2020 Annual Report

AGRICULTURAL COMPLEX
FOR
ADVANCED RESEARCH
AND
EXTENSION SYSTEMS
(AG-CARES)

IN COOPERATION WITH

Texas A&M Agrilife Research   Lamesa Cotton Growers   Texas A&M Agrilife Extension Service

Technical Report 21-2

Texas A&M AgriLife and Research and Extension Center of Lubbock
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Mr. Cecil Haralson was selected to replace Dr. Danny Carmichael as our AG-CARES Farm Manager. He was previously employed in Dr. Terry Wheeler's disease and nematode program. Prior to that, he grew up farming with his father in the area. We are very pleased to have Cecil in this position and are well satisfied with his performance during the 2020 growing season despite the challenges that were experienced.

2020 was an extremely challenging year for our nation, the Southern High Plains Ag producers, and our AgriLife scientists working at AG-CARES. COVID-19 posed a threat most had never experienced. Agriculture research was declared an essential function so we were able to continue our work with social distancing, wearing masks in public, and one person per vehicle when traveling. In person meetings were highly discouraged so remote meetings became the norm.

In addition to COVID-19, weather conditions were not favorable across the region. AG-CARES received less than 8 inches of rainfall in 2020 which eliminated the dryland cotton crop and lowered irrigated yields. In addition, a cold period in late September followed by frost in late October shortened the growing season especially for late planted cotton.

Despite these distractions we were able to continue our programs in the following areas which are summarized in this booklet:

- Root-knot nematode management and variety testing and development
- Soil fertility – improving nitrogen and potassium use and efficiency
- New cotton variety evaluations
- Cover crop management
- Non-GMO variety development
- Irrigation and water management
- Weed control
- Soil health

Our thanks to Lamesa Cotton Growers for providing AG-CARES and their support and guidance for the past 31 years. Current officers are: Kirk Tidwell, President; Glen Phipps, Vice-President; and Rusty Cozart, Secretary. Dr. Wayne Keeling continues to provide leadership to coordinate our activities at AG-CARES.

Our thoughts and prayers go out to those who lost family members during this past year. May 2021 be a more bountiful year with less concerns about health.

Jaroy Moore
Resident Director of Research
Texas A&M AgriLife Research and Extension Center
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Danny Nusser
Regional Program Director
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The Lamesa Cotton Growers would like to thank the following for their contributions to the AG-CARES Project:

Americot Cotton Seed	BASF
Bayer CropScience	Corteva
Cotton, Inc. – State Support Program	Dawson County Commissioners Court
National Cotton Council	PhytoGen Cotton Seed
Sam Stevens, Inc.	Syngenta Crop Protection

TITLE:

Cover crop management with wheat and rye at AG-CARES, Lamesa, TX, 2017-2020.

AUTHORS:

Ray White – Research Assistant
Wayne Keeling – Professor
Katie Lewis – Associate Professor
Justin Spradley – Research Assistant

MATERIALS AND METHODS:

Plot Size:	8 rows by 50-60 feet, 3 replications
Cover Crop Seeding Date:	December 12, 2016 November 17, 2017 December 18, 2018 November 20, 2019
Cover Crop Terminations:	March 27 & April 10, 2017 March 27 & April 10, 2018 April 9 & 23, 2019 March 23 & April 6, 2020
Variety & Planting Date:	NG 4545 B2XF – May 24, 2017 DP 1646 B2XF – May 16, 2018 DP 1646 B2XF – May 19, 2019 DP 1646 B2XF – May 20, 2020
Herbicides:	2,4-D 1 qt/A Prowl 3 pt/A Roundup PowerMax 1 qt/A Roundup PowerMax 1 qt/A
Fertilizer:	2017 - 138-40-0 2018 - 115-35-0 2019 - 120-0-0 2020 - 120-0-0

Irrigation:

	2017	2018	2019	2020
Preplant	0.0”	0.5”	1.8”	1.5”
In Season	9.1”	11.1”	9.0”	9.9”
Total	9.1”	11.6”	10.8”	11.4”

Harvest Date:	October 20, 2017 November 14, 2018 October 28, 2019 October 20, 2020

RESULTS AND DISCUSSION:

In 2017, biomass ranged from 3500-4500 lbs/A at the optimum termination and almost doubled to 6500-7500 lbs/A at the late termination. At the late termination timing, there was no difference between seeding rate or species in biomass accumulated. At the optimum termination, there was no difference within species at either seeding rate. In 2018, less biomass was accumulated when compared to 2017 with only 2000-4000 lbs/A from the optimum to late termination. At the late termination timing, rye at 30 lbs/A produced more biomass than wheat at either seeding rate. At the optimum termination time, there was no difference between species, but wheat at 60 lbs/A produced more than 30 lbs/A. In 2019, biomass accumulated was even less than previous years, producing between 1000-2500 lbs/A. The late terminated wheat at both seeding rates and rye at 60 lbs/A produced more biomass than any combination in the optimum. At the optimum termination, there were no differences across treatments. In 2020, biomass increased and ranged from 1800-5500 lbs/A. The rye tended to produce more than the wheat, and the late termination produced more than the optimum. There was no difference between seeding rates except at the wheat and optimum timing, where the 60 lbs/A produced more than the 30 lbs/A (Fig. 1)

In 2017, 2018, and 2020, cotton populations were at an acceptable range for optimum production. In 2018, due to poor early season conditions, low stands were recorded with both the rye and wheat at the late termination and 30 lbs/A seeding rate being significantly lower. However, the late, lower seeding rate wheat was the only treatment that was below an acceptable stand. (Fig. 2)

Cotton lint yields ranged from 1100-1500 lbs lint/A in 2017. When compared to the conventional tillage system, the only significantly lower treatment was the rye at the late termination timing. All other treatments were similar to the conventional. The conventional and the lower seeding rate and optimum termination in both species trended towards the highest yields. In 2018, yields ranged from 600-1000 lbs lint/A. Highest yields were attained by the wheat at the low seeding rate and optimum termination as well as the conventional tillage. The conventional system was also similar to the rye at the low seeding rate and early termination timing. All other treatments were lower when compared to the conventional. Yields had less variation in 2019, ranging from 800-975 lbs lint/A. No treatments varied when compared to the conventional. Yields in 2020 ranged from 550-800 lbs lint/A. The rye at the high seeding rate and optimum termination, conventional, and the wheat at the low seeding rate and both terminations produced the highest yields. The rye at the low seeding rate and both termination dates are the only treatments that varied from the conventional system (Fig. 3)

Figure 1. Effect of cover crop species, planting rate, and termination date on aboveground biomass production at three collection dates.

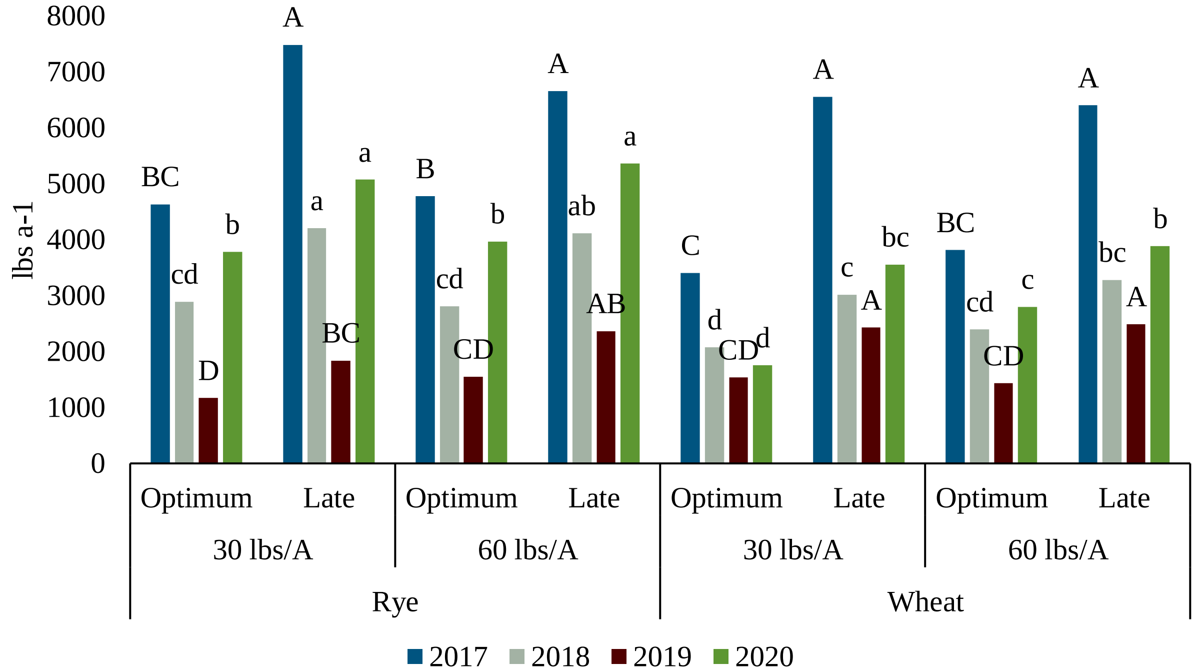


Figure 2. Effect of cover crop species, planting rate, and termination date on cotton plant populations.

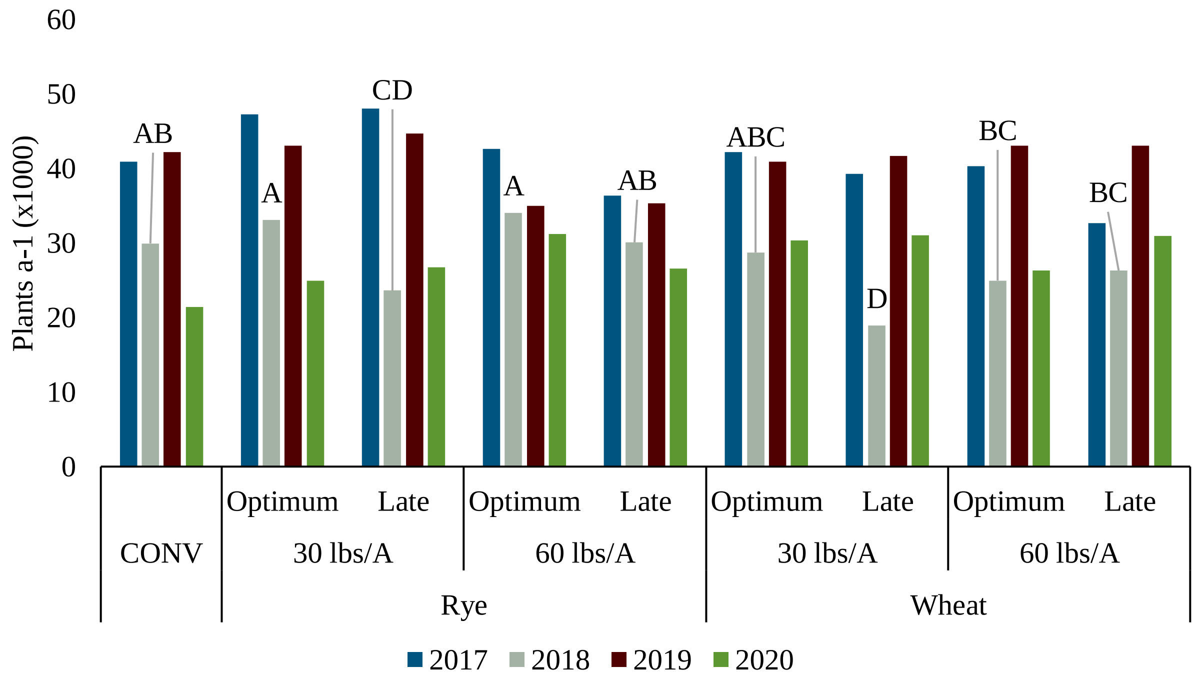


Figure 3. Effect of cover crop termination timing on cotton lint yield.

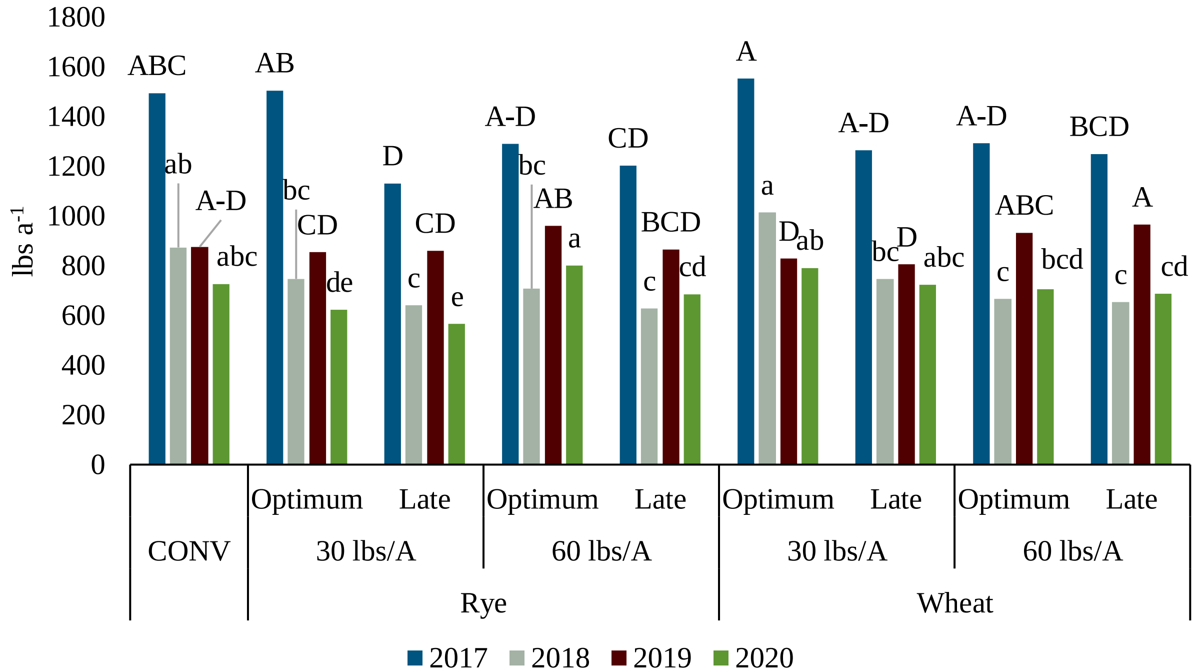
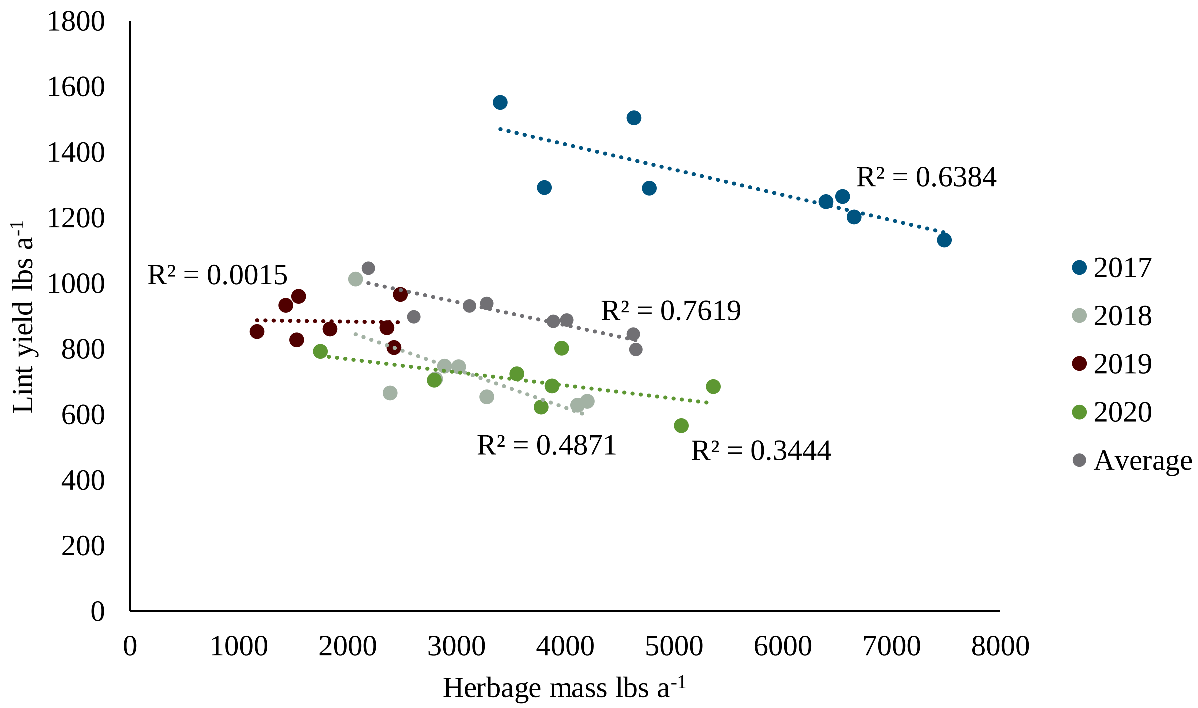


Figure 4. Relationship between cover crop biomass and cotton lint yield, 2017-2020 and four-year average.



TITLE:

Impact of Cotton Cropping Systems on Cotton Lint Yield and the Productive Capacity of Soil at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Katie Lewis – Associate Professor
Joseph Burke – Graduate Research Assistant
Wayne Keeling – Professor
Dustin Kelley, Amee Bumguardner – Research Associates
Ira Yates and Debrah Dobitz – Technicians

MATERIALS AND METHODS:

Location:	AG-CARES, Lamesa, TX
Plot Size:	8 rows by 45 ft, 3 replications
Design:	Randomized complete block
Row Spacing:	40”
Cover Crop Seeding Dates:	2 December 2014; 4 November 2015; 12 December 2016; 17 November 2017; 4 December 2018; and 21 November 2019
Termination:	10 April 2015; 11 March 2016; 3 April 2017; 27 March 2018; 9 April 2019; and 27 March 2020
Cotton Planting Dates:	13 May 2015; 24 May 2016; 5 May 2017; 15 May 2018; and 19 May 2019; and 18 May 2020
Cotton Harvest:	28 October 2015; 22 November 2016; 7 November 2017; 19 November 2018; 28 October 2019; and 31 October 2020
Variety:	2015 DP 1321 B2RF planted at 53,000 seed/acre; 2016-2018 DP 1646 B2XF planted at 53,000 seed/acre; 2019-2020 DP 1747 NR B2XF and DP 1646 B2XF planted at 53,000 seed/acre
Fertility:	120 lb N/A as 32-0-0 and 113 lb/A 10-34-0
Irrigation:	7.1” (2015); 5.1” (2016); 8.0” (2017); 11.6” (2018); and 10.8” (2019); 11.4” (2020)

Management practices being demonstrated include: 1) conventional, winter fallow; 2) reduced tillage (no-till) - rye (*Secale cereal* L.) cover crop; and, 3) reduced tillage (no-till) – mixed species cover crop. Mixed cover crop species included hairy vetch (*Vicia villosa* Roth), radish (*Raphanus sativus* L.), winter pea (*Pisum sativum* L.), and rye. Conventional tillage and reduced tillage with rye cover crop treatments were established in 1998 and the mixed species cover was seed in 2014 in 8 of 16 rows of the rye cover crop plots. In 2019, each plot was split into 8-row plots to include a nematode resistant cotton variety (DP 1747 NR B2XF). Cover crops were planted using a no-till drill on 2 December 2014, 4 November 2015, 12 December 2016, 17 November 2017, 4 December 2018, and 21 November 2019 and were chemically terminated 10 April 2015, 11 March 2016, 3 April 2017, 27 March 2018, 9 April 2019 and 27 March 2020 using Roundup PowerMAX (32 oz/acre). Prior to termination, above ground biomass of cover crops were harvested from a 1 m^2 area to calculate herbage mass (dry weight basis), nitrogen (N) uptake, and C:N ratios. Soil core samples were collected following cover crop termination each year to a depth of 24 inches from each plot and analyzed for total C and N, organic C, nitrate-N, Mehlich III extractable macronutrients, and sodium (Na), and pH and electrical conductivity (EC). Additional samples were collected at this time to a 6-inch depth and analyzed using the Soil Health Test. After soil sampling, cotton (DP 1321 B2RF) was planted 13 May 2015, 24 May 2016, 5 May 2017, (DP 1646 B2XF) 15 May 2018, 19 May 2019, and 18 May 2020 (DP 1747 NR B2XF and DP 1646 B2XF) at a seeding rate 53,000 seed/acre. Cotton was harvested on 28 October 2015, 22 November 2016, 7 November 2017, 19 November 2018, 28 October 2019, 31 October 2020. After cotton harvest the no-till plots were drilled with cover.

Soil moisture measurements were collected via neutron attenuation with access tubes installed within each plot to a depth of approximately 60 inches. Readings were taken at 7.9-inch increments and every two weeks throughout the year unless rainfall inhibited our ability to get into the field.

Additional locations where soil quality is being monitored include: 1) AG-CARES, Lamesa, TX (conventional tillage/continuous cotton; reduced tillage, wheat/fallow/cotton rotation; and, reduced tillage, continuous cotton with rye cover); and, 2) Helms Farm near Halfway, TX (cotton/grain sorghum rotation, cotton/wheat rotation, and cotton following wheat cover all under conventional and reduced tillage). Soil samples are collected to a 24-inch depth (0-6", 6-12", and 12-24" increments) once per year and analyzed for organic C. Aggregate stability is determined using a dry sieving technique and reported as mean weight diameter. More extensive C and N analyses are underway on samples collected in 2020.

RESULTS AND DISCUSSION:

Soil Characteristics

Soil organic C (SOC) was greatest in the no-tillage with cover crops at the 0-6" depth compared to the conventional tillage treatments prior to planting cotton in May 2020 (Table 1). This is likely the result of greater microbial biomass and activity with the cover crop systems compared to conventionally tilled system.

Nitrate-N was significantly greater under conventional tillage at the 0-6" depth compared to the no-tillage with cover crops (Table 1). At the 0-6" depth, pH was significantly decreased with conservation management practices compared to the conventional system. Phosphorus levels were greatest under no-till at the 0-6" depth.

Cover Crop Herbage Mass

Herbage mass was not significantly different between no-till with rye cover and no-till with mixed cover crop treatments in 2016, 2018, or 2020 but differences were determined in 2015, 2017, and 2019 with the rye cover crop treatment producing greater above ground biomass compared to the mixed cover crop treatment in 2015 and 2017, while in 2019 the mixed species cover produced significantly greater biomass compared to the rye (Fig. 1). In 2015, 2016, and 2018 the rye cover crop tended to produce more herbage mass than the mixed cover crop treatment. Cover crops harvested in 2016 were seeded about a month earlier than cover crops harvested in 2015 and 2017, which provided adequate time for crop establishment prior to colder temperatures. Cover crops harvested in 2018 had the longest growing season of the five years but due to limited rainfall during the growing season it produced reduced biomass. In 2019, the mixed species cover produced greater herbage mass compared to rye for the first time in the study. This is most likely due to poor rye germination in winter 2018. Herbage production in 2020 was similar to production rates in 2016 and 2017. This was likely a combination of increased heat units in Spring 2020.

Table 1. Soil pH electrical conductivity (EC), organic C (OC), total N (TN), and extractable macronutrient under conventional tillage (winter fallow), no-till with rye cover, and no-till with mixed cover at depths of 0-6”, 6-12”, and 6-24”. Samples were collected prior to planting cotton in 2018. Means within soil parameter and depth followed by the same letter are not significantly different at *P* < 0.05.

