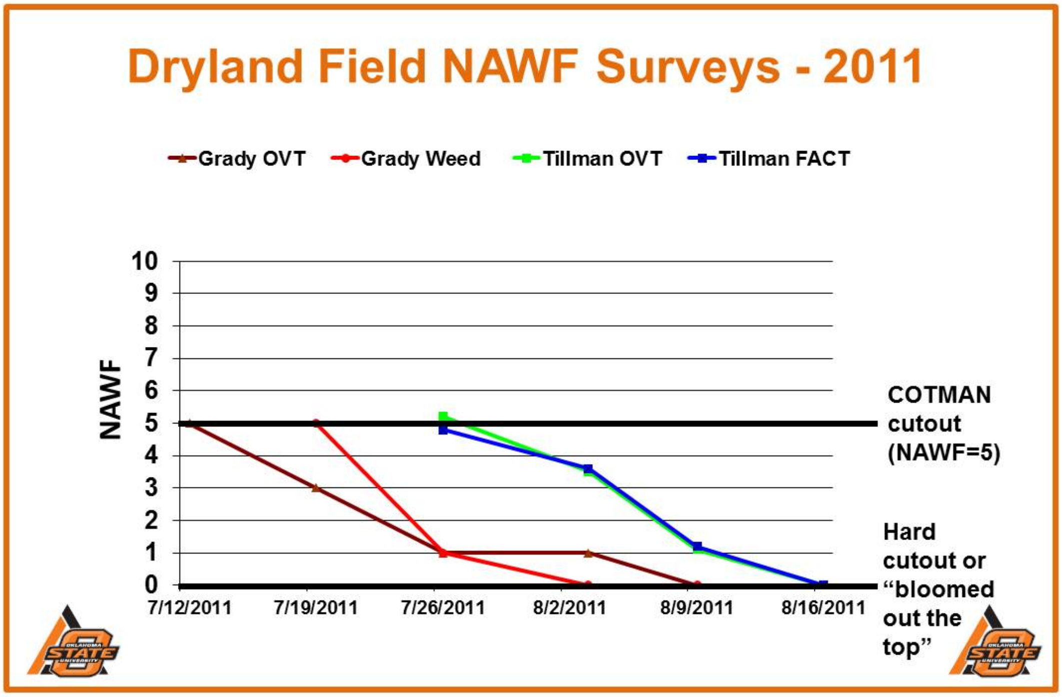
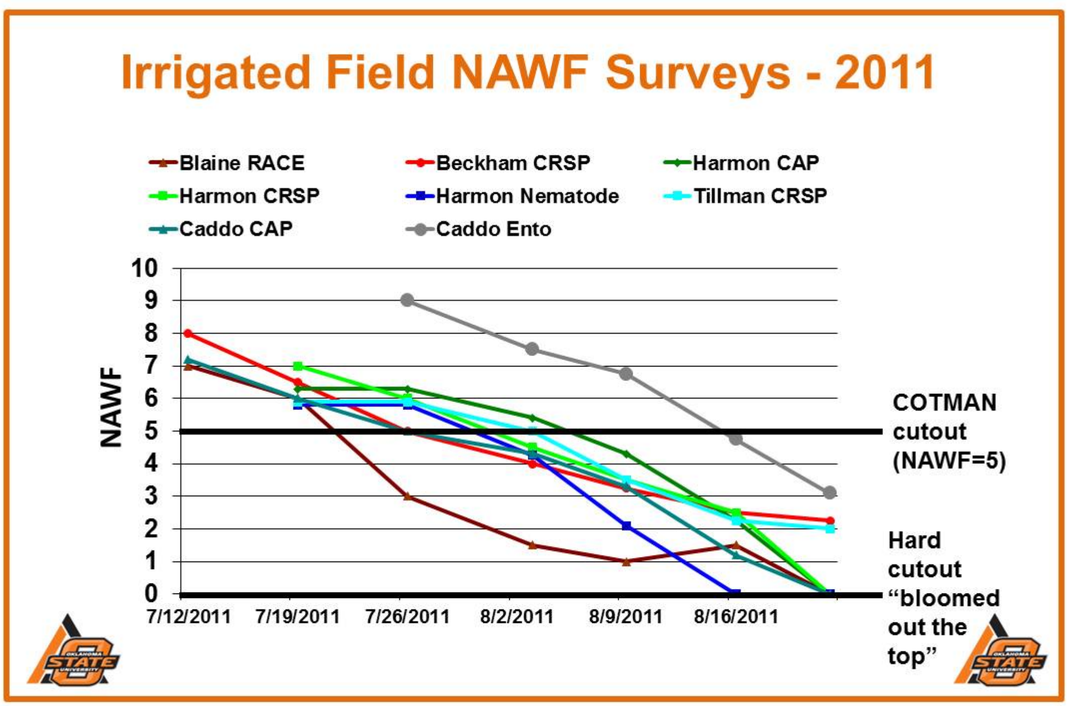


Figure 2. Irrigated trial nodes above white flower, 2011.



Bollworm / Tobacco Budworm and Beet Armyworm Monitoring

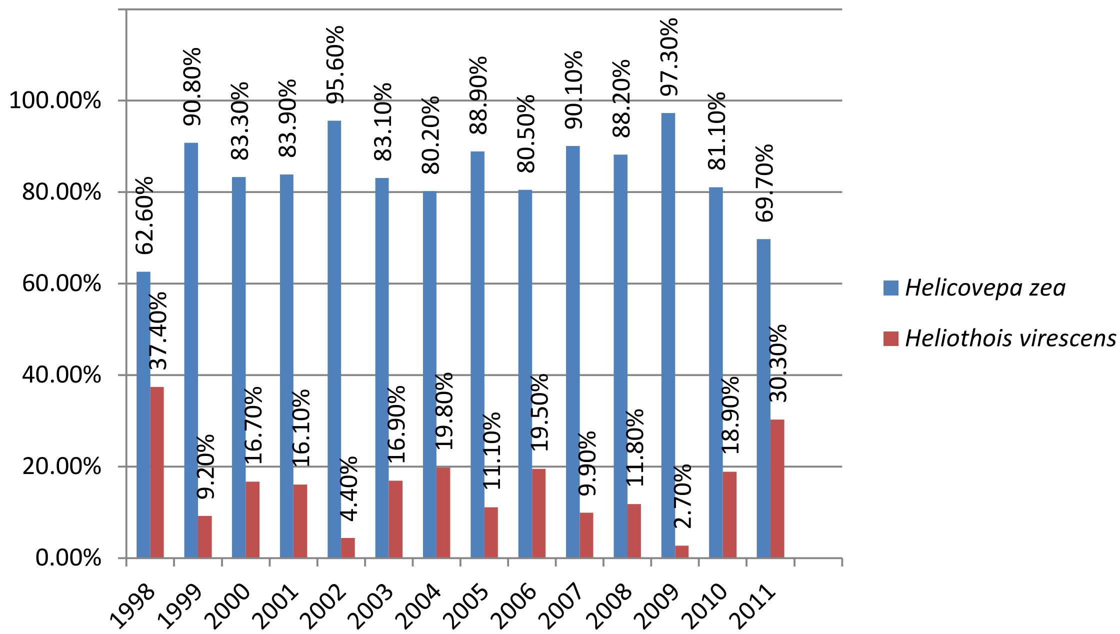
The bollworm/tobacco budworm complex has been the target of insecticide applications applied annually to cotton in Oklahoma. Monitoring moth activities helps determine species ratio and peak ovipositional activity for these insects. Traps were located near the communities of Altus, Chickasha, Hollis, Texola and Tipton. In addition to Heliothine activity, beet armyworm movements were also monitored at each location. Traps were maintained between June 1 and October 1, 2011.

Although both species do coexist and are considered the same by growers, this species ratio is important since tobacco budworms exhibit a higher level of resistance to insecticides than bollworms. It is extremely important to detect fluctuations in species ratio of each ovipositional period and adjust insecticide recommendations accordingly. A total of 881 moths were captured between the weeks of June 1 and October 1 (Table 1). Bollworms comprised 69.7% of the total catch in 2011. This shows the second highest percentage of Tobacco Budworm compared to Bollworm in the past twenty years. Only 1998 had a higher percentage (Figure 3). Although Beet Armyworm moths numbers were up, the lack of cotton acres apparently drove this pest to alternate hosts. High larvae numbers were reported in soybean fields with corresponding control measures being difficult.

Table 1. Moth pheromone trap catch totals for selected regions of Oklahoma, summer 2011.

Bollworm				
Altus	Tipton	Hollis	Chickasha	Texola
156	151	98	126	142
Tobacco Budworm				
Altus	Tipton	Hollis	Chickasha	Texola
26	73	22	47	36
Beet Armyworm				
Altus	Tipton	Hollis	Chickasha	Texola
62	103	69	67	142

Figure 1. Species composition of moths trapped across Oklahoma, 1998-2011.



Nematode and Insect Control Projects

Two root-knot nematode product evaluation trials were attempted but due to poor soil moisture both sites were lost. The Hollis location was an irrigated trial and in spite of our cooperator's best efforts was abandoned in September due to lack of yield potential. The Elk City location was dryland and with the harsh conditions it failed to emerge.

With the extreme drought, lack of triggering populations of pests, and failure of cotton acres, no insect control trials could be initiated in 2011.

Targeting Root-Knot Nematode Using Seed Treatments

Poncho Votivo, Aeris, and Gaucho were investigated for impact on early season insects and root-knot nematodes. The trial was planted May 13, 2011 under sprinkler irrigation at Hollis, Oklahoma. Treated seeds were planted into 4 row plots on 40 inch spacing, 30 feet in length. The producer-cooperator indicated that an economically damaging root-knot nematode population was present in the field. In prior years, the cooperator had been managing this field by variety selection and in-furrow applications of Temik insecticide/nematicide. In lieu of the loss of Temik (the standard for nematode management) from the marketplace many growers expressed interest in the effectiveness of currently available seed treatments. This trial was established with the objectives of evaluating the effectiveness of various seed treatments for managing nematodes in cotton. Stand establishment was extremely difficult due to hot dry winds experienced after planting. Final plant populations ranged from approximately 26,000 to

31,000 plants per acre. No significant differences were observed between any treatments at any observation date. This field was subsequently failed by the cooperator once boll count adjustment methods were approved in September.

Description					Stand count	Stand count	Stand count	Stand count
Rating Date					May-20-11	May-23-11	May-27-11	July 6
Rating Type					Plants	Plants	Plants	Plants
Rating Unit					/acre	/acre	/acre	/acre
Plant-Eval Interval					7 DP-1	10 DP-1	14 DP-1	54 DP-1
Trt No.	Treatment Name	Rate	Rate Unit	Appl Code				
1	Control			A	0.0a	1852.5a	33150.0a	28625.0a
2	GAUCHO 600 FS	9.49	lb ai/a	A	0.0a	1072.5a	33800.0a	31025.0a
3	GAUCHO 600 FS	9.49	lb ai/a	A	0.0a	2372.5a	27300.0a	27162.5a
	PONCHO VOTIVO	10.76	lb ai/a	A				
4	AERIS SEED APPLIED SYSTEM	18.98	lb ai/a	A	0.0a	2405.0a	26325.0a	25962.5a
	PONCHO VOTIVO	10.76	lb ai/a	A				
5	AERIS SEED APPLIED SYSTEM	18.98	lb ai/a	A	0.0a	1690.0a	34125.0a	29662.5a
	PONCHO VOTIVO	10.76	lb ai/a	A				
	BYF14182	0.3195	lb ai/a	A				
6	AVICTA COMPLETE PAK - CRU	0.034	mg ai/seed	A	0.0 a	1625.0 a	31200.0 a	27000.0a
	AVICTA COMPLETE PAK - AVI	0.15	mg ai/seed	A				
LSD (P=.05)					0.00	1078.63	9026.53	7653.39
Standard Deviation					0.00	715.82	5990.35	5079.08
CV					0.0	38.98	19.33	17.99
Bartlett's X2					0.0	5.199	1.423	2.749
P(Bartlett's X2)					.	0.392	0.922	0.739
Skewness					.	0.2748	0.3821	0.4664
Kurtosis					.	1.3779	-0.9064	-1.0658
Replicate F					0.000	1.247	7.473	4.749
Replicate Prob(F)					1.0000	0.3277	0.0027	0.0160
Treatment F					0.000	1.968	1.289	0.552
Treatment Prob(F)					1.0000	0.1422	0.3198	0.7344

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls) Mean comparisons performed only when AOV Treatment P (F) is significant at mean comparison OSL.

COTTON DISEASE LOSS ESTIMATE COMMITTEE REPORT

Compiled by: Don Blasingame and Mukund V. Patel, Extension Plant Pathologists, Retired, Mississippi State, MS 39762

Table 1. Estimated Reduction in 2011 Cotton Yield Resulting from Diseases.*

DISEASES	AL	AZ	AR	CA	FL	GA	LA	MS
Note: Table entries are % loss (top figure) and bales lost (lower figure)**								
Fusarium Wilt *F. oxysporium f. sp. vasinfectum*	0.50 4,012	-	0.50 7,740	0.50 2,792	-	Trace	1.00 5,824	Trace
Verticillium Wilt *V. dahliae*	0.50 4,012	1.00 8,091	-	0.10 558	-	-	Trace	Trace
Bacterial Blight *X. malvacearum*	Trace	-	2.50 38,701	-	-	Trace	Trace	1.00 13,714
Phymatrotrichum Root Rot *P. omnivorum*	-	0.20 1,618	-	-	-	-	Trace	-
Seedling Diseases Several fungi	4.50 36,108	0.30 2,427	2.50 38,701	2.50 13,961	0.20 385	0.50 15,318	1.00 5,824	2.00 27,429
Ascochyta Blight *A. gossypii*	0.50 4,012	-	-	-	1.00 1,927	Trace	Trace	Trace
Boll Rots	4.00 32,096	0.10 809	2.00 30,960	-	3.00 5,782	1.00 30,636	-	2.00 27,429
Nematode (Total)	4.50 36,108	2.00 16,183	4.00 61,921	0.20 1,117	5.00 9,637	11.50 352,312	7.00 40,769	7.00 96,000
Root-knot	*0.50* *4,012*	*2.00* *16,183*	*3.00* *46,441*	*0.20* *1,117*	*3.00* *5,782*	*8.50* *260,405*	*3.00* *17,473*	*1.00* *13,714*
Reniform	*4.00* *32,096*	-	*1.00* *15,480*	-	*2.00* *3,855*	*2.50* *76,590*	*4.00* *23,297*	*6.00* *82,286*
Others	-	-	-	-	-	*0.50* *15,318*	*Trace*	-
Leaf Spots And Others***	2.00 16,048	-	-	Trace	-	0.50 15,318	Trace	0.50 6,857
TOTAL PERCENT	**16.50**	**3.60**	**11.50**	**3.30**	**9.20**	**13.50**	**9.00**	**12.50**
BALES LOST	132,395	29,129	178,023	18,428	17,731	413,584	52,418	171,429
YIELDS IN BALES****	802,395	809,129	1,548,023	558,428	192,731	3,063,584	582,418	1,371,429

* Cotton disease loss estimates were made by extension and research plant pathologists and agronomists with cotton responsibilities in their respective states. ** Rounding errors present ***Leaf spots (*Alternaria, Cercospora, Phomopsis*, etc.) and various root rots.

**** Yield potential had not disease been present.

Cotton Disease Loss Estimate Committee

AL - Dr. Kathy Lawrence, Auburn University
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CA - Dr. Rebecca Bennett, University of California
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COTTON DISEASE LOSS ESTIMATE COMMITTEE REPORT

Compiled by: Don Blasingame, and Mukund V. Patel, Extension Plant Pathologists, Retired, Mississippi State, MS 39762

Table 1. (continued) 2011

MO	NM	NC	OK	SC	TN	TX	VA	BALES LOST	AVG. % LOST
-	-	0.01 118	-	1.00 5,314	-	0.40 16,979	-	42,780	**0.24**
-	1.00 1,276	0.01 118	0.25 265	-	1.00 9,439	0.90 38,203	-	61,962	**0.30**
0.01 92	Trace	-	-	-	-	Trace	Trace	52,506	**0.22**
-	Trace	-	-	-	-	4.80 203,749	-	205,367	**0.31**
4.00 36,604	0.50 638	2.00 23,661	0.20 212	0.25 1,329	6.00 56,636	0.60 25,469	2.00 4,047	288,746	**1.82**
-	Trace	-	-	0.10 531	0.50 4,720	-	-	11,190	**0.13**
0.01 92	Trace	2.00 23,661	-	0.25 1,329	-	0.70 29,713	0.10 202	182,708	**0.95**
2.00 18,302	0.50 638	3.00 35,492	0.20 212	5.00 26,570	3.01 28,412	1.90 80,650	4.00 8,094	812,415	**3.80**
2.00 *18,302*	*0.50* *638*	*2.50* *29,576*	*0.20* *212*	*3.00* *15,942*	*0.01* *94*	*1.70* *72,161*	*2.50* *5,059*	*507,109*	***2.10***
-	-	*0.25* *2,958*	-	*1.00* *5,314*	*3.00* *28,318*	*0.20* *8,490*	*Trace*	*278,682*	***1.50***
-	-	*0.25* *2,958*	-	*1.00* *5,314*	-	*Trace*	*1.50* *3,035*	*26,625*	***0.20***
-	Trace	-	0.20 212	0.25 1,329	0.50 4,720	-	Trace	44,483	**0.25**
6.02	**2.00**	**7.02**	**0.85**	**6.85**	**11.01**	**9.30**	**6.10**		**8.02**
55,088	2,551	83,050	900	36,401	103,926	394,763	12,343	**1,361,038**	
915,088	127,551	1,183,050	105,900	531,401	943,926	4,244,763	202,343	16,979,816	

Comments:

AL Dry weather in May, June, and August reduced yields and reduced certain diseases.
GA Hot and very dry weather reduced severity of seedling diseases, foliar diseases and boll rots. The loss of Temik contributed to a slight increase in losses to nematodes.
MS Dry wether in mid to late season reduced boll rots, but may have increased nematode damage.
NM Year-long dry conditions limited both disease and nematode losses.
OK Disease and insect pressure was low due to extreme head and dry conditions. Yields were greatly affected. 2011 was a disastrous year for Oklahoma producers.
SC Dry weather resulted in low disease pressure and lower yields.
TX Severe drought conditions and above average temperatures adversely affected yields in 2011. These conditions led to below average losses to both Fusarium and Verticillium wilts.
VA High temperatures and drought affected production in 2011. Seedling disease and nematodes continued to be responsible for the greatest losses in the state.