Management Practice	pH	EC	OC	TN	NO_3-N	P	K	Ca	Mg	S
	---	µmhos cm^{-1}	g kg^{-1}	mg kg^{-1}						
				Depth 0-6"						
CT	7.7 a	106 b	2.0 b	328	4.9 a	39 b	264	870	687	5
R-NT	7.2 b	173 a	4.3 a	483	0.6 b	54 a	340	884	658	13
M-NT	7.4 b	70 b	3.5 a	299	0.5 b	58 a	271	851	659	8
				Depth 6-12"						
CT	7.8	124 b	2.1	315	1.9 a	38	233	830	660	5
R-NT	7.6	217 a	1.7	354	0.2 b	25	250	813	693	28
M-NT	7.7	119 b	2.0	275	0.4 b	31	205	727	604	12
				Depth 12-24"						
CT	7.7	366 b	2.9	344	5.9 a	7	245	1244	974	49
R-NT	7.7	510 a	2.8	325	5.2 a	11	221	1258	1059	62
M-NT	7.5	281 c	3.3	374	0.3 b	16	237	1132	991	66

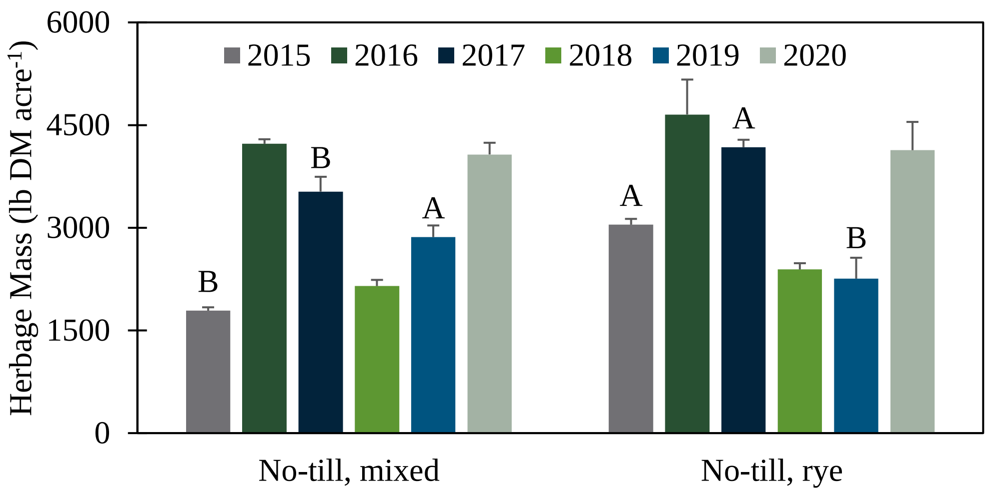


Figure 1. Herbage mass of rye and mixed cover crops harvested in 2015, 2016, 2017, 2018, 2019, and 2020 with the no-till treatments at Lamesa, TX. Bars represent standard error of the

sample mean. Mean values with the same letter within year are not significantly different at $P < 0.05$.

Cotton Lint Yield

Lint yields were greater in the conventional tillage treatment followed by no-till, mixed cover and no-till, rye cover treatments in 2016 and 2017 (Fig. 2). Lint yields were not different between the conventional tillage and no-till with mixed cover crop treatments in any year but were significantly reduced when cotton was planted in terminated rye cover compared to the conventional tillage treatment in 2016 and 2017. In 2019, plots were split from 16 to 8 rows to determine the impact of nematode pressure of cotton lint yield under conservation management practices. The two years of results suggest there is no yield benefit to nematode resistant varieties in conservation management systems (Fig. 3).

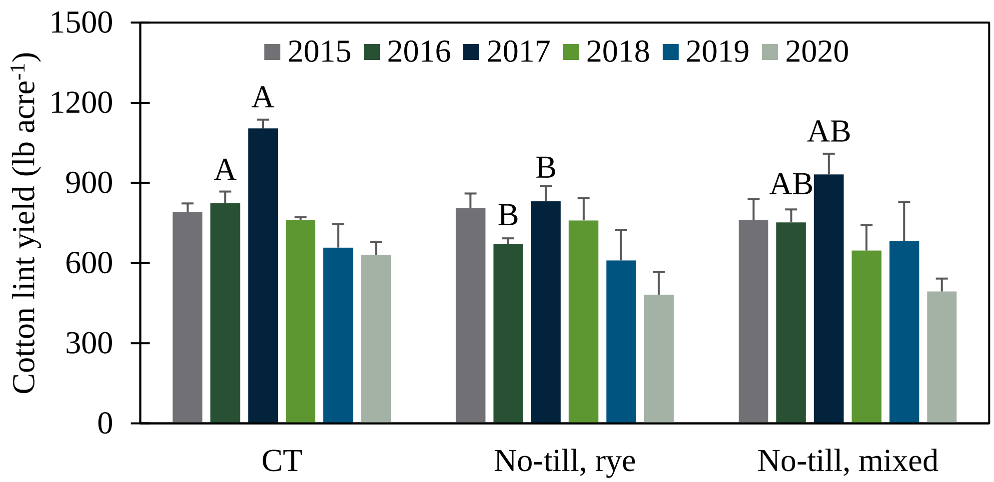


Figure 2. Lint yield with conventional tillage (CT), no-till with rye cover (NT-Rye), and no-till with mixed cover (NT-Mixed) treatments in Lamesa, TX for 2015, 2016, 2017, 2018, 2019, and 2020. Bars represent standard deviation of the sample mean. Mean values within year with the same letter are not significantly different at $P < 0.1$.

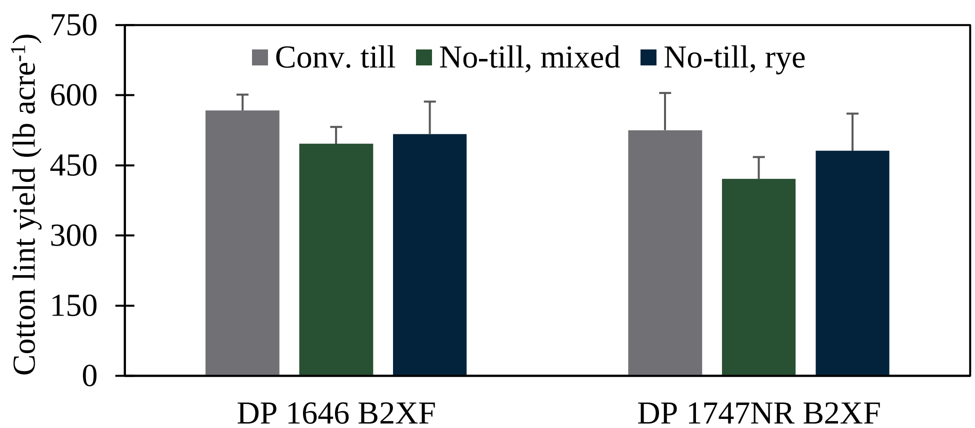


Figure 3. Lint yield between DP 1646 B2XF and DP 1747NR B2XF for with conventional tillage (Conv. till), no-till with rye cover (No-till, rye), and no-till with mixed cover (No-till, mixed)

treatments in Lamesa, TX in 2020. Bars represent standard error of the sample mean. There were no differences between variety or treatments within variety.

Soil Moisture

Profile soil water was greatest in the no-tillage treatments prior to terminating the cover crops in 2018. However, the trend was reversed in 2020 where the conventional tillage system had greater soil water prior to terminating the cover crop than the no-tillage system. In all years, after termination of the cover crops, profile soil water was greatest following the no-tillage cover cropping systems compared to the conventionally grown system. During the cropping season, soil moisture was greatest in the no-till treatments (NT-Mixed and NT-Rye) where greater soil cover provided by cover crop residue likely increased water capture and reduced evaporation losses. Organic matter and reduced tillage can improve soil structure increasing infiltration and percolation while decreasing evaporation from the soil surface. The no-till treatments were better able to respond to precipitation events possibly through increased infiltration and moisture storage. Water infiltration and soil water holding capacity have likely increased over the 22-year period, which enables greater water capture and retention with cover crops.

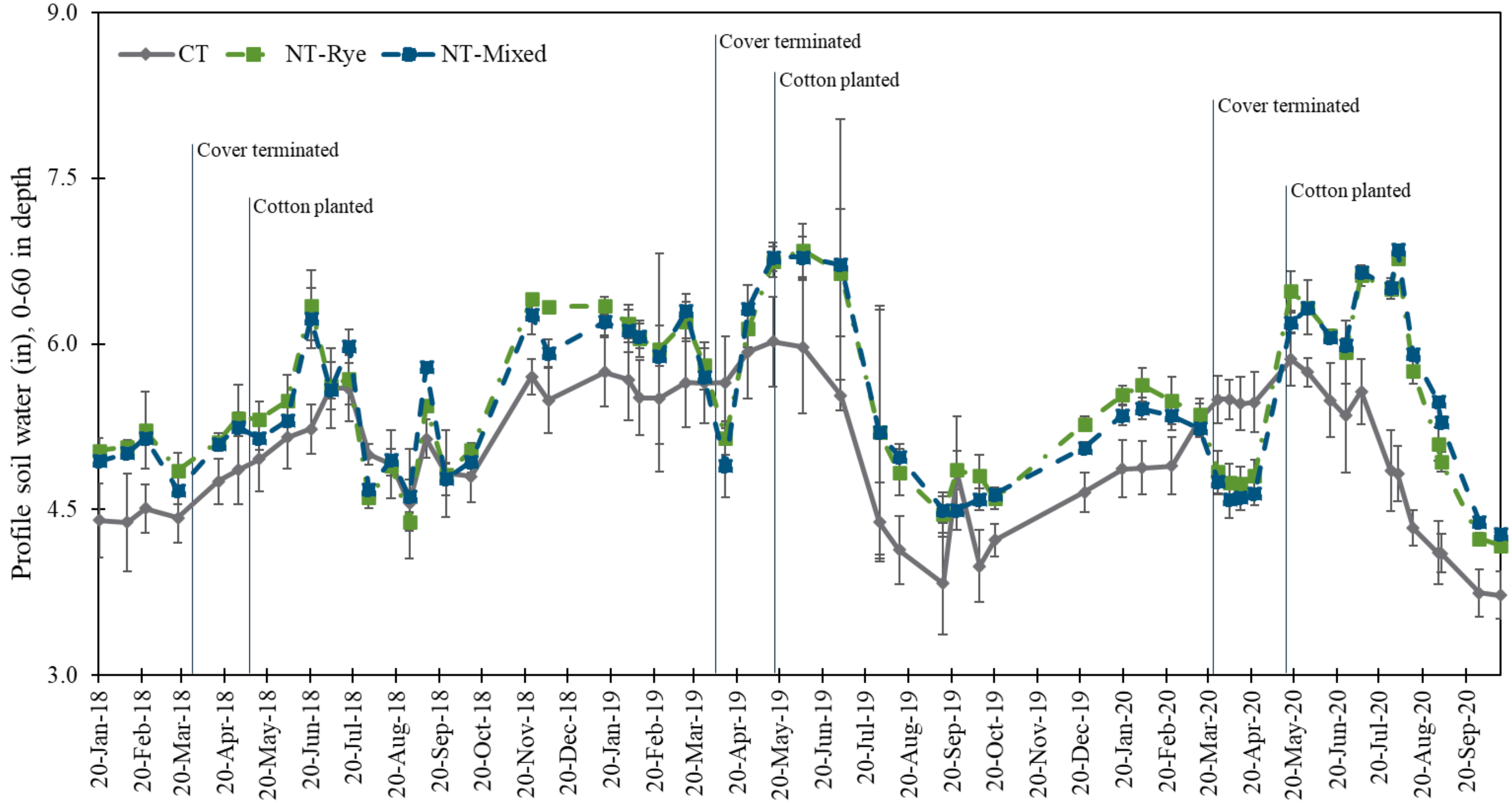


Figure 4. Profile soil water measured from January 2018 to October 2020 to a depth of 60 inches under conventional tillage (CT), no-till with mixed cover (NT-Mixed), and no-till with rye cover (NT-Rye) in Lamesa, TX. Bars represent standard deviation of the sample mean. Cover termination and cotton planting dates have been superimposed for ease of interpretation. Profile soil water data available since project initiation in Spring 2015.

TITLE:

Impact of Cotton Cropping Systems and Nitrogen Management on Cotton Lint Yield at AG-CARES, Lamesa, TX, 2020.

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Dustin Kelley and Amee Bumguardner – Research Associates
Ira Yates and Debrah Dobitz – Technicians

MATERIALS AND METHODS:

Location:	AG-CARES, Lamesa, TX
Plot Size:	4 rows by 40 ft, 40" row spacing
Design:	Randomized complete block with 4 replications
Cotton	
Planting Dates:	16 May 2018; replanted on 7 June 2018; 19 May 2019; and 21 May 2020
Cotton Harvest:	26 November 2018; 31 October 2019; and 23 & 30 October 2020
Variety:	DP 1522 B2XF planted at 53,000 seed/acre
Fertility:	120 lb N/A as 32-0-0 and 113 lb/A 10-34-0 applied through the pivot in 4 applications of 30 lb N/A
Irrigation:	11.6" (2018); 10.8" (2019); and 11.1" (2020)

A trial was initiated in 2018 to evaluate the effect of N fertilizer application time on lint yield of cotton (DP 1522 B2XF) following a rye cover crop, in rotation with wheat, and in a conventional tillage/winter fallow system. The N treatments were replicated within each cropping system, and included: 1) check, AG-CARES practice (described above); 2) additional 30 lb N/A applied at preplant; 3) additional 30 lb N/A applied three weeks after emergence; and, 4) additional 30 lb N/A applied at pinhead square plus 2 weeks. This research serves as preliminary data to help explain yield reductions following a rye cover crop. Cotton in this trial was harvested 17 November 2018 and 31 October 2019. In 2020 cotton following the rye cover crop and cotton in rotation with wheat was harvested on 23 October 2020, while continuous cotton in conventional tillage was harvested on 30 October 2020.

RESULTS AN DISCUSSION:

The significance of the cropping system and N treatment interaction was tested and determined to be significant for yield and nitrogen use efficiency (NUE), and for this reason, N treatments were compared within cropping systems. Lint yield differences were determined within the continuous cotton (winter fallow) and continuous cotton with a rye cover crop in 2018 but only in the continuous cotton, rye cover in 2019 (Tables 3 and 4). Differences in lint yield and NUE have not existed following the wheat-fallow-cotton rotation in any of the three years. In 2020 differences amongst treatments were not determined; however, trends are similar to 2018 and 2019 with greater response to added N applied preplant or shortly after emergence (Table 5). In 2019 an additional 30 lb N/A applied during the growing season in the conventional tillage system did not significantly increase lint yield compared to the farmer practice (check). While in the continuous cotton with a rye cover crop system, applying an additional 30 lb N/A preplant resulted in greater yield compared to the check followed by 30 lb N/A applied 3 weeks after emergence. There was no yield difference between the check and the 30 lb N/A applied at 2 weeks after pinhead square. Similar trends were observed for NUE.

Results indicate that the timing of N application can potentially influence N mineralization/immobilization processes following a cover crop and thereby affecting lint yield and NUE. The lack of response to added N fertilizer in the wheat-fallow-cotton rotation would indicate that N is not limited due to the 11-month fallow period allowing sufficient time to reach the point of net mineralization. However, the yield response to added N applied early in the season following a rye cover would indicate that net immobilization and reduced N availability is likely the reason for the usual yield reduction following a grain cover crop such as rye or wheat in sandy soil of semi-arid environments. The next phase of this research will be to evaluate N uptake by collecting plant samples three times throughout the growing season.

Table 3. Lint yield and nitrogen use efficiency (NUE) from AG-CARES, Lamesa, TX, in 2018 from cropping systems of continuous cotton, continuous cotton with a rye cover, and a Wheat-fallow-cotton rotation. Means within system followed by the same letter are not significantly different at $P < 0.05$.

Nitrogen Management	**Cont. Cotton (CC)**	**CC, Rye Cover**	**Wheat/Cotton**
	Lint yield (lb/A)		
Farm Practice (120 lb N/A)	641 bc	683 c	1101
Preplant (+30 lb N/A)	808 a	830 b	1048
Emerg + 3 wks (+30 lb N/A)	686 b	975 a	1155
PHS + 2 wks (+30 lb N/A)	605 c	786 bc	1072
P -value	0.001	0.009	0.061
	NUE, over check (lb lint/lb N)		
Farm Practice (120 lb N/A)	---	---	---
Preplant (+30 lb N/A)	5.59 a	4.90 b	-1.76
Emerg + 3 wks (+30 lb N/A)	1.52 b	9.73 a	1.81
PHS + 2 wks (+30 lb N/A)	-1.18 c	3.44 b	-0.97
P -value	0.0001	0.009	0.062

Table 4. Lint yield and nitrogen use efficiency (NUE) from AG-CARES, Lamesa, TX, in 2019 from cropping systems of continuous cotton (CC), and continuous cotton with a rye cover. Means within system followed by the same letter are not significantly different at $P < 0.05$.

Nitrogen Management	**Cont. Cotton (CC)**	**CC, Rye Cover**
	--------------Lint yield (lb/A)-------------	
Farm Practice (120 lb N/A)	845	924 b
Preplant (+30 lb N/A)	872	1118 a
Emerg + 3 wks (+30 lb N/A)	790	1001 b
PHS + 2 wks (+30 lb N/A)	776	912 b
P -value	0.168	0.002
	-------NUE, over check (lb lint/lb N)------	
Farm Practice (120 lb N/A)	---	---
Preplant (+30 lb N/A)	0.89	6.47 a
Emerg + 3 wks (+30 lb N/A)	-1.85	2.57 ab
PHS + 2 wks (+30 lb N/A)	-2.3	-0.38 b
P -value	0.402	0.015

Table 5. Lint yield and nitrogen use efficiency (NUE) from AG-CARES, Lamesa, TX, in 2020 from cropping systems of continuous cotton (CC), continuous cotton with a rye cover, and a Wheat-fallow-cotton rotation. Means within system followed by the same letter are not significantly different at $P < 0.05$.

Nitrogen Management	**Cont. Cotton (CC)**	**CC, Rye Cover**	**Wheat/Cotton**
	------------------------Lint yield (lb/A)-----------------------		
Farm Practice (120 lb N/A)	684	811	1166
Preplant (+30 lb N/A)	680	865	1015
Emerg + 3 wks (+30 lb N/A)	668	915	1077
PHS + 2 wks (+30 lb N/A)	669	869	1056
P -value	0.945	0.556	0.656
	----------------NUE, over check (lb lint/lb N)---------------		
Farm Practice (120 lb N/A)	---	---	---
Preplant (+30 lb N/A)	-0.13	1.78	-5.03
Emerg + 3 wks (+30 lb N/A)	0.03	3.44	-2.96
PHS + 2 wks (+30 lb N/A)	-0.51	1.93	-3.67
P -value	0.927	0.662	0.870

TITLE:

Root-knot nematode populations as affected by cropping system, irrigation rate, and variety at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Terry Wheeler – Professor
Jay Hodge, Daniel Campos, Robert Ballesteros – Technicians

MATERIALS AND METHODS:
The cropping systems involved in this project were: continuous cotton with annual cultivation and no cover crop; continuous cotton with a terminated rye cover crop; and cotton rotated with winter wheat/summer fallow. There are three irrigation rates in each of these systems, a base rate (medium) and 30% above (high) or below (low) the base rate. There are five varieties planted in this test. The root-knot nematode susceptible varieties are DP 1845 B3XF, FM 2498GLT, and NG 4777 B2XF. The other two varieties, PHY 350W3FE and ST 4946GLB2 have partial resistance to root-knot nematode. Plots were sampled between September 2-4 following a rain and irrigation event. Root-knot nematode eggs and second-stage juveniles were extracted and summed per 500 cm^3 soil (RK).

RESULTS AND DISCUSSION:
In generally for all three systems, the root-knot nematode susceptible varieties (DP 1845B3XF, FM 2498GLT, and NG 4777B2XF) had higher root-knot nematode densities than the partially resistant varieties (PHY 350W3FE and ST 4946GLB2) (Table 1).
To determine the effect of cropping system on root-knot nematode density, only DP 1845B3XF and ST 4946GLB2 were used in the analysis. For the first time since the beginning of this cropping system experiment (2014), the density of root-knot nematode was not significantly different between cropping systems. The average root-knot nematode density for the continuous cotton with conventional tillage and no cover crop was 2,419 RK; continuous cotton, minimum tillage/terminated rye cover was 1,646 RK, and wheat/fallow/cotton rotation were 1,992 RK. There were more root-knot nematodes in the medium (2,361 RK) and high irrigation rate (3,301 RK) than the low irrigation rate (394 RK). The susceptible variety DP 1845B3XF had higher root-knot nematode densities (3,076 RK) than the partially resistant variety ST 4946GLB2 (962 RK) when averaged across all three cropping systems. The use of partially resistant varieties reduces the density of the root-knot nematode for the following growing season. Normally the winter wheat/summer fallow/cotton rotation reduces the root-knot nematode density as much or more than using resistant varieties. However, in 2020 this was not true, and the root-knot nematode densities were as high in the rotated system as with continuous cotton. It is possible that weeds that grew during the summer after the wheat harvest were responsible for the nematode buildup.

Table 1. Effect of cropping system, variety, and irrigation rate on root-knot nematode density.

Variety	Continuous cotton/ no cover			Continuous cotton/ with Rye cover			Winter wheat/Fallow/ Cotton		
	Low	Med	High	Low	Med	High	Low	Med	High
DP 1845B3XF	473	4,940	6,447	1,547	1,820	4,840	120	3,727	3,767
FM 2498GLT	1,333	9,267	12,073	1,200	5,280	12,573			
NG 4777B2XF	3,327	1,973	13,700	200	260	8,893			
PHY 350W3FE	513	3,400	1,833	0	193	73			
ST 4946GLB2	73	873	1,707	40	33	1,593	40	33	1,593

TITLE:

Exploration and Discovery of the Cotton Microbiome at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Lindsey Slaughter – Assistant Professor
Katie Lewis – Associate Professor
Jyotsna Sharma – Associate Professor

MATERIALS AND METHODS:

In this study, we assessed how variation in management practices such as tillage, irrigation, and rotation strategies influence the cotton soil microbiome. Cotton trials conducted by Wayne Keeling et al. using the same cultivar were selected within established research plots comparing different tillage levels (conventional vs. reduced-tillage), irrigation levels, and crop rotation systems. Management strategies included Conventional tillage Continuous cotton (CT-Cot), no-tillage cotton with rye cover (RT-Cover), and no-tillage cotton with wheat rotation (RT-Rotation). Each replicated treatment plot was further split to receive either high or low irrigation. Experimental tillage, cover crop, and irrigation treatments at each site have been in place for several years (>7) by the time of this study. During early bloom stage in August 2019 and 2020, we collected root-associated soil from three plants per treatment plot. Soil samples used for microbial analyses for each treatment combination were stored field-moist at −80 °C.

We characterized microbial biomass and community structure via ester-linked fatty acid methyl ester (EL-FAME) analysis. In addition, total genomic DNA extracted from each sample was prepared for Illumina Mi-Seq next-generation metagenomic sequencing at the TTU Center for Biotechnology and Genomics. Bacterial taxonomic groups were detected by amplifying and sequencing the V3 and V4 region of the 16S rRNA gene that is specific to bacteria and archaea. To determine the functional capacity of microbial communities in response to treatments, we directly assessed microbial nutrient cycling activities in soil samples via high-throughput assays of extracellular enzymes involved in C, N, and P cycling. Extracellular enzymes that were assayed included: β-1, 4, glucosidase (BG), β-1, 4, N-acetylglucosaminidase (NAG), leucine amino peptidase (LAP), and phosphatase (PHOS).

RESULTS AND DISCUSSION:

Total soil microbial biomass (nmol FAME g^{-1} soil) varied significantly by the interactive effects of vegetation/tillage treatment and irrigation level ($p < 0.05$). In the root-associated soils, microbial biomass was significantly higher in RT-Rotation compared to CT-Cotton regardless of irrigation level, while RT-Cover treatments hosted significantly more microbial biomass than CT-Cotton only under high irrigation (Figure 1).

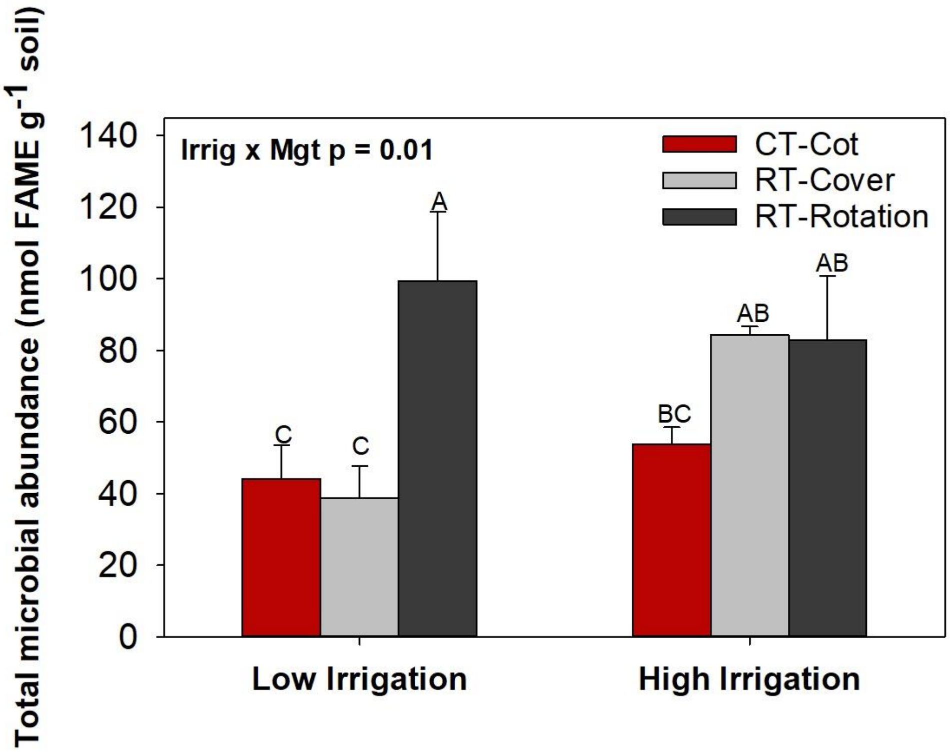


Figure 1: Total soil microbial abundance (nmol FAME g-1 soil) as affected by tillage/vegetation treatment and irrigation level. Capital letters indicate significant differences ($\alpha = 0.05$) between grouped tillage/vegetation treatments within each irrigation level, where bars sharing no common letter are statistically significant. No significant differences were detected between irrigation levels of the same tillage/vegetation treatment.

The abundance of specific microbial groups that are commonly viewed as beneficial plant symbionts such as arbuscular mycorrhizal fungi (AMF) were also influenced by vegetation/tillage treatment and irrigation level. For example, arbuscular mycorrhizal fungi (AMF) biomass at the Lamesa site was significantly increased in the RT-Rotation treatment compared to RT-Cover and CT-Cotton under high irrigation levels (Figure 2). Many studies suggest that AMF aid plant uptake of water and nutrients to help alleviate drought conditions, and are typically more abundant under reduced or no-till conditions with diverse vegetative inputs. Our results suggest that hyphal growth in these semi-arid sandy loam soil textures was severely limited by moisture, such that vegetation/tillage-related (RT-Rotation) increases in AMF abundance were most pronounced under high irrigation levels that allowed greater hyphal growth.

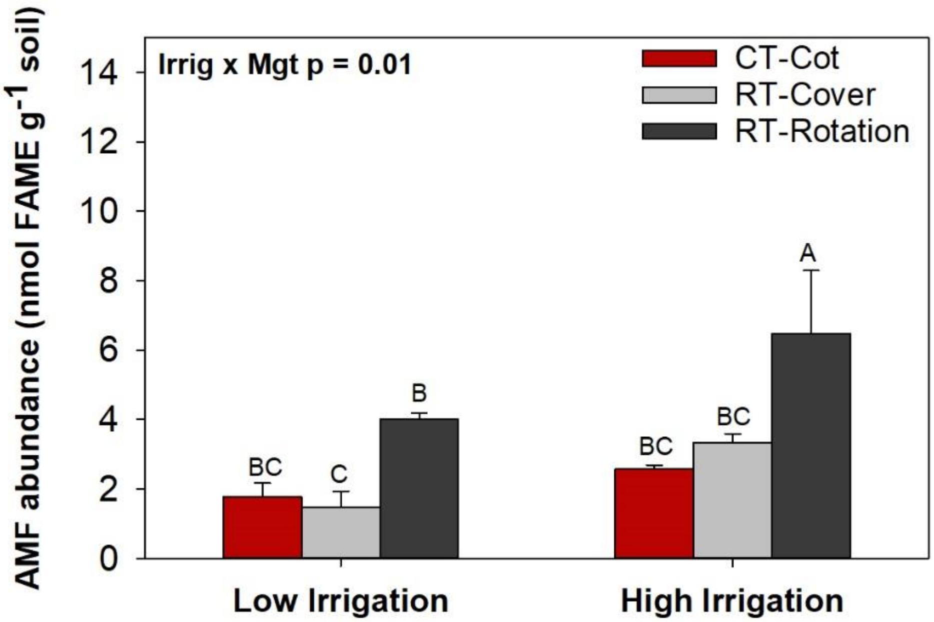


Figure 2: Total arbuscular mycorrhizal fungi (AMF) biomass (nmol FAME g-1 soil) at the in response to the interactive effect of irrigation and vegetation/tillage treatment. Capital letters indicate significant differences (α = 0.05) between grouped tillage/cover treatment within each irrigation level, where bars sharing no common letter are statistically significant. No significant differences were detected between irrigation levels of the same tillage/cover treatment.

Overall, the bacterial and fungal community structure assessed using FAME results was typically more similar between RT-Cover and RT-Rotation plots, with both of these shifting away from that in CT-Cot plots (Figure 3). We found little effect of irrigation on community structure in these sandy loam soils.

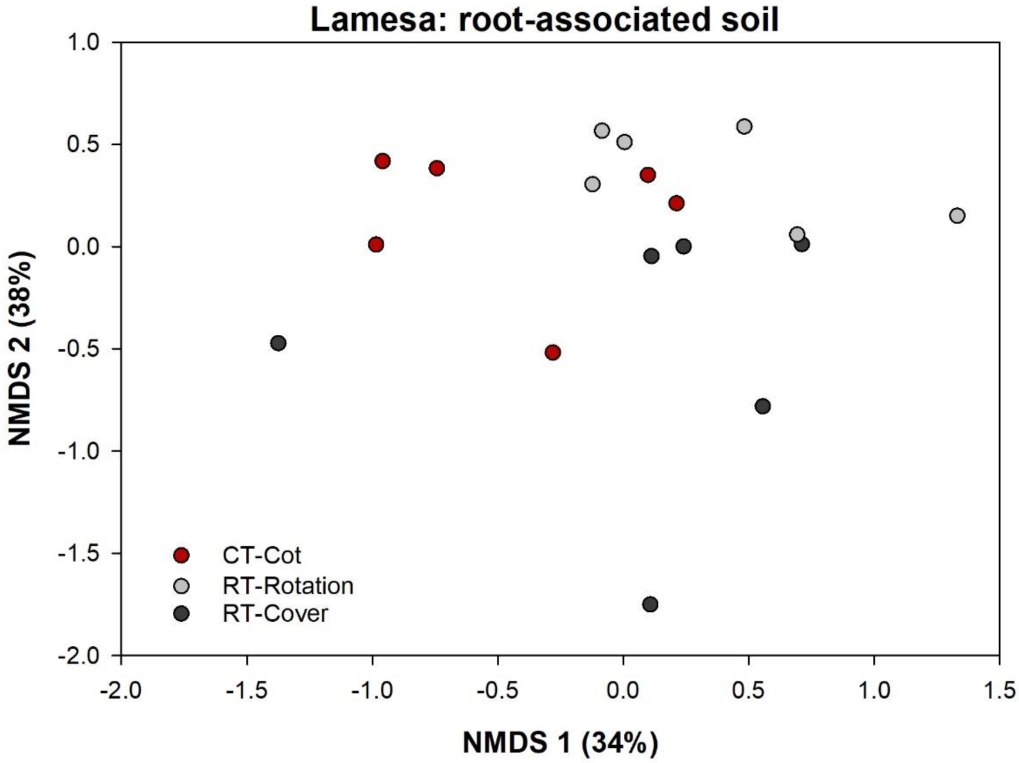


Figure 3: Non-metric multidimensional scaling (NMS) ordinations of microbial community structure using the relative abundance of bacterial and fungal FAME biomarkers in root-associated samples from 2019, grouped by vegetation/tillage treatments. No significant separation in community structure was observed due to irrigation treatments.

From 16S rRNA sequencing we detected an average of 1608 bacterial genome reads across the study treatments. Most of these were classified into 13 bacterial phyla (Figure 4). We found that the relative abundance of certain bacterial phyla follow patterns typically observed in drought-affected soils. Specifically, cotton root-associated soils in Lamesa supported high relative abundances of Actinobacteria and Chloroflexi (typically enriched under drought conditions) and lower relative abundances of Planctomycetes and Bacteroidetes (typically depleted under drought conditions) compared to sequencing results from other semi-arid research sites.

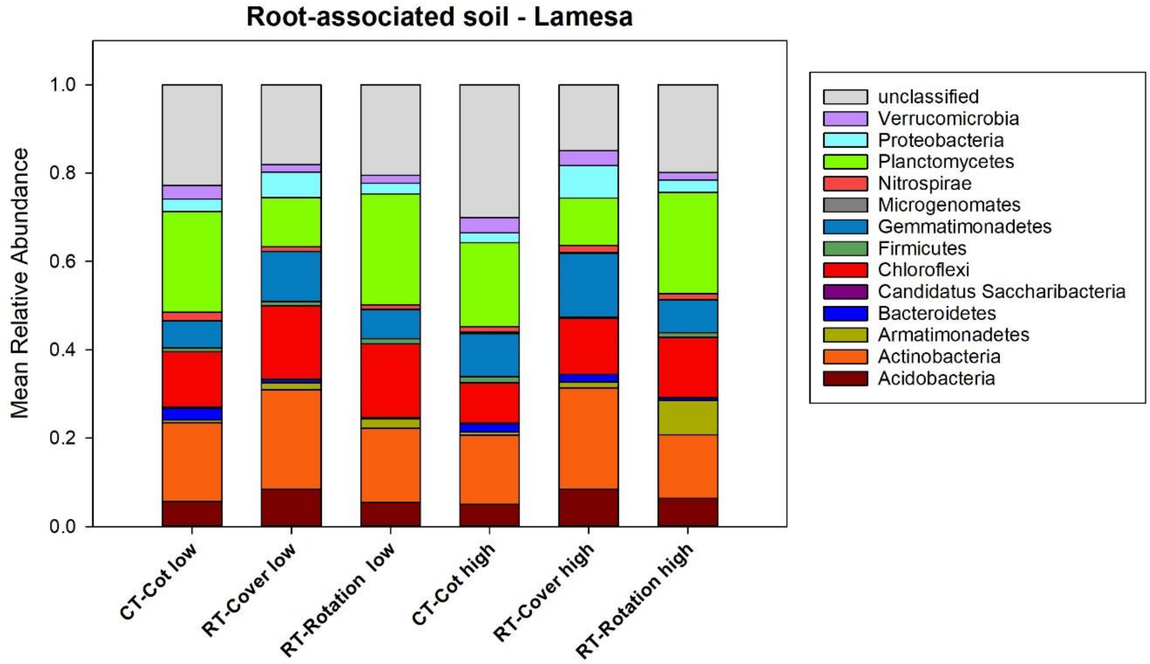


Figure 4: Mean relative abundance of the dominant bacterial phyla (present in greater than 1% of the total bacterial sequencing reads) detected in cotton root-associated soil samples collected in 2019. Values of individual phylum abundance (indicated by section color) within each stacked column indicate the mean of three biological replicates from which DNA was extracted for sequencing, with the total height of the column indicating total abundance of bacterial sequencing reads. Each column represents a different combination of vegetation and tillage management (CT-Cot, RT-Cover, or RT-Rotation) and irrigation level (low or high).

Differences in microbiome composition due to vegetation and tillage management were pronounced in root-associated soils, with some response to irrigation. Each vegetation and tillage combination hosted distinct bacterial phyla compositions, with the reduced tillage/rye cover crop treatment (RT-Cover) typically containing a greater proportion of Actinobacteria and Acidobacteria, Gemmatimonadetes, and Proteobacteria than the CT-Cot or RT-Rotation treatments (Figure 4). Across vegetation and tillage combinations, lower irrigation levels tended to contain greater relative abundances of drought-enriched Actinobacteria and Chloroflexi and lower abundances of drought-depleted Planctomycetes and Bacteroidetes (Figure 4).
Bacterial community structure at the phylum level revealed strong management-related shifts in the root-zone soil microbiome, with minimal clustering of bacterial communities due to irrigation treatments (Figure 5).

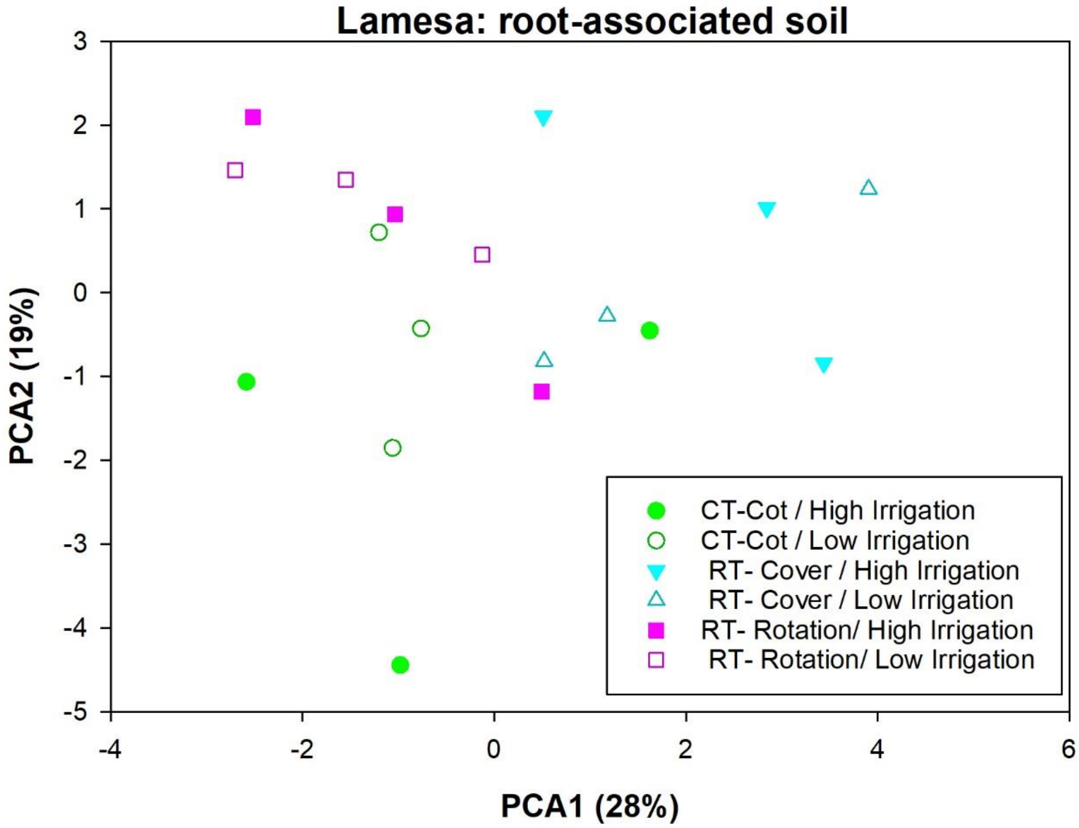


Figure 5: Principle component analysis (PCA) for cotton root-associated soil samples collected in 2019. Symbol shapes indicate different vegetation and tillage management (CT-Cot, RT-Cover, or RT-Rotation). Fill colors indicate the level of irrigation received, where closed shapes indicate high irrigation and open shapes indicate low irrigation.

Soil microbial function assessed via extracellular enzyme activities (BG, NAG, LAP, PHOS) exhibited greater sensitivity to vegetation/tillage treatments than to irrigation level, despite significant interactions between these treatments for three of the four enzymes (Figure 6). Our results suggest that widely-distributed microbial enzymes responsible for C, N, and P cycling (BG, LAP, and PHOS activities, respectively) were sensitive to vegetation and tillage management, where conservation management systems (RT-Cover and RT-Rotation) typically had greater enzyme activities than the CT-Cotton system. This is likely a result of increased plant cover, litter decomposition, and microbial biomass or turnover in these systems. Only NAG activity was insensitive to both vegetation/tillage and irrigation treatments. This is likely because NAG is responsible for degrading microbial residues found in greatest proportion in fungal cell walls, and fungal abundance was low relative to bacterial abundance at this site.

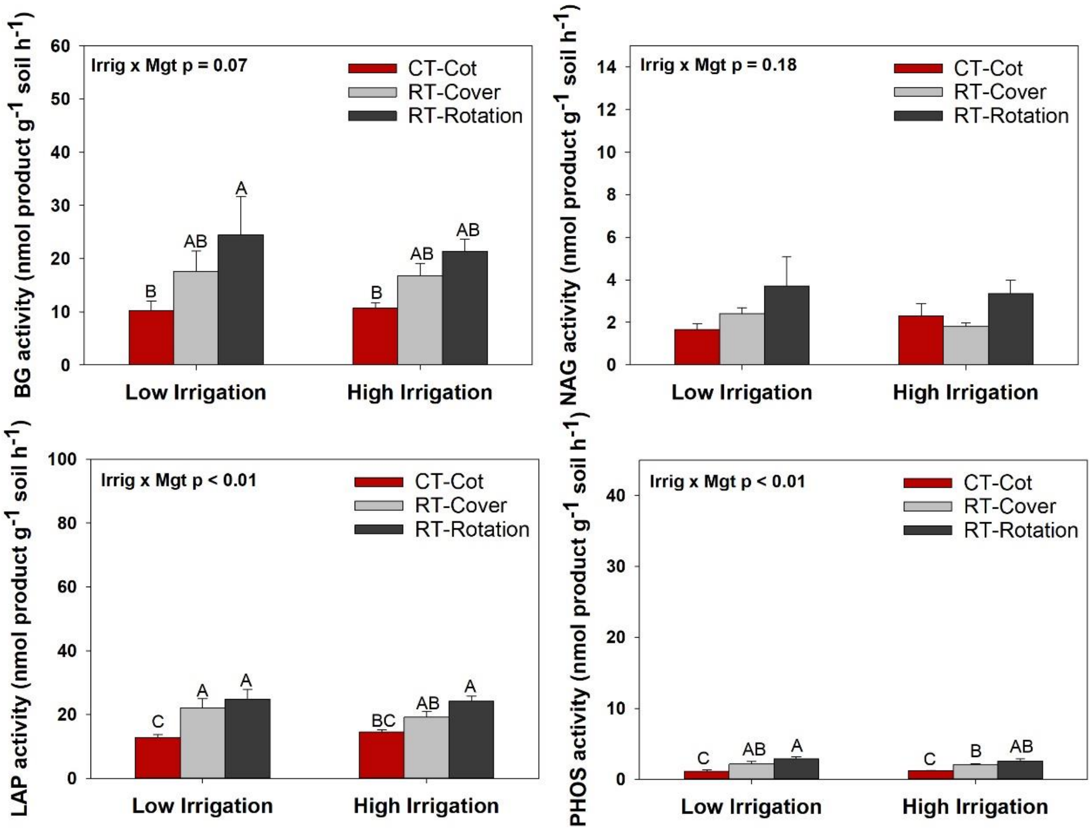


Figure 6: Activity of microbial extracellular enzymes β-1, 4, glucosidase (top left, BG), N-acetyl glucosaminidase (top right, NAG), leucine amino peptidase (bottom left, LAP), and acid/alkaline phosphatase (bottom right, PHOS) in response to the interactive effects of irrigation level and vegetation/tillage management. Within each panel, letters indicate significant differences ($\alpha = 0.05$) between grouped bars, where bars sharing no common letter are statistically significant. No significant differences were detected between irrigation levels of the same vegetation/tillage treatment.

CONCLUSIONS:

Our analysis of root-associated soil microbial community structure and function in 2019 indicate strong, generalizable shifts in microbiome composition and function that are more heavily influenced by vegetation and tillage management than by irrigation level. Bacterial sequencing results show that the soil microbiome in Lamesa is shaped heavily by drought conditions. Analysis of fungal sequencing results from 2019 field soil samples and data collection from the 2020 field soil samples are ongoing. Future analyses will examine relationships between specific soil physical or chemical characteristics (e.g., clay content, pH, soil carbon, water infiltration rate) and shifts in specific microbial taxa between treatments.

TITLE:

Cotton yield response to simulated cotton fleahopper and western tarnished plant bug infestations as influenced by irrigation level and cultivar treatments at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Megha Parajulee – Professor, Faculty Fellow, and Regents Fellow
Abdul Hakeem – Assistant Research Scientist
Dol Dhakal – Research Associate
Wayne Keeling – Professor

MATERIALS AND METHODS:

Plot Size:	4 rows by 300 feet, 3 replications
Planting date:	May 20
Fertilizer in-season:	120-0-0
Cultivars:	PHY 350 W3FE and ST 4946 GLB2

Irrigation:

	Low	High
Preplant	3.9”	3.9”
In Season	5.1”	10.1”
Total	9.0”	14.0”

Herbicides:
Prowl H_2O 3 pt/A+Roundup 24 oz/A – pre-planting (April 21)
Gramoxone 32 oz/A+Caparol 32 oz/A – post-planting (May 21)
Roundup 32 oz/A (June 12)
Roundup 32 oz/A+Dual Magnum 20 oz/A (July 7)

Treatments: Three treatments included c*ontrol*, *manual removal of 100% squares three weeks into squaring (July 15) to time cotton fleahopper susceptible stage, and removal of 20% bolls from the top of the plant to simulate Lygus infestation (August 21)*.

Harvest date: October 13, 2020 (hand-harvested)

Effect of manual removal of early-stage versus late-stage fruits was evaluated on two cotton cultivars, PHY 350 W3FE and ST 4946 GLB2, as influenced by two irrigation (low and high) water levels. The experiment comprised of two water levels, two cultivars, and three simulated fruit loss events [control, pre-flower 100% square loss mimicking the cotton fleahopper injury-induced loss, and 20% small bolls (<3 cm diameter) loss mimicking the Lygus boll injury-induced small fruit abortion at cut-out], replicated three times, totaling 36 plots. The test plots were monitored for the occurrence of any other insects, but no such occurrences were observed during the growing season.

RESULTS AND DISCUSSION:

Combined over two cultivars and three insect simulation treatments, significantly higher lint yield was recorded from ‘high’ water regime (936 lb/acre) compared to that in ‘low’ water regime (725 lb/acre). However, no significant difference in lint yield was recorded between insect simulated (cotton fleahopper or Lygus) and control plots regardless of the water regime (Fig. 1). Although not significant, late season fruit removal mimicking Lygus injury reduced lint yield by about 200 lb/A compared to that for early season square removal at both irrigation regimes (Fig. 1), indicating a greater pest risk at cut-out than pre-flower fruit abortion. While Lygus simulation consistently reduced lint yield across all irrigation water level X cultivar combinations, ST 4946 GLB2 at high water treatment showed the most impact (Fig. 2). Also, the yield performance of ST 4946 GLB2 much more sensitive too water level than PHY 350 W3FE (Fig. 2).

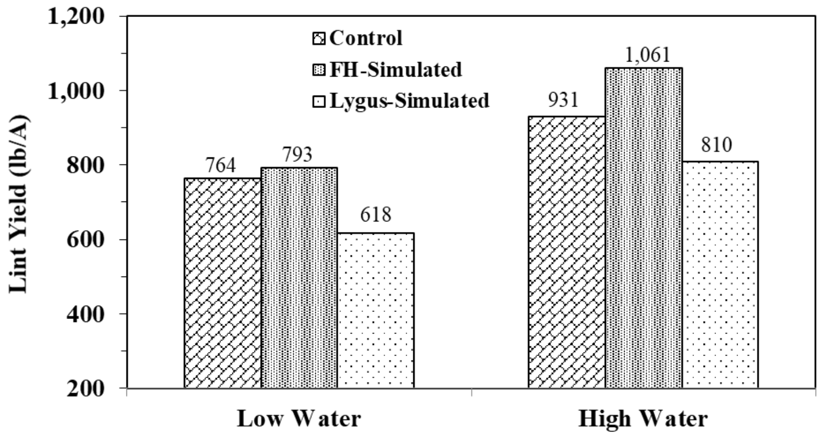


Figure 1. Average lint yield under low and high irrigation regimes following cotton fleahopper and Lygus infestation simulation versus control, Lamesa, Texas, 2020.