December 2011

COTTON INSECT LOSSES 2011

This report is sponsored by a grant from the Cotton Foundation.

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Kansas --- Dr. Stu Duncan	Texas --- Dr. David Kern
Louisiana --- Dr. Roger Leonard	Virginia --- Dr. Ames Herbert
Mississippi --- Dr. Angus Catchot	

Background

This information was provided by state coordinators and was collected from surveys of county agents, extension specialists, private consultants and research entomologists. All data are averaged over a total reporting unit. For example, if a unit report represents 100 acres and an 8% loss on 25 of these acres, then in the table summary this shows up as a 2% loss. ((.08 ×25)/100). This type of averaging is used for all data reported including yields and costs of control. Because of averaging and rounding some individual state summary numbers listed as `0' are slightly larger. Costs are averaged to the nearest cent, bales and acres to the nearest whole number, other numbers are rounded to the nearest .001. Bales are calculated at 480 pounds.

Highlights

Cotton losses to arthropod pests reduced overall yields by 3.03%. Lygus were the top ranked pest in 2011 reducing yields by 1.03%. Thrips were ranked second at 0.695%. Stink bugs were ranked third at 0.509%. Bollworm/budworm complex caused 0.383%

loss. Spider mites reduced yields by 0.167%. No other pest exceeded 0.1% loss. Total costs and loss for insects in 2011 were $1.022 billion. Direct management costs for arthropods were $62.34 per acre.

Explanation of Tables

In an attempt at capturing as many of the costs of insect management as possible, the Cotton Insect Losses estimates have changed in the last few years. They were begun as a simple attempt to arrive at the `average cost of spraying insecticide` for control of cotton arthropod pests. We still attempt to arrive at the most accurate estimate possible for spray activities, but have also added some of the other costs which are incurred in cotton insect pest management. These `additional` costs increase the bottom line of expenditures for arthropod pest management - but also more accurately reflect true expenditures. We include `at planting insecticide costs,`(an estimate of the cost of systemic insecticides applied at planting for control of thrips and other pests of seedling cotton) `Bt cotton costs`,(an estimate of the technology fee and the seed surcharge) `eradication costs`(which include the maintenance fee in those states which have eradicated the weevil and other eradication projects) and `scouting costs` to the traditional `foliar insecticide costs`. Bales lost are also given a dollar value using 480 pound bales at the average per pound price. Remember these are estimates and may not totally reflect an individual farm or area, but they do reflect trends and serve as a general comparison.

Table 8 **Summary of All States** **Cotton insect losses 2011**

Pest	acres infested	acres treated	#apps/ acre trtd	#apps/ tot acres	cost/ acre	%red	Bales lost
Boll Weevil	185,353	17,500	3.00	0.01	$0.01	0.00%	0
Bollworm/Budworm	5,702,269	1,990,592	1.53	0.30	$2.04	0.38%	103,781
Pink Bollworm	18,184	1	0.00	0.00	$0.00	0.00%	0
Cotton Fleahopper	2,658,864	1,055,418	2.02	0.21	$0.93	0.09%	16,200
Lygus	5,098,902	3,112,214	3.37	1.02	$12.57	1.03%	313,941
Cotton Leaf Perforator	18,310	1	0.00	0.00	$0.00	0.00%	0
Spider Mites	4,290,794	1,347,324	1.35	0.18	$2.60	0.17%	57,441
Thrips	8,574,843	4,492,042	1.16	0.51	$2.43	0.69%	167,445
Beet Armyworm	966,329	15,444	0.93	0.00	$0.02	0.00%	6
Fall Armyworm	1,012,570	62,849	0.43	0.00	$0.03	0.01%	3,244
European Cornborer	0	0	0.00	0.00	$0.00	0.00%	0
Stink Bugs	4,775,848	2,629,184	1.09	0.28	$2.05	0.51%	108,438
Grasshoppers	889,911	144,026	0.91	0.01	$0.08	0.01%	1,482
Saltmarsh Caterpillars	255,801	430	1.00	0.00	$0.00	0.00%	17
Aphids	6,093,761	872,587	0.89	0.08	$0.81	0.03%	8,581
Banded Winged Whitefly	537,126	6,570	0.96	0.00	$0.01	0.00%	173
Silverleaf Whitefly (Bemesia)	616,184	184,301	0.90	0.02	$0.45	0.03%	10,158
Loopers	517,856	6,000	1.00	0.00	$0.01	0.00%	397
Southern Armyworms	16,651	0	0.00	0.00	$0.00	0.00%	0
Cutworms	585,598	737,499	0.94	0.07	$0.29	0.00%	566
Clouded Plant bugs	615,905	108,685	1.00	0.01	$0.08	0.03%	10,519
Other Insects 1	602,363	107,941	0.99	0.01	$0.03	0.04%	54,877
				2.690	$24.44	3.03%	856784

Yield & Management Results	
Total Acres	10,272,288
Total bales Harvested	16,627,155
yield (lbs/acre)	777
Total bales Lost to Insects	857,265
Percent Yield Loss	3.03%
Yield w/o Insects (lbs/ac)	801
Ave. # Spray Applications	2.69
Bales lost all factors	8,562,605
% yield loss all factors	33.99%

Economic results	Total	Per Acre
Foliar Insecticides Costs	$251,043,287	$24.44
At Planting Costs	$83,258,791	$8.11
In-furrow costs	$29,340,336	$2.86
Scouting costs	$56,451,232	$5.50
Eradication costs	$52,499,492	$5.11
Transgenic cotton	$167,824,266	$16.34
Total Costs	$640,417,404	$62.34
Yield Lost to insects	$381,669,896	$37.16
Total Losses + Costs	$1,022,087,301	$99.50

**PBWerad = $.52 Boll Weevil erad = $4.59

Harvest Aids

In spite of the loss of numerous projects, we were able to establish several harvest aid projects in 2011. Two harvest aid demonstrations were in western Harmon County in a producer- cooperator field. This site was sub-surface drip irrigated, and was planted to DP 0912B2RF. Treatments were applied by ground at 12 GPA with Turbo Teejet 110015 wide angle flat spray tips @ 65 PSI. The first demonstration treatments were applied on September 13. An additional application was made with the same treatments on September 21. Both of these demonstrations received considerable traffic from both western Oklahoma and the eastern Texas Panhandle. A harvest aid/harvesting field day was held in late September, and over 50 clientele attended the meeting.

Treatments included:

24 oz/A Prep + 0.6 oz/A Blizzard + Crop Oil
32 oz/A Prep + 2.0 oz/A ET + Crop Oil
24 oz/A Prep + 2.0 oz/A ET + Crop Oil
24 oz/A Prep + 6.0 oz/A Ginstar
32 oz/A Prep + 3.0 oz/A Ginstar
24 oz/A Prep + 24 oz/A Def
32 oz/A Prep + 16 oz/A Def
24 oz/A Finish 6 Pro + 16 oz/A Def
32 oz/A Prep + 0.6 oz/A Blizzard + Crop Oil

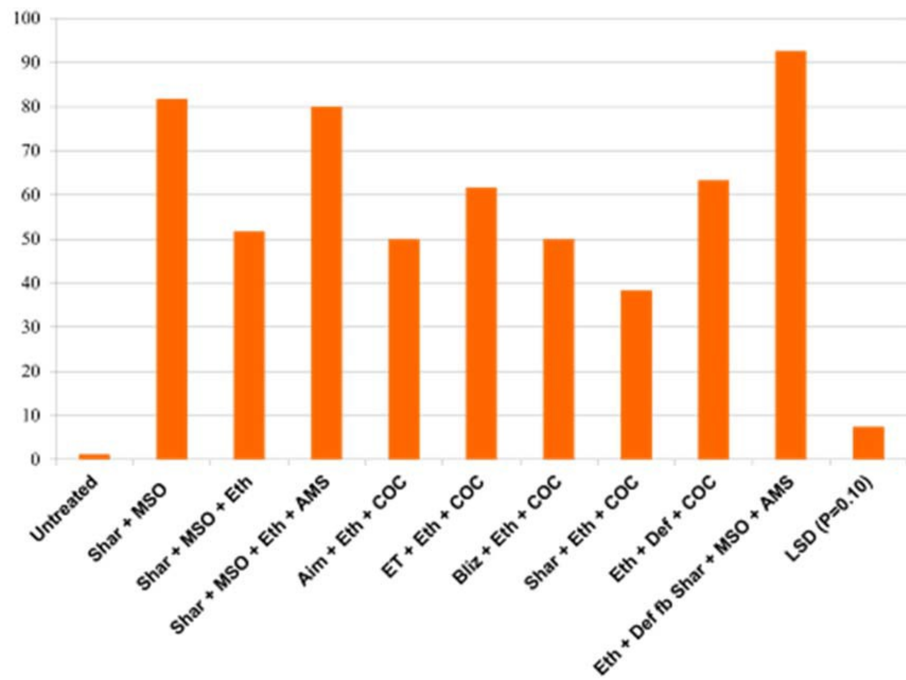
Additional Work with Sharpen Harvest Aid

Sharpen received labeling as a cotton harvest aid in Texas for use in 2011. We are optimistic that Oklahoma can have this product labeled by 2012 harvest. Sharpen likely has a fit in Oklahoma as a harvest aid and its potential role should be investigated. Also, the PPO inhibitors' safety with respect to small grains gives them a clear advantage over paraquat when harvest aids are applied next to a seedling wheat or rye crop. Seedling wheat's tolerance to Sharpen is not yet well defined. Sharpen's development as an effective harvest aid in Oklahoma (or alternative to paraquat) could depend heavily on this aspect. Three studies were conducted in the spring and fall of 2011 in order to evaluate the effectiveness of Sharpen for horseweed control, as a cotton harvest aid, and to observe its effects on seedling wheat. Results from the Sharpen harvest aid treatments are presented in Figure 2. This trial received a total of 3 inches of rainfall beginning 24 hours after the first application, and over the next 3 days. Sandy soil conditions allowed the sequential applications to remain on schedule 7 DAT. Treatments were evaluated for defoliation and boll opening at 7 and 14 DAT, but only data from the 14 day visual evaluation are presented. Sharpen applied at 1 oz/A with methylated seed oil (MSO) or when combined with ethephon and ammonium sulfate (AMS) resulted in 80-82% defoliation. When Sharpen was tank-mixed with ethephon and MSO, defoliation was significantly decreased to 52%. Defoliation ranged from 50-63% for treatments including tank- mixes of ethephon with other PPO products (Aim, ET and Blizzard with crop oil concentrate (COC)) or with 8 oz/A Def. Sharpen tank-mixed with ethephon and COC resulted in 38% defoliation, which was the least amount observed 14 DAT. Ethephon tank-mixed with 8 oz/A of Def + COC followed by a sequential application of 1 oz/A of Sharpen + MSO + AMS provided the greatest amount of defoliation observed 14 DAT (93%). These data suggest that Sharpen has potential as a harvest aid; however, it was noted that the addition of ethephon reduced cotton defoliation unless AMS was present. In addition, Sharpen + MSO + AMS performed well as a sequential (desiccant type) application 7 days after the initial treatment of ethephon plus Def.

Treatments evaluated for defoliation project:

1. Untreated
2. 1 oz/A Sharpen + 1% MSO
3. 1 oz/A Sharpen + 1% MSO + 21 oz/A Ethephon
4. 1 oz/A Sharpen + 1% MSO + 21 oz/A Ethephon+ 17 lb/100 gal AMS
5. 1 oz/A Aim + 21 oz/A Ethephon + 1% COC
6. 2 oz/A ET + 21 oz/A Ethephon + 1% COC
7. 0.6 oz/A Blizzard + 21 oz/A Ethephon + 1% COC
8. 1 oz/A Sharpen + 21 oz/A Ethephon+ 1% COC
9. 21 oz/A Ethephon + 8 oz/A Def + 1% COC
10. 21 oz/A Eth + 8 oz/A Def + 1% COC fb 1 oz/A Sharpen + 1% MSO + 17 lb/100 gal AMS

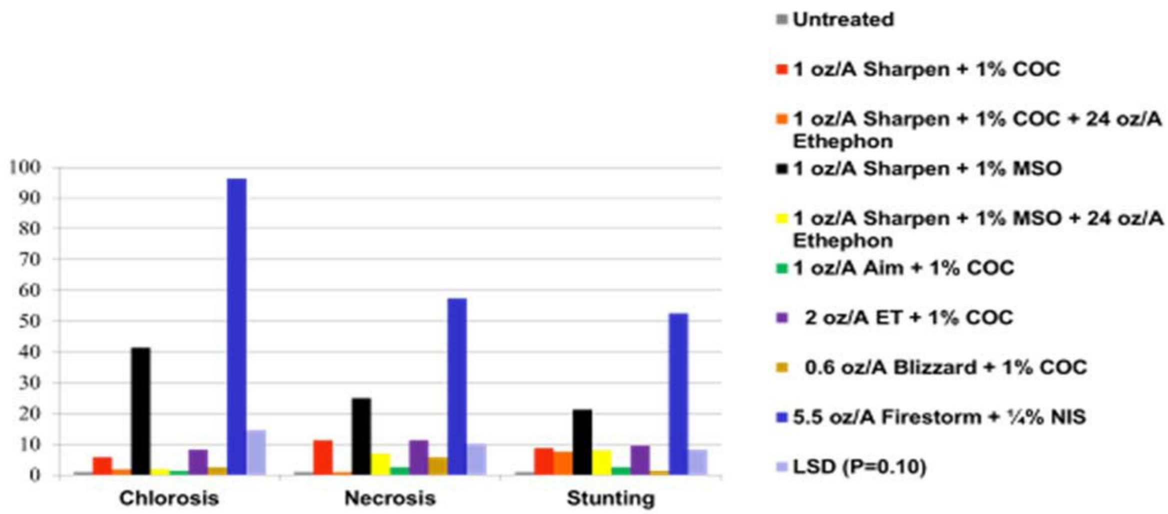
Figure 2. Defoliation - 14 DAT



Wheat Tolerance Project

Data obtained 10 DAT for cotton harvest aid treatments made directly to 3-4 leaf seedling wheat are presented in Figure 4. When Sharpen was tank-mixed with COC, ethephon + COC or ethephon + MSO, less than 10% chlorosis was observed. Similar results were observed when Aim, ET or Blizzard were applied with COC. Tank-mixing Sharpen with MSO alone (no ethephon) increased chlorosis significantly to 42%. Firestorm (3 lb/gallon paraquat) applied at 5.5 oz/A produced 96% chlorosis 10 DAT. Sharpen + MSO also produced 25% necrosis and 21% stunting which was significantly greater than that observed from all other treatments except Firestorm. Subsequent observations (data not presented) indicate that all treatments except Firestorm were beginning to recover from early injury.

Figure 4. Seedling wheat project treatments and results 10 DAT.



Sharpen Summary

Results from the defoliation and wheat injury trials indicate that tank-mixing Sharpen with ethephon can significantly alter its performance. However, in the defoliation trial, the addition of AMS to the tank-mix resulted in similar performance to Sharpen treatments without ethephon. Unfortunately, AMS was not utilized in the wheat injury trial. Further studies should be conducted to determine if AMS could also safen the application of Sharpen + MSO with respect to seedling wheat. In addition, these treatments will be evaluated again in the spring in an attempt to identify any potential long-term effects on wheat growth and development.

Beltwide Cotton Conference Presentations

Project personnel were involved in several Beltwide Cotton Conference presentations at Orlando in January 2012. Sharpen herbicide/defoliant is an exciting new product that is becoming an important tool for Oklahoma producers. Results from several projects with this product were also presented at the Beltwide Cotton Conferences. However, these results have been previously presented in other sections of this report (weed control and defoliation). Mr. Wesley Porter is a doctoral student working under Dr. Randy Taylor at OSU. He was very busy working in cotton in 2011. Some of the work was based on local salinity issues whereas other projects were focused more on fiber quality issues related to stripper harvesting. Some of these presentations were a continuation of work began by Dr. Boman in Texas in collaboration with USDA-ARS and Texas Tech University personnel. Results from this work are still pertinent and important for Oklahoma producers. Saw ginning is currently the standard ginning method in our region. However, based on initial work investigating both picker and stripper harvested cotton in the Texas High Plains, there is no doubt that high speed roller ginning of upland cotton has a role to play in maximizing fiber quality.

ZONE MANAGEMENT STRATEGIES FOR SODIC/SALINE SOILS

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Abstract

Irrigation water in southwestern Oklahoma can have salinity issues and some fields in this region have developed low production areas due to saline accumulation. The accumulation of salts in the soils reduces yield and causes a reduction in plant stand. The goal of this project was to evaluate potential management strategies for these areas. A producer's field with known sodic/saline issues and yield history was selected for field trials. Historic yield data was normalized and used to create a yield stability map. The yield stability map was used in a composite soil sampling strategy. Fifteen soil samples were collected from each zone, divided into depth (0-6, 6-12, 12-18, 18-24 inch) and mixed into composite samples. The soil sample results were used to determine gypsum application rates. The gypsum was applied using a commercial variable rate spreader with a Raven Viper Pro controller. Due to an unnaturally dry year and a damaging storm event during the early growing season, the crop stand was lost. Thus, yield results are not available for 2011. Correlations were found between soil test results and the developed yield stability zones for parameters such as soil test electrical conductivity. The relationships between soil test results and historic yield stability data indicated that yield data can be used to delineate management zones for sodic/saline soils. Future work will include yield and soil test data to determine if gypsum is a viable solution to manage sodic/saline problems in cotton fields in southwestern Oklahoma. If it is determined that gypsum is not a viable solution, other methods of soil management will be researched to develop strategies to manage this production challenge.

Introduction

Irrigation water in southwestern Oklahoma can have salinity issues. Salinity accumulation in this region has caused many of the fields to develop low production areas (Figure 1). High sodic/saline areas cause poor plant stands and a reduction in yields.