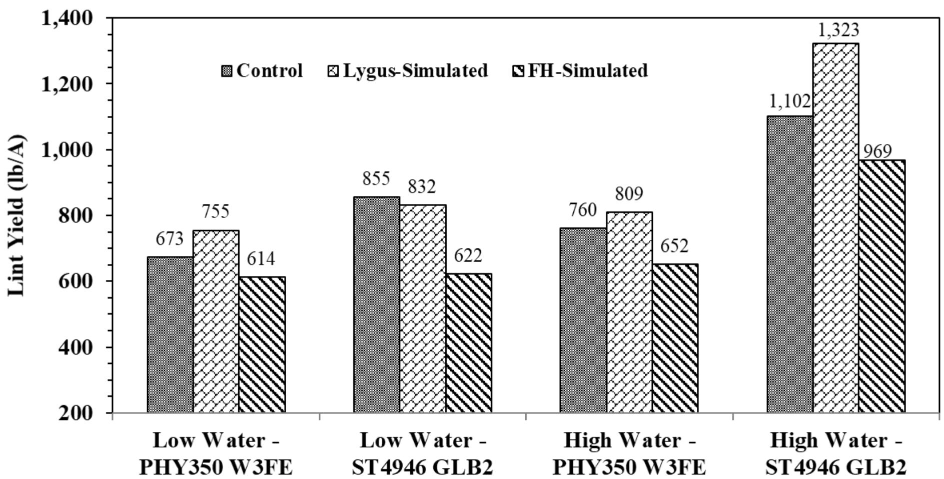


Figure 2. Average lint yield influenced by simulated cotton fleahopper versus *Lygus*-induced fruit removal in two cotton cultivars under low and high irrigation regimes, Lamesa, Texas, 2020. Average values were not statistically significant due to high variation in data.

Averaged over two cotton cultivars, early-season square removal resulted in increased micronaire values at low irrigation regime, reaching to the discount range (Fig. 3). The effect of late-season simulated *Lygus*-induced fruit removal did not significantly influence the lint micronaire. The increased irrigation water level (high water regime) improved micronaire values in cotton cultivar PHY 350 W3FE the micronaire was generally unchanged across cultivar X irrigation treatment combinations (Fig. 4).

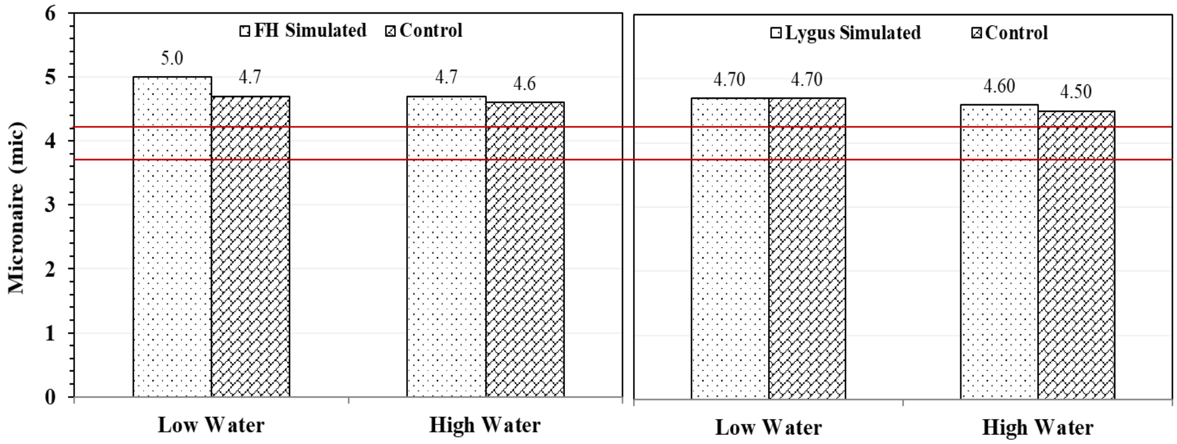


Figure 3. Average micronaire values influenced by early-season simulated cotton fleahopper damage (left) and simulated *Lygus*-induced fruit removal in late season averaged over two cotton cultivars under low and high irrigation regimes, Lamesa, Texas, 2020. The area enclosed by two red lines (3.7-4.2) indicates the microaire values for premium quality cotton lint.

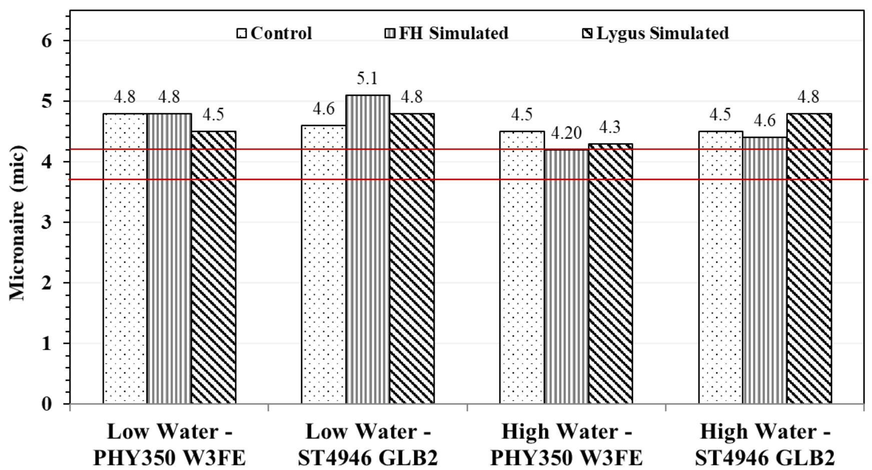


Figure 4. Average micronaire values influenced by early-season simulated cotton fleahopper damage and simulated *Lygus*-induced fruit removal in late season in two cotton cultivars under low and high irrigation regimes, Lamesa, Texas, 2020. The area enclosed by two red lines (3.7-4.2) indicates the micronaire values for premium quality cotton lint.

TITLE:

Effect of cover crops in root knot nematode incidence and soil fertility at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Cecilia Monclova – Professor
Jonathan Shockey, Jennifer Chagoya – Technicians
Jessica Dotray – Graduate student

MATERIALS AND METHODS:

Planting date: May 22

Varieties: DP 1747NR B2XF (root-knot nematode resistant)
NG 4545 B2XF (susceptible check)

Cover crops: Rye
Crimson Clover
Hairy Vetch
Fallow

Cover Crop planted on December 06 and terminated on April 15.

Harvest date: November 4

RESULTS AND DISCUSSION:

Legume cover crops, hairy vetch and crimson clover absorbed less nitrogen from the soil than the cereal rye cover crop (table 1). Both varieties, DP 1747NR B2XF and NG 4545 B2XF on a hairy vetch cover crop had the lowest average stand counts compare to all other treatments. In contrast, hairy vetch in DP 1747NR B2XF had the lowest nematodes counts of 420 juveniles/ 500 cm^3 of soil. The highest yielding treatment was DP 1747NR B2XF in a rye cover crop with an average yield of 790 lint lbs/ acre. In addition, this treatment had the lowest egg counts from all cover crop treatments. The highest turnout is NG 4545 B2XF on crimson clover cover crop with 34.86% (Table 1). Fiber quality per variety is presented on Table 3.

Table 1: Soil fertility per cover crop treatment. Percent of organic matter; nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, and sodium.

		N	P	K	Ca	Mg	S	Na
Cover Crop	%OM	parts per million						
Crimson Clover	0.39	0.75	38.25	303.50	1090.50	609.50	5.67	18.25
Hairy Vetch	0.46	0.50	46.50	337.50	1011.50	611.50	6.25	13.50
Fallow	0.42	3.00	37.75	303.00	820.50	605.00	5.50	13.50
Rye	0.44	0.00	71.50	341.00	1062.75	623.75	5.75	13.50

Table 2: Stand counts, lint yield, nematode and egg counts and turnout per variety and cover crop treatment.

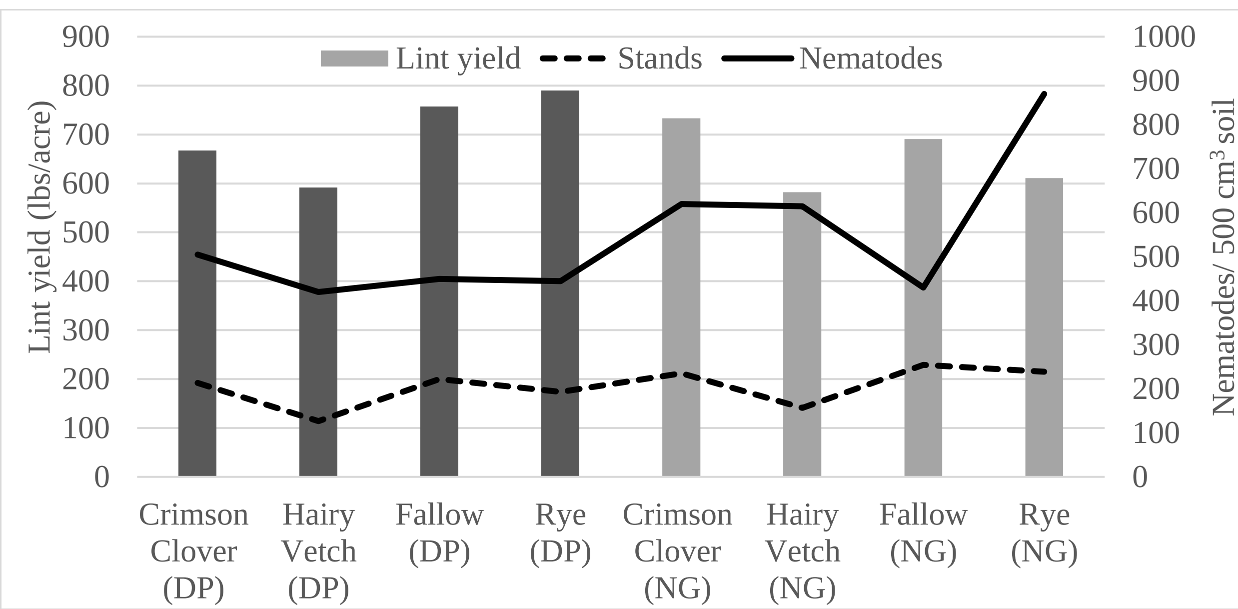
Variety	Cover Crop	Stands	Lint yield	Nematodes	Eggs	Turnout
DP 1747NR B2XF	Crimson Clover	192	667	505	1225	29.16
DP 1747NR B2XF	Hairy Vetch	114	591	420	1235	30.62
DP 1747NR B2XF	Fallow	200	757	450	2040	29.86
DP 1747NR B2XF	Rye	174	790	445	1100	32.80
NG 4545 B2XF	Crimson Clover	212	733	620	1335	34.86
NG 4545 B2XF	Hairy Vetch	141	582	615	1735	30.99
NG 4545 B2XF	Fallow	229	691	430	1540	30.15
NG 4545 B2XF	Rye	215	611	870	1980	30.53
Prob>F		0.002	0.238	0.101	0.893	0.893
MDS (0.05)[1]		53.51	192.32	319.25	1664.00	10.39

[1] Nematodes juveniles or egg counts per 500 cm^3 of soil.

[2] MDS= Minimum significance difference.

Table 3: Fiber quality per variety.

Entry	Mic	Length	Unif.	Strength	Elon.	Rd	+B	Cgrd	Leaf
DP 1747	4.85	1.06	81.1	30.1	5.9	82.2	8.8	11-1	1
NG 4545	4.89	1	80	25.7	5.1	81.2	8.7	21-1	2
DP 1747	4.59	1.05	81.2	28.6	5.8	81	8.9	11-2	2
NG 4545	4.65	1.02	80.1	26.2	5.1	81.6	8.5	11-2	2



Graph 1: Lint yield, stand counts and nematodes per cover crop and variety. DP is Deltapine and NG is NexGen.

TITLE:

Cotton variety performance (continuous cotton conventional tillage) as affected by low-energy precision application (LEPA) irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size:	4 rows by 300-700 feet, 3 replications	
Planting Date:	May 20	
Varieties:	DP 1845 B3XF FM 2498 GLT NG 4777 B2XF PHY 350 W3FE ST 4946 GLB2	
Herbicides:	Trifluralin 24 oz/A-PPI Disc lister	3/20/20
	Roundup 32 oz/A	6/12/20
	Roundup 32 oz/A+Dual Magnum 20 oz/A	7/7/20
Fertilizer:	120-0-0 (base irrigation)	

Irrigation:

	Low	Base	High
Preplant	3.9"	3.9"	3.9"
In Season	5.1"	7.6"	10.1"
Total	9.0"	11.5"	14.0"

Harvest Date: November 17

RESULTS AND DISCUSSION:

Five varieties were compared under three irrigation levels in a continuous cotton, conventional tillage system. This area has been in continuous cotton form more than 30 years. Lack of in-season rainfall and limited irrigation capacity resulted in below average yields. When averaged across varieties, yields ranged from 427 to 741 lbs lint/A as irrigation level increased. When averaged across irrigation levels, highest yields were produced with ST 4946 GLB2. Loan values were reduced with the low irrigation treatment, while base and high irrigation loan values were similar. When averaged across irrigation levels, highest loan values were achieved with DP 1845 B3XF, FM 2498 GLT, and ST 4946 GLB2. High gross revenues ($/A) were achieved with ST 4946 GLB2.

Table 1. Effect of varieties and irrigation level on cotton lint yield (lbs./A), loan value (¢/lb.), and gross revenue ($/A) in a conventional tillage system.

	In-season Irrigation Levels (inches)			
Variety	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
		------------------ lbs/A------------------		
DP 1845 B3XF	326	458	559	**448 C**
FM 2498 GLT	476	613	765	**618 B**
NG 4777 B2XF	315	362	572	**417 C**
PHY 350 W3FE	483	563	833	**626 B**
ST 4946 GLB2	537	691	974	**734 A**
Average	**427 C**	**537 B**	**741 A**	**--**
		------------------ ¢/lb------------------		
DP 1845 B3XF	53.08	55.80	53.88	**54.25 A**
FM 2498 GLT	52.68	54.05	55.25	**53.99 AB**
NG 4777 B2XF	45.60	50.98	53.28	**49.95 C**
PHY 350 W3FE	53.15	51.75	53.60	**52.83 B**
ST 4946 GLB2	52.60	54.65	54.78	**54.01 AB**
Average	**51.42 B**	**53.45 A**	**54.16 A**	**--**
		------------------ $/A------------------		
DP 1845 B3XF	173	256	228	**219 C**
FM 2498 GLT	252	381	423	**352 AB**
NG 4777 B2XF	144	185	305	**211 C**
PHY 350 W3FE	257	294	447	**333 B**
ST 4946 GLB2	284	379	533	**398 A**
Average	**222 C**	**299 B**	**387 A**	**--**

TITLE:

Cotton variety performance (continuous cotton terminated rye cover) as affected by low-energy precision application (LEPA) irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size: 4 rows by 300-700 feet, 3 replications

Planting Date: May 20

Varieties:
DP 1845 B3XF
FM 2498 GLT
NG 4777 B2XF
PHY 350 W3FE
ST 4946 GLB2

Herbicides:

Prowl H_2O 3 pt/A+Roundup 24 oz/A	4/21/20
Gramoxone 32 oz/A+Caparol 32 oz/A	5/21/20
Roundup 32 oz/A	6/12/20
Roundup 32 oz/A+Dual Magnum 20 oz/A	7/7/20

Fertilizer: 120-0-0

Irrigation:

	Low	Base	High
Preplant	3.9”	3.9”	3.9”
In Season	5.1”	7.6”	10.1”
Total	9.0”	11.5”	14.0”

Harvest Date: November 16

RESULTS AND DISCUSSION:

Five varieties were compared under three levels of irrigation in a continuous cotton/terminated rye cover system. When averaged across varieties, yields ranged from 423 to 730 lbs lint/A as irrigation levels increased. When averaged across irrigation levels, highest yields were produced with ST 4946 GLB2. Loan values increased with irrigation level and where highest with DP 1845 B2XF. Highest gross revenues ($/A) were produced with FM 2498 GLT and ST 4946 GLB2 (Table 1).

Table 1. Effect of varieties and irrigation level on cotton lint yield (lbs./A), loan value (¢/lb.), and gross revenue ($/A) under continuous cotton terminated rye cover.

	In-season Irrigation Levels (inches)			
Variety	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
		------------------ lbs/A------------------		
DP 1845 B3XF	331	499	611	**480 C**
FM 2498 GLT	474	680	804	**653 AB**
NG 4777 B2XF	300	432	578	**437 C**
PHY 350 W3FE	482	535	775	**597 B**
ST 4946 GLB2	529	695	884	**702 A**
Average	**423 C**	**568 B**	**730 A**	**--**
		------------------ ¢/lb------------------		
DP 1845 B3XF	55.48	56.53	55.43	**55.81 A**
FM 2498 GLT	51.18	53.20	54.03	**52.80 B**
NG 4777 B2XF	45.75	47.53	50.98	**48.08 D**
PHY 350 W3FE	46.03	51.73	53.00	**50.25 C**
ST 4946 GLB2	51.10	53.28	54.63	**53.00 B**
Average	**49.91 C**	**52.45 B**	**53.61 A**	**--**
		------------------ $/A------------------		
DP 1845 B3XF	184	282	284	**250 C**
FM 2498 GLT	243	363	434	**347 A**
NG 4777 B2XF	138	206	294	**213 C**
PHY 350 W3FE	222	277	410	**303 B**
ST 4946 GLB2	270	371	482	**374 A**
Average	**211 C**	**300 B**	**381 A**	**--**

TITLE:

Cotton variety performance (wheat-cotton rotation) as affected by low-energy precision application (LEPA) irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size:	4 rows by 300-700 feet, 3 replications	
Planting Date:	May 20	
Varieties:	DP 1845 B3XF ST 4946 GLB2	
Herbicides:	Prowl H_2O 3 pt/A+Roundup 24 oz/A	4/20/20
	Gramoxone 32 oz/A+Caparol 32 oz/A	5/21/20
	Roundup 32 oz/A	6/12/20
	Roundup 32 oz/A+Dual Magnum 20 oz/A	7//7/20
Fertilizer:	120-0-0	

Irrigation:

	Low	Base	High
Preplant	3.9”	3.9”	3.9”
In Season	5.1”	7.6”	10.1”
Total	9.0”	11.5”	14.0”

Harvest Date: November 16

RESULTS AND DISCUSSION:

Two varieties were compared under three irrigation levels in a wheat/cotton rotation, which has been in-place for seven years. Wheat was harvested in June 2019 and cotton was planted in standing stubble in May 2020. When averaged across varieties, yields ranged from 517 to 907 lbs/A as irrigation level increased. When averaged across irrigation levels, higher yields were produced with ST 4946 GLB2. Higher loan values were produced with DP 1845 B3XF, but higher gross revenues ($/A) resulted with ST 4946 GLB2 (Table 1).

Comparisons made on the last four years (2017-2020) showed yields averaged across irrigation levels were 878 lbs/A for continuous cotton/conventional tillage, 782 lbs/A for terminated rye cover, and 1004 lbs/A for the wheat-cotton rotation (Table 2). Compared to conventional tillage, yields were 11% lower for the terminated rye cover system and 14% higher with the wheat-cotton rotation.

Table 1. Effect of varieties and irrigation level on cotton lint yield (lbs./A), loan value (¢/lb.), and gross revenue ($/A) in a wheat cotton rotation in 2020.

	In-season Irrigation Levels (inches)			
Variety	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
		------------------ lbs/A------------------		
DP 1845 B3XF	468	646	722	**612 B**
ST 4946 GLB2	565	762	1091	**806 A**
Average	**517 C**	**704 B**	**907 A**	**--**
		------------------ ¢/lbs------------------		
DP 1845 B3XF	53.80	56.43	56.08	**55.43 A**
ST 4946 GLB2	51.68	52.58	53.43	**52.56 B**
Average	**52.74 B**	**54.50 A**	**54.75 A**	**--**
		------------------ $/A------------------		
DP 1845 B3XF	252	364	405	**341 B**
ST 4946 GLB2	292	402	583	**426 A**
Average	**272 C**	**383 B**	**494 A**	**--**

Table 2. Effect of cropping system and irrigation level over a four-year period (2017-2020) on cotton lint yield averaged across five varieties.

	In-season Irrigation Levels			
Variety	**Low (-33%)**	**Base**	**High (+33%)**	**Average**
		------------------ lbs/A------------------		
Continuous Cotton-Conv Tillage (>30 yr)	668	884	1083	**878**
Continuous Cotton-Rye Cover	604	780	961	**782 (-11%)**
Wheat-Cotton rotation	778	998	1237	**1004 (+14%)**

TITLE:

An economic analysis evaluating terminated rye cover crop with continuous cotton vs wheat/cotton rotation at AG-CARES, Lamesa, TX, 2014-2019

AUTHORS:
Clay Braden – Research Assistant
Donna McCallister – Assistant Professor
Will Keeling – Extension Risk Management

MATERIALS AND METHODS:
An economic analysis was performed using the management data from the field trials conducted at the AG-CARES center in Lamesa, TX. Enterprise budgets were created for the continuous cotton with terminated rye cover and the wheat-cotton rotational system to compare profitability from 2014 to 2019. Revenue was calculated using the loan value multiplied by the average cotton lint yield. AgriLife custom rate surveys were used to estimate costs for management practices. Gross margin (revenue less variable expenses) was used as a measure of profitability.

RESULTS AND DISCUSSION:
The wheat-cotton rotation produced a larger revenue stream than the continuous cotton cropping system from 2014-2019. (Figure 1). Throughout the six-year period, the wheat-cotton rotation had produced an average gross revenue of $528.29/acre while the continuous cotton system averaged $380.62/acre resulting in a $147.67 difference. Soil health and other benefits from the rotation are likely to be the cause of this difference in revenue.

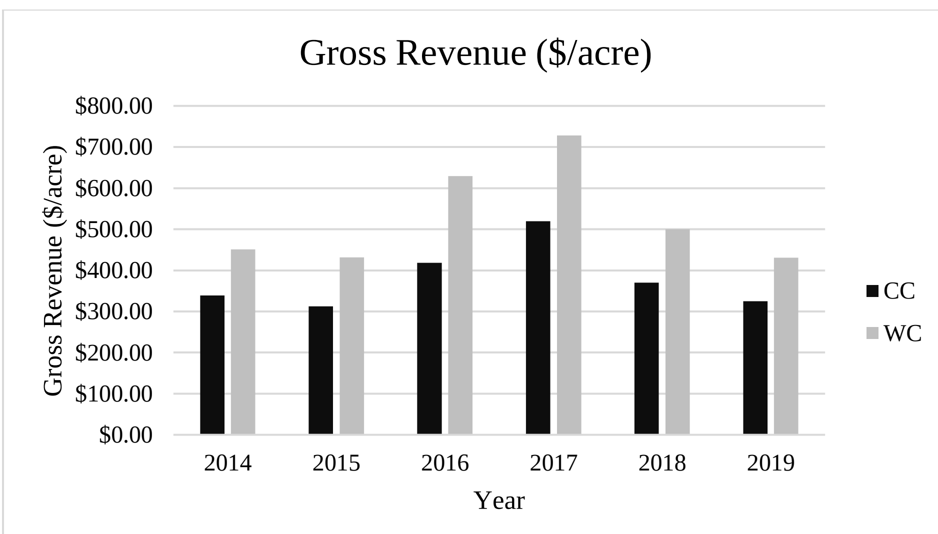


Figure 1. Gross revenue comparison between continuous cotton with terminated rye cover crop (CC) and the wheat-cotton rotation (WC).

Figure 2 depicts the differences in variable cost between the two cropping systems. In every year but 2016, the continuous cotton with terminated rye cover incurred higher variable costs due to increased field operations. Even though the wheat-cotton rotation had higher average variable cost in 2016 the gross margin was still greater due to the increase in yield from crop rotation. The continuous cotton system with terminated rye cover had an average variable cost of $659.52/acre and the wheat-cotton rotation averaged $626.80/acre.