Figure 1. Typical poor crop stand in sodic/saline areas.

Producers in the surrounding area have questioned the value of gypsum application to these fields as a viable management option for low productivity areas. Generally, gypsum is recognized as being of value for management of sodic soils. Sodicity is an issue in some areas, but salinity and not sodicity is apparently more problematic in many local production fields where poor stands and lower production are observed. Thus, the value of gypsum application has been questioned.

Materials and Methods

A producer field was selected for this study based on known sodic/salinity issues combined with multiple years of spatial yield data. The selected field had yield data from 2004 until the present. However, it was decided to only use yield data from 2008 on because between the 2007 and 2008 production seasons drip irrigation was installed on the field. Historically the field was furrow irrigated in a south to north direction. The drip irrigation was installed from east to west. The different directions of the irrigation were evident in yield data. Thus to ensure the yield data analyzed was similar to the current production season 2008-2010 yield data was used. Yield stability analysis was performed on the three years of yield data in the manner described by Taylor et al. (2000). A 40 foot grid was overlaid on the field. This size represented two harvester widths (20 foot wide cotton picker). Determining areas with stable yield addresses temporal variability by identifying zones that are consistently high or low yielding regardless of the growing season. Other areas are treated as average. Unstable areas are grouped within the average group because their response is unpredictable.

As shown in Table 1, yield stability data for the field were divided into five classes. This process was completed by observing the consistently high and consistently low zones. If the yield was consistently 20% higher than average it was assigned a two and called “very high stable”, if the yield was consistently 20% lower than average it was assigned a negative two and called “very low stable.” If the yields were from above 20% down to average was assigned a one and deemed “stable high” and if the yield fell between below average and 20% less than average they were assigned a negative one and deemed “stable low.”

Table 1. Yield stability classes.

Yield Class	Definition	Normalized Yield Level
-2	Very low stable	At least 20% below average
-1	Low stable	10-20% below average
0	Average	+/- 10% of average
1	High stable	10-20% above average
2	Very high stable	At least 20% above average

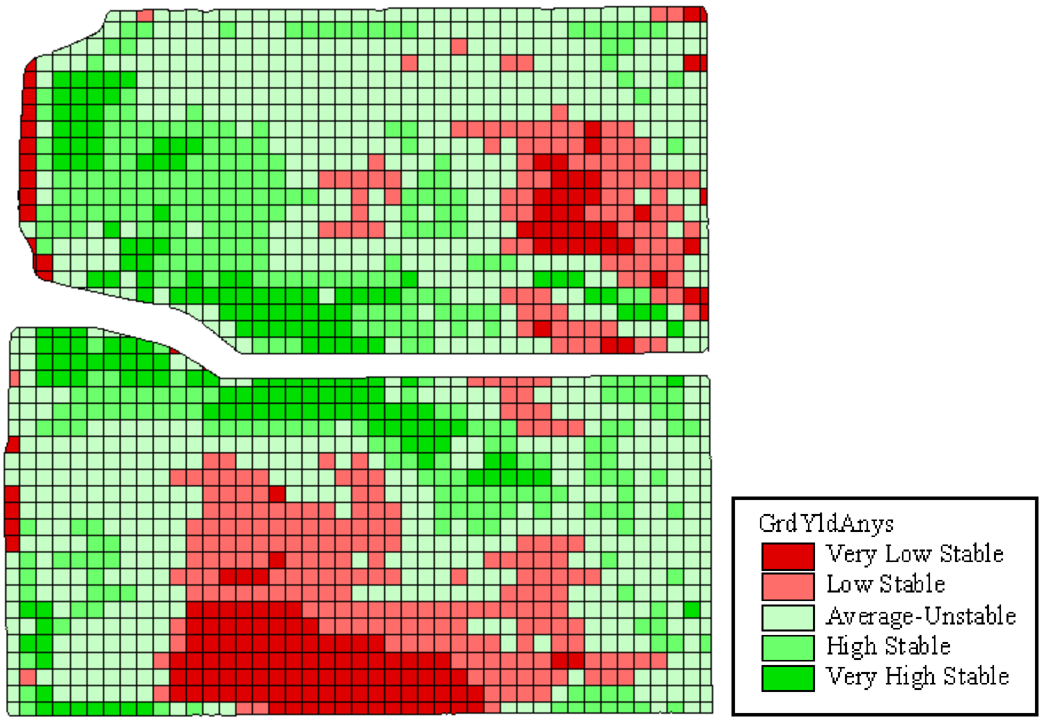

Figure 2. Yield Stability Map.

The yield stability map (figure 2) was used to delineate soil sampling zones. Small areas (2-3 grids) of one yield class included within another were merged with the surrounding yield class. Samples were collected to a 24-inch depth. Since the entire field was divided into two physical portions by a drainage ditch, five composite samples were collected from the south field and five composite samples were collected from the north field. Similar methods were used to obtain the composite samples from each potential management zone. Each composite sample consisted of fifteen subsamples. The subsamples were collected from the similar zones based using surface area weighting. To ensure the samples were collected from within each zone correctly an ATV with a handheld computer was used with the yield stability map as the background. Thus, a very high yield zone in the north field had one area of twenty acres and one area of ten acres then ten and five samples were collected from the zones respectively. As the subsamples were collected they were divided into four increments based on sample depth, 0-6, 6-12, 12-18, 18-24 inch. The samples were sent to the Oklahoma State University Soil, Water and Forage Testing Laboratory where a routine soil test, macro nutrient, micro nutrient, and comprehensive salinity paste tests were performed. Apparent soil EC was collected from the field using a Veris 3100, with the goal of finding correlations with soil test results.

Figure 2. Soil core in tray used for dividing samples into depths.

Relationships were found between the soil test results and the developed yield stability zones. These results suggest that using yield history is a viable way to delineate zones for managing sodic/saline soils in this region of Oklahoma. Figure 3 provides soil test electrical conductivity (EC) and an inverse relationship to the yield from the developed stability zones. This indicates that the lower yields are possibly caused by the higher salinity levels in the soil.

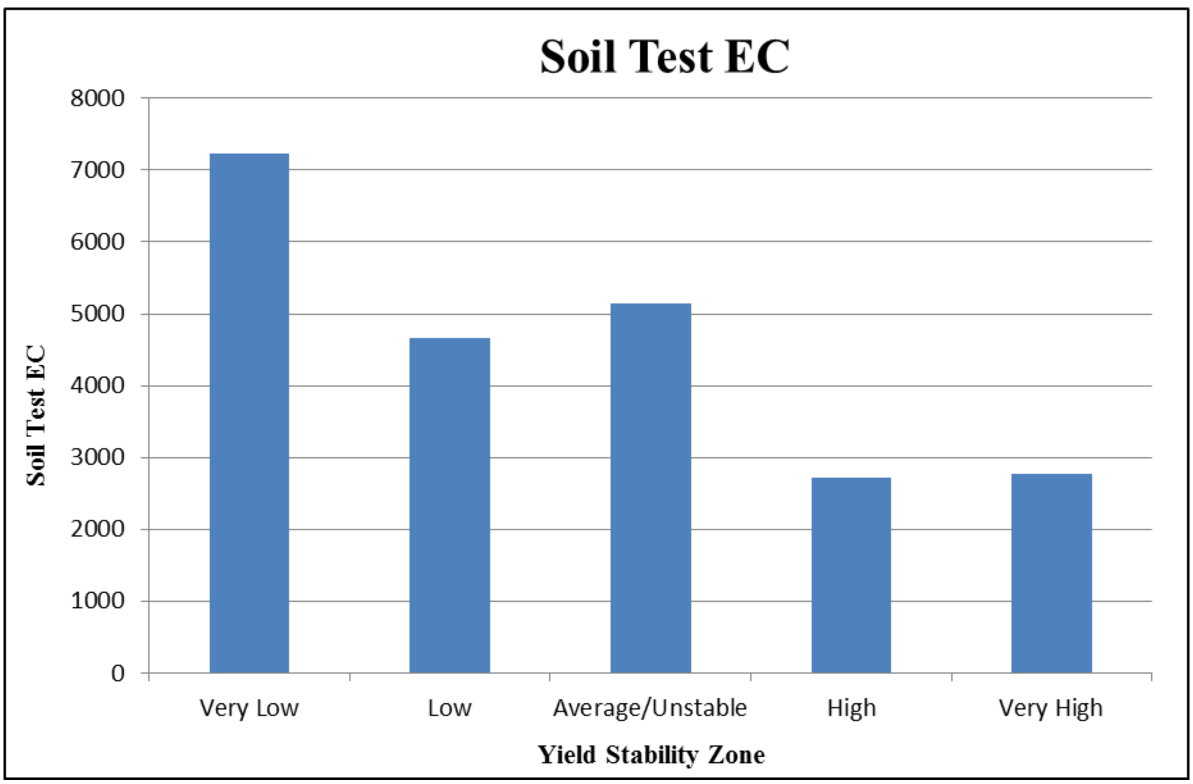

Figure 3. Soil test electrical conductivity and its correlations with yield stability zones

The results of the soil tests combined with the yield stability data were used to develop a prescription application map for agricultural gypsum. Gypsum was applied using a variable rate commercial applicator controlled using a Raven Viper Pro. Test strips were applied within both the northern and southern sections of the field. The test strips had the low (0 lbs/ac) and high (2000 lbs/ac) applied to them. The width of the strips was based on the effective commercial spreader width. The rest of the field had a variable rate application applied to it with the very high zones receiving 500 lbs/ac, the high and average zones receiving 1000 lbs/ac, the low zone receiving 1500 lbs/ac and the very low zone receiving 2000 lbs/ac (Figure 4).

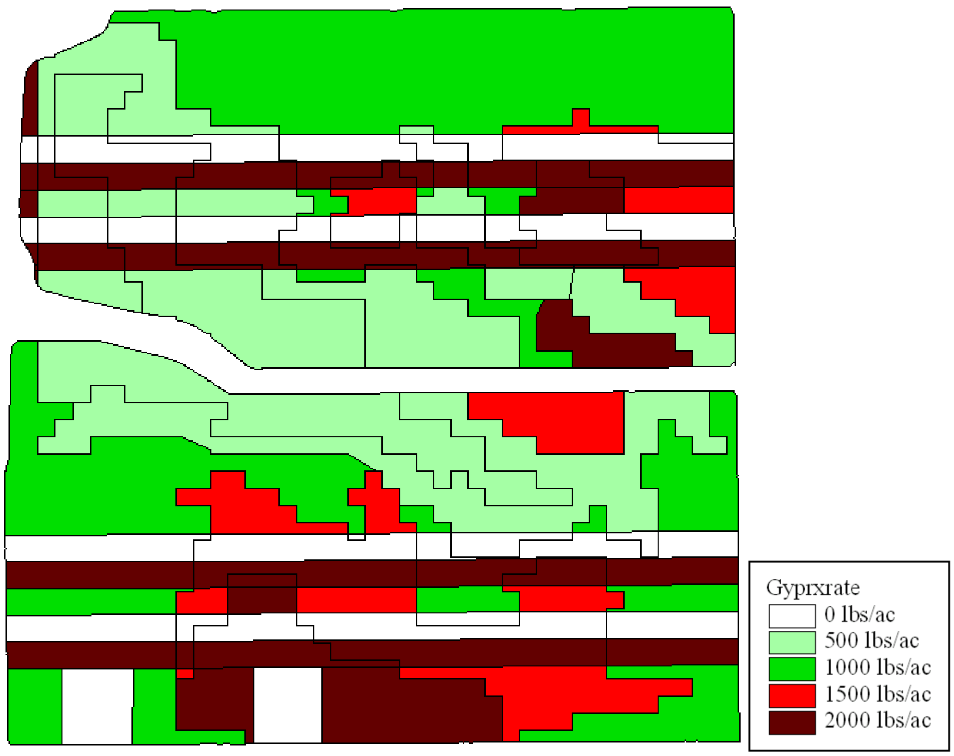

Figure 4. Gypsum Prescription Application Map

Summary

This study embraced cotton production challenges in producer fields in southwestern Oklahoma. The data collected during this study will aid extension recommendations for the producers of this area. Due to the extreme weather conditions present in the Southern Great Plains region in 2011, the crop was lost. Therefore, 2011 results cannot be reported. However, since this field is in continuous monoculture cotton, it is hoped that yield data can be obtained from the 2012 crop.

Acknowledgements

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TRACKING COTTON FIBER QUALITY THROUGHOUT A STRIPPER HARVESTER

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Abstract

It is known that cotton fiber quality begins to degrade with the opening of the boll. Mechanical harvesting processes are perceived to aid in fiber degradation. Previous research indicates that stripper harvested cotton generally has lower fiber quality and higher foreign matter content than picker harvested cotton. The main objective of this project was to track cotton fiber quality and foreign matter content throughout the harvesting units and conveying/cleaning systems on a brush-roll stripper harvester. Seed cotton samples were collected at six locations including: 1) hand-picked from the field, 2) just after the brush rolls in the row unit, 3) just after the row units, 4) from the separation duct after the cotton was conveyed by the cross auger, 5) from the basket with the field cleaner by-passed, and 6) from the basket after the cotton was processed through the field cleaner. Seed cotton samples collected at each location were analyzed for foreign matter content and ginned to produce fiber for HVI and AFIS fiber analyses. Results show that the row unit augers and field cleaner aid in reducing the overall foreign matter content, effectively increasing the gin turnout to that of hand harvested cotton. AFIS and HVI results indicate that the harvesting and conveying systems on the stripper have a minimal effect on fiber length characteristics and the formation and size of neps. Leaf grade increased between the harvesting units and the field cleaner due to the breakup of foreign material caused by mechanical action. The field cleaner helped to reduce leaf grade back to the level observed at the stripper rolls. The results of this work indicate that the cross auger and pneumatic conveying systems on stripper harvesters could be redesigned to help improve seed cotton cleanliness while helping to preserve fiber quality.

Introduction

Cotton fiber quality begins to degrade with the opening of the boll. Mechanical harvesting processes increase the amount of foreign material contained in seed cotton at the gin and are perceived to increase nep and short fiber content at the spinning mill. Stripper harvested cotton generally has lower fiber quality and higher foreign matter content than picker harvested cotton. In a study conducted by Kerby et al. (1986) brush stripped seed cotton contained 27.8% total trash compared to 4.6% for spindle picked seed cotton. Unlike picker harvesters, which use spindles to remove seed cotton from the boll of the plant, stripper harvesters use brushes and bats to indiscriminately remove seed cotton, bolls, leaves, and other plant parts from the stem of the plant. As a result, stripper harvested cotton contains more foreign matter than spindle picked cotton (Faulkner et al. 2007).

Stripper harvesting is predominately confined to the Southern High Plains of the US due to several factors including: low humidity levels during harvest, tight boll conformations and compact plant structures adapted to withstand harsh weather during the harvest season, and reduced yield potential due to limited rainfall and irrigation capacity Cotton strippers typically cost about one-third the price of cotton pickers and have harvesting efficiencies in the range of 95 – 99% making them ideal for lower yielding cotton conditions. Approximately 35% of the total acreage of cotton harvested in the U.S. in 2011 came from Texas and Oklahoma (USDA, 2011). A majority of this cotton in these two states is harvested with stripper harvesters. Stripper harvested cotton also leads to higher transportation and processing costs.

Many studies (such as Faulkner et al. 2007., and Nelson et al. 2001.) have investigated the overall quality of stripper harvested cotton, quality of stripper harvested cotton versus picker harvested cotton, and a cost comparison of the two harvest methods. Several studies focus on the use of field cleaners and their effectiveness at removing foreign material (Brashears 2005, Smith and Dumas 1982, Wanjura and Baker 1979, Wanjura and Brashears 1983, Wanjura, Holt and Carroll 2009). All of these studies show that a field cleaner is a very effective way of removing foreign material from stripper harvested cotton; however these studies do not address any other components of the stripper harvester. To our knowledge, no previous work addresses the influence of the individual harvesting and conveying systems of a stripper harvester on fiber quality. Thus, the objective of this work is to document cotton quality and foreign matter content at several sequential locations on a stripper harvester. The overall goal of this effort is to identify components and systems on the stripper that if redesigned, could help to improve the cleanliness and better preserve the quality of stripper harvested cotton.

Materials and Methods

In this study the term location refers to a location on the harvester not a location from within the actual field the fiber was collected from. Five locations on the harvester and a hand collected field stand of cotton were identified as points of interest from the fiber quality standpoint to begin the collection process. The data collection for this project occurred at the Texas A&M Research and Extension Center just north of Lubbock, TX. Two varieties were harvested for this project, FiberMax 9170 B2F, and Stoneville 5458 B2F. One hundred rows of each variety were planted in a row irrigated field that was 775 feet long. The cotton was stripper harvested using a four row wide John Deere 7460, thus the collections for each replication occurred from within one 4-row wide 775 foot long strip. A total of eight 4-row passes were harvested from each variety: 5 passes for the machine location and hand harvested sample collections and three additional full length passes used to measure yield. The six locations of interest are cotton handpicked from the field, from the row unit augers (after brush rolls), collections at the end of the row unit/beginning of the cross auger, the end of the cross auger, before the field cleaner, and from the basket of the stripper after the cotton has been field cleaned (Figure 1).

Figure 1. Clockwise from top left to bottom left: Before Field Cleaner, After Field Cleaner, Hand Harvested, After Brush Rolls, After Cross Auger, and After Row Unit.

A total of five replications were conducted for each sampling location per variety. For each replication, approximately 20-lb. of seed cotton was collected from each sampling location. In order to collect an adequate sample amount from the after brush roll, after row unit, and after cross auger locations, it was necessary to stop the harvester several times in the field. Only one replication per variety was collected from the row unit auger area because with the row unit augers disabled the row unit filled with dirt and debris too quickly (Figure 2).

Figure 2. Excessive dirt in the stripper rolls.