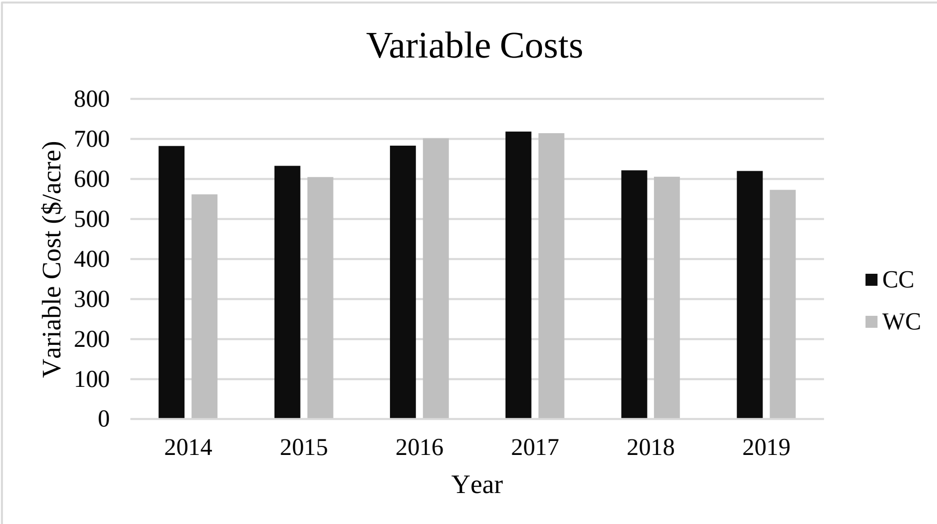


Figure 2. Variable cost comparison between continuous cotton with terminated rye cover crop (CC) and the wheat-cotton rotation (WC)

Average gross margin for the continuous cotton system with terminated rye cover was -$165/acre whereas the wheat-cotton rotation averaged $36/acre (Figure 3) The $201 difference between the two systems can be attributed to substantially less field operations and higher yields. This analysis evaluated the economic results from cotton in each system and did not include net returns from the wheat component, due to the marginal productivity of the wheat.

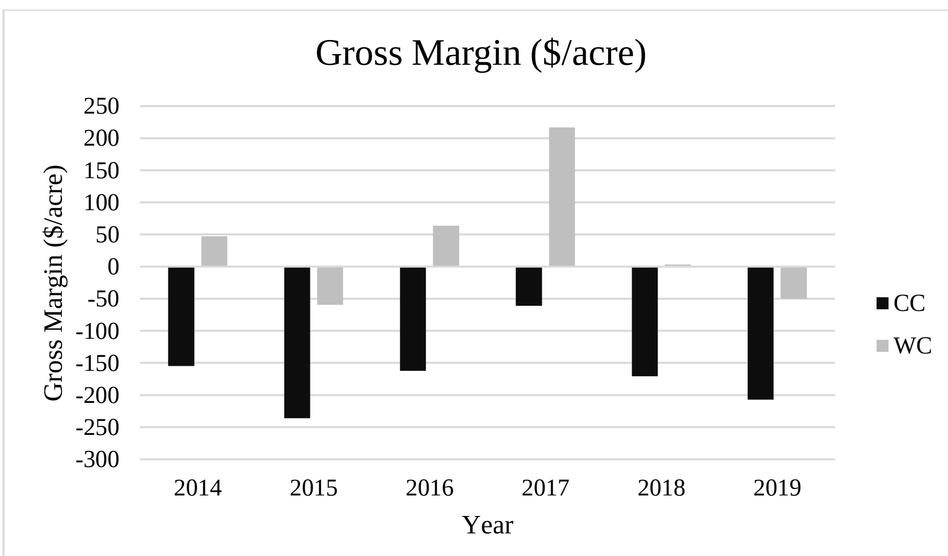


Figure 3. Gross margin comparison between continuous cotton with terminated rye cover crop (CC) and the wheat-cotton rotation (WC)

TITLE:

Performance of Americot varieties as affected by drip irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size: 4 rows by 35 feet, 4 replications

Planting Date: May 18

Varieties:

AMX19A014B3XF	NG 3406 B2XF
AMX19A015B3XF	NG 3930 B3XF
AMX19A016B3XF	NG 4098 B3XF
AMX19A018B3XF	NG 4936 B3XF
AMX19B001B3XF	NG 5711 B3XF
AMX19B003B3XF	DP 1845 B3XF

Herbicides:

Trifluralin 20 oz/A-PPI Springtooth	2/15/20
Gramoxone 32oz/A	5/6/20
Roundup 32oz/A	6/12/20
Roundup+Liberty 32 oz/A+Dual Magnum 20 oz/A	7/7/20

Fertilizer: 120-0-0

Irrigation:

	Low	Base	High
Preplant	6.0”	6.0”	6.0”
In Season	6.0”	9.2”	11.8”
Total	12.0”	15.2”	17.8”

Harvest Date: October 20

RESULTS AND DISCUSSION:

Six Americot experimental varieties and six NexGen commercial varieties were compared under three levels of subsurface drip irrigation. Plots were planted on May 18 and excellent emergence and stand establishment were achieved. When averaged across varieties, yields ranged from 708 to 1175 lbs lint/A with increasing irrigation levels (Table 1). When averaged across irrigation levels, the highest yielding varieties included NG 4098 B3XF, NG 3930 B3XF, NG 3406 B2XF, and three of the experimental varieties. Loan values trended higher with increased irrigation. Highest loan values were achieved with DP 1845 B3XF, NG 4098 B3XF, NG 4936 B3XF, NG 5711 B3XF, and two of the experimentals. Highest gross revenue per acre (yield X loan price) were achieved with NG 4098 B3XF, NG 3930 B3XF, DP 1845 B3XF, and one of the experimentals. Due to lack of rainfall and limited irrigation capacity, overall yields were lower than in previous years.

Table 1. Effect of variety and irrigation level on cotton lint yield (lbs/A), loan value (¢/lb), and gross revenue ($/A).

	In-season Irrigation Levels (inches)			
Variety	**Low (6.0)**	**Base (9.2)**	**High (11.8)**	**Average**
	------------------ lbs/A------------------			
AMX19A014B3XF	634	981	1187	**934 CDEF**
AMX19A015B3XF	633	930	1117	**893 EF**
AMX19A016B3XF	761	966	1306	**1011 ABC**
AMX19A018B3XF	786	1092	1267	**1048 A**
AMX19B001B3XF	696	943	1116	**918 DEF**
AMX19B003B3XF	691	1056	1232	**993 ABCD**
NG 3406 B2XF	702	1006	1215	**974 ABCD**
NG 3930 B3XF	777	1073	1211	**1020 AB**
NG 4098 B3XF	788	1024	1275	**1029 AB**
NG 4936 B3XF	650	957	1018	**875 F**
NG 5711 B3XF	631	975	1049	**885 F**
DP 1845 B3XF	741	1051	1105	**966 BCDE**
Average	**708 C**	**1004 B**	**1175 A**	**--**
	------------------ ¢/lb------------------			
AMX19A014B3XF	55.60	56.00	56.50	**56.03 D**
AMX19A015B3XF	56.60	56.70	56.70	**56.67 A**
AMX19A016B3XF	54.30	56.60	55.70	**55.53 E**
AMX19A018B3XF	56.20	56.20	56.60	**56.33 BCD**
AMX19B001B3XF	56.40	56.50	56.60	**56.50 ABC**
AMX19B003B3XF	53.30	53.80	54.50	**53.87 F**
NG 3406 B2XF	54.60	55.70	55.90	**55.40 E**
NG 3930 B3XF	56.10	56.10	56.50	**56.23 CD**
NG 4098 B3XF	56.70	56.60	56.60	**56.63 AB**
NG 4936 B3XF	56.20	56.40	56.60	**56.40 ABC**
NG 5711 B3XF	56.10	56.70	56.80	**56.53 ABC**
DP 1845 B3XF	56.70	56.70	56.70	**56.70 A**
Average	**55.73 C**	**56.17 B**	**56.31 A**	**--**
	------------------ $/A------------------			
AMX19A014B3XF	352	549	671	**524 DEFG**
AMX19A015B3XF	358	527	633	**506 EFG**
AMX19A016B3XF	413	547	727	**562 ABCD**
AMX19A018B3XF	442	614	717	**591 A**
AMX19B001B3XF	393	533	632	**519 DEFG**
AMX19B003B3XF	369	568	671	**536 CDEFG**
NG 3406 B2XF	383	560	679	**541 BCDEF**
NG 3930 B3XF	436	602	684	**574 ABC**
NG 4098 B3XF	447	579	721	**582 AB**
NG 4936 B3XF	365	540	576	**494 G**
NG 5711 B3XF	354	553	596	**501 FG**
DP 1845 B3XF	420	596	626	**548 ABCDE**
Average	**394 C**	**564 B**	**661 A**	**--**

TITLE

Irrigated Replicated Agronomic Cotton Evaluation (RACE) Trial at AG-CARES, Lamesa, TX, 2020

AUTHORS

Murilo Maeda – Cotton Specialist
Wayne Keeling – Systems Agronomist
Cecil Haralson – Ag-CARES Farm Manager

MATERIALS AND METHODS:

Plot Size: 4 rows by 850 feet, 3 replications

Planting Date: May 21, 2020

Varieties:

ARMOR 9210 B3XF	FM 2398 GLTP
ARMOR 9598 B3XF	NG 3930 B3XF
DP 1820B 3XF	NG 4098 B3XF
DP 1845 B3XF	NG 4777 B2XF
FM 1621 GL	NG 4792 XF
FM 2202 GL	ST 5600 B2XF

Herbicides: Trifluralin 24 oz/A – Pre-plant
Caparol 26 oz/A + Gramoxone 32 oz/A – Pre-Emergence

Fertilizer in-season: 90 lb/A (N) 32-0-0 (+ 30lb/A pre-plant)

Harvest: October 23, 2020

RESULTS AND DISCUSSION:

Twelve varieties from 5 different brands (Deltapine, Fibermax, NexGen, Stoneville, and Winfield United) were tested under subsurface drip. The trial was planted with adequate soil moisture and good environmental conditions (3.3 mph, 94 F, 23% RH, 78 F soil). Plots were seeded at 51,000 seeds/A and the mean final plant population for the test was 25,600 plants/A (approximately 50% of the total seeding rate). Average lint yield ranged from 707 to 945 lb/A for DP1845 B3XF and DP 1820 B3XF, respectively. Average loan value for the test was $55 cents/lb and ranged from $53 to $56 cents/lb for ST 5600 B2XF and NG 3930 B2XF, respectively. Ultimately, lint value averaged across three replications ranged from as low as $393/A to as high as $524/A for DP1845 B3XF and DP 1820 B3XF, respectively. The mean lint value for the test was $463/A (Table 1).

Table 1. Lint yield and fiber quality parameters of twelve cultivars tested under irrigated conditions in 2020 at Ag-CARES in Lamesa, TX. Ranked by high to low lint yield.

Variety	Lint Yield (lb/A)	Turnout (%)	MIC	Length (in.)	Uniformity (%)	Strength (g/tex)	Color	Leaf	Loan Value (cents/lb)	Lint Value ($/A)
DP 1820 B3XF	945	35	4.7	1.12	81.3	30.8	11, 11, 21	1, 1, 4	55.5	524
ARMOR 9210 B3XF	931	36	4.6	1.15	81.0	31.7	11, 11, 11	1, 1, 2	56.2	523
ST 5600 B2XF	906	35	5.0	1.06	81.0	29.9	11, 11, 21	1, 1, 2	52.8	476
NG 4792 XF	882	34	4.7	1.10	81.0	30.5	11, 11, 11	2, 1, 2	54.5	481
NG 3930 B3XF	872	37	4.7	1.13	80.5	31.9	11, 11, 11	1, 1, 1	56.5	492
NG 4777 B2XF	865	36	4.8	1.11	80.9	30.7	11, 11, 21	1, 2, 2	54.2	469
NG 4098 B3XF	862	36	4.8	1.11	80.5	31.0	21, 11, 21	1, 2, 2	56.1	483
FM 2398 GLTP	856	37	4.7	1.07	81.4	30.4	11, 11, 21	1, 1, 1	53.8	460
ARMOR 9598 B3XF	793	33	4.6	1.12	80.5	31.6	11, 11, 21	2, 1, 2	55.4	440
FM 1621 GL	756	35	4.8	1.09	80.5	30.6	21, 21, 21	2, 3, 1	55.1	416
FM 2202 GL	739	35	4.8	1.08	80.9	31.0	11, 11, 21	1, 1, 3	54.1	400
DP 1845 B3XF	707	34	4.5	1.12	80.3	31.8	11, 11, 11	1, 1, 1	55.5	393
Mean	843	35	4.7	1.11	80.8	31.0			55	463
STDEV	114	2.1	0.3	0.03	0.6	1.7			1.8	64
CV, %	14	6.1	6.8	3.1	0.7	5.6			3.2	14
p-value	0.1518	0.4900	0.9393	0.0226	0.4142	0.9714			0.2439	0.1483
LSD	n.s.	n.s.	n.s.	0.02	n.s.	n.s.			n.s.	n.s.

Loan value calculated using the Cotton Incorporated Upland Loan Calculator Program ($52.0 cents/lb base for 41 color, 4 leaf, 34 staple)
STDEV (standard deviation). CV (coefficient of variation). LSD (least significant difference, p <0.05).
https://www.cottoninc.com/cotton-production/ag-resources/cotton-farming-decision-aids/2020-upland-cotton-loan-calculator/

TITLE:

Performance of FiberMax and Stoneville varieties as affected by subsurface drip irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size: 4 rows by 35 feet, 3 replications

Planting Date: May 26

Varieties:

FM 1730 GLTP	FM 2202 GL
ST 5091 B3XF	FM 2398 GLTP
BX 2192 B3XF	ST 4480 B3XF
ST 4993 B3XF	ST 4990 B3XF
BX 2194 B3XF	ST 5600 B2XF
FM 1621 GL	ST 5707 B2XF

Herbicides:

Trifluralin 20 oz/A-PPI Springtooth	2/15/20
Gramoxone 32oz/A	5/6/20
Roundup 32oz/A	6/12/20
Roundup+Liberty 32 oz/A+Dual Magnum 20 oz/A	7/7/20

Fertilizer: 120-0-0

Irrigation:

	Dry	Low	Base	High
Preplant	3.9”	6.0”	6.0”	6.0”
In Season	0.0”	6.0”	9.2”	11.8”
Total	3.9”	12.0”	15.2”	17.8”

Harvest Date: October 21

RESULTS AND DISCUSSION:

Twelve FiberMax and Stoneville commercial varieties and experimentals were compared under three levels of subsurface drip irrigation and in a dryland field. Dryland yields ranged from 159 to 264 lbs/A and averaged 208 lbs/A. Irrigation was applied at planting to ensure good stand establishment, but no additional in-season irrigation was applied to these dryland plots. When averaged across varieties, lint yields increased from 591 to 1220 lbs/A with increased irrigation. When averaged across irrigation levels, yields ranged from 789 to 1084 lbs/A, with eight of the twelve entries in the highest yielding group (Table 1). Highest average loan values were produced in the base irrigation level, and loan values in all irrigation levels were increased compared to dryland (Table 1). Gross revenues (yield x loan price) increased with increased irrigation but were similar for both base and high irrigation levels. Due to very little rainfall high temperatures, and limited irrigation capacity, yields were lower than in recent years.

Table 1. Effect of FiberMax and Stoneville varieties and subsurface drip irrigation level on cotton lint yield (lbs./A), loan value (¢/lb.), and gross revenue ($/A).

Variety	Dry (0.0)	In-season Irrigation Levels (inches) Low (6.0)	Base (9.2)	High (11.8)	Average
		---------------------- lbs/A--------------------			
FM 1730 GLTP	159 de	663	1016	1124	**934 BC**
ST 5091 B3XF	203 bcd	562	1179	1332	**1024 AB**
BX 2192 B3XF	198 bcd	622	1238	1271	**1044 AB**
ST 4993 B3XF	264 a	649	927	1274	**950 AB**
BX 2194 B3XF	242 ab	545	1305	1363	**1071 AB**
FM 1621 GL	225 abc	457	1277	1407	**1047 AB**
FM 2202 GL	241 ab	691	1115	1152	**986 AB**
FM 2398 GLTP	213 abc	657	1027	1238	**974 AB**
ST 4480 B3XF	144 e	442	1076	848	**789 D**
ST 4990 B3XF	187 cde	545	935	887	**789 CD**
ST 5600 B2XF	193 bcde	729	1052	1471	**1084 A**
ST 5707 B2XF	229 abc	527	1034	1271	**944 AB**
Average	**208**	**591 B**	**1098 A**	**1220 A**	**--**
		----------------------¢/lb--------------------			
FM 1730 GLTP	51.50	56.30	57.00	57.20	**56.83 A**
ST 5091 B3XF	46.05	51.55	55.10	56.25	**54.30 CD**
BX 2192 B3XF	51.90	56.25	57.35	57.00	**56.87 A**
ST 4993 B3XF	49.15	53.90	56.85	54.40	**55.05 BC**
BX 2194 B3XF	48.35	54.05	57.20	54.65	**55.30 BC**
FM 1621 GL	49.05	49.35	55.05	55.10	**53.17 D**
FM 2202 GL	49.80	55.60	56.45	56.90	**56.32 AB**
FM 2398 GLTP	48.75	56.30	57.30	54.50	**56.03 AB**
ST 4480 B3XF	49.15	55.20	56.65	56.50	**56.12 AB**
ST 4990 B3XF	55.05	56.35	56.90	57.25	**56.83 A**
ST 5600 B2XF	51.35	54.20	57.20	54.85	**55.42 BC**
ST 5707 B2XF	51.55	56.10	54.70	54.45	**55.08 BC**
Average	**50.14**	**54.60 C**	**56.48 A**	**55.75 B**	**--**
		-----------------------$/A----------------------			
FM 1730 GLTP	82 de	373	579	643	**532 AB**
ST 5091 B3XF	93 cde	290	650	749	**563 AB**
BX 2192 B3XF	103 bcd	350	710	725	**595 AB**
ST 4993 B3XF	130 a	350	527	693	**523 ABC**
BX 2194 B3XF	117 abc	295	746	745	**595 AB**
FM 1621 GL	110 abc	226	703	775	**568 AB**
FM 2202 GL	120 ab	384	629	655	**556 AB**
FM 2398 GLTP	104 abcd	370	588	675	**544 AB**
ST 4480 B3XF	71 e	244	610	479	**444 C**
ST 4990 B3XF	103 bcd	307	532	508	**449 C**
ST 5600 B2XF	99 bcd	395	602	807	**601 A**
ST 5707 B2XF	118 abc	295	566	692	**518 BC**
Average	**104**	**323 B**	**620 A**	**679 A**	**--**

TITLE:

Performance of PhytoGen varieties as affected by irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size:	4 rows by 32 feet, 4 replications		
Planting Date:	May 21		
Varieties:	DP 1845 B3XF	PHY 580 W3FE	
	FM 2498 GLT	PX 2C14 W3FE	
	NG 3930 B3XF	PX 2D18 W3FE	
	PHY 210 W3FE	PX 2E05 W3FE	
	PHY 250 W3FE	PHY 332 W3FE	
	PHY 350 W3FE	PHY 443 W3FE	
	PHY 394 W3FE	PX 3E33 W3FE	
	PHY 400 W3FE	PX 4B08 W3FE	
	PHY 430 W3FE	PX 5C45 W3FE	
	PHY 480 W3FE	PX 5E28 W3FE	
	PHY 500 W3FE	PX 5E34 W3FE	
Herbicides:	Prowl H_2O 3 pt/A+Roundup 24 oz/A		4/20/20
	Gramoxone 32 oz/A+Caparol 32 oz/A		5/21/20
	Roundup 32 oz/A		6/12/20
	Roundup 32 oz/A+Dual Magnum 20 oz/A		7/7/20
Fertilizer:	120-0-0		
Irrigation:	LEPA		

	Dry	Low	Base	High
Preplant	3.9”	3.9”	3.9”	3.9”
In Season	0.0”	5.1”	7.6”	10.1”
Total	3.9”	9.0”	11.5”	14.0”

Harvest Date: October 30

RESULTS AND DISCUSSION:

Commercial and experimental Phytogen varieties and three competitive standards were compared under three levels of LEPA irrigation in 2020. Consistent stands were achieved but below average seasonal rainfall combined with above average temperatures increased irrigation demands and limited yields. The area in which this trial was conducted is part of a wheat cotton rotation with wheat harvested in 2019. Dryland yields averaged 207 lb/A (received irrigation to ensure emergence but no additional in-season irrigation). Average irrigated yields increased from 606 to 979 lbs lint/A with increased in-season irrigation. PHY 480 W3FE produced highest yields when averaged across irrigation levels and was similar to FM 2498 GLT (Table 1). When averaged across varieties, averaged loan values were highest with base and higher irrigation levels (Table 2). Loan values ranged from 50.01 to 56.01 ¢/lb. Gross revenues increased with increased irrigation and were highest with PHY 480 W3FE and FM 2498 GLT (Table 3).

Table 1. Effect of variety and irrigation level on cotton lint yield (lbs./A).

		In-season Irrigation Levels (inches)			
Variety	**Dry (0.0)**	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
		---------------- lbs/A----------------			
DP 1845 B3XF	143 ef	491	720	729	**646 K**
FM 2498 GLT	244 abc	706	986	1078	**923 AB**
NG 3930 B3XF	225 abcd	613	794	998	**802 DEFG**
PHY 210 W3FE	218 abcd	601	672	959	**744 GHIJ**
PHY 250 W3FE	176 def	584	805	857	**749 FGHI**
PHY 350 W3FE	236 abc	667	893	1088	**883 BC**
PHY 394 W3FE	250 ab	610	789	1084	**828 CEDE**
PHY 400 W3FE	198 bcde	589	687	884	**720 HIJK**
PHY 430 W3FE	243 abc	717	720	1098	**845 BCD**
PHY 480 W3FE	219 abcd	722	1046	1134	**967 A**
PHY 500 W3FE	188 cdef	510	647	984	**714 IJK**
PHY 580 W3FE	204 bcd	644	776	937	**786 DEFGHI**
PX 2C14 W3FE	187 cdef	566	741	999	**769 DEFGHI**
PX 2D18 W3FE	214 abcd	527	612	860	**666 JK**
PX 2E05 W3FE	266 a	545	877	873	**765 EFGHI**
PHY 332 W3FE	192 bcdef	583	781	1105	**823 CDEF**
PHY 443 W3FE	200 bcde	674	782	933	**796 DEFGH**
PX 3E33 W3FE	218 abcd	611	744	998	**785 DEFGHI**
PX 4B08 W3FE	240 abc	611	787	965	**788 DEFGHI**
PX 5C45 W3FE	203 bcd	689	817	991	**833 CDE**
PX 5E28 W3FE	138 f	490	915	1013	**806 CDEFG**
PX 5E34 W3FE	141 ef	593	880	969	**814 CDEFG**
Average	**207**	**606 C**	**794 B**	**979 A**	**--**

Table 2. Effect of variety and irrigation level on loan value (¢/lb).

		In-season Irrigation Levels (inches)			
Variety	**Dry (0.0)**	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
		------------------¢/lb-----------------			
DP 1845 B3XF	54.33 a	54.68	56.73	56.63	**56.01 A**
FM 2498 GLT	50.90 b	52.43	52.23	51.80	**52.15 GH**
NG 3930 B3XF	46.03 def	49.85	55.08	55.83	**53.58 CDE**
PHY 210 W3FE	44.13 fg	51.20	54.25	55.25	**53.57 CDE**
PHY 250 W3FE	48.08 cd	48.48	51.98	53.28	**51.24 IJ**
PHY 350 W3FE	44.13 fg	52.20	54.15	54.25	**53.53 DE**
PHY 394 W3FE	50.15 bc	52.90	52.95	54.65	**53.50 DE**
PHY 400 W3FE	51.35 b	51.18	54.15	52.95	**52.76 FG**
PHY 430 W3FE	42.20 g	51.10	51.48	50.38	**50.98 IJ**
PHY 480 W3FE	46.95 de	47.55	53.58	53.45	**51.53 HI**
PHY 500 W3FE	49.90 bc	52.68	52.48	53.70	**52.95 EF**
PHY 580 W3FE	46.88 de	51.28	51.48	51.45	**51.40 HIJ**
PX 2C14 W3FE	47.28 de	49.65	52.65	53.93	**52.08 GH**
PX 2D18 W3FE	45.20 ef	49.80	52.65	51.95	**51.47 HI**
PX 2E05 W3FE	45.63 ef	49.28	51.48	51.25	**50.67 JK**
PHY 332 W3FE	49.63 bc	52.15	54.98	53.80	**53.64 BCDE**
PHY 443 W3FE	45.53 ef	51.30	51.05	52.33	**51.56 HI**
PX 3E33 W3FE	46.85 de	51.30	55.53	55.15	**53.99 BCD**
PX 4B08 W3FE	46.53 de	47.60	52.10	50.33	**50.01 K**
PX 5C45 W3FE	46.48 de	50.73	51.50	50.48	**50.90 IJ**
PX 5E28 W3FE	50.93 b	52.35	56.15	54.48	**54.33 BC**
PX 5E34 W3FE	48.05 cd	52.30	54.65	56.20	**54.38 B**
Average	**47.59**	**51.00 B**	**53.33 A**	**53.34 A**	**--**

Table 3. Effect of variety and irrigation level on gross revenue ($/A).