Simultaneous sampling of the harvested seed cotton at each location on the harvester was problematic from a safety and feasibility standpoint. Therefore, all samples from one location were collected from both varieties prior to collecting samples from the other locations. The following sequence of events was conducted to collect the seed cotton samples from each location for each rep:

1. Before field cleaner sample collection: The machine was operated at full load into the un-harvested cotton with the field cleaner bypassed so that the harvested cotton flowed directly into the basket and not through the field cleaner. After the machine traveled approximately 150 feet into the field, the harvester was stopped and a 20-lb. sample of seed cotton was collected in the basket. The remaining seed cotton in the basket was moved so that there was an empty location in the basket for the next sample to fall into.
2. After field cleaner sample collection: The bypass lever on the field cleaner was switched to allow the cotton to pass through the field cleaner before entering the basket. The harvester was operated at full load into the un-harvested cotton in the same rep as in step 1 above for approximately 150 feet. The harvester was stopped and a 20-lb. sample of seed cotton was collected from the field cleaned cotton in the basket. The stripper basket was emptied and moved to the next replication. Steps 1 and 2 were completed for all reps in both varieties before samples were collected from other machine locations.
3. Hand harvested sample collection: a 20-lb. sample of seed cotton was hand harvested from each replication in both varieties after step 2.
4. After row unit and after cross auger sample collection: The right-hand section of the cross auger was removed from the header allowing the two right-hand row units to empty directly into the open auger trough. A large sack was connected to the bottom of the main cotton conveying duct to collect the cotton moved to the center of the header by the remaining left-hand section of the cross auger. With the main conveying fan disengaged and the row units and cross auger running, the stripper proceeded into the un-harvested cotton located after the hand harvested collection area. The machine was operated until the cross auger trough behind the right hand row units was full at which time the cotton was removed from the open auger trough and placed in a collection bag. This process was repeated until approximately 20 lb. of seed cotton were collected from the open right-hand auger trough (after row unit sample) and in the large sack attached to the base of the main cotton conveying duct (after cross auger sample). Step 4 was conducted for all replications in both varieties before step 5.
5. After stripper roll sample collection: The drive gears used to operate the two row unit augers in each row unit were removed from the harvester. The stripper was operated at full engine speed into the un-harvested cotton and stopped when the row unit auger troughs were full of harvested material. The material was removed from the row units and placed in a collection bag and this process was repeated until a total of 20-lb. of harvested material was collected. Step 5 was only conducted for one replication in each variety due to aforementioned reasons.

Cotton samples were hand collected from the field for gravimetric moisture analysis each time a collection occurred (Figure 3). At each sample stop throughout the entire process, temperature and relative humidity were recorded.

Figure 3. Scale and sealing system for moisture samples.

The cotton samples collected from the field were transported back to the USDA-ARS Gin Lab at Lubbock for ginning. The samples were separated by variety and location, and then weighed. Once the samples were weighed they were transported to the top of the extractor-feeder/gin stand. Prior to ginning two hand fractionation samples were pulled from each of the samples. A moisture sample was collected from the extractor-feeder apron during ginning of each lot. Analysis of the hand fractionation samples and the moisture content samples were performed based on the procedures outlined by USDA (1972). Each of the cotton samples collected in the field were processed through an extractor-feeder, 16-saw gin stand, and one stage of saw-type lint cleaning. The cleaned lint was weighed to obtain lint turnout. The trash collected from the extractor-feeder and seeds from the gin stand were collected and weighed to obtain the amount of trash and seeds removed from each sample. Two samples of the cleaned cotton lint from each sample were collected and sent to the Texas Tech University, Fiber and Biopolymer Research Institute in Lubbock, TX for HVI and AFIS fiber analysis.

Results and Discussion

Analysis of the ginning data showed a trend of increasing gin turnout and decreasing seed cotton trash content as the cotton was sampled on the harvester. A significant difference was not seen between varieties for the results of the gin data, thus all data presented represents both the Stoneville and FiberMax varieties. In the graphical and tabular representations of the data the machine location was assigned a numerical value to make it easier for analysis. Table 1 gives the numerical equivalent of the name.

Table 1. Numerical equivalent of the machine locations of fiber collection.

Machine Location	Numerical Equivalent
Hand Harvested	1
Row Unit Augers/After Brush Rolls	2
After Row Unit	3
After Cross Auger	4
Before Field Cleaner	5
After Field Cleaner	6

Gin turnout was highest for the hand harvested location with an average of approximately 37%. This was expected since only fiber and seed was intentionally removed from the plants. There was minimal trash incorporated into the hand harvested fiber. The second location which occurred after the brush rolls had removed the cotton from the plants had the lowest gin turnout with an average of about 12%. The row unit augers were disabled during this data collection, and a large amount of dirt, dust, and debris was picked up by the row units and conveyed into the row unit auger troughs. It was very easy to see the amount of debris removal that the row unit augers are aiding in. After the row unit once the cotton had entered the cross auger trough, gin turnout increased to near double that of the after brush roll location, or about 25%. The difference in turnout between locations 2 and 3 indicates that the row unit augers are quite effective at removing debris. Next, the cross auger collection area, there is about a percent or two drop in the average in gin turnout. The mechanical conveyance occurring from the cross auger is affecting the gin turnout of the cotton over that of the cotton collected from the cross auger trough. At the fifth location, the cotton was allowed to flow up the separation duct, by pass the field cleaner and then was collected. There is a much more consistent gin turnout represented in this area. The average gin turnout is not much higher than the previous two locations but the higher consistency means that a consistent amount of similar trash is being removed through this conveyance point. An average 5% increase is seen in the gin turnout when the cotton is allowed to pass through the field cleaner. So looking at the gin turnout data it can be said that the mechanical cleaning processes are having increasing effects on the gin turnout back close to that of the hand harvested cotton.

Percent trash, based on total sample weight, collected from the extractor feeder before the gin stand is shown in Figure 4. The hand harvested and field cleaned cotton has the lowest percent trash. Again the row unit auger collection area had the highest percentage of trash.

Figure 4 below is the statistical groupings based on machine location. It can be seen that use of the field cleaner made it is possible to obtain statistically similar gin turnouts and lower trash contents to that of hand harvested cotton. The non-field cleaned, cross auger, and after brush roll cotton had statistically similar gin turnouts and trash contents. The cotton collected from the row unit was in its own statistical group having a very high trash content and low gin turnout.

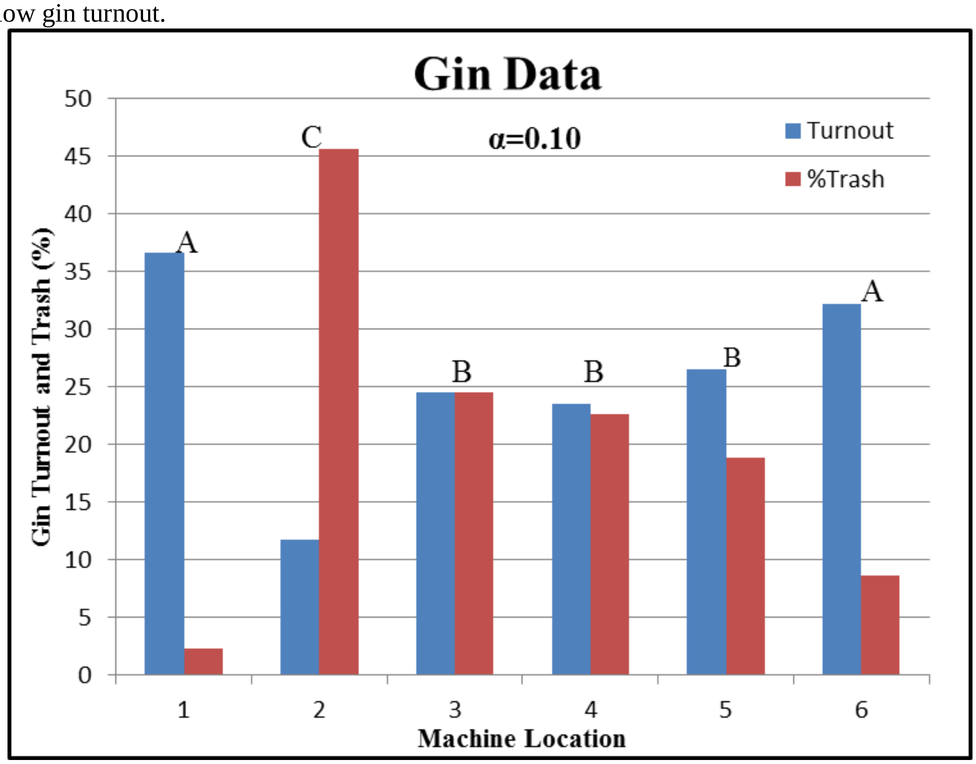

Figure 4. Statistical groupings of gin data.

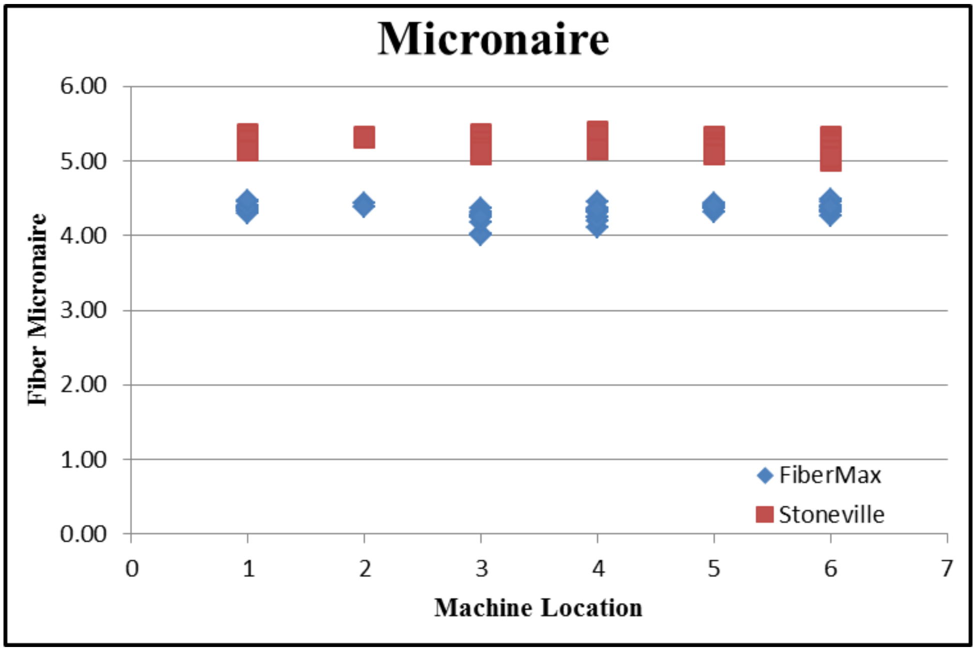

Figure 5. Fiber Micronaire

Micronaire of the two cotton varieties by sampling location is shown in Figure 5. The Stoneville variety had and average micronaire of about 5.2 while the FiberMax had an average micronaire of about 4.3. Independent of the varietal difference there is no significant difference in fiber micronaire between machine locations. Micronaire is an estimate of maturity and fineness thus should not be significantly affected by mechanical handling. As can be seen below in figure 6, fiber length as reported by the HVI has no correlation with the machine sample location. The fiber lengths are equally distributed across each of the sample locations with small varietal differences.

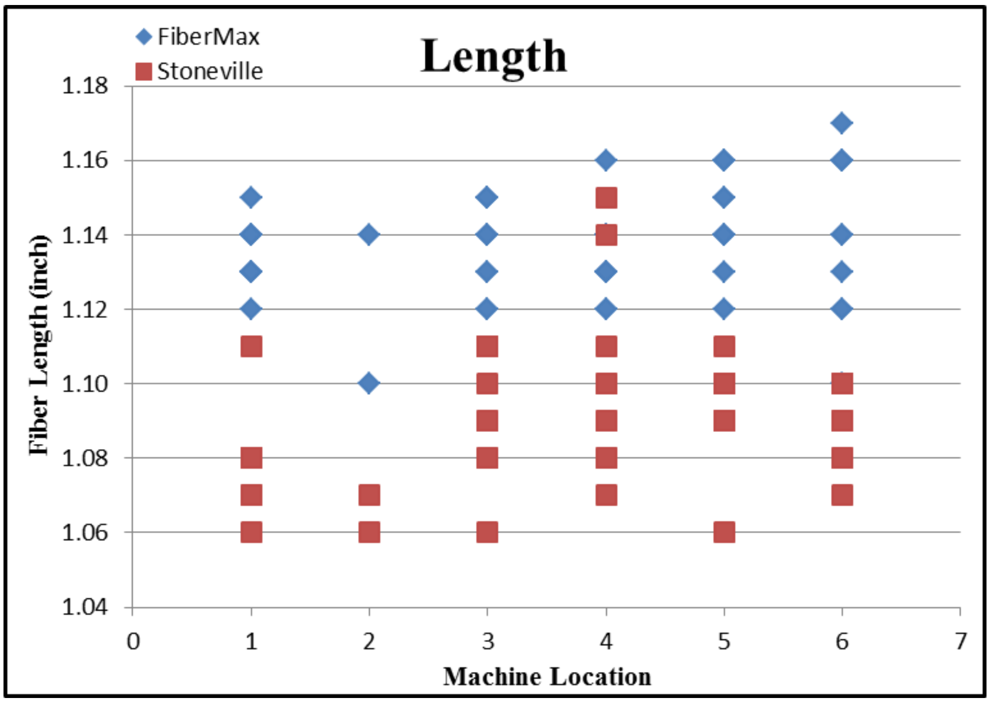

Figure 6. Fiber length reported by the HVI.

Differences among sample locations were observed for length uniformity (Figure 7), strength (Figure 8), and leaf grade (Figure 9). Little variation in uniformity was observed between locations and tended to increase at later sampling locations. Leaf grade increased continuously from locations 1 through 5 because the mechanical action imparted on the cotton during harvesting and conveying causes leaf trash and other foreign material to be broken up and further mixed into the fiber (Figure 9). The field cleaner removed some of the foreign material contained in the seed cotton and helped to reduce leaf grade.

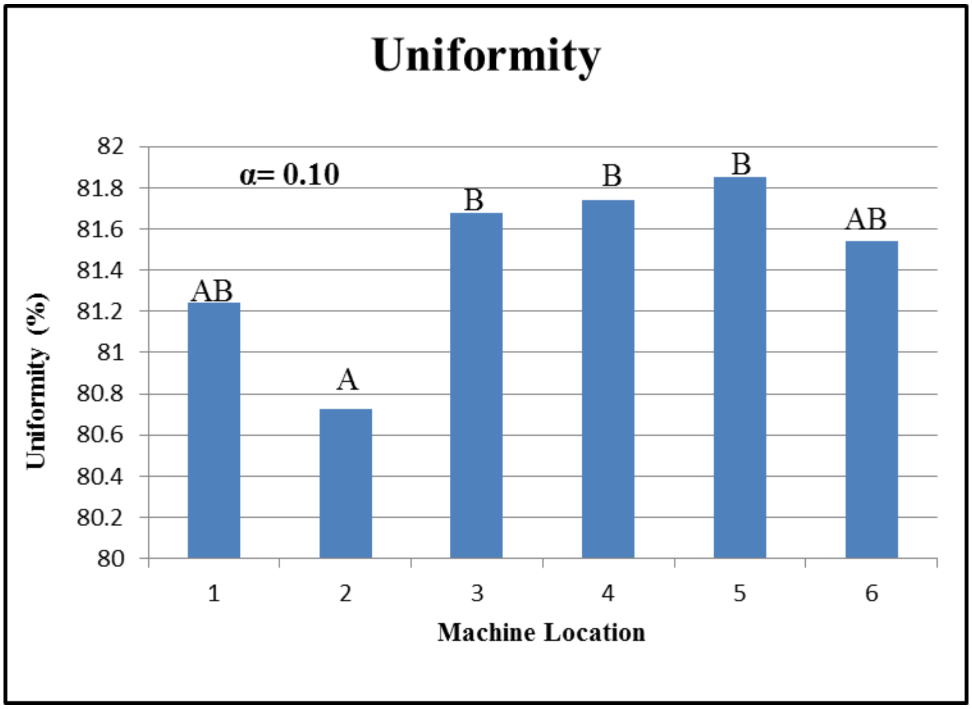

Figure 7. Fiber Uniformity.

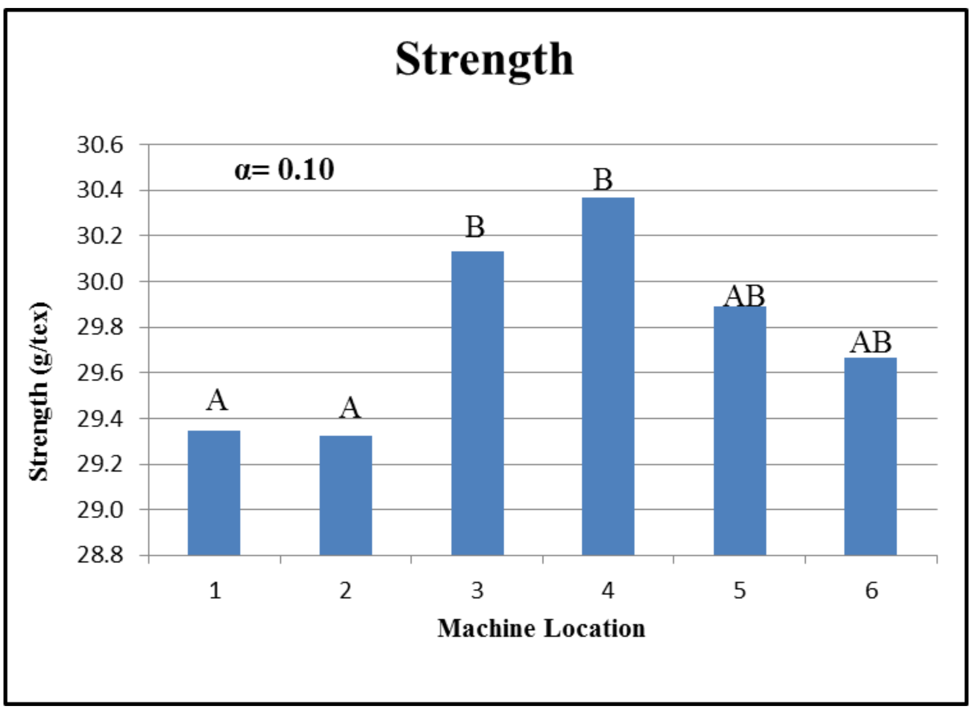

Figure 8. Fiber Strength.

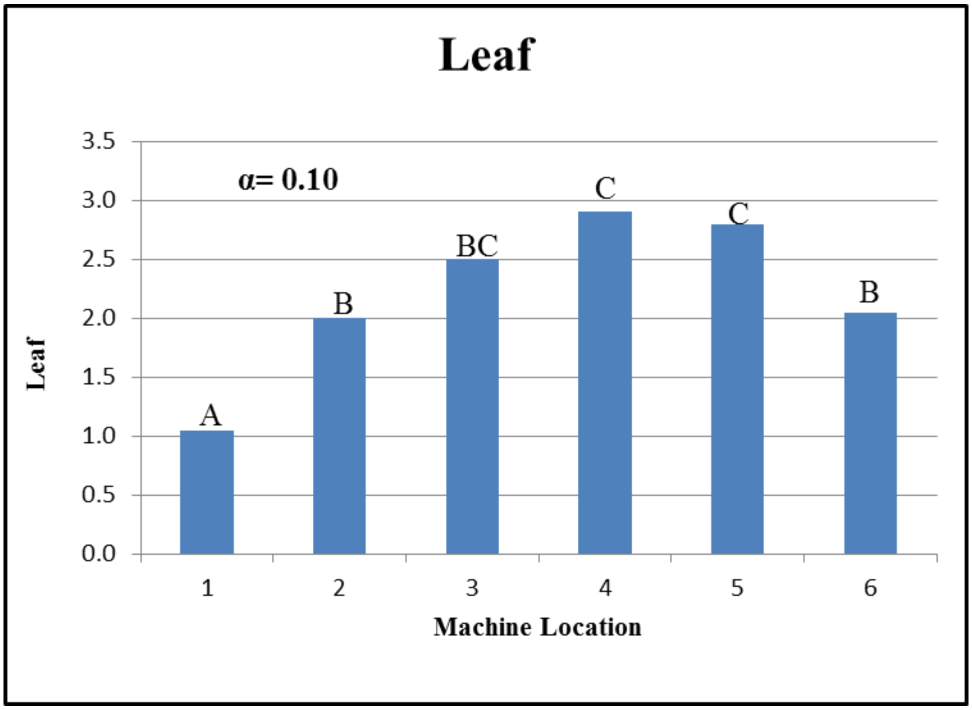

Figure 9. Leaf grade by sampling location.

Two parameters that would seem to have been affected by mechanical handling of cotton fiber are Nep size and Nep content. However, no clear trend with sampling location was observed for the nep size (Figure 10) or nep content (Figure 11) data.

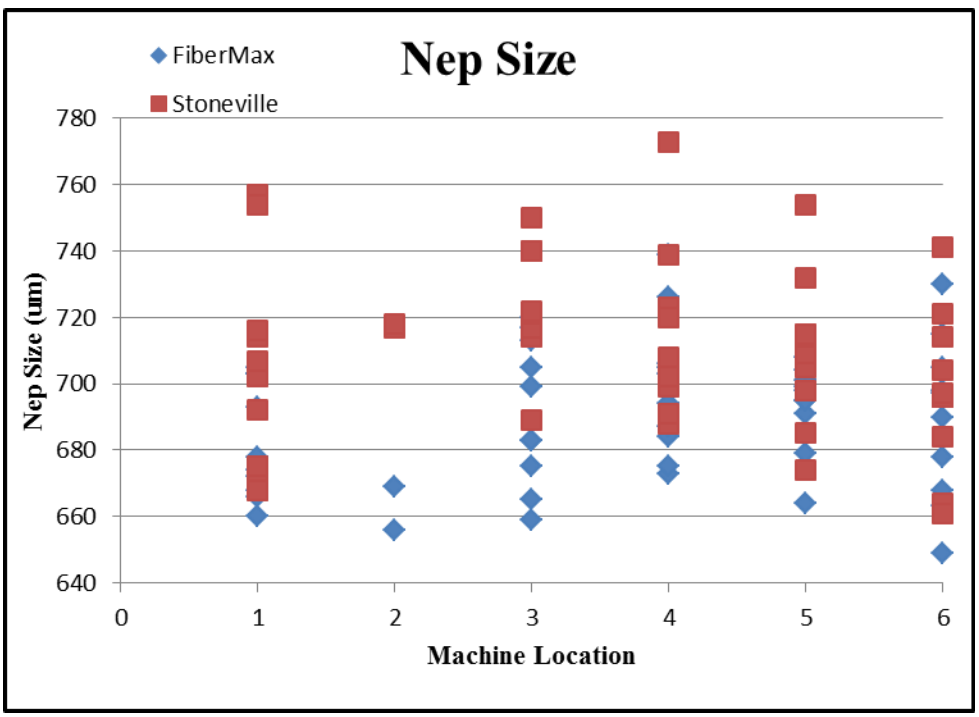

Figure 10. Nep size.

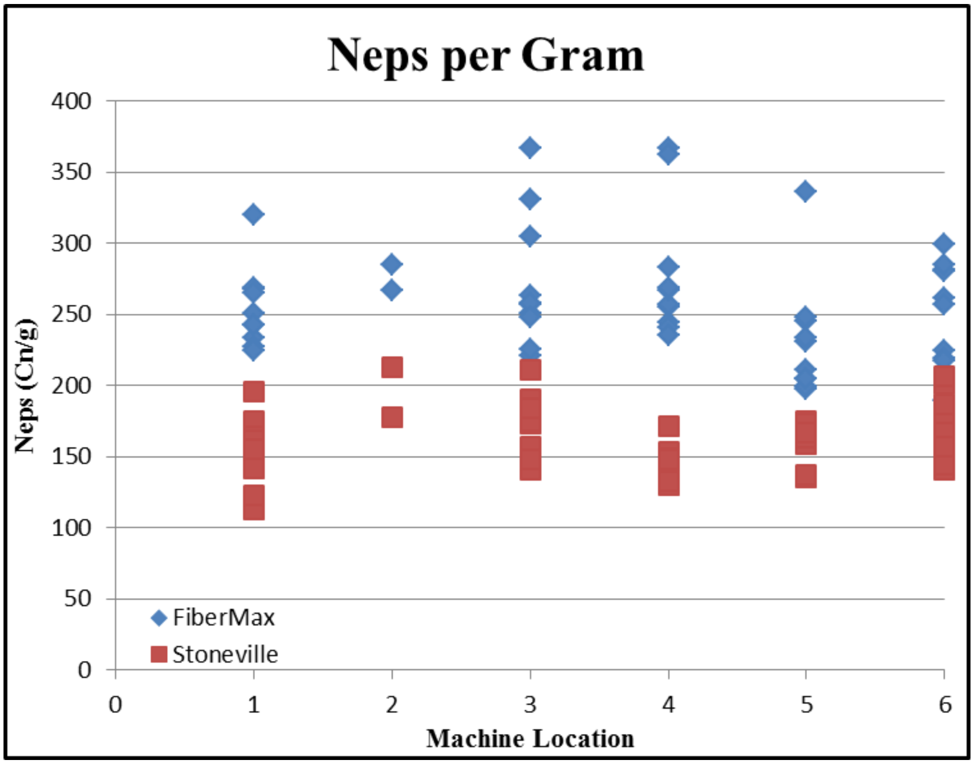

Figure 11. Neps per Gram.

Differences were observed among sampling locations for AFIS short fiber content by weight (Figure 12). It was expected that short fiber content would increase throughout the harvest process as the fibers are handled and exposed to additional mechanical action; however, this trend was not observed. One possible reason for the unexpected result is the reduced number of samples collected from the row unit. AFIS trash (Figure 13) and dust content (Figure 14) follow similar trends to each other throughout the machine. The levels have a general increase throughout sample locations until the cotton is pneumatically conveyed and then passed through the field cleaner. The pneumatic conveyance of the cotton through the separation duct allows for some of the dust and larger/heavier trash to fall out, and then more of the trash and dust was removed when the cotton passed through the field cleaner.

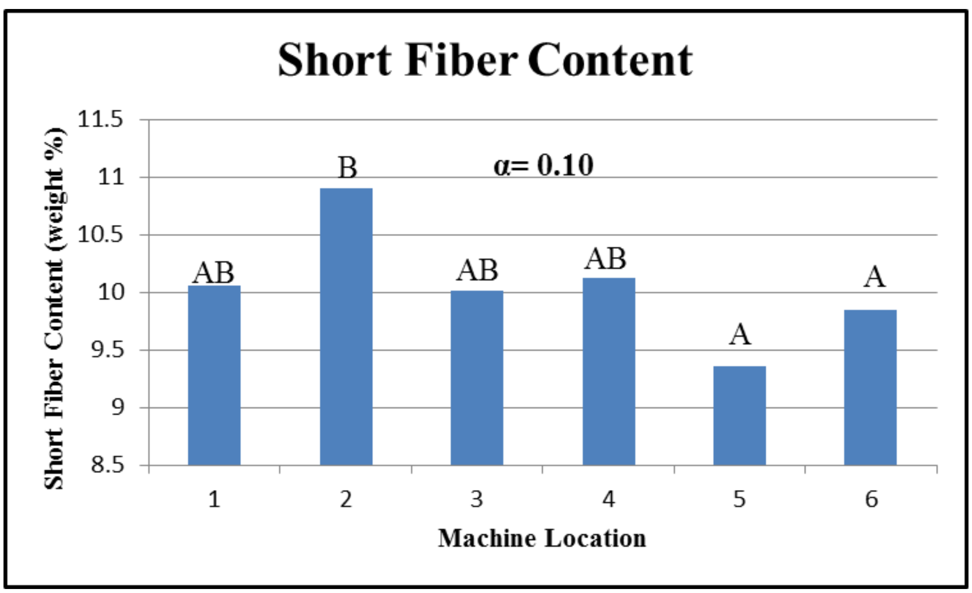

Figure 12. Short Fiber Content

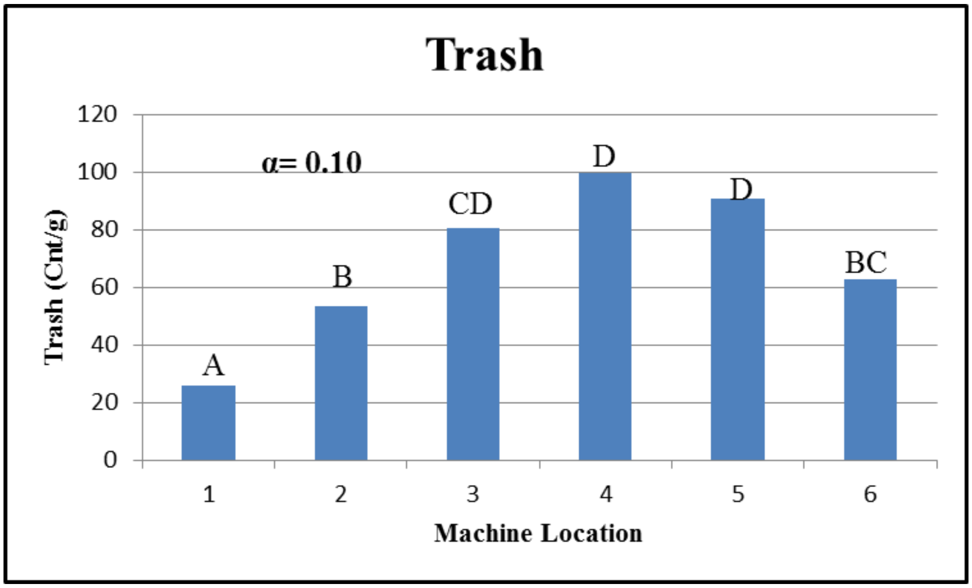

Figure 13. Trash Content

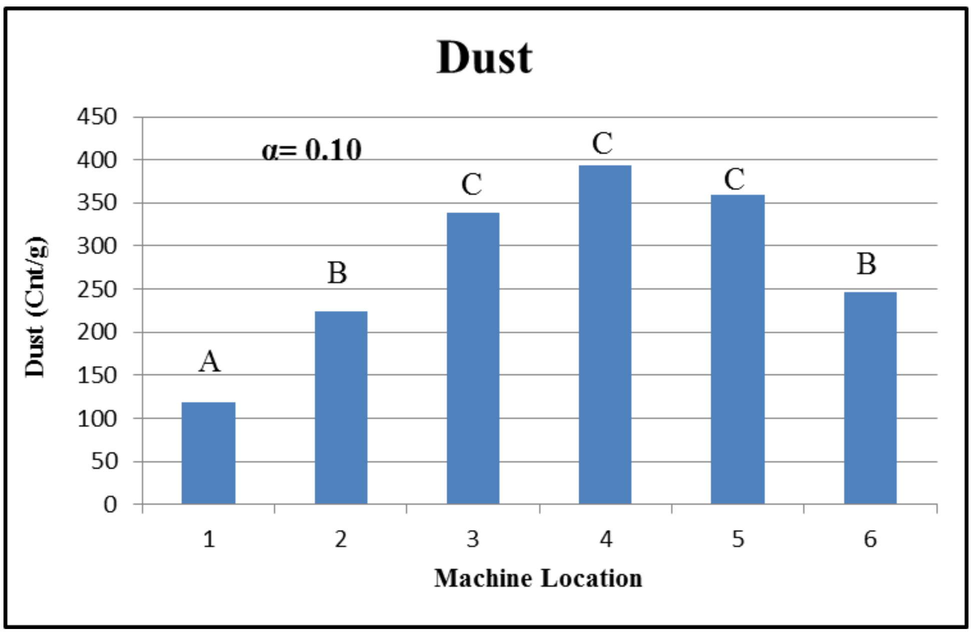

Figure 14. Dust Content

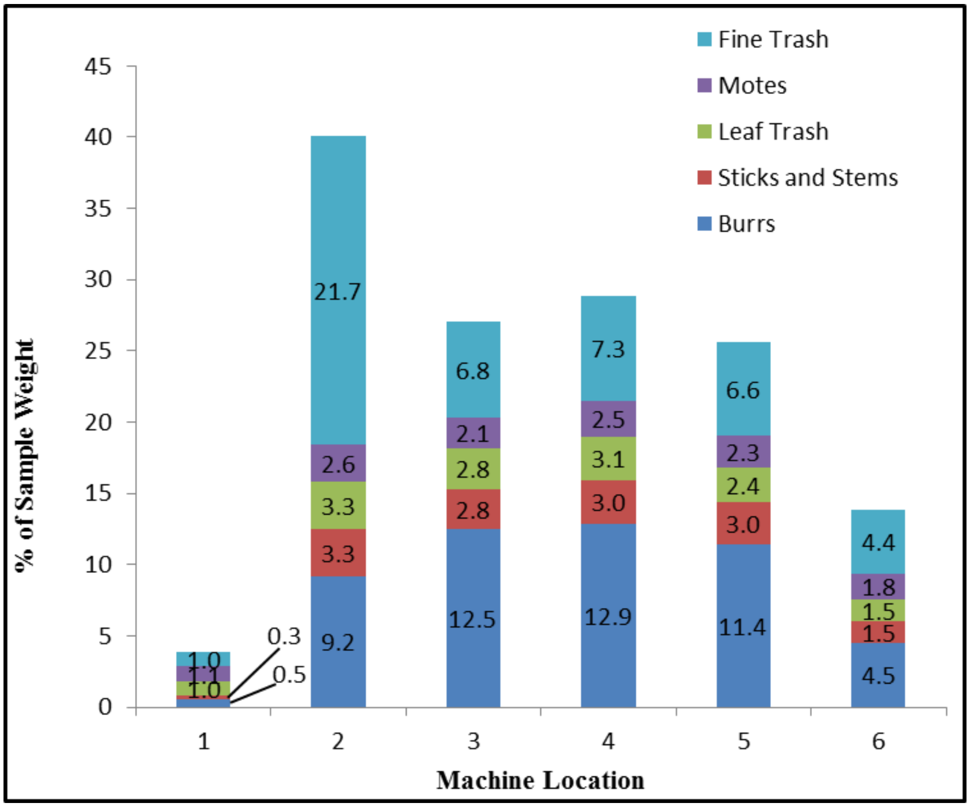

Figure 15. Hand fractionation results.

The results of hand fractionation analysis on samples collected at each location are shown in Figure 15. The bars in Figure 15 represent the total percentage of trash and the contribution from each type of foreign material is illustrated in each bar. Consistent with the rest of the gin data, total trash was reduced throughout the machine. It is apparent that the row unit augers do a very good job of reducing fine trash in the cotton. Once past the row units, burs consistently make up the highest percentage of trash with fine trash falling at a close second. The data shown in Figure 15 indicate that the field cleaner performs well at removing total trash and even in removing fine trash and burrs from the samples. The data represented in this graphs shows that an effort to remove burrs and fine trash is most important since they compose the highest amount of the total trash collected from the fiber samples.

Summary

The goal of this work was to identify components and systems on a cotton stripper harvester that, if redesigned, could improve seed cotton cleanliness and better preserve fiber quality. Seed cotton samples were hand harvested in the field and collected at five sequential locations on a cotton stripper harvester. The samples were analyzed for foreign matter content and HVI and AFIS fiber quality. Seed cotton total foreign matter content was highest after the stripper rolls before the cotton was conveyed out of the row units by the row unit augers. The row unit augers decreased total foreign matter content in the seed cotton by removing a substantial amount of fine trash comprised mostly of soil and small plant parts. Total foreign matter content remained at a consistent level during conveyance in the cross auger until the harvested seed cotton was processed through the field cleaner. The field cleaner decreased total foreign matter content by removing burs and some fine trash. Leaf grade and AFIS trash and dust content measurements follow similar trends where parameter levels increase on the stripper from the stripper rolls until the inlet to the field cleaner. Leaf grade, AFIS trash, and AFIS dust content were decreased by the field cleaner back to levels observed just after the stripper rolls. HVI and AFIS fiber analysis results indicated that the harvesting and conveying systems on the cotton stripper did not have a detrimental impact on fiber length characteristics or on the formation or size of neps.