	In-season Irrigation Levels (inches)				
Variety	**Dry (0.0)**	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
		------------------$/A------------------			
DP 1845 B3XF	78 efg	268	408	413	**363 JK**
FM 2498 GLT	124 ab	370	515	559	**481 AB**
NG 3930 B3XF	104 abcde	306	437	557	**434 CDEF**
PHY 210 W3FE	96 cdef	308	364	530	**401 EFGHIJ**
PHY 250 W3FE	85 efg	283	419	457	**386 HIJ**
PHY 350 W3FE	104 abcde	348	484	590	**474 ABC**
PHY 394 W3FE	125 a	323	418	593	**444 BCD**
PHY 400 W3FE	102 abcde	302	372	468	**381 IJK**
PHY 430 W3FE	102 abcde	366	370	553	**430 DEFG**
PHY 480 W3FE	103 abcde	343	561	606	**503 A**
PHY 500 W3FE	93 cdefg	269	340	528	**379 IJK**
PHY 580 W3FE	95 cdeg	330	400	482	**404 DEFGHIJ**
PX 2C14 W3FE	88 defg	281	391	539	**403 DEFGHIJ**
PX 2D18 W3FE	97 bcdef	262	322	447	**344 K**
PX 2E05 W3FE	120 abc	268	451	447	**389 GHIJ**
PHY 332 W3FE	95 cdefg	304	429	595	**443 BCDE**
PHY 443 W3FE	91 defg	345	399	488	**411 DEFGHI**
PX 3E33 W3FE	102 abcde	313	413	551	**426 DEFGHI**
PX 4B08 W3FE	112 abcd	291	410	486	**396 FGHIJ**
PX 5C45 W3FE	94 cdefg	349	421	500	**424 DEFGH**
PX 5E28 W3FE	70 fg	257	514	552	**441 BCDE**
PX 5E34 W3FE	68 g	310	481	545	**445 BCD**
Average	**98**	**309 C**	**424 B**	**522 A**	**--**

TITLE:

Performance of Deltapine varieties as affected by irrigation levels at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size: 4 rows by 32 feet, 4 replications

Planting Date: May 21

Varieties:

19R132B3XF	20R747B3XF
19R227B3XF	20R748B3XF
19R228B3XF	DP1845B3XF
19R237B3XF	DP2012B3XF
19R242NRB3XF	DP2020B3XF
20R721NRB3XF	DP2044B3XF

Herbicides:

Prowl H_2O 3 pt/A+Roundup 24 oz/A	4/20/20
Gramoxone 32 oz/A+Caparol 32 oz/A	5/21/20
Roundup 32 oz/A	6/12/20
Roundup 32 oz/A+Dual Magnum 20 oz/A	7/7/20

Fertilizer: 120-0-0

Irrigation: LEPA

	Dry	Low	Base	High
Preplant	3.9”	3.9”	3.9”	3.9”
In-season	0.0”	5.1”	7.6”	10.1”
Total	3.9”	9.0”	11.5”	14.0”

Harvest Date: November 2

RESULTS AND DISCUSSION:

Eight experimentals and four commercial Deltapine varieties were compared under three levels of LEPA irrigation in 2020. Cotton was planted no-till into standing wheat stubble on May 21. When averaged across varieties, lint yields increased from 757 lbs/A to 966 lbs/A with increasing irrigation levels. When averaged across irrigation levels, the highest yielding group included DP 1845 B3XF, DP 2044 B3XF, and four of the experimental varieties (Table 1). Loan values increased with increasing irrigation levels. When averaged across irrigation levels, highest loan values were achieved with DP 1845 B3XF, and one of the experimental varieties. Highest gross revenues ($/A) were produced with DP 1845 B3XF and DP 2044 B3XF.

Table 1. Effect of variety and irrigation level on cotton lint yield (lbs/A), loan value (¢/lb), and gross revenue ($/A).

	In-season Irrigation Levels (inches)			
Variety	**Low (5.1)**	**Base (7.6)**	**High (10.1)**	**Average**
	---------------- lbs/A----------------			
19R132B3XF	845	895	1039	**926 ABC**
19R227B3XF	691	900	1142	**911 ABC**
19R228B3XF	775	1037	951	**921 ABC**
19R237B3XF	705	746	851	**767 E**
19R242NRB3XF	695	833	831	**786 E**
20R721NRB3XF	727	828	991	**849 CDE**
20R747B3XF	810	924	993	**909 ABC**
20R748B3XF	732	831	973	**845 CDE**
DP1845B3XF	839	1102	978	**973 A**
DP2012B3XF	741	946	956	**881 BCD**
DP2020B3XF	685	769	954	**803 DE**
DP2044B3XF	842	1052	928	**941 AB**
Average	**757 B**	**905 A**	**966 A**	**--**
	-------------------¢/lb----------------			
19R132B3XF	51.43	50.56	51.44	**51.14 E**
19R227B3XF	53.05	48.23	51.03	**50.77 E**
19R228B3XF	52.05	54.99	54.34	**53.79 D**
19R237B3XF	56.48	56.14	56.76	**56.46 A**
19R242NRB3XF	49.60	51.03	52.60	**51.08 E**
20R721NRB3XF	55.08	53.48	53.44	**54.00 CD**
20R747B3XF	51.00	51.92	52.07	**51.66 E**
20R748B3XF	48.73	51.89	53.94	**51.52 E**
DP1845B3XF	54.98	56.64	56.64	**56.09 AB**
DP2012B3XF	47.45	51.54	52.55	**50.51 E**
DP2020B3XF	53.83	54.76	54.43	**54.34 CD**
DP2044B3XF	53.18	56.21	56.01	**55.13 BC**
Average	**52.24 C**	**53.12 B**	**53.77 A**	**--**
	------------------$/A--------------			
19R132B3XF	434	453	535	**474 CD**
19R227B3XF	367	434	583	**461 CD**
19R228B3XF	403	570	516	**496 BC**
19R237B3XF	398	419	483	**433 DE**
19R242NRB3XF	342	425	437	**401 E**
20R721NRB3XF	400	443	531	**458 CD**
20R747B3XF	413	479	517	**470 CD**
20R748B3XF	356	431	524	**437 DE**
DP1845B3XF	462	624	554	**547 A**
DP2012B3XF	352	487	500	**446 DE**
DP2020B3XF	369	421	520	**436 DE**
DP2044B3XF	447	592	520	**520 AB**
Average	**395 C**	**481 B**	**518 A**	**--**

TITLE

Results of the irrigated cotton variety performance test at AG-CARES at Lamesa, TX, 2020.

AUTHORS

Jane K. Dever – Professor
Carol M. Kelly – Research Scientist
Valerie M. Morgan – Research Specialist
Koy Stair – Sr. Research Associate

MATERIALS AND METHODS:

Test:	Cotton variety, pivot irrigated – high level
Planting Date:	May 15th
Design:	Randomized complete block, 4 replications
Plot Size:	2-row plots, 24ft
Planting Pattern:	Solid
Herbicide:	Trifluralin @1.3 pt/A applied pre-plant
Fertilizer:	32 lbs/A nitrogen (fertigation) pre-plant
	96 lbs/A nitrogen (fertigation) in season
Irrigations:	Pre-Plant: 3.0 acre-in
	In Season:10.9 acre-in (May – September)
	Total: 13.9 acre-in
Harvest Aid:	Ethephon 32 oz/A + ET®X 1.25 oz/A – one application
	Paraquat 32 oz/A – one application
Harvest Date:	November 3rd

RESULTS AND DISCUSSION:

Cotton variety test

Texas A&M AgriLife Research in Lubbock, in conjunction with the AG-CARES location in Lamesa, provides an important service to seed companies and producers through a fee-based system that can evaluate a relatively large number of commercial and pre-commercial cotton varieties in small plot replicated performance tests. This service allows varieties from different companies and seed developers to be tested together by an independent source. The small plot replicated tests are intended to evaluate the genetic performance of lines independent of biotechnology traits, so the tests are managed as conventional varieties as opposed to herbicide or insecticide systems. Every effort is made to minimize the effects of insect and weed pressure. The same varieties are tested in four locations across the Southern High Plains, including a low water site at AG-CARES.

Lint yield is determined by the stripper-harvested plot weight and a percentage of lint (gin turnout) from a ~600 g grab sample collected randomly from the harvested plot material. Boll size and pulled and picked lint percent are determined from a random 50-boll sample obtained from two replications of each entry. Relative maturity and storm resistance ratings are a visual assessment of percent open bolls on a given date and a 1 (very loose, considerable storm loss) to 9 (very tight boll, no storm loss) storm resistance rating.

Fifty cotton varieties from seven different seed companies and one university were submitted for variety testing at four locations, including the irrigated location at AG-CARES in Lamesa. The test emerged to a good stand but suffered some wind and blowing sand damage early. Weed and insect management was excellent, and the test recovered well by boll opening stage.

Brownfield Seed and Delinting entered three conventional varieties, SSG UA222 and SSG UA114 are conventional varieties licensed to Seed Source Genetics from University of Arkansas, and Tamcot are conventional lines from the Texas A&M AgriLife Research breeding program in College Station. Tamcot 73 is also under a license agreement with Brownfield Seed and Delinting. There were 15 B3XF, three B2XF, and six XF varieties; two GLTP, two GLT, and two GL varieties; and 13 W3FE and one WRF (included as a Western region standard in the National Cotton Variety Testing Program) varieties in the test.

Average yield was 881 pounds of lint per acre with a 16.9% test coefficient of variation and 202 pound least significant difference. The highest yielding variety was PhytoGen PHY 394 W3FE with a yield of 1317 pounds of lint per acre. This top yielder also had an 9.3 seed index, a micronaire of 4.6, upper half mean length (UHML) of 1.14 in., and a strength of 29.9 g/tex. The next 10 varieties in the test were not significantly different than the highest yielding variety (Table 1). The seed index for these varieties ranged from 8.4 to 11.3, and they had an average mic of 4.5, an average UHML of 1.11 in., and average strength of 30.9 g/tex. PhytoGen was joined in the top tier by NexGen and Deltapine brands. Yields for the test ranged from 432 pounds of lint per acre to 1317 pounds of lint per acre. Plant height ranged from 21-28 inches with a test average of 25 inches. Relative maturity of the varieties as indicated by percent open bolls on September 30 averaged 59%, with a range from 40-80%. Storm resistance ratings ranged from 2-7 with a test average of 5. There was quite a range of fiber quality throughout the test with mic ranging from 3.9 to 5.3, UHML from 1.04 to 1.15 in., and strengths from 27.6 to 34.5g/tex (Table 2).

Table 2. Yield and agronomic property data from the irrigated uniform cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

		% Turnout		% Lint		Agronomic Properties				% Open		
						Boll	Seed	Lint	Seed per	Bolls	Storm	
Designation	Yield	Lint	Seed	Picked	Pulled	Size	Index	Index	Boll	30-Sep	Resistance	Height
PhytoGen PHY 394 W3FE	1317	24.7	27.6	39.9	28.1	4.0	9.3	8.8	18.3	58	6	24
PhytoGen PHY 443 W3FE	1252	26.0	32.7	40.3	28.3	4.0	9.3	8.8	18.4	58	4	28
NexGen NG 4098 B3XF	1251	24.8	35.1	39.5	29.7	4.9	10.9	8.5	22.9	58	4	25
PhytoGen PX5C45W3FE	1245	28.2	34.3	43.1	32.2	4.4	8.7	9.6	19.8	58	5	27
NexGen NG 3930 B3XF	1203	27.8	38.0	38.6	29.1	3.9	9.0	7.5	20.2	78	6	23
PhytoGen PHY 580 W3FE	1153	27.9	32.8	42.5	32.5	4.2	9.2	9.2	19.5	53	5	27
PhytoGen PHY 332 W3FE	1142	23.8	34.9	41.4	29.9	3.9	9.0	9.1	17.6	40	5	26
Deltapine DP 2012 B3XF	1140	29.4	37.8	40.1	30.1	3.8	8.4	7.8	19.5	73	4	26
Deltapine DP 2044 B3XF	1135	26.0	36.0	40.9	32.0	4.7	11.3	9.8	19.5	78	5	24
PhytoGen PHY 400 W3FE	1128	26.2	29.5	40.8	30.3	3.9	8.9	8.6	18.5	53	6	22
PhytoGen PHY 350 W3FE	1118	23.9	33.5	40.4	31.2	4.1	9.5	8.0	20.7	58	6	24
FiberMax FM 2022GL	1111	28.3	32.7	42.8	32.3	5.0	9.0	9.6	22.1	55	5	25
PhytoGen PHY 480 W3FE	1085	27.0	32.5	44.3	32.0	4.2	8.7	10.1	18.3	68	4	23
FiberMax FM 1621GL	1001	28.5	31.6	43.2	33.0	5.4	9.8	10.8	21.6	68	6	25
Seed Source Genetics SSG UA 222	993	27.8	38.3	39.3	30.5	4.5	10.8	8.3	21.1	68	3	23
FiberMax FM 2498GLT	973	28.0	34.0	41.7	31.5	4.8	10.5	9.6	20.5	60	5	24
FiberMax FM 2398GLTP	967	28.1	34.2	44.8	33.2	5.0	9.9	10.4	21.3	63	5	25
PhytoGen PHY 250 W3FE	959	23.5	32.8	39.6	27.5	3.8	9.1	8.6	17.4	80	6	22
NexGen NG 3956 B3XF	946	24.9	38.1	38.4	28.9	4.1	9.9	7.6	20.7	55	5	25
PhytoGen PHY 430 W3FE	928	25.7	32.7	40.5	29.2	4.1	8.9	8.7	19.0	50	5	23
PhytoGen PX2C14W3FE	925	23.3	31.3	39.0	27.3	4.2	9.0	7.5	21.7	65	6	24
PhytoGen PHY 764 WRF	902	22.1	33.5	35.9	27.2	4.0	10.6	7.4	19.4	40	2	26
DynaGro DG 3520 B3XF	881	24.9	35.3	37.9	28.8	4.2	11.7	8.7	18.3	48	5	23
NexGen NG 3500 XF	879	25.5	38.5	40.6	31.8	4.4	9.6	8.1	21.7	50	5	28
Brownfield Seed and Delinting 9X	872	24.7	36.8	38.5	28.1	4.2	10.2	8.4	19.6	65	5	26

Table 2 (continued). Yield and agronomic property data from the irrigated uniform cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

		% Turnout		% Lint		Agronomic Properties				% Open		
						Boll	Seed	Lint	Seed per	Bolls	Storm	
Designation	Yield	Lint	Seed	Picked	Pulled	Size	Index	Index	Boll	30-Sep	Resistance	Height
Stoneville ST 5600B2XF	850	26.4	37.6	41.7	32.7	4.8	9.3	9.1	21.8	50	5	24
Seed Source Genetics SSG UA 114	846	26.3	38.1	37.9	28.5	4.6	11.7	9.2	19.4	70	3	26
Stoneville ST 5610B3XF	818	25.4	35.5	43.3	31.9	4.5	8.8	8.5	22.9	45	5	27
Brownfield Seed and Delinting Ton Buster Elite	816	23.6	38.1	35.9	27.0	4.3	10.3	7.2	21.4	48	5	27
NexGen NG 4792 XF	801	25.9	36.6	39.1	29.2	4.0	9.2	7.8	20.3	48	6	26
NexGen NG 4689 B2XF	788	23.8	36.2	37.7	27.9	4.2	9.3	7.5	20.9	45	6	25
PhytoGen PHY 210 W3FE	754	24.4	31.6	41.2	28.3	3.7	9.0	8.4	18.4	73	7	22
NexGen NG 3640 XF	747	24.3	36.2	41.2	31.1	4.1	9.2	8.4	20.0	73	5	25
Brownfield Seed and Delinting 6X	745	24.5	35.9	37.1	27.5	4.6	10.8	7.8	22.0	70	5	24
Deltapine DP 1822 XF	738	25.2	34.1	38.2	28.6	4.0	9.8	8.5	17.8	80	4	25
Deltapine DP 1646 B2XF	726	27.7	32.2	43.0	33.1	4.0	8.3	8.4	20.5	45	4	27
NexGen NG 4777 B2XF	715	21.3	35.4	39.1	28.4	3.9	9.3	7.1	21.5	40	6	26
Deltapine DP 2020 B3XF	702	24.0	33.5	40.6	30.8	4.5	8.9	8.4	22.0	75	5	26
Tamcot 13S-03	695	26.3	37.3	38.3	28.2	4.6	10.0	8.2	21.6	65	4	21
FiberMax FM 1830GLT	691	25.2	30.5	44.4	32.8	4.7	9.8	10.4	19.9	68	4	24
NexGen NG 5711 B3XF	680	27.4	35.7	39.4	30.6	4.0	8.5	7.5	20.9	48	6	27
Stoneville ST 4990B3XF	668	28.1	30.3	39.0	30.7	4.3	9.2	8.1	20.6	53	3	25
PhytoGen PHY 500 W3FE	666	21.7	30.1	41.1	29.1	3.9	8.2	9.2	17.2	53	6	26
Stoneville ST 4550GLTP	664	27.5	28.9	41.8	31.4	4.2	8.7	9.3	19.0	45	5	27
Deltapine DP 1820 B3XF	654	26.9	29.8	37.8	32.4	4.3	9.0	8.9	18.6	73	5	25
Deltapine DP 2021 B3XF	623	24.0	31.0	40.3	30.1	4.0	8.3	8.0	20.2	68	5	25
NexGen NG 4936 B3XF	607	25.0	29.5	37.2	28.4	4.4	9.1	7.7	21.6	50	4	25
NexGen NG 4050 XF	575	26.8	34.6	40.1	29.6	4.7	9.5	9.3	20.0	60	5	21
Tamcot 73	553	20.6	32.1	39.3	28.6	4.3	10.2	7.9	21.6	70	6	24
Stoneville ST 4480B3XF	432	23.2	34.0	38.1	27.5	3.4	9.0	7.6	17.2	43	5	24
Mean	881	25.5	34.0	40.1	30.0	4.3	9.5	8.5	20.1	59	5	25
c.v.%	16.9	3.3	2.7	1.5	2.4	5.7	5.1	6.0	8.0	16.9	13.4	9.7
LSD 0.05	202	1.4	1.5	1.0	1.2	0.4	0.8	0.9	2.7	17	1	4

Table 1A. Fiber quality data from the irrigated, low level, regional cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

Designation	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf	Color Grade
NexGen NG 4098 B3XF	4.7	1.12	79.6	29.1	5.5	77.1	8.6	3	31-1
PhytoGen PHY 394 W3FE	4.8	1.02	80.6	27.6	6.0	76.6	9.1	3	31-1,32-1
PhytoGen PHY 430 W3FE	4.4	1.11	79.9	32.4	5.6	77.0	8.4	4	31-1,31-2
PhytoGen PHY 332 W3FE	5.0	1.02	80.3	27.9	6.5	75.2	8.9	3	31-3,41-3
PhytoGen PHY 350 W3FE	4.4	1.08	79.4	26.9	5.7	78.1	9.1	2	21-1,21-2
PhytoGen PX5C45W3FE	4.8	1.01	79.8	28.4	6.2	77.9	9.1	2	31-1,31-3
PhytoGen PHY 443 W3FE	4.8	1.07	80.3	28.5	6.0	75.0	9.7	2	21-1
PhytoGen PHY 400 W3FE	4.1	1.09	80.2	28.8	5.4	79.1	9.2	2	21-1,21-3
DynaGro DG 3520 B3XF	4.2	1.09	78.7	29.7	5.5	76.3	8.8	4	31-2,31-3
FiberMax FM 2398GLTP	4.7	1.05	79.2	30.2	5.7	77.2	8.6	3	31-1
Brownfield Seed and Delinting 6X	4.6	1.07	81.1	29.3	5.8	77.3	8.5	2	31-1,31-2
FiberMax FM 2022GL	4.7	1.04	81.5	31.5	5.8	77.9	8.7	4	31-1
PhytoGen PHY 480 W3FE	4.9	1.07	81.8	30.1	6.7	77.5	9.2	3	21-3,21-4
FiberMax FM 2498GLT	5.1	1.07	80.5	29.9	5.1	76.7	7.9	5	31-1,41-1
Brownfield Seed and Delinting 9X	4.9	1.10	80.9	30.3	6.4	77.2	8.7	3	31-1,31-3
Deltapine DP 2044 B3XF	5.4	1.09	81.4	30.9	5.5	78.8	8.3	3	21-2,31-1
PhytoGen PHY 580 W3FE	5.4	1.07	80.7	28.8	5.5	78.6	8.7	2	21-2,31-1
NexGen NG 3956 B3XF	4.5	1.05	79.7	28.3	5.3	79.4	8.0	3	21-2,31-1
Seed Source Genetics SSG UA 222	4.5	1.07	80.4	28.8	6.0	75.6	9.3	5	31-3,32-1
NexGen NG 3930 B3XF	4.5	1.03	80.5	29.1	6.0	76.7	9.5	3	21-4,31-2
FiberMax FM 1621GL	4.3	1.03	79.7	27.9	6.2	79.8	8.6	1	21-1,21-2
NexGen NG 4689 B2XF	4.5	1.12	82.2	31.7	6.0	76.1	8.7	3	31-2,31-3
Brownfield Seed and Delinting Ton Buster Elite	4.5	1.14	83.2	31.3	7.1	78.3	8.3	4	31-1
Stoneville ST 5610B3XF	4.9	1.05	81.7	31.2	6.1	77.9	9.3	3	21-3,31-3
PhytoGen PHY 210 W3FE	4.8	1.06	79.5	29.0	5.5	78.0	8.4	2	21-2,31-2
PhytoGen PHY 250 W3FE	5.4	1.06	81.4	29.8	6.5	76.0	9.5	3	21-4,32-1
PhytoGen PHY 500 W3FE	5.0	1.09	82.4	30.9	6.2	77.4	8.5	3	31-1,31-3
PhytoGen PHY 764 WRF	4.3	1.09	82.3	30.2	6.1	79.9	8.9	2	21-1
NexGen NG 3640 XF	4.9	1.03	79.8	26.9	6.0	78.0	8.9	2	21-1,31-1
PhytoGen PX2C14W3FE	4.7	1.07	81.7	31.5	6.5	77.0	9.2	2	21-4,31-1

Table 1A (continued). Fiber quality data from the irrigated, low level, regional cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

Designation	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf	Color Grade
Seed Source Genetics SSG UA 114	4.9	1.07	81.1	28.9	5.3	75.2	9.5	3	31-3,32-1
Deltapine DP 1822 XF	4.4	1.03	81.0	28.6	5.2	78.9	8.1	3	21-4,31-1
NexGen NG 4777 B2XF	5.1	1.05	81.2	31.4	6.3	76.4	9.9	2	21-4,22-2
FiberMax FM 1830GLT	4.7	1.07	80.5	27.8	5.6	77.3	8.7	3	21-2,31-1
Deltapine DP 2012 B3XF	4.7	1.08	81.1	30.5	5.4	78.5	8.2	4	31-1
NexGen NG 3500 XF	4.8	1.10	80.1	27.3	6.6	79.6	8.7	1	21-1,31-1
Stoneville ST 4550GLTP	4.5	1.05	79.8	28.4	5.1	77.2	9.0	2	21-4,31-2
Stoneville ST 5600B2XF	4.3	1.09	80.5	27.5	5.0	80.1	8.2	3	21-1,21-2
Tamcot 73	5.0	1.08	80.8	32.7	5.8	77.1	8.4	3	31-1,31-2
Tamcot 13S-03	4.7	1.10	80.7	29.1	5.2	80.7	8.2	1	21-1,21-2
NexGen NG 4792 XF	4.5	1.09	81.1	28.4	6.1	76.9	9.1	1	21-4,31-2
Deltapine DP 2020 B3XF	4.6	1.11	82.2	29.2	6.3	79.0	8.8	1	21-2,31-1
Stoneville ST 4990B3XF	4.3	1.06	81.5	31.3	5.7	79.6	8.2	2	21-2,31-1
Deltapine DP 1646 B2XF	4.8	1.08	81.8	31.0	6.3	78.3	9.0	2	21-2,21-4
NexGen NG 4050 XF	4.3	1.10	80.4	32.1	5.3	76.8	9.2	1	12-2,31-2
NexGen NG 5711 B3XF	4.2	1.10	80.8	28.4	5.3	79.6	9.0	2	21-1
Deltapine DP 2021 B3XF	4.6	1.11	81.7	28.2	6.4	77.0	9.5	2	22-1,31-3
Stoneville ST 4480B3XF	4.8	1.04	79.8	29.2	5.9	77.4	8.1	3	31-1,31-2
Deltapine DP 1820 B3XF	4.5	1.07	80.8	28.6	6.3	77.5	8.9	2	21-2,31-3
NexGen NG 4936 B3XF	4.6	1.08	78.6	27.6	5.4	81.4	7.3	2	31-1,31-2
Mean	4.7	1.07	80.7	29.4	5.8	77.7	8.7	2	
c.v.%	4.0	2.0	1.2	4.4	2.2	1.2	4.3	35.3	
LSD0.05	0.3	0.04	1.6	2.2	0.2	1.6	0.6	1	

TITLE:

Results of the irrigated, low level, cotton variety performance test at AG-CARES at Lamesa, TX, 2020.