The results of this work indicate that the cross auger and pneumatic conveying system on the stripper could be redesigned to provide additional seed cotton cleaning on the harvester. Pneumatic conveyance of seed cotton requires a substantial amount of engine power that could be reduced if mechanical conveyors were implemented.

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Disclaimer

Mention of trade names or commercial products in this manuscript is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture.

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COMPARISON OF HIGH-SPEED ROLLER AND SAW GINNING ON TEXAS HIGH PLAINS COTTON

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Abstract

New high-quality cotton cultivars have been adopted in the Southern High Plains recently and, as a result, interest has grown in finding harvest and ginning practices that better preserve fiber quality. Advancements in roller ginning technology have increased the ginning rate of some roller gins to that of saw gins. Thus, there is renewed interest in roller ginning for upland cotton. The objective of this work was to compare fiber quality and turnout of upland cotton produced in the Southern High Plains, harvested using a spindle picker or a brush-roll stripper, and ginned using saw or high-speed roller ginning (HSRG) systems. The findings of this work indicate that the HSRG substantially improved the length characteristics of the upland cultivar used regardless of harvest method. Turnout was higher for the HSRG cotton and for picker harvested cotton. Nep content was reduced for picker harvested cotton and HSRG cotton. Loan value for HSRG cotton was reduced slightly compared to the saw ginned cotton due to reduced fiber reflectance values. The fiber length distribution and nep content improvements afforded by the HSRG make this fiber more attractive to ring spinning mills which produce high count yarns for high value products.

Introduction

Compared to saw ginning, increased ginning costs associated with conventional roller ginning due to low production rates prevented the widespread application of roller ginning for upland cultivars (Thomas et al., 2008, Armijo and Gillum, 2010). Advances in roller ginning technology have increased gin stand production rates to levels comparable to saw gin stands (Armijo and Gillum, 2007). These advancements have lead to new interest in roller ginning upland cultivars in several areas of the US, including the Southern High Plains. Earlier work comparing saw and roller ginned upland cotton indicates that fiber length and length uniformity properties can be substantially improved with roller ginning (Hughs and Leonard, 1986, Mangialardi, 1991, Armijo and Gillum, 2007, Armijo and Gillum, 2010). The objective of this work is to compare fiber quality and turnout of upland cotton produced in the Southern High Plains, harvested using a spindle picker or a brush-roll stripper, and ginned using saw and high-speed roller ginning (HSRG) systems.

Methods

One cotton cultivar (FiberMax 9180 B2F, Bayer CropScience) was produced on a drip irrigated farm in Lubbock, TX, during 2010, for this project. Half of the cotton was harvested using a brush-roll cotton stripper (John Deere 7445, Moline, IL), while the remaining half was harvested with a spindle picker (John Deere 9996, Moline, IL). The stripper harvested cotton was processed through a field cleaner mounted on the harvester to help reduce the amount of foreign matter contained in the seed-cotton. The field average lint yield was 1486 kg/ha (1325 lb/acre). The harvested seed-cotton was compressed into 114-kg (250-lb) bales for shipment to the Southwestern Cotton Ginning Lab in Mesilla Park, NM, where the cotton was ginned. Prior to ginning, 160-kg (375-lb) seed-cotton lots were processed through different seed-cotton cleaning machine sequences based on harvest method. The picker harvested cotton passed through the following seed-cotton cleaner sequence: suction, green boll/rock trap, #1 inclined cleaner (6 cylinders), #1 stick machine (3 saw), and #2 inclined cleaner. The stripper harvested cotton passed through the same sequence with an additional stick machine (3 saw) after the #2 inclined cleaner. Half of the seed-cotton lots from each harvest method were ginned on a HSRG system while the remaining lots were ginned on a saw ginning system. The HSRG system consisted of a 1-m (40-in) wide Consolidated HGM roller gin stand with a spiked-cylinder feeder (Consolidated HGM, Lubbock, TX). The roller ginned cotton passed through one stage of lint cleaning consisting of a mill-type lint cleaner similar to the Guardian™ lint cleaner (Lummus, Savannah, GA). The saw ginning system consisted of a 46-saw Continental/Murray Double Eagle (Continental Eagle Corp., Prattville, AL) gin stand and Continental/Moss Gordin Galaxy (Continental Eagle Corp., Prattville, AL) extractor-feeder. The saw ginned cotton passed through one stage of saw type lint cleaning on a Continental/Moss-Gordin Lodestar (Continental Eagle Corp., Prattville, AL) lint cleaner with 41-cm (16-in) saw diameter and five grid bars.

Seed-cotton samples were collected at the suction and feeder apron (prior to ginning) for fractionation analysis and gravimetric moisture content analysis. Lint samples were collected before and after the lint cleaner used after each ginning system for high volume instrument (HVI) and advanced fiber information system (AFIS) fiber analysis and an additional lint sample was collected after lint cleaning for gravimetric moisture content analysis. The foreign material removed by each seed-cotton and lint cleaner was collected and weighed. Seed samples were collected after ginning for visible mechanical damage (VMD) and seed grade analyses. Seed-cotton, lint, and seed weights were recorded for each lot.

Results

Foreign matter removed by the seed-cotton cleaners (not including the gin feeders) was only different by harvest method and averaged 41.4 kg/bale (91 lb/bale) for the picker harvested cotton and 86 kg/bale (189 lb/bale) for the stripper harvested cotton. Total foreign matter removed by the cleaning equipment before the gin stands was different by harvest and ginning method since the gin feeders were different for each ginning system. The spiked cylinder feeder before the HSRG removed an additional 3.5 and 3.7 kg/bale (7.7 and 8.1 lb/bale) from the picked and stripped cotton, respectively while the extractor-feeder before the saw gin removed 23.9 and 36.5 kg/bale (52.6 and 80.4 lb/bale) more trash from the picked and stripped cotton, respectively. Ginning rate for the HSRG averaged 3.2 bales/hr-m (0.98 bales/hr-ft) and was lower than the saw gin processing rate of 4.4 bales/hr-m (1.34 bales/hr-ft). The HSRG controller was configured to begin feeding the gin stand slowly and gradually increase the feeding rate up to the steady-state ginning rate where the rotary knife power reaches 1200 W. The start-up period duration of the HSRG increased total ginning time such that average ginning rates for the roller gin were reported much lower than the steady-state ginning rate. It is anticipated that using larger lot sizes or logging gin stand power consumption during the ginning period would help to better characterize ginning rate. The start-up period duration for the saw gin was much shorter than the HSRG and did not substantially reduce the average ginning rate.

Turnout was different by both harvest and ginning method. Picked-HSRG, picked-saw, stripped-HSRG, and stripped-saw turnout values were 34.5, 32.0, 31.3, and 29.2%, respectively (treatments identified as harvest method-ginning method). HVI upper half mean length was different by ginning method and averaged 31.2 and 30.2 mm (1.23 and 1.19 in) for the HSRG and saw gin, respectively. HVI length uniformity was increased substantially by the HSRG where uniformity averaged 84.4% compared to 82.3% for the saw gin. AFIS short fiber content by number was lower for the HSRG and averaged 24.1% compared to 27.6% for the saw gin. The AFIS length by number distributions, shown in Figure 1, indicate a distinct difference in length properties between ginning systems that is independent of harvest method. The length distributions for the HSRG cotton indicate a higher portion of fibers longer than 25.4 mm (1 in) and lower portion of fibers shorter than 12.7 mm (0.5 in) compared to the distributions for the saw ginned cotton. Nep content, as shown in Figure 2, before lint cleaning was lower for HSRG (164 cnt./g) compared to saw ginned cotton (206 cnt./g). After lint cleaning, nep content increased to 179 and 252 cnt./g for the HSRG and saw gins, respectively. The more aggressive cleaning action of the saw type lint cleaner used with the saw gin increased nep content more so than the gentler mill-type lint cleaner used with the HSRG. Nep content was lower for picker harvested cotton before (176 vs. 194 cnt./g, picker vs. stripper) and after (206 vs. 224 cnt./g, picker vs. stripper) lint cleaning (Figure 2). Micronaire was higher for picked cotton (4.36) compared to stripped (4.25) which follows the findings of previous research comparing picker and stripper based harvest systems (Faulkner et al., 2011 and Boman et al., 2011). Unexpectedly, micronaire averaged 4.38 and 4.23 for the HSRG and saw gin, respectively. Leaf grade and AFIS total foreign matter content were both higher for the HSRG compared to the saw gin (Leaf: 2.38 vs. 1.06, AFIS Total FM: 560 vs. 325 cnt/g) and could have affected higher micronaire readings for the HSRG. Differences in AFIS maturity ratio by ginning method were observed and follow the trends observed in micronaire. However, the difference in maturity ratio by ginning method is small (HSRG = 0.88, saw = 0.87) and likely of little practical significance. Commodity Credit Corporation loan rates were lower for the HSRG cotton at 1.252 \$/kg (0.5682 \$/lb) compared to the saw ginned cotton at 1.263 \$/kg (0.5734 \$/lb), primarily as a result of lower color grades (predominate color grades: HSRG – 31, Saw – 21). No differences by harvest or ginning method were observed for high, medium, or low classifications of seed VMD but total VMD was higher for picked cotton compared to stripped (11.86 vs. 9.82%). Linter content of the ginned seed was not different by harvest method or ginning method. Seed quality index was higher for the picker harvest method (98.4 vs. 96.6, picked vs. stripped) and saw ginning method (100 vs. 94.96, saw vs. HSRG). Seed quantity index was higher for the saw ginning method which averaged 109.83 compared to 105.61 for the HSRG. Composite seed grade was higher for picked cotton (106.53 vs. 103.59, picker vs. stripper) and saw ginning (109.88 vs. 100.25, saw vs. HSRG).

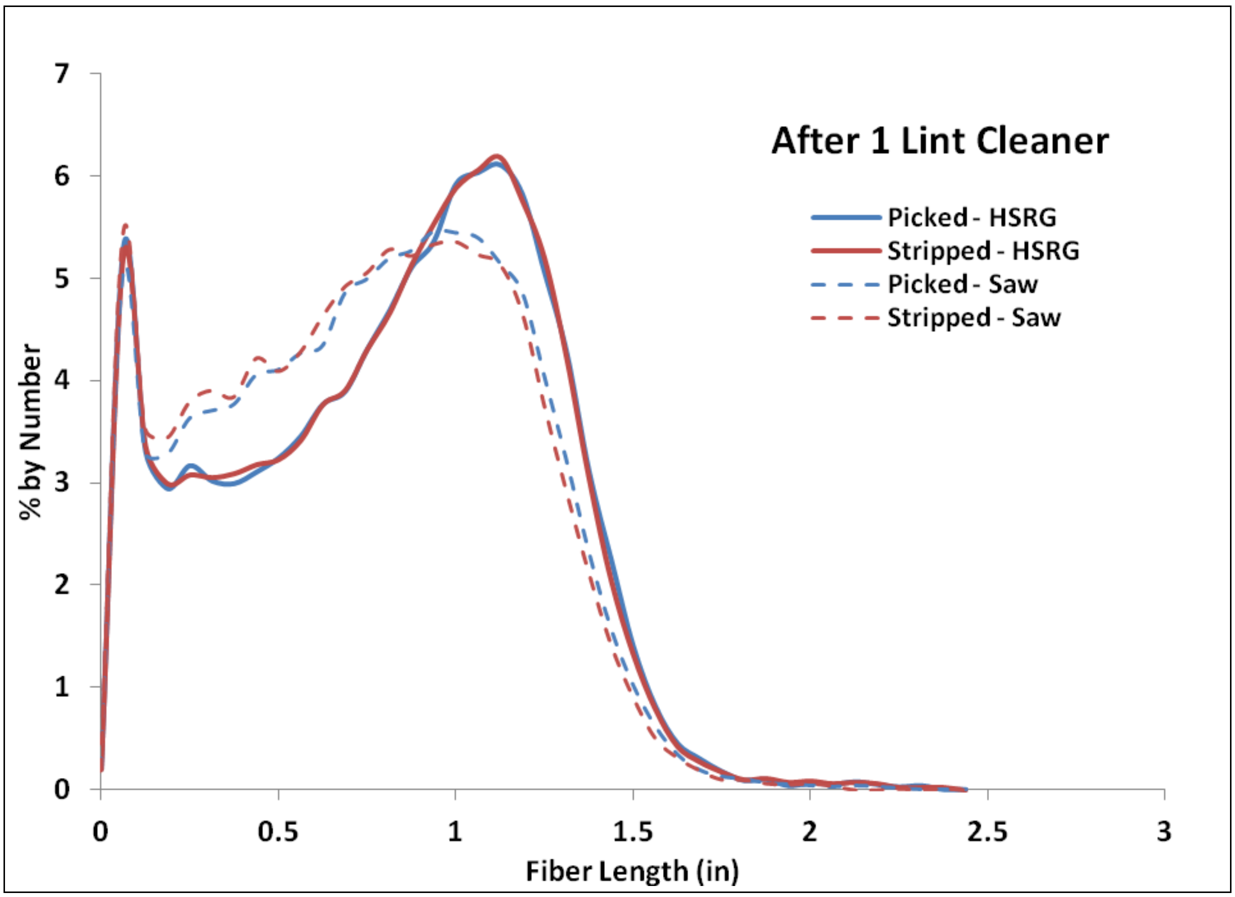

Figure 1. AFIS length by number distributions for the four harvest method-ginning method treatments.

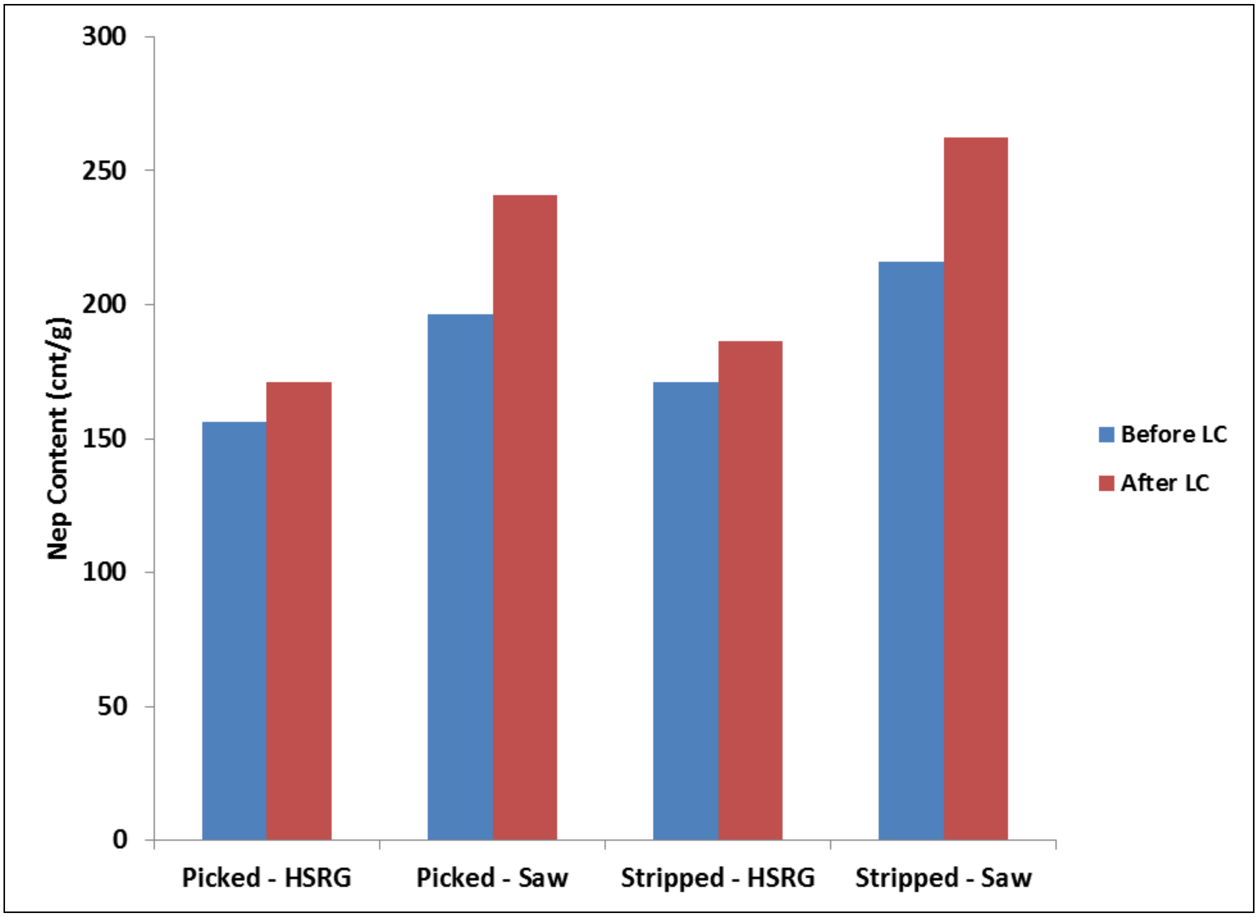

Figure 2. Nep content before lint cleaning (Before LC) and after lint cleaning (After LC) for the four harvest method – ginning method treatments.

Conclusions

Findings from the first year of this project indicate that the HSRG is capable of significantly improving fiber length, length uniformity, short fiber content, turnout, and nep content, regardless of harvest method. Increased foreign matter content and reduced color grades for HSRG cotton may be improved with additional stages of seed cotton or lint cleaning. Although loan values for HSRG cotton were slightly reduced compared to saw ginned cotton, it is likely that the loan chart does not properly account for the ring spinning efficiency and yarn quality improvements afforded by the HSRG process on upland cotton.

Acknowledgements

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Disclaimer

Mention of trade names or commercial products in this manuscript is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture.

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EFFECT OF HARVESTING METHODS AND COTTON FIBER MATURITY ON YARN QUALITY

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Abstract

Large-scale tests undertaken by Texas AgriLife Extension in Lubbock, TX, were the base for our investigations. The tests were conducted in eight locations over a three years period. Each test consisted of four large plots. Each large plot was divided into two blocks. Each block corresponded to one module. Half of the blocks were harvested with a stripper with field cleaner and half with a picker. The stripped cotton was ginned with the usual industrial sequence for stripper harvested cotton. The gins used a less aggressive ginning sequence for the picker harvested cotton (bypassing some seedcotton cleaners and one lint cleaner). This totaled 64 modules. From each module, one bale was purchased. The bales were sampled and fiber quality determined (HVI and AFIS). Then, spinning tests were performed. Ring spun yarn 30Ne was produced (carded and combed).