AUTHORS:

Jane K. Dever – Professor
Carol M. Kelly – Research Scientist
Valerie M. Morgan – Research Specialist
Koy Stair – Sr. Research Associate

MATERIALS AND METHODS:

Test:	Cotton variety, pivot irrigated – low level
Planting Date:	May 15th
Design:	Randomized complete block, 4 replications
Plot Size:	2-row plots, 24ft
Planting Pattern:	Solid
Herbicide:	Trifluralin @1.3 pt/A applied pre-plant
Fertilizer:	32 lbs/A nitrogen (fertigation) pre-plant
	96 lbs/A nitrogen (fertigation) in season
Irrigations:	Pre-Plant: 3.0 acre-in
	In Season: 5.9 acre-in (May – September)
	Total: 8.9 acre-in
Harvest Aid:	Ethephon 32 oz/A + ET®X 1.25 oz/A – one application
	Paraquat 32 oz/A – one application
Harvest Date:	November 3rd

RESULTS AND DISCUSSION:

Cotton variety test

Texas A&M AgriLife Research in Lubbock, in conjunction with the AG-CARES location in Lamesa, provides an important service to seed companies and producers through a fee-based system that can evaluate a relatively large number of commercial and pre-commercial cotton varieties in small-plot replicated performance tests. This service allows varieties from different companies and seed developers to be tested together by an independent source. The small plot replicated tests are intended to evaluate the genetic performance of lines independent of biotechnology traits, so the tests are managed as conventional varieties as opposed to herbicide or insecticide systems. Every effort is made to minimize the effects of insect and weed pressure. The same varieties are tested in four locations across the Southern High Plains, including the irrigated site at AG-CARES.

Lint yield is determined by the stripper-harvested plot weight and percentage of lint (gin turnout) from a ~600 g grab sample collected randomly from the harvested plot material. Boll size and pulled and picked lint percent are determined from a random 50-boll sample obtained from two replications of each entry. Relative maturity and storm resistance ratings are a visual assessment of percent open bolls on a given date and a 1 (very loose, considerable storm loss) to 9 (very tight boll, no storm loss) storm resistance rating.

Fifty cotton varieties from seven different seed companies and one university were submitted for variety testing at four locations, including the irrigated (low level) location at AG-CARES in Lamesa. The test emerged to a good stand but suffered some wind and blowing sand damage early. Weed and insect management was excellent, and the test recovered well by boll opening stage.

Brownfield Seed and Delinting entered three conventional varieties, SSG UA222 and SSG UA114 are conventional varieties licensed to Seed Source Genetics from University of Arkansas, and Tamcot are conventional lines from the Texas A&M AgriLife Research breeding program in College Station. Tamcot 73 is also under a license agreement with Brownfield Seed and Delinting. There were 15 B3XF, three B2XF, and six XF varieties; two GLTP, two GLT, and two GL varieties; and 13 W3FE and one WRF (included as a Western region standard in the National Cotton Variety Testing Program) varieties in the test.

Average yield was 467 pounds of lint per acre with a 18.3% test coefficient of variation and 116 pound least significant difference. The highest yielding variety was NexGen NG 4098 B3XF with a yield of 723 pounds of lint per acre. This top yielder also had an 9.1 seed index, a micronaire of 4.7, upper half mean length (UHML) of 1.12 in., and a strength of 29.1 g/tex. The next 5 varieties in the test were not significantly different than the highest yielding variety (Table 1). The seed index for these varieties ranged from 7.9 to 9.1, and they had an average mic of 4.7, an average UHML of 1.05 in., and average strength of 28.6 g/tex. NexGen was joined in the top tier by PhytoGen brand varieties. Yields for the test ranged from 723 pounds of lint per acre to 183 pounds of lint per acre. Plant height ranged from 18-26 inches with a test average of 22 inches. Relative maturity of the varieties as indicated by percent open bolls on September 24 averaged 57%, with a range from 35-83%. Storm resistance ratings ranged from 2-7 with a test average of 4. There was quite a range of fiber quality throughout the test with mic ranging from 4.1 to 5.4, UHML from 1.01 to 1.14 in., and strengths from 26.9 to 32.7 g/tex (Table 2).

Table 1. Yield and agronomic property data from the irrigated, low level, regional cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

						Agronomic Properties				% Open		
		% Turnout		% Lint		Boll	Seed	Lint	Seed per	Bolls	Storm	
Designation	Yield	Lint	Seed	Picked	Pulled	Size	Index	Index	Boll	24-Sep	Resistance	Height
NexGen NG 4098 B3XF	723	24.4	32.8	39.9	29.8	4.4	9.1	7.9	22.7	65	4	22
PhytoGen PHY 394 W3FE	693	21.3	27.1	40.2	27.8	3.7	9.1	9.8	15.1	48	5	20
PhytoGen PHY 430 W3FE	654	25.1	25.3	40.2	29.2	4.0	7.9	8.5	18.8	63	4	22
PhytoGen PHY 332 W3FE	654	23.4	25.5	43.5	33.2	4.0	8.5	10.0	17.4	60	6	22
PhytoGen PHY 350 W3FE	647	22.7	27.5	38.2	27.9	3.8	8.7	9.2	15.9	73	5	22
PhytoGen PX5C45W3FE	628	22.5	23.8	42.5	30.6	3.6	8.5	10.1	15.3	60	6	22
PhytoGen PHY 443 W3FE	602	22.5	24.7	41.3	29.3	3.8	8.5	9.5	16.8	70	4	23
PhytoGen PHY 400 W3FE	596	22.1	24.3	41.4	30.6	3.5	8.3	8.4	16.9	53	5	18
DynaGro DG 3520 B3XF	591	23.1	33.0	38.0	28.1	3.7	11.1	8.9	15.7	53	4	20
FiberMax FM 2398GLTP	569	25.8	28.5	43.7	32.5	4.9	9.1	9.9	21.5	60	6	22
Brownfield Seed and Delinting 6X	568	23.0	33.6	36.9	26.9	4.2	10.0	7.4	21.0	65	5	24
FiberMax FM 2022GL	566	23.4	27.5	46.3	33.0	2.9	8.4	11.4	11.3	65	4	20
PhytoGen PHY 480 W3FE	565	22.1	23.0	41.8	29.8	3.8	8.4	9.7	16.4	53	4	22
FiberMax FM 2498GLT	550	25.3	26.5	40.3	29.6	4.6	9.9	9.4	20.0	35	5	24
Brownfield Seed and Delinting 9X	548	22.5	28.7	37.8	27.1	4.1	9.8	8.0	19.5	48	4	22
Deltapine DP 2044 B3XF	538	24.0	27.9	38.0	29.0	4.2	9.2	8.1	19.7	55	3	20
PhytoGen PHY 580 W3FE	507	23.0	24.0	44.3	32.2	3.7	8.4	9.7	17.1	43	3	21
NexGen NG 3956 B3XF	506	20.8	27.2	39.1	27.3	3.8	9.0	7.4	20.0	67	5	22
Seed Source Genetics SSG UA 222	502	23.7	30.2	37.6	29.2	4.1	10.0	7.9	19.5	68	2	20
NexGen NG 3930 B3XF	498	21.2	27.8	39.1	30.6	3.9	8.2	7.2	21.0	73	5	21
FiberMax FM 1621GL	489	23.3	26.9	39.9	29.3	4.7	9.3	9.7	19.2	65	6	24
NexGen NG 4689 B2XF	487	22.3	32.1	40.8	30.8	4.3	8.6	7.9	22.3	55	5	25
Brownfield Seed and Delinting Ton Buster Elite	474	22.9	33.2	36.8	27.6	4.1	9.4	7.0	21.7	53	4	22
Stoneville ST 5610B3XF	471	20.9	27.0	41.7	30.8	4.2	8.2	8.4	20.6	45	4	25
PhytoGen PHY 210 W3FE	460	20.5	23.3	36.4	24.5	3.4	8.9	7.8	15.8	83	7	19
PhytoGen PHY 250 W3FE	460	21.7	27.0	41.8	29.0	3.6	8.7	8.7	17.2	63	5	20
PhytoGen PHY 500 W3FE	451	23.7	27.6	41.2	27.9	3.3	8.0	7.7	17.7	48	5	23
PhytoGen PHY 764 WRF	450	22.3	23.0	37.4	27.6	3.5	9.6	7.6	17.0	43	3	23
NexGen NG 3640 XF	443	18.0	22.5	38.8	28.0	3.2	8.6	7.8	16.0	63	5	24
PhytoGen PX2C14W3FE	438	21.9	29.5	38.3	26.6	3.7	8.1	7.0	20.1	63	7	20

Table 1 (continued). Yield and agronomic property data from the irrigated, low level, regional cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

		% Turnout		% Lint		Agronomic Properties				% Open		
						Boll	Seed	Lint	Seed per	Bolls	Storm	
Designation	Yield	Lint	Seed	Picked	Pulled	Size	Index	Index	Boll	24-Sep	Resistance	Height
Seed Source Genetics SSG UA 114	434	21.3	28.3	39.1	29.0	4.6	9.7	7.6	23.3	75	2	23
Deltapine DP 1822 XF	431	22.4	27.9	37.3	27.2	3.5	9.6	7.7	16.8	78	5	25
NexGen NG 4777 B2XF	424	23.9	32.8	41.1	29.3	3.8	9.5	8.1	19.2	50	5	25
FiberMax FM 1830GLT	423	24.9	27.8	40.6	29.9	4.2	9.6	9.2	18.3	50	6	25
Deltapine DP 2012 B3XF	421	21.9	30.7	38.9	28.9	3.8	8.1	7.5	19.8	68	6	22
NexGen NG 3500 XF	421	21.1	28.6	41.4	30.4	3.9	8.8	8.1	19.8	48	5	26
Stoneville ST 4550GLTP	412	26.7	26.5	37.5	28.9	4.3	8.6	8.0	20.2	40	4	26
Stoneville ST 5600B2XF	393	22.1	22.9	39.0	28.8	4.3	9.0	8.2	20.5	45	4	24
Tamcot 73	385	22.3	35.3	36.8	26.2	3.6	8.9	6.9	19.4	78	5	22
Tamcot 13S-03	371	22.5	29.5	37.8	28.5	4.5	9.2	8.1	20.9	65	7	20
NexGen NG 4792 XF	346	23.0	30.3	42.5	32.4	4.0	8.6	8.8	19.0	40	5	21
Deltapine DP 2020 B3XF	340	21.4	29.0	39.1	27.8	3.7	8.4	7.8	18.4	68	5	24
Stoneville ST 4990B3XF	331	23.2	27.9	37.4	28.3	4.0	8.7	7.4	19.9	43	4	26
Deltapine DP 1646 B2XF	311	22.5	21.8	44.2	32.8	3.6	7.6	9.1	17.6	55	4	24
NexGen NG 4050 XF	310	24.4	22.7	39.9	28.2	4.2	9.8	9.5	17.6	63	5	21
NexGen NG 5711 B3XF	309	24.2	26.4	39.7	29.7	3.9	8.1	7.7	20.0	43	4	23
Deltapine DP 2021 B3XF	307	23.4	29.9	38.4	28.4	3.9	8.5	7.8	19.1	48	4	26
Stoneville ST 4480B3XF	294	20.9	32.1	35.9	25.4	3.2	8.7	6.9	16.7	45	4	21
Deltapine DP 1820 B3XF	190	23.3	32.1	39.8	27.9	3.4	8.4	8.6	15.7	73	5	25
NexGen NG 4936 B3XF	183	25.2	29.5	38.3	28.7	4.1	8.8	8.3	18.9	45	4	23
Mean	467	22.8	27.8	39.7	29.0	3.9	8.9	8.4	18.6	57	4	22
c.v.%	18.3	4.5	3.3	1.9	3.0	10.0	4.1	7.0	10.4	17.4	10.0	9.9
LSD 0.05	116	1.7	1.5	1.3	1.5	7.0	0.6	1.0	3.2	16	1	4

Table 2A. Fiber quality data from the irrigated regional cotton performance test at the AG-CARES farm, Lamesa, 2020.

Designation	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf	Color Grade
PhytoGen PHY 394 W3FE	4.6	1.14	80.6	29.9	5.5	78.0	8.7	3	31-1
PhytoGen PHY 443 W3FE	4.8	1.06	82.0	32.2	5.9	76.4	9.6	1	21-3,32-1
NexGen NG 4098 B3XF	4.5	1.15	81.1	33.1	5.8	76.9	8.8	4	31-1
PhytoGen PX5C45W3FE	4.6	1.06	81.8	30.5	6.5	77.7	9.5	2	21-3,21-4
NexGen NG 3930 B3XF	4.5	1.12	82.0	29.6	5.9	78.5	8.7	2	21-2,31-1
PhytoGen PHY 580 W3FE	4.5	1.07	82.0	30.7	6.3	78.4	9.3	1	21-1,21-3
PhytoGen PHY 332 W3FE	4.6	1.13	82.5	31.7	6.3	76.3	10.1	2	23-1,31-1
Deltapine DP 2012 B3XF	4.4	1.12	81.5	29.5	5.2	79.1	8.4	2	21-1,31-1
Deltapine DP 2044 B3XF	4.1	1.15	80.6	32.1	5.7	79.0	9.0	4	21-1
PhytoGen PHY 400 W3FE	4.8	1.09	80.7	30.5	5.8	78.7	8.4	3	21-2,31-1
PhytoGen PHY 350 W3FE	4.5	1.11	82.6	30.2	6.0	79.4	8.6	2	21-2
FiberMax FM 2022GL	4.5	1.07	81.7	31.8	5.8	76.5	9.4	2	21-4,31-3
PhytoGen PHY 480 W3FE	4.9	1.07	82.2	31.3	7.0	78.7	9.2	2	21-1,21-4
FiberMax FM 1621GL	4.8	1.08	81.7	30.7	5.2	78.1	8.4	3	31-1
Seed Source Genetics SSG UA 222	5.1	1.11	81.7	30.8	6.5	78.8	8.4	3	21-2,31-1
FiberMax FM 2498GLT	5.3	1.11	82.2	30.8	5.4	80.4	8.6	2	21-1
FiberMax FM 2398GLTP	5.0	1.08	81.1	28.9	5.6	79.6	8.5	1	21-1,21-4
PhytoGen PHY 250 W3FE	4.5	1.07	80.7	30.0	5.4	78.0	8.6	2	21-4,31-1
NexGen NG 3956 B3XF	4.5	1.10	81.7	29.9	6.3	77.1	9.1	3	21-4,31-3
PhytoGen PHY 430 W3FE	4.5	1.04	80.8	29.4	6.0	76.6	9.8	3	21-4,22-2
PhytoGen PX2C14W3FE	4.2	1.06	81.3	30.2	6.1	78.8	8.8	2	21-4,31-1
PhytoGen PHY 764 WRF	4.0	1.13	82.9	34.5	5.8	77.2	9.6	2	21-4,22-1
DynaGro DG 3520 B3XF	4.1	1.15	84.1	33.1	7.0	78.6	8.8	4	21-2,31-1
NexGen NG 3500 XF	4.6	1.08	82.8	32.9	6.0	76.1	9.9	2	23-2,31-1
Brownfield Seed and Delinting 9X	4.4	1.08	81.2	30.4	5.2	79.0	8.5	2	21-2,31-1
Stoneville ST 5600B2XF	4.7	1.14	82.2	31.9	6.2	75.8	9.8	3	22-2,31-1
Seed Source Genetics SSG UA 114	5.0	1.13	83.5	33.2	6.5	78.7	8.7	2	21-1,21-2
Stoneville ST 5610B3XF	4.3	1.09	81.1	31.5	6.1	78.3	9.6	2	21-1,22-1
Brownfield Seed and Delinting Ton Buster Elite	4.6	1.06	81.3	30.0	6.0	78.1	8.8	2	31-1
NexGen NG 4792 XF	4.5	1.08	82.4	32.8	6.3	75.7	10.2	2	22-1,22-2

Table 2A (continued). Fiber quality data from the irrigated regional cotton performance test at the AG-CARES farm, Lamesa, 2020.

Designation	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf	Color Grade
NexGen NG 4689 B2XF	4.6	1.06	81.2	29.9	5.1	77.7	9.6	1	21-1,22-1
PhytoGen PHY 210 W3FE	4.6	1.07	81.8	30.1	5.3	79.3	8.3	2	21-2,31-1
NexGen NG 3640 XF	4.6	1.09	82.3	32.5	6.4	77.0	10.0	2	22-1
Brownfield Seed and Delinting 6X	4.6	1.04	80.7	27.6	5.6	79.3	8.7	2	21-1,21-2
Deltapine DP 1822 XF	4.7	1.11	81.6	32.0	5.5	78.3	8.8	3	21-1,31-1
Deltapine DP 1646 B2XF	4.9	1.15	80.9	28.2	6.4	81.0	8.3	2	21-1,21-2
NexGen NG 4777 B2XF	4.2	1.06	80.5	28.1	5.0	76.9	9.9	1	22-1,22-2
Deltapine DP 2020 B3XF	4.4	1.11	81.0	28.9	5.2	80.4	8.8	1	11-2,21-1
Tamcot 13S-03	4.6	1.09	82.5	33.9	5.6	78.6	8.8	3	21-2
FiberMax FM 1830GLT	4.6	1.10	80.7	29.1	5.1	80.8	8.3	2	21-1,21-2
NexGen NG 5711 B3XF	4.5	1.12	81.8	30.8	6.2	79.0	9.3	1	21-1,21-3
Stoneville ST 4990B3XF	4.9	1.12	82.2	28.8	6.1	79.1	8.5	1	21-2
PhytoGen PHY 500 W3FE	4.0	1.08	81.3	31.5	5.7	78.1	9.3	3	21-2,22-1
Stoneville ST 4550GLTP	4.8	1.08	82.7	31.5	6.4	77.4	8.8	2	31-1
Deltapine DP 1820 B3XF	4.6	1.13	80.9	30.0	5.1	76.8	8.9	2	21-3,41-1
Deltapine DP 2021 B3XF	4.5	1.11	81.7	28.9	5.2	79.8	8.6	3	21-1,21-2
NexGen NG 4936 B3XF	4.3	1.13	82.8	29.5	6.2	77.3	9.0	3	21-2,31-1
NexGen NG 4050 XF	4.3	1.08	81.7	30.4	5.8	76.7	8.5	2	31-1
Tamcot 73	3.9	1.09	80.8	30.2	6.1	77.8	9.2	2	22-2,31-1
Stoneville ST 4480B3XF	4.4	1.09	79.8	28.3	5.3	81.6	7.3	2	21-2
Mean	4.5	1.09	81.6	30.7	5.8	79.2	8.9	2	
c.v.%	3.7	1.5	0.9	3.6	2.2	1.4	6.2	37.7	
LSD 0.05	0.3	0.03	1.3	1.9	0.2	1.8	0.9	1	

TITLE:

Results of the Root-Knot Nematode (RKN) cotton variety performance test at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Jane K. Dever – Professor
Terry A. Wheeler – Professor
Carol M. Kelly – Research Scientist
Valerie M. Morgan – Research Specialist

MATERIALS AND METHODS:

Test:	Root-Knot Nematode Variety
Planting Date:	May 17th – initial, June 16th - replant
Design:	Randomized complete block, 4 replications
Plot Size:	2-row plots, 24ft
Planting Pattern:	Solid
Herbicide:	Trifluralin @1.3 pt/A applied pre-plant
Fertilizer:	32 lbs/A nitrogen (fertigation) pre-plant
	96 lbs/A nitrogen (fertigation) in season
Irrigations:	Pre-Plant: 3.0 acre-in
	In Season: 8.4 acre-in (May - September)
	Total: 11.4 acre-in
Harvest Aid:	Ethephon 32 oz/A + ET®X 1.25 oz/A – one application
	Paraquat 32 oz/A – one application
Harvest Date:	November 5th

RESULTS AND DISCUSSION:

Some field locations at the AG-CARES facility provide an excellent opportunity to evaluate commercial, pre-commercial, and breeding strains from multiple companies and seed developers in small plot replicated tests under root-knot nematode (RKN) pressure. Texas A&M AgriLife Research provides a fee-based testing service to evaluate varieties from different sources in the same test and allow producers access to independently generated performance data in production situations that may resemble their own.

Lint yield is calculated from the stripper-harvested plot weight and a percentage of lint (gin turnout) determined from a ~600g sample randomly grabbed from the harvested plot material. Boll size and pulled and picked lint percent are determined from 50 bolls picked randomly from two replications of each entry. Maturity and storm resistance ratings are a visual assessment of percent open bolls on a given date and a 1 (very loose, considerable storm loss) to 9 (very tight boll, no storm loss) visual rating.

Thirty-eight cotton varieties and experimental strains from five seed companies and one university were submitted for variety testing in a field where root-knot nematodes are known to be present. The test planted May 17 suffered severe wind and sand damage following emergence and was replanted on June 16.

Pressure from root-knot nematode was relatively light in 2020. Average yield was 614 pounds of lint per acre with a 13.4% test coefficient of variation and 97 pound least significant difference. Yields for the test ranged from 446 to 765 pounds of lint per acre (Table 1). TAMULBB 17-4-116N, an early-maturing breeding line from Texas A&M AgriLife Research in Lubbock, was the top yielding entry. Besides early maturity, the top-yielding experimental has a storm proof boll (7 rating) and large seed compared to top commercial varieties (seed index of 11.5). Fiber quality for top yielder was a 3.0 micronaire, 1.15 in upper half mean length (UHML)., and a strength of 32.2 g/tex (Table 2). It was followed by eleven varieties and experimental strains that were not significantly different in terms of yield represented by DynaGro, PhytoGen, BASF, and Seed Source Genetics brands (Table 1). This group of varieties had an average micronaire of 3.0, UHML of 1.10 in., and strength of 31.4 g/tex (Table 2). There were six varieties and experimental strains from PhytoGen that had an RKN count of zero in 2020 with two of them being in the highest yielding group.

The late replant date impacted yield and fiber quality with some varieties being more affected than others. Maturity ratings ranged from 10 to 75% open bolls on October 14, three weeks before harvest. Micronaire ranged from 2.5 to 3.5. Fiber quality for this test overall was still comparable to other tests in the same location with an average micronaire of 3.0, UHML of 1.10 in., and a strength of 31.4 g/tex. There was variation among the thirty-eight entries with UHML ranging from 1.03 to 1.17 in., uniformity from 78.8 to 82.9% and strength from 28.6 to 35.5 g/tex (Table 2).