Results are as follows:

<u>Picker harvested cottons have on average better fiber properties</u>:

- Micronaire: +0.17 (+4.3%)*
- UHML: +0.01 inch (+0.7%)
- UI: +0.5 % (+0.6%)
- Reflectance: 0.6 % (+0.8%) and Yellowness: -0.3 (-3.2%)
- Neps: -130 count/g (-29.0%)
- UQL: +0.01 inch (+1.4%)
- L(n): +0.03 inch (+3.3%)
- L(n)CV: -2.3 % (-4.3%)
- SFC(n): -2.5% (-8.6%)
- VFM: -0.8% (-35.9%)
- Fineness: +2.9 mtex (+1.9%)
- IFC: -0.7 % (-7.3%)
- MR: +0.01 (+1.2%)

**100 x (picker – Stripper)/Stripper*

<u>Picker harvested cottons have on average better carded ring spun yarn quality</u>:

- Opening waste: -0.5% (-15.5%)
- Card waste: -0.7% (-16.5%)
- CVm: -0.39% (-2.4%)
- Thin places: -4 count/km (-18.8%)
- Thick places: -49 count/km (-18.4%)
- Neps 200%: -99 count/km (-24.4%)
- IPI: -151 count/km (-21.9%)
- Hairiness: -0.16 (-2.9%)

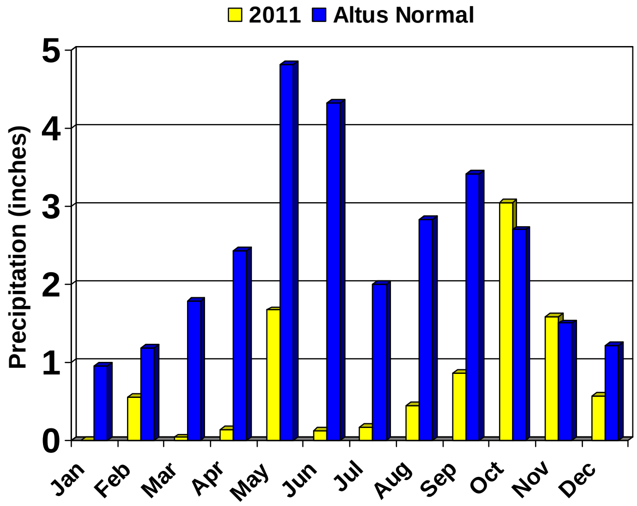
<u>Picker harvested cottons have on average better combed ring spun yarn quality</u>:

- Noils percentage: -0.85% (-4.9%)
- CVm: -0.14 % (-1.1%)

- Thin places: -0.07 count/km (-11.3%)
- Thick places: -5.4 count/km (-29.4%)
- Neps 200%: - 19.9 count/km (-33.6%)
- IPI: -25.4 count/km (-32.5%)
- Hairiness: -0.08 (-1.7%)

In conclusion, for lower micronaire cottons, picker harvesting is clearly beneficial. It results in better fiber quality; more importantly, it results in better yarn quality for all evenness-related parameters. However, in 2010-11, micronaire readings (≥ 4.0) were much higher than in 2008-09, and 2009-10. In these conditions, it appears that picker harvesting does not benefit yarn quality.

Altus Normal (1971-2000) and Mesonet 2011 Rainfall



Altus Normal From January 1 – May 31 11.18”

Altus Actual From January 1 – May 31 2.41”

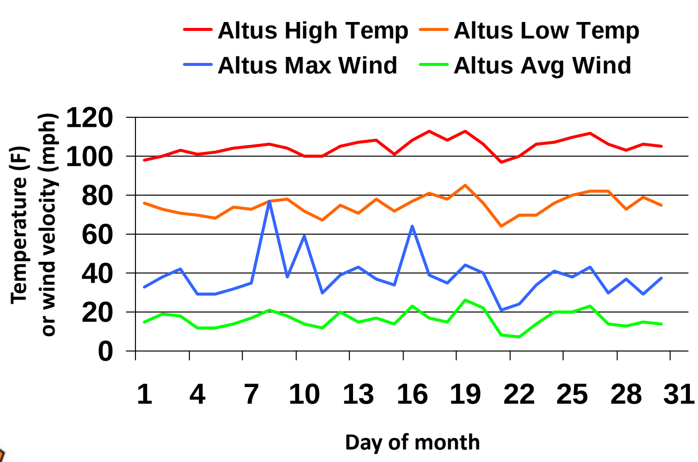
22% of normal

May 2011 precipitation includes a rainfall event not captured by the Mesonet due to equipment malfunction

Total through September 30 4.01”

Source: http://agweather.mesonet.org/index.php/data/section/climate

Altus Mesonet Maximum and Minimum Air Temperatures and Wind Speed Averages and Maximums June 2011



June averages

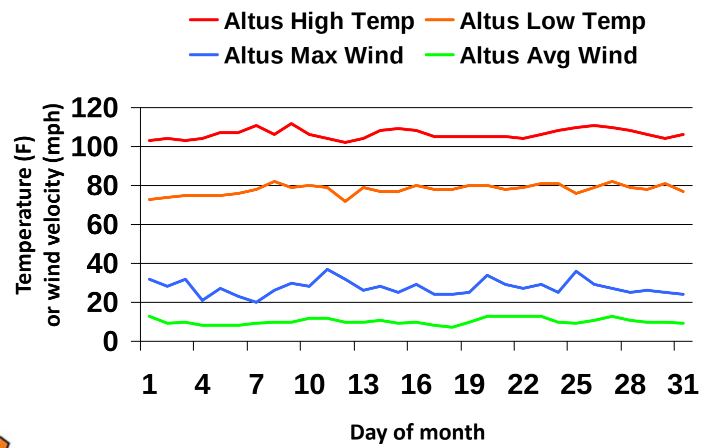
Daily maximum temperature: 105

Daily minimum temperature: 75

Daily maximum wind speed: 38

Daily average wind speed: 16

Altus Mesonet
Maximum and Minimum Air Temperatures and Wind Speed Averages and Maximums
July 2011



July averages

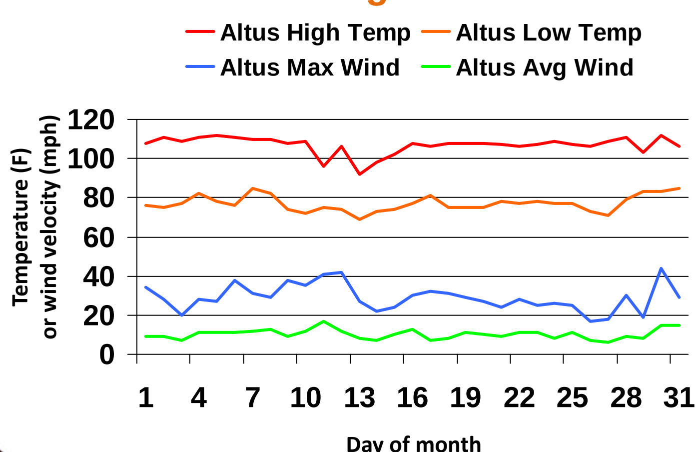
Daily maximum temperature: 106

Daily minimum temperature: 78

Daily maximum wind speed: 28

Daily average wind speed: 10

Altus Mesonet
Maximum and Minimum Air Temperatures and Wind Speed Averages and Maximums
August 2011



August averages

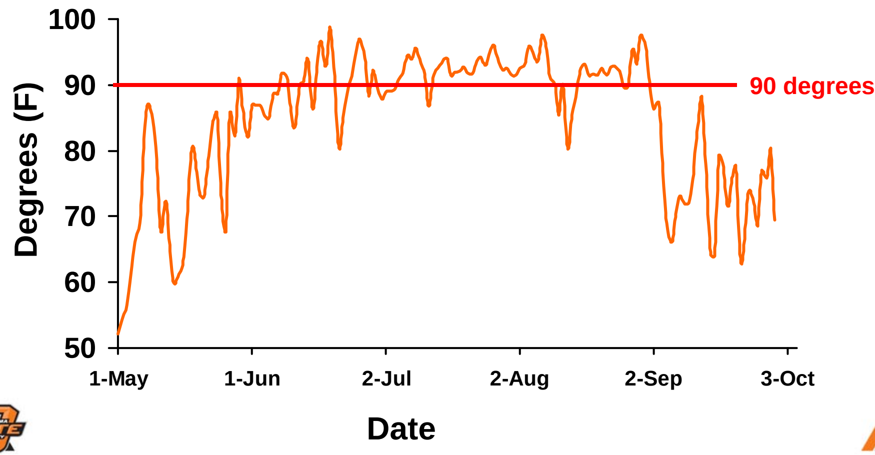
Daily maximum temperature: 107

Daily minimum temperature: 77

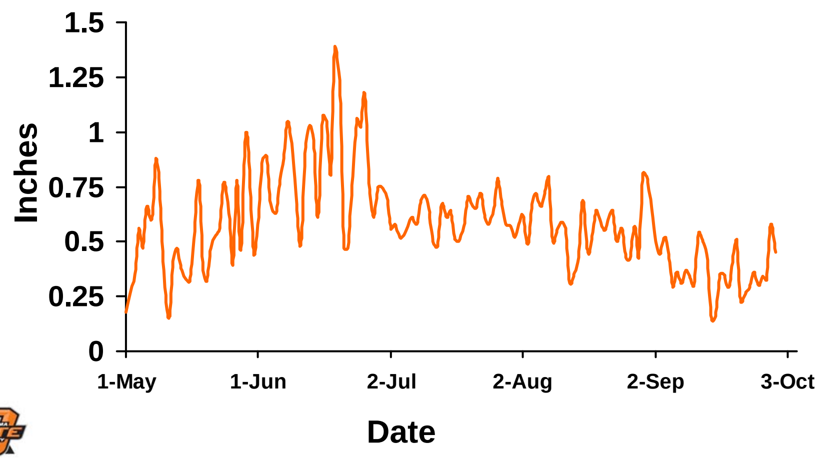
Daily maximum wind speed: 29

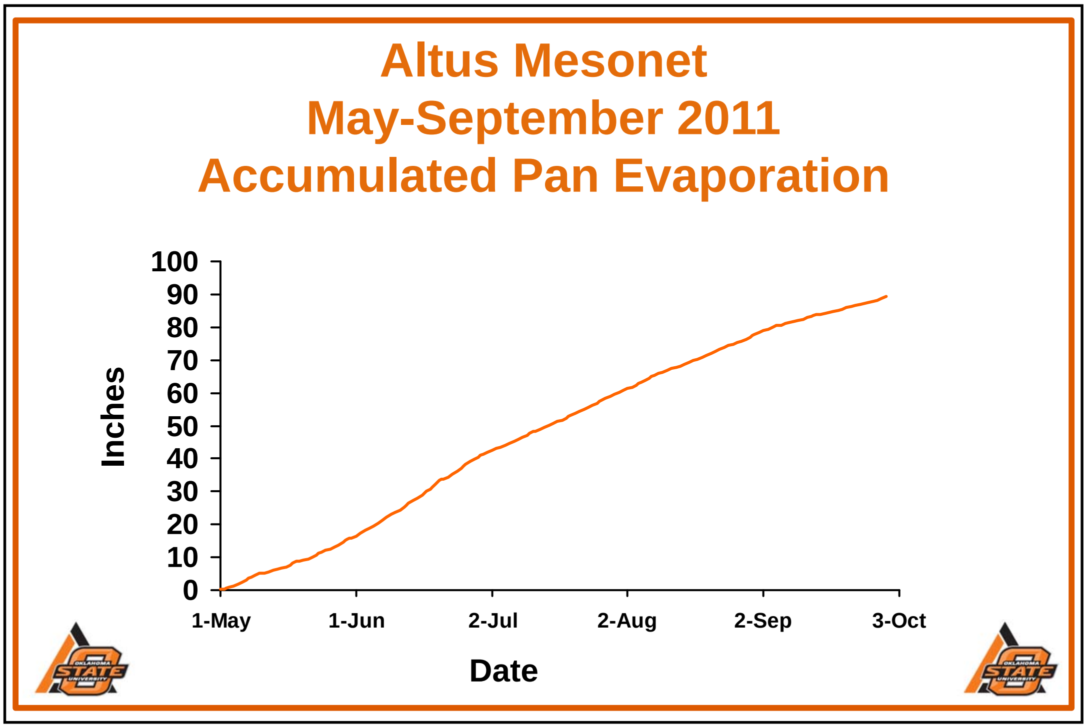
Daily average wind speed: 10

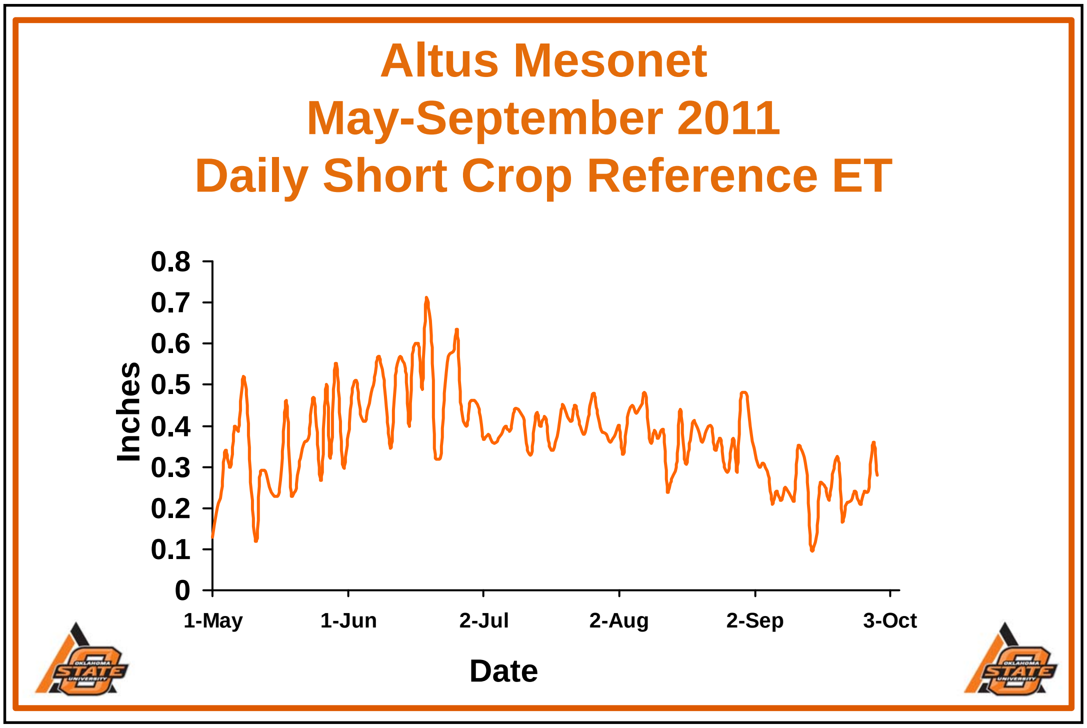
Altus Mesonet
May-September 2011
Daily 24-Hr Average Temperature



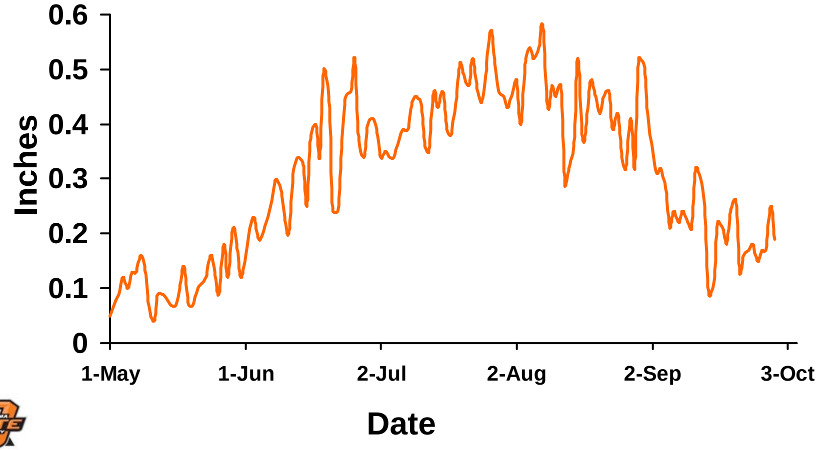
Altus Mesonet
May-September 2011
Daily Pan Evaporation



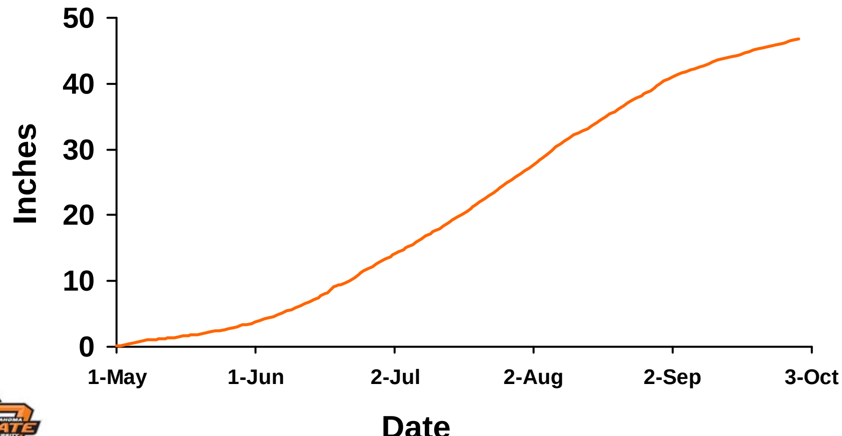

Altus Mesonet
May-September 2011
Accumulated Pan Evaporation
Inches
100
90
80
70
60
50
40
30
20
10
0
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date
STATE


Altus Mesonet
May-September 2011
Daily Short Crop Reference ET
Inches
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date
STATE