Table 3. Yield and agronomic property data from the irrigated root-knot nematode cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

						Agronomic Properties				% Open			Nematode
		% Turnout		% Lint		Boll	Seed	Lint	Seed per	Bolls	Storm		Rating
Designation	Yield	Lint	Seed	Picked	Pulled	Size	Index	Index	Boll	14-Oct	Resistance	Height	RK
TAMULBB 17-4-116N	765	19.1	39.4	32.3	23.8	4.2	11.5	6.3	21.7	65	7	24	390
DynaGro DGX 19917 B3XF	752	21.0	37.4	28.0	20.5	4.8	11.0	5.0	26.9	15	5	29	1410
DynaGro DGX 19908 B3XF	742	22.2	31.4	36.7	27.2	4.6	9.2	6.5	26.0	33	6	23	180
PhytoGen PHY 480 W3FE	720	19.6	30.7	34.4	24.9	4.8	10.0	6.5	25.2	23	6	26	115
PhytoGen PHY 394 W3FE	708	19.6	29.6	34.3	23.2	4.4	9.7	6.8	22.4	25	6	21	90
PhytoGen PHY 350 W3FE	702	20.0	31.5	33.2	24.2	4.4	10.1	6.3	23.1	30	5	25	180
PhytoGen PHY 580 W3FE	702	22.5	29.9	37.8	27.0	4.7	10.0	7.2	24.7	15	5	27	0
PhytoGen PX4B08W3FE	688	23.0	25.4	37.9	27.1	3.9	7.9	7.4	19.8	38	5	20	0
BASF BX 2194B3XF	685	19.9	32.3	35.9	29.5	5.4	11.0	7.1	27.2	25	6	22	685
PhytoGen PX5C45W3FE	683	23.1	30.2	37.7	27.6	4.4	9.5	7.2	23.2	10	5	26	90
PhytoGen PHY 443 W3FE	682	18.9	26.4	35.6	24.1	4.7	9.6	6.7	25.4	25	5	26	0
Seed Source SSG UA 114	676	20.2	35.0	32.7	25.7	4.9	10.7	6.3	25.4	75	5	24	150
BASF BX 2116GLTP	665	20.1	37.3	32.4	24.3	4.9	12.0	6.5	24.5	18	6	24	780
FiberMax FM 1621GL	661	20.7	29.9	35.9	27.6	4.9	10.4	7.6	23.3	33	6	20	300
PhytoGen PX2E05W3FE	659	20.8	32.1	39.2	27.4	4.7	10.0	7.9	23.0	48	7	19	90
TAMULBB 17-4-114N	653	19.9	35.1	32.1	23.4	4.3	11.2	6.1	22.4	40	7	23	480
PhytoGen PHY 400 W3FE	622	19.1	30.3	37.4	26.6	4.5	9.6	7.1	23.9	25	6	21	210
PhytoGen PX2C14W3FE	618	19.2	32.9	32.1	25.8	5.2	10.1	5.6	29.9	33	6	23	175
PhytoGen PHY 332 W3FE	615	19.9	29.5	36.0	24.8	4.2	9.4	6.9	22.1	20	5	23	175
Stoneville ST 5600B2XF	614	21.3	32.8	33.8	26.7	5.5	9.9	6.2	29.7	10	5	28	160
Stoneville ST 5091 B3XF	609	25.2	32.7	38.3	28.4	4.7	9.2	7.1	25.5	25	6	28	120
TAMULBB 17-4-122N	595	18.9	39.7	30.5	23.6	4.7	11.3	5.7	25.3	63	7	22	120
PhytoGen PX3E33W3FE	593	19.4	30.4	34.5	23.2	4.6	9.4	6.1	26.2	18	6	22	0
PhytoGen PX2D18W3FE	579	21.2	32.4	35.4	24.7	4.3	9.1	6.2	24.4	25	7	22	0
Seed Source SSG UA 222	561	20.1	32.5	32.8	25.7	5.3	10.9	6.5	26.5	28	6	23	240
PhytoGen PX5E34W3FE	560	21.3	35.0	33.5	22.6	4.0	9.3	5.6	24.0	13	5	31	30
PhytoGen PX5E28W3FE	559	20.5	33.1	34.7	24.4	4.4	9.3	6.2	24.9	25	4	30	120
FiberMax FM 2202GL	552	23.4	32.4	36.0	26.0	5.2	9.6	7.0	26.9	25	5	24	450
TAMULBB 18-4-107N	548	19.1	34.3	32.7	23.6	5.1	11.6	6.3	26.4	20	6	23	60
FiberMax FM 1730GLTP	544	21.3	32.1	34.7	25.2	4.5	10.0	6.7	23.2	45	6	24	130

Table 3 (continued). Yield and agronomic property data from the irrigated root-knot nematode cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

		% Turnout		% Lint		Agronomic Properties				% Open			Nematode
						Boll	Seed	Lint	Seed per	Bolls	Storm		Rating
Designation	Yield	Lint	Seed	Picked	Pulled	Size	Index	Index	Boll	14-Oct	Resistance	Height	RK
TAMULBB 19-8-115/215	542	20.0	35.4	31.5	23.3	4.9	11.4	6.8	22.6	40	5	25	540
Stoneville ST 4993B3XF	530	22.8	26.9	39.3	29.6	4.5	9.6	8.3	21.6	43	6	24	355
Deltapine DP 2143 NR B3XF	530	21.3	25.6	35.2	24.9	4.1	8.9	6.9	20.9	13	5	24	210
DynaGro DGX 20127B3XF	512	19.3	29.6	35.7	26.3	4.5	9.3	6.3	25.3	20	6	25	420
TAMULBB 18-4-213N	510	19.0	32.2	34.2	23.6	5.0	11.7	7.0	24.7	28	6	26	120
Deltapine DP 2141 NR B3XF	502	19.8	33.2	36.0	26.1	3.9	9.7	6.5	21.4	15	6	26	480
BASF BX 2192B3XF	457	20.7	26.0	32.9	23.6	4.4	9.1	5.8	24.8	10	5	27	90
PhytoGen PHY 500 W3FE	446	18.4	22.0	34.5	25.4	4.2	9.1	6.8	21.1	13	4	27	0
Mean	614	20.5	31.7	34.6	25.3	4.6	10.0	6.6	24.3	28	5	24	
c.v.%	13.4	3.3	3.5	1.7	2.5	5.0	3.7	4.1	6.1	31.2	12.3	8.4	prob>f0.224
LSD 0.05	97	1.1	1.9	1.0	1.1	0.4	0.6	0.5	2.5	15	1	0.3	

Table 3A. Fiber quality data from the irrigated nematode cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

Designation	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf	Color Grade
TAMULBB 17-4-116N	3.0	1.15	81.3	32.2	5.8	79.4	9.7	2	11-2,12-1
DynaGro DGX 19917 B3XF	2.9	1.12	80.6	33.4	5.9	72.1	12.8	1	13-1,24-1
DynaGro DGX 19908 B3XF	2.8	1.08	80.6	29.9	6.5	75.9	11.9	2	13-1
PhytoGen PHY 480 W3FE	3.0	1.12	81.0	30.5	6.6	72.8	12.7	3	13-3,13-4
PhytoGen PHY 394 W3FE	2.9	1.11	78.9	30.0	5.7	73.2	11.7	3	22-1,23-3
PhytoGen PHY 350 W3FE	3.0	1.11	80.8	31.0	6.1	72.9	12.3	2	23-1,23-3
PhytoGen PHY 580 W3FE	3.1	1.07	80.6	30.1	6.4	72.1	13.7	3	13-3,24-1
PhytoGen PX4B08W3FE	3.5	1.03	80.9	30.4	6.0	74.1	12.6	2	13-3
BASF BX 2194B3XF	2.5	1.12	80.0	30.7	6.3	73.1	12.3	3	13-4,23-1
PhytoGen PX5C45W3FE	3.1	1.09	81.8	31.1	6.3	73.2	13.2	2	13-3,24-1
PhytoGen PHY 443 W3FE	3.3	1.08	81.5	31.9	5.9	70.2	13.8	2	24-1
Seed Source SSG UA 114	3.2	1.16	81.8	35.5	6.4	78.4	9.8	2	11-4,21-3
BASF BX 2116GLTP	2.7	1.11	80.7	29.5	5.5	75.6	11.8	1	12-4,13-1
FiberMax FM 1621GL	2.7	1.09	81.5	31.6	5.3	72.6	12.1	3	23-1,23-3
PhytoGen PX2E05W3FE	3.5	1.05	81.6	31.3	5.5	72.3	11.5	2	22-1,33-3
TAMULBB 17-4-114N	3.0	1.17	80.7	32.3	5.9	76.3	10.7	2	21-1,23-3
PhytoGen PHY 400 W3FE	2.6	1.11	78.8	31.8	5.9	76.1	11.1	3	13-2,22-1
PhytoGen PX2C14W3FE	2.8	1.06	80.0	30.7	6.4	75.3	12.0	2	13-1,13-2
PhytoGen PHY 332 W3FE	3.0	1.10	80.7	30.8	6.2	73.6	13.0	2	13-1,24-1
Stoneville ST 5600B2XF	3.1	1.08	79.7	30.8	6.6	70.3	14.0	2	24-1
Stoneville ST 5091 B3XF	3.2	1.11	80.7	28.8	5.5	76.5	11.2	2	12-1,12-2
TAMULBB 17-4-122N	3.3	1.13	80.4	30.8	5.7	80.2	9.3	3	11-2,21-1
PhytoGen PX3E33W3FE	2.7	1.07	79.0	30.0	6.0	72.6	13.1	1	13-3,13-4
PhytoGen PX2D18W3FE	2.9	1.09	79.8	32.1	5.5	74.6	11.9	2	13-1,23-1
Seed Source SSG UA 222	2.8	1.16	80.8	33.2	6.7	74.6	11.2	3	22-1,23-3
PhytoGen PX5E34W3FE	2.6	1.10	79.8	31.7	6.1	75.0	12.3	2	31-1,31-3
PhytoGen PX5E28W3FE	2.5	1.10	81.1	32.6	6.1	75.4	11.8	2	31-1,31-2
FiberMax FM 2202GL	2.9	1.08	81.8	34.4	5.9	72.4	12.0	3	23-1,23-4
TAMULBB 18-4-107N	2.9	1.09	79.9	30.0	5.3	69.5	12.9	3	23-1,24-4
FiberMax FM 1730GLTP	3.1	1.14	82.0	33.1	5.3	78.1	10.0	2	21-1,22-1

Table 3A (continued). Fiber quality data from the irrigated nematode cotton variety performance test at the AG-CARES farm, Lamesa, 2020.

Designation	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf	Color Grade
TAMULBB 19-8-115/215	3.4	1.13	81.5	33.0	5.5	75.6	11.2	1	12-1,23-1
Stoneville ST 4993B3XF	3.4	1.09	81.9	32.3	6.2	75.9	11.7	1	12-1,13-4
Deltapine DP 2143 NR B3XF	3.5	1.14	80.9	32.3	5.7	72.5	13.5	3	13-3,24-1
DynaGro DGX 20127B3XF	3.0	1.08	80.4	28.6	6.1	74.4	13.2	1	13-1,24-1
TAMULBB 18-4-213N	2.9	1.13	82.9	34.5	6.4	72.1	12.3	2	23-1,23-3
Deltapine DP 2141 NR B3XF	3.0	1.12	80.7	30.4	5.7	72.0	13.5	2	13-3,24-1
BASF BX 2192B3XF	2.9	1.14	81.7	32.2	5.5	73.9	11.8	3	13-1,23-3
PhytoGen PHY 500 W3FE	2.8	1.06	79.2	30.2	5.7	71.5	13.5	2	13-4,24-1
Mean	3.0	1.10	80.7	31.4	5.9	74.1	12.1	2	
c.v.%	7.8	2.1	1.2	4.0	2.6	2.9	7.2	37.1	
LSD 0.05	0.4	0.04	1.7	2.1	0.3	3.6	1.5	1	

TITLE:

Nematicide Treatments Compared in 2020 at AG-CARES, Lamesa, TX, 2020

AUTHORS:

Terry Wheeler – Professor
Cecil Haralson – Farm Manager
Jay Hodge, Robert Ballesteros, and Daniel Campos – Technicians

MATERIALS AND METHODS:

A trial to compare different nematode control options including a chemical seed treatment (Copeo®), and biological seed treatment (BIOST® Nematicide), two liquid infurrow nematicides (Velum Prime and Propulse), and combinations of seed treatment and liquid infurrows (Copeo+Velum Prime and Copeo+Propulse) and infurrow plus post-emergence application (Velum Prime + Vydate CLV). Data collected included plant stand, root galls from root-knot nematode, root-knot nematode eggs+second-stage juveniles (RK), and cotton lint yield.

RESULTS:

Plots that received Propulse had lower plant stands than plots that received Velum, Copeo, Velum + Copeo, or Velum + Vydate (Table 1). Root galling and root-knot nematode density (RK) were not significantly different between chemical treatments (Table 1). The highest lint yields were associated with Velum applied in the furrow and Copeo seed treatment. The lowest yields were associated with Propulse (13.6 oz/acre), either alone or combined with Copeo. There was a heavy rain that occurred the day after planting, and that may have triggered phytotoxicity with Propulse that led to the poorer stands. The rain also probably caused the low plant stands overall.

Table 1. Impact of nematicide seed treatments, liquid infurrows, and post-emergence application on cotton stand, root-knot nematode density, and cotton yield in 2020.

Treatment	Plants/ Ft row	Galls/ root	RK/500 cm^3 soil	Lint yield (lbs/acre)
No nematicide	0.74 bcd[1]	1.8	60	606 a
BIOST Nematicide	0.59 cd	2.3	50	567 ab
Copeo	1.01 ab	2.5	295	626 a
Propulse (10 oz/a)	0.19 e	1.1	0	481 ab
Propulse (13.6 oz/a)	0.19 e	3.3	120	377 c
Velum Prime (6.5 oz/a)	0.80 abc	3.4	360	629 a
Copeo+Propulse (13.6 oz/a)	0.40 de	2.5	180	438 bc
Copeo+Velum Prime (6.5 oz/a)	1.15 a	1.9	0	603 a
Velum Prime (6.5 oz/a)+Vydate CLV (17 oz/a)	0.86 abc	1.2	30	590 a

[1]Treatments with the same letter are not significantly different at P=0.05.

TITLE:

Effect of Valor and Zidua herbicides applied preplant on cotton growth at AG-CARES, Lamesa, TX, 2020.

AUTHORS:

Wayne Keeling – Professor
Justin Spradley and Ray White – Research Assistants

MATERIALS AND METHODS:

Plot Size:	4 rows by 30 feet, 4 replications	
Planting Date:	May 17	
Varieties:	DP 1845 B3XF	
Application Dates:	April 15 15 GPA TT 11002	April 29 15 GPA TT 11002
Fertilizer:	120-0-0	
Irrigation:	LEPA	

	Base
Preplant	3.9”
In Season	5.1”
Total	9.0”

RESULTS AND DISCUSSION:

Zidua and Valor herbicides were evaluated alone or tank-mixed and applied 30 and 15 days before (DBP). Cotton was planted on May 17 in no-till wheat stubble. Cotton injury was evaluated at three dates in June and July. When applied 30 DBP, Zidua injured cotton 35-90% rated 4 weeks after planting (Table 1). Less than 3% injury was observed with Valor at the 2 oz/A (typical rate) but increased to 27% when applied at 4 oz/A. Zidua and Valor tank-mixed injured cotton 42-55% at this evaluation date. Injury levels declined as the season progressed but ranged from 27-82% at the last evaluation date. Treatments applied 15 DBP had greater injury levels compared to 30 DBP applications. These results indicate that Valor applied 30 DBP at 2 oz/A is a safe treatment. Zidua does not appear to have sufficient cotton safety to apply preplant but can be used postemergence.

Table 1. Cotton crop injury from Zidua and Valor alone and in combinations applied 15 and 30 days before planting in 2020 at Lamesa, TX.

Cotton Injury					
Timing	**Treatment**	**Rate (oz/A)**	**6/12/20**	**6/24/20**	**7/10/20**
			--------------- % Injury ---------------		
30 Days Before Planting	Untreated		0 i	0 f	0 e
	Zidua SC	1.75	35 fg	26 de	28 d
	Zidua SC	3.5	70 bc	68 bc	44 bc
	Zidua SC	7	90 a	90 a	83 a
	Valor SX	2	3 i	0 f	0 e
	Valor SX	4	28 gh	11 ef	6 e
	Zidua SC Valor SX	1.75 2	43 ef	39 d	30 cd
	Zidua SC Valor SX	3.5 4	55 de	60 c	50 b
15 Days Before Planting	Zidua SC	1.75	65 cd	64 c	36 bcd
	Zidua SC	3.5	80 ab	74 abc	75 a
	Zidua SC	7	93 a	91 a	74 a
	Valor SX	2	13 hi	6 f	3 e
	Valor SX	4	24 gh	15 ef	10 e
	Zidua SC Valor SX	1.75 2	71 bc	61 c	43 bcd
	Zidua SC Valor SX	3.5 4	86 a	84 ab	76 a
	LSD P=.05		14.48	17.63	15.16
	Standard Deviation		10.14	12.35	10.62
	CV		19.98	26.59	28.64

	January			February		
Day	Max Temp	Min Temp	Precipitation	Max Temp	Min Temp	Precipitation
1	51	26	-	70	26	-
2	59	28	-	73	33	-
3	56	30	-	73	38	0.01
4	65	24	-	57	24	-
5	66	26	-	31	6	0.02
6	61	24	-	46	0	-
7	62	19	-	51	29	-
8	63	27	-	62	32	-
9	72	38	-	69	46	-
10	65	38	-	47	35	0.02
11	52	20	0.01	35	32	0.04
12	63	28	-	52	29	-
13	73	26	-	45	27	-
14	77	27	-	45	28	-
15	66	36	-	70	31	-
16	46	31	0.02	60	33	-
17	60	32	0.53	80	41	-
18	51	32	-	52	38	-
19	50	27	-	49	30	-
20	54	25	-	43	31	-
21	52	38	0.07	49	19	-
22	64	36	-	63	39	-
23	57	34	-	68	42	-
24	61	26	-	73	33	-
25	71	31	-	52	27	-
26	70	34	-	48	22	-
27	72	36	-	67	18	-
28	53	30	-	71	30	-
29	55	22	-	75	39	-
30	48	30	-			
31	55	26	-			

	March			April		
Day	Max Temp	Min Temp	Precipitation	Max Temp	Min Temp	Precipitation
1	72	38	-	75	54	-
2	71	47	-	87	53	-
3	61	46	0.26	60	36	-
4	49	37	1.02	53	39	-
5	63	33	0.01	64	45	-
6	65	36	-	71	58	0.01
7	71	41	-	87	53	-
8	62	52	-	89	48	-
9	73	49	-	74	51	-
10	77	45	-	74	43	0.28
11	80	50	-	81	52	-
12	75	52	0.01	75	41	-
13	58	46	0.33	56	32	-
14	69	47	0.01	55	35	-
15	50	44	0.29	71	39	-
16	58	43	0.01	84	43	-
17	72	52	0.18	63	39	-
18	75	50	0.02	72	38	-
19	70	53	-	83	53	-
20	54	37	-	86	47	-
21	42	37	0.01	90	54	-
22	71	41	0.01	84	57	-
23	81	44	-	87	45	-
24	77	47	-	86	49	-
25	90	44	-	79	47	-
26	93	52	-	87	48	-
27	80	57	-	94	64	-
28	68	42	-	101	66	-
29	72	37	-	82	52	-
30	80	51	-	92	47	-
31	76	40	-			

	May			June		
Day	Max Temp	Min Temp	Precipitation	Max Temp	Min Temp	Precipitation
1	104	66	-	88	64	-
2	102	60	-	91	63	-
3	101	58	-	97	65	-
4	102	63	-	100	66	-
5	78	61	-	101	71	-
6	86	58	-	97	71	-
7	101	61	-	99	70	-
8	75	49	-	106	69	-
9	81	45	-	89	63	-
10	80	54	-	92	50	-
11	82	55	0.01	95	63	-
12	90	57	-	96	61	-
13	86	62	0.06	95	71	-
14	96	57	-	95	65	-
15	97	60	0.53	92	62	-
16	81	58	-	93	69	-
17	87	58	-	99	71	0.20
18	102	65	-	99	71	-
19	107	63	-	95	70	0.03
20	100	66	-	94	63	-
21	97	63	-	104	71	-
22	97	60	-	103	76	-
23	93	63	0.07	89	67	0.04
24	94	62	0.03	95	65	-
25	74	56	-	97	66	-
26	84	48	-	98	72	-
27	96	57	-	98	72	-
28	87	62	-	102	75	-
29	89	56	-	103	79	-
30	91	60	-	104	75	-
31	89	59	-			

	July			August		
Day	Max Temp	Min Temp	Precipitation	Max Temp	Min Temp	Precipitation
1	105	76	-	98	67	-
2	95	72	0.22	99	74	-
3	99	70	-	89	68	-
4	100	71	-	99	74	-
5	98	67	0.66	103	76	-
6	91	70	0.01	103	76	-
7	96	70	-	100	76	-
8	101	70	-	99	72	-
9	106	79	-	100	74	0.03
10	105	76	-	100	74	-
11	108	72	-	102	76	-
12	107	77	-	105	78	-
13	109	73	-	107	70	0.17
14	109	78	-	108	73	-
15	107	81	-	106	79	-
16	101	74	-	93	73	-
17	100	81	-	94	71	0.33
18	86	78	-	98	66	-
19	97	77	-	99	66	-
20	92	75	-	97	72	-
21	80	73	0.07	98	67	-
22	88	71	0.01	99	70	-
23	96	71	-	98	70	-
24	92	72	-	95	66	-
25	95	76	-	96	64	-
26	95	72	-	99	67	-
27	95	73	-	99	68	-
28	99	77	0.01	104	84	-
29	101	75	0.21	102	71	-
30	98	73	-	103	69	-
31	91	71	-	93	75	-

	September			October		
Day	Max Temp	Min Temp	Precipitation	Max Temp	Min Temp	Precipitation
1	98	71	0.42	82	53	-
2	90	68	-	85	55	-
3	96	65	-	91	61	-
4	94	65	-	81	55	-
5	91	64	-	94	54	-
6	93	67	-	93	55	-
7	96	69	-	93	50	-
8	93	52	-	88	51	-
9	50	45	0.03	92	55	-
10	55	45	-	100	52	-
11	78	54	-	97	57	-
12	86	55	-	80	56	-
13	80	64	0.17	92	45	-
14	83	62	-	99	57	-
15	85	64	-	73	52	-
16	89	61	-	69	44	-
17	85	64	0.33	91	51	-
18	83	58	-	79	48	-
19	81	55	-	71	41	-
20	83	54	-	89	48	-
21	84	51	-	87	60	-
22	87	51	-	89	60	-
23	87	62	-	70	47	-
24	96	55	-	72	36	-
25	95	55	-	76	39	-
26	100	64	-	38	26	-
27	100	62	-	30	24	0.09
28	73	47	-	41	30	0.04
29	83	40	-	61	38	-
30	91	45	-	68	33	-
31				82	40	-

	November			December		
Day	Max Temp	Min Temp	Precipitation	Max Temp	Min Temp	Precipitation
1	72	44	-	66	27	-
2	74	42	-	41	28	-
3	78	43	-	46	25	-
4	87	47	-	58	17	-
5	86	47	-	51	24	-
6	80	42	-	64	32	-
7	75	47	-	69	28	-
8	82	54	-	73	30	-
9	84	60	-	75	28	-
10	67	41	-	78	29	0.09
11	73	34	-	62	37	0.01
12	77	37	-	52	27	-
13	54	45	-	44	23	-
14	81	51	-	50	15	-
15	63	30	-	46	24	-
16	81	31	-	58	15	-
17	73	38	-	61	18	-
18	75	43	-	61	35	-
19	82	45	-	59	29	-
20	77	43	-	62	30	-
21	72	48	-	69	27	-
22	56	46	-	72	24	-
23	62	43	-	52	31	-
24	74	41	-	57	18	-
25	65	30	-	64	26	-
26	78	34	-	67	26	-
27	56	41	-	72	29	-
28	51	36	0.11	52	37	-
29	53	30	0.11	70	46	0.30
30	54	21	-	50	34	0.12
31				35	28	-