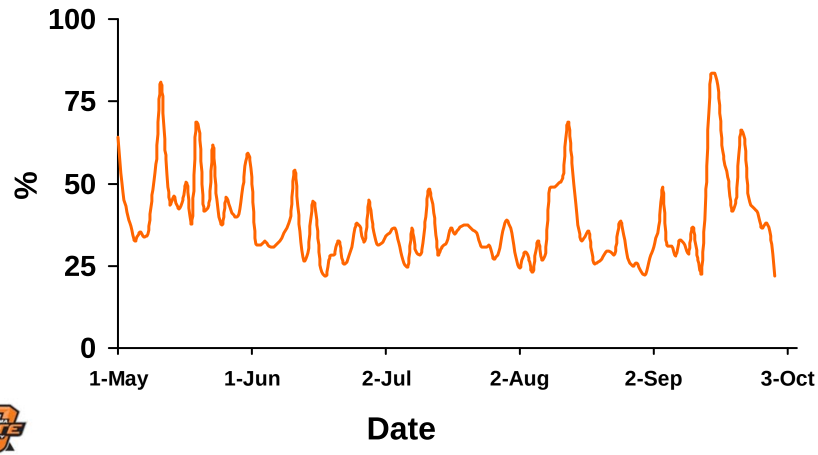
Altus Mesonet
May-September 2011
Daily Cotton ET



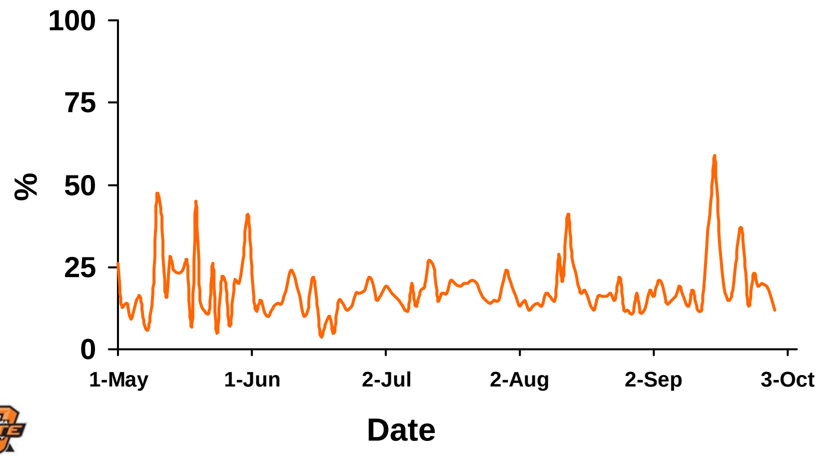
Altus Mesonet
May-September 2011
Accumulated Cotton ET



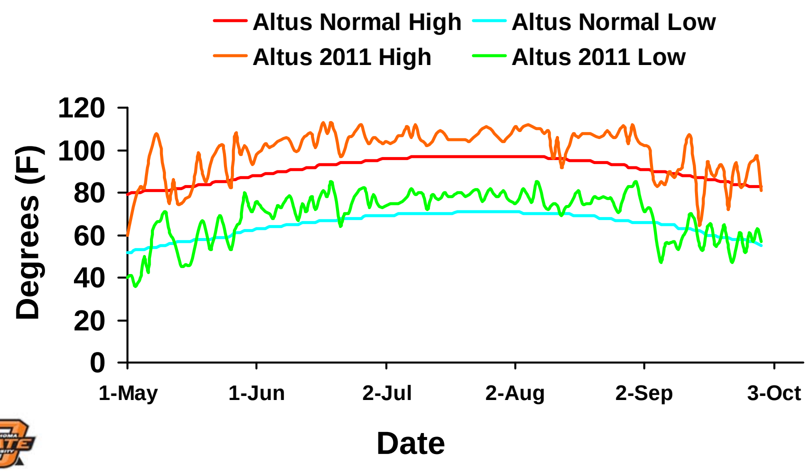
Altus Mesonet
May-September 2011
Daily Average Relative Humidity



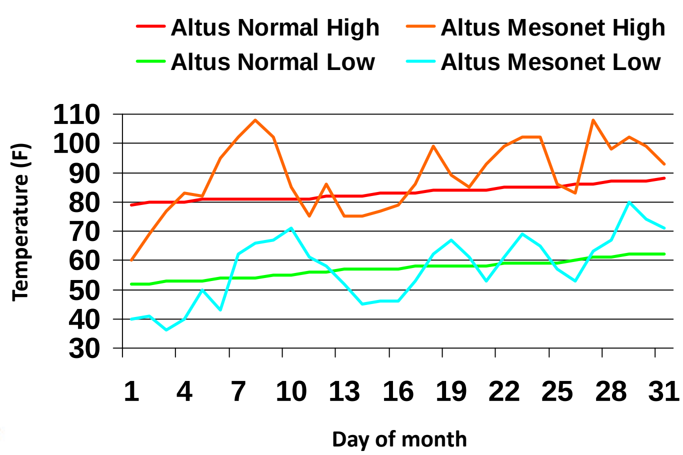
Altus Mesonet
May-September 2011
Daily Minimum Relative Humidity



Altus
30-Year (1971-2000) Normal and
2011 Mesonet Temperatures for May-September



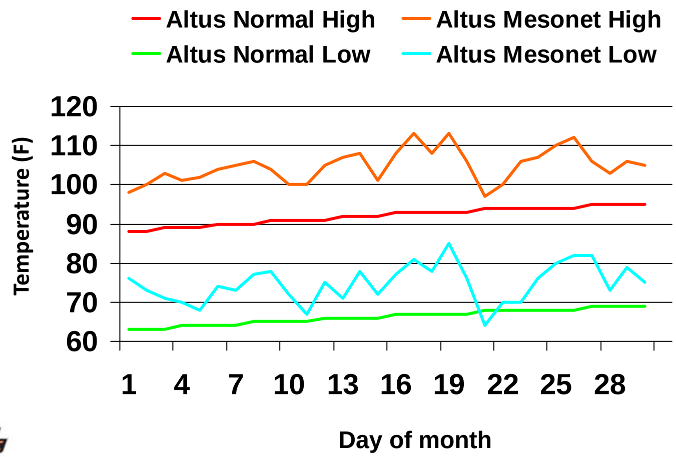
Altus
Normal (1971-2000) and Mesonet
Air Temperatures
May 2011



Heat Units

Normal: 314
2011: 426
% of normal: +36

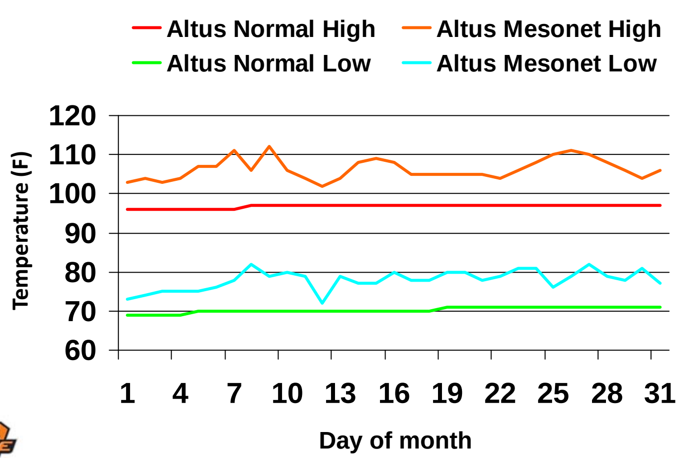
Altus
Normal (1971-2000) and Mesonet Air Temperatures
June 2011



Heat Units

Normal: 575
2011: 894
% of normal: +55

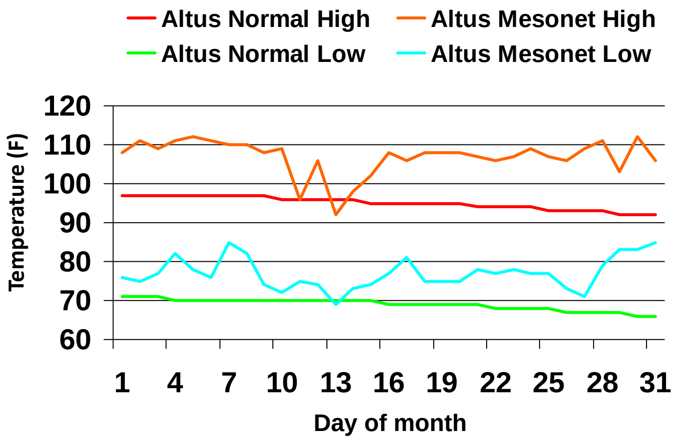
Altus
Normal (1971-2000) and Mesonet Air Temperatures
July 2011



Heat Units

Normal: 730
2011: 997
% of normal: +37

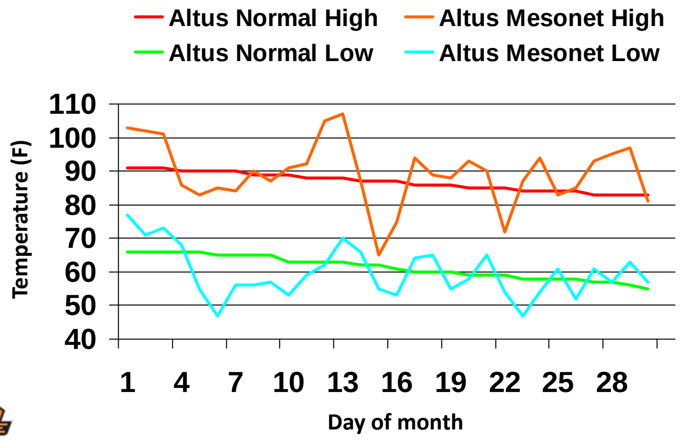
Altus
Normal (1971-2000) and Mesonet
Air Temperatures
August 2011



Heat Units

Normal: 683
2011: 990
% of normal: +45

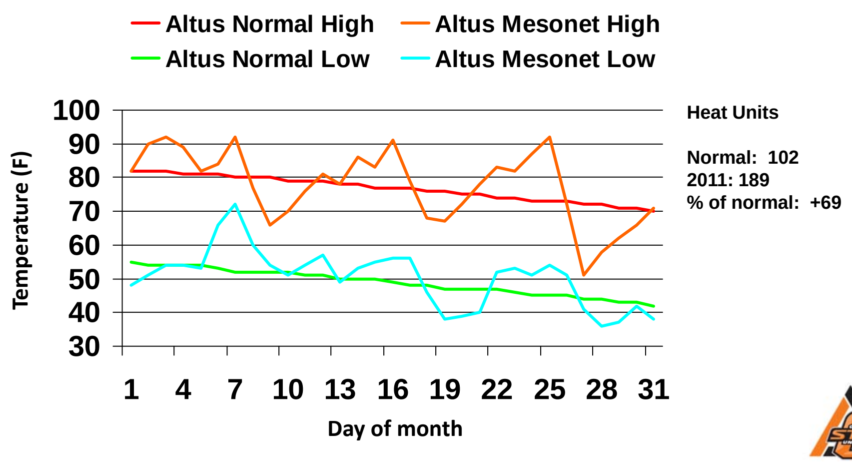
Altus
Normal (1971-2000) and Mesonet
Air Temperatures
September 2011



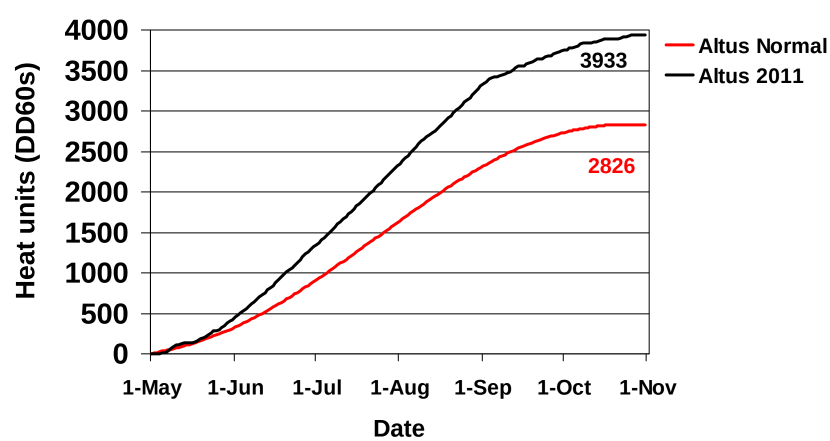
Heat Units

Normal: 424
2011: 438
% of normal: +3

Altus
Normal (1971-2000) and Mesonet
Air Temperatures
October 2011



Altus
30-Yr Normal and 2011
Cotton Heat Unit Accumulation



Evaluating Field Trial Data

This article has been reprinted from Southwest Farm Press Vol 25, Number 11, April 9, 1998.

Field Trials can provide helpful information to producers as they compare products and practices for their operations. But field trials must be evaluated carefully to make sure results are scientifically sound, not misleading and indicate realistic expectations for on-farm performance.
This fact sheet is designed to give you the tools to help you determine whether data from a field trial is science fact or science fiction.

What are the best sources of field trial data?

Field trials are conducted by a broad range of individuals and institutions, including universities, ag input suppliers, chemical and seed companies and growers themselves. All are potentially good sources of information.

What are the common types of field trials?

Most field trials fall into one of two categories: side-by-side trials (often referred to as strip trials) or small-plot replicated trials. Side-by-side trials are the most common form of on-farm tests. As the name suggests, these trials involve testing practices or products against one another in plots arrayed across a field, often in strips the width of the harvesting equipment.
These strips should be replicated across the field or repeated at several locations to increase reliability.
Small-plot replicated trials often are conducted by universities and companies at central locations because of the complexity of managing them and the special planting and harvesting equipment often required.
Replicated treatments increase the reliability of an experiment. They compare practices or products against one another multiple times under uniform growing conditions in several randomized small plots in the same field or location.
Small-plot replicated trials also may be conducted on farmers' fields where special conditions exist, for example, a weed infestation that does not occur on an experiment station.

Are side-by-side plots more valuable than small-plot replicated trials, or vice versa?

Both types of plots can provide good information. The key is to evaluate the reliability of the data. It is also important to consider the applicability of the trial to your farming operation.

When is plot data valid, and when isn't it?

There isn't a black-and-white answer to that questions. But there are good rules of thumb that can help guide you. Consider these three field trial scenarios:

Scenario 1:

A single on-farm side-by-side trial comparing 10 varieties. Each variety is planted in one strip the width of the harvesting equipment and is 250 to 300 feet long.

What you can learn:

This trial will allow you to get a general feel for each variety or hybrid in the test, including how it grows and develops during the season.
However, this trial, by itself, probably won't be able to reliably measure differences in yield. This is because variability within the field, even if it appears to be relatively uniform, may be large enough to cause yield variations that mask genetic difference among the varieties. Other varietal characteristics, such as maturity or micronaire in cotton, can also be masked by soil variation.

Scenario 2:

Yield data from side-by-side variety trials conducted on the same varieties on multiple farms in your region.

What you can learn:

When data from multiple side-by-side trials are considered together, reliability increases. In this case, the more trials comparing the same varieties, the better. As you go from three to five to 10 or more locations, the certainty goes up that yield differences represent genetic differences and not field variability. Be aware, however, that small differences between treatments (in this case varieties) may still be within the margin of random variability of the combined trial and may not indicate actual genetic differences. One treatment will almost always be numerically higher. Statistical analysis helps determine if differences are significant (consistent).

Scenario 3:

A university-style small-block replicated trial comparing the same 10 varieties.

What can you learn:

Data from such trials, if they are designed well and carried out precisely, generally are reliable. This is, the results generally determine the yield potential of crop varieties. However, it is still important to consider whether results are applicable to your farming operation and are consistent with other research.

How do I know whether differences in yield, for example, are real and not caused by field variability or sloppy research?

Scientists use statistical analysis to help determine whether differences are real or are the result of experimental error, such as field variation. The two most commonly used statistics are **Least Significant Difference (LSD)** and the **Coefficient of Variation (CV)**, both of which can provide insight on the validity of trial data. If these values aren't provided with trial results, ask for them.

Least Significant Difference (LSD) is the minimum amount that two varieties must differ to be considered significantly different. Consider a trial where the LSD for yield is four bushels per acre. If one variety yields 45 bushels per acre and another yields 43 bushels per acre, the two are not statistically different in yield. The difference in their yields is due to normal field variation, not to their genetics. In this example, a variety that yields 45 bushels per acre is significantly better than those yielding less than 41 bushels per acre. In many research trials, LSDs are calculated at confidence level of 75 to 95 percent. For example, a confidence level of 95 percent means you can be 95 percent certain that yield differences greater than the LSD amount are due to genetics and not to plot variability.

Coefficient of Variation (CV) measures the relative amount of random experimental variability not accounted for in the design of a test. It is expressed as a percent of the overall average of the test.

For measuring yield differences, CV's of up to five percent are considered excellent; 5.1 to 10 percent are considered good; and 10.1 to 15 percent are fair.

A high CV means there must be larger differences among treatments to conclude that significant differences exist. The bottom line: <u>When considering yield test data, be skeptical when the CV exceeds 15 percent.</u>

Is a one-year test valid, or are several years of results necessary to know whether one product or practice is superior to another?

In an ideal world, having several years of tests to verify use of a practice or product is best. But where changes are rapid, such as with crop varieties, having university data from multiple years isn't always possible.

When multi-year university data aren't available, pay more careful attention to statistical measures like CV and LSD, and the number of locations and testing environments.

Multi-year data on yield and performance can also be requested from the developers of new products prior to university testing. In either case, be cautious about making major production changes and trying large acreages of a given variety based on one year's data.

How should I evaluate trial results that are markedly different from other research in my area?

When research results are at odds with the preponderance of scientific evidence, examine the new research with extra care.

Pay special attention to factors that might have influenced the outcome, such as soil type, planting date, soil moisture and other environmental conditions, and disease, insect and weed pressures. For example, was the growing season unusually wet or unusually dry? When was it dry or wet? What was the crop growth stage when it was wet or dry?

Was there a disease that affected one variety or hybrid more than another one? Were there insect problems? Could this have influenced the trial's outcome and its applicability to your operation? If you determine that unusual circumstances affected the outcome, be cautious about how you use the results